

## GMPI and EPI Manual Codes

Derwent World Patents Index | Edition 26





# Derwent World Patents Index (DWPI)

GMPI and EPI Manual Codes

#### Edition 26

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### **Contents**

INTRODUCTION	6
PART 1: GENERAL AND MECHANICAL PATENTS INDEX (GMPI) & ELECTRICAL F	
SECTION P: GENERAL	
P1: AGRICULTURE, FOOD, TOBACCO	14
P11: Soil Working; Planting	14
P12: Harvesting	
P13: Plant culture; Dairy products	
P14: Animal Management and Care	
P15: Tobacco	24
P2: PERSONAL, DOMESTIC	25
P21: Wearing Apparel	25
P22: Footwear	
P23: Haberdashery and Jewellery	
P24: Hand and Travelling Articles; Brushes	
P25: Office and Home Furniture	32
P26: Chairs, Sofas and Beds	34
P27: Shops and Household Furnishing	36
P28: Kitchen and Sanitary Equipment	
P31: Diagnosis, surgery	
P32: Dentistry, bandages, veterinary, prosthesis	
P33: Medical aids, oral administration	
P34: Sterilizing, syringes	
P35: Life-saving, safety, firefighting, fire extinguishing and fire prevention	
P36: Sports, games, toys, amusements	
P4: SEPARATING, MIXING	50
P41: Crushing, centrifuging, separating solids, sorting	50
P42: Spraying, atomizing, coating, surface treatment and liquid application	56
P43: Generating and using mechanical vibrations, cleaning, waste disposal	60
P5: SHAPING METALS	63
P51: Metal Rolling, Drawing, Extruding	63
P52: Metal Punching, Working and Forging	
P53: Metal Casting and Powder Metallurgy	
P54: Metal milling and other machining	
P55: Welding and Soldering	
P56: Machine Tools: Post-treatment for metal working	

P6: SHAPING NON-METALS	76
P61: Grinding and polishing of non-metals	76
P62: Hand tools, cutting	
P63: Working, preserving wood	82
P64: Working cement, clay, stone	
P7: PRESSING, PRINTING	86
P71: Presses	86
P72: Working Paper	89
P73: Layered Products	91
P74: Printing and lining machines	92
P75: Typewriters, stamps, duplicators	
P76: Books, special printed matter	
P77: Writing, drawing appliances; Bureau /desk accessories	
P78: Decorative art	
P8: OPTICS, PHOTOGRAPHY, GENERAL	
P81: Optics	101
P82: Photographic apparatus	
P83: Photographic processes/compositions	
P84: Other photographic	
P85: Educational, cryptographic or advertising apparatus or systems	
P86: Musical instruments, acoustics	111
SECTION Q: MECHANICAL	114
Q1 VEHICLES IN GENERAL	116
Q11: Wheels, Tyres, Connections	116
Q12: Suspension	
Q13: Powertrain/transmission, systems and their control	
Q14: Vehicle Accessories	
Q15: Transporting Special Loads	
Q16: Vehicle servicing, maintenance, cleaning equipment, Vehicle design	
Q17: Vehicle construction, Fittings, Propulsion arrangements	
Q18: Brake systems; Steering systems; Control	
Q19: Vehicle applications	
Q2 SPECIAL VEHICLES	137
Q21: Railways	
Q22: Hand/Foot/Animal Drawn Vehicles	
Q24: Ship; Waterborne Vessels; Related Equipment	
Q25: Aircraft; Aviation; Cosmonautics	
Q23. Aircraft, Aviation, Cosmonautics	130

Q3 CONVEYING, PACKAGING, STORING	156
Q31: Packaging processes and equipment	156
Q32: Container/Closure Types, Special packaging features and Transit packaging	
Q33: Packaging container and closure materials	
Q34: Types of goods packaged, bottled, bound, labelled, unpacked	164
Q35: Refuse Collection; Conveyors	168
Q36: Handling Thin Materials	169
Q37: Container Traffic (Pre-1984 Only)	169
Q38: Hoisting; Lifting; Hauling; Trucks	170
Q4: BUILDINGS; CONSTRUCTION	171
Q41: Road, rail, bridge construction	171
Q42: Hydraulic engineering, soil shifting and sewerage	173
Q43: General building constructions	175
Q44: Structural elements	
Q45: Roofing, stairs, floors	177
Q46: Building aids, special structures, ladders	
Q47: Locks, window and door fittings	
Q48: Blinds, shutters, doors and windows	
Q49: Mining	182
Q5 ENGINES, PUMPS, COMPRESSORS, FLUID PRESSURE ACTUATORS	184
Q51: Internal Combustion Engines; Reciprocating Engines; Rotary Engines	184
Q52: Reaction Engines; External Combustion; Gas Turbines; Rockets	189
Q53: Positive Displacement Fluid Engines (i.e. driven by fluid)	
Q54: Non-positive Displacement Fluid Engines (i.e. driven by fluid); Miscellaneou	
and Machines for Producing Mechanical Power/Thrust	
Q55: Positive Displacement Fluid Machines/Pumps/Compressors (i.e. for driving	
Q56: Non-positive Displacement Fluid Machines/Pumps/Compression (i.e. for dr	-
OF7. Third Drass are Astronomy Hudraulia/Drass are the in Consequence	
Q57: Fluid Pressure Actuators; Hydraulic/Pneumatics in General	
Q6 ENGINEERING ELEMENTS	196
Q61: Fastening Elements; Connections	
Q62: Shafts and Bearings	
Q63: Couplings; Clutches; Brakes; Springs; Dampers	
Q64: Belts, Chains, Gearing	
Q65: Pistons, Cylinders, Packing, Seals	
Q66: Valves; Taps; Cocks; Vents	
Q67: Pipes; Joints; Fittings	
Q68: Other Engineering Elements	
O69: Storing/Distributing Gas/Liquid	206

Q7: LIGHTING, HEATING	207
Q71: Lighting	207
Q72: Steam generation	
Q73: Combustion apparatus and processes	211
Q74: Heating, ranges and ventilating	
Q75: Refrigeration and Liquefaction	217
Q76: Drying	219
Q77: Furnaces, kilns, ovens, retorts	221
Q78: Heat exchange	223
Q79: Weapons, ammunition, blasting	225
SECTION S: INSTRUMENTATION, MEASURING AND TESTING	230
S01: Electrical Instruments	231
S02: Engineering Instrumentation	240
S03: Scientific Instrumentation	257
S04: Clocks and Timers	
S05: Electrical Medical Equipment	280
S06: Printing and Photography	292
SECTION T: COMPUTING AND CONTROL	312
T01: Digital Computers	313
T02: Analogue and Hybrid Computers	346
T03: Data Recording	
T04: Computer Peripheral Equipment	
T05: Counting, Checking, Vending, ATM and POS Systems	
T06: Process and Machine Control	
T07: Traffic Control Systems	410
SECTION U: SEMICONDUCTORS AND ELECTRONIC CIRCUITRY	415
U11: Semiconductor Materials and Processes	
U12: Discrete Devices	
U13: Integrated Circuits	
U14: Memories, Film and Hybrid Circuits	
U21: Logic Circuits, Electronic Switching and Coding	
U22: Pulse Generation and Manipulation	
U23: Oscillation and Modulation	
U24: Amplifier and Low Power Supplies	
U25: Impedance Networks and Tuning	
SECTION V: ELECTRONIC COMPONENTS	516
V01: Resistors and Capacitors	
V02: Inductors and Transformers	
V03: Switches, Relays	
V04: Printed Circuits and Connectors	543

V05: Valves, Discharge Tubes and CRTs	560
V06: Electromechanical Transducers and Small Machines	592
V07: Fiber-Optics and Light Control	610
V08: Lasers and Masers	617
SECTION W: COMMUNICATIONS	620
W01: Telephone and Data Transmission Systems	621
W02: Broadcasting, Radio and Line Transmission Systems	
W03: TV and Broadcast Radio Receivers	719
W04: Audio/Visual Recording and Systems	749
W05: Alarms, Signalling, Telemetry and Telecontrol	796
W06: Aviation, Marine and Radar Systems	820
W07: Electrical Military Equipment and Weapons	836
SECTION X: ELECTRIC POWER ENGINEERING	840
X11: Power Generation and High Power Machines	841
X12: Power Distribution / Components / Converters	847
X13: Switchgear, Protection, Electric Drives	863
X14: Nuclear Power Generation	879
X16: Electrochemical Storage	888
X21: Electric Vehicles	896
X22: Automotive Electrics	
X23: Electric Railways and Signalling	926
X24: Electric Welding	
X25: Industrial Electric Equipment	
X26: Lighting	952
X27: Domestic Electrical Appliances	960
PART 2: SUBJECT INDEX AND APPENDICES	971
Subject Index	972
Appendices	1289
Appendix 1: EPI Subject Matter Coverage	1290
Appendix 2: EPI Manual Coding Criteria	1292
Appendix 3: IPC to EPI Manual Code Approximate Concordance	1294
Appendix 4: Concise Guide to EPI and Mechanical Classification	1350
Appendix 5: Nanotechnology	1369
Appendix 6: Green technology	1373
Appendix 7: Internet of Things	
Appendix 8: Digital Health	1383

#### **GMPI and EPI MANUAL CODES**

#### Introduction

This User Manual is intended to assist users of the General and Mechanical Patents Index (GMPI) and Electrical Patents Index (EPI) Service in making the best use of the classification and indexing (Manual Coding) scheme which Clarivate applies to all patents covered.

#### **Background**

Clarivate coverage of Engineering patents is divided into two main areas: the Electrical Patents Index (EPI) and the General and Mechanical Patents Index (GMPI).

EPI was introduced in 1980 (Update 198018), to provide an improved patent information alerting service for users whose interests lie in the electrical field. Coverage is arranged in six sections (S-X), each dealing with a fairly broad range of subject matter. Within these sections are the EPI classes, 50 in total, which provide a more precise breakdown of material (see Appendix 4 for details). Associated with each class is a set of Manual Codes applied by Clarivate technical staff to allow detailed retrieval.

More recently, GMPI has also been developed from its original structure of two sections (P and Q) incorporating 103 classes, to improve its focus on mechanical engineering patents and those of general interest. This involved the introduction of Manual Codes for the mechanical transportation field in 2006, for mechanical packaging in 2012, and for the remaining classes in 2015.

For both EPI and GMPI the codes form a hierarchical indexing system, mainly intended as an online retrieval tool, that is reviewed annually. For example, the EPI manual codes, which were originally based, in part, on the International Patent Classification (IPC), numbered approximately 1,900 when introduced and have been revised yearly with the latest revision (2023) now including over 14,200 active EPI Manual Codes. There are also now over 3,200 active GMPI Manual Codes, with 1,900 of those introduced in the 2015 manual code revision.

The annual Manual Code Revision (MCR) process, carried out in consultation with our customers, is designed to update the coding hierarchy in order to reflect changes in technology, provide finer subject matter breakdown to enable customers to find the information they need with precision and accuracy, and continue to develop an alternative technical viewpoint to that of the IPC.

#### **Format of Manual Codes**

Manual Codes are structured so that an increase in the number of characters represents a finer subject matter breakdown. For the 1992 revision, the permissible maximum length of manual codes was increased to ten characters (including the hyphen), the possible formats being shown below:

ANN Class

ANN-A Generic Manual Code

ANN-ANN Sub-group

ANN-ANNAN Sub-group division
ANN-ANNAN Full Manual Code
ANN-ANNANA (9 or 10 digits)

The class to which a Manual Code belongs is indicated by the characters preceding the hyphen, thus the codes are always sub-divisions of their related Class. It should be noted that leading zeros are used to preserve the correct hierarchy. The shortest possible Manual Code is thus of five characters length (e.g. S01-A).

#### **Criteria for Assigning Manual Codes**

Manual Codes are intended to highlight the novel aspects of an invention and are therefore normally assigned according to the claimed novelty. In addition, depending on either the electrical content of the invention itself, or its intended use, codes are applied to indicate the application of an invention. (For a fuller explanation of these criteria see Appendix 2).

It should be noted that Manual Codes are frequently used in combination to represent a particular topic, so that some subjects may be routinely assigned two or three Manual Codes.

#### **Documents Assigned Manual Codes**

Manual Codes are currently assigned to all Basic patents in EPI. Prior to Update 199510, EPI classes were assigned to title-only entries, except those for Chinese and Japanese patents, which were fully coded.

#### **Transportation Codes**

Mechanical transportation Q11-Q25 codes are applied to all patent documents from 200601 and are applied to highlight mechanical application or patents with mechanical novelty.

The Q codes are designed to be used in conjunction with one another in the same way as the electrical manual codes are assigned, and they may also be applied in conjunction with the electrical manual codes when appropriate.

Q11-Q25 codes are applied to cover the core transportation areas such as vehicles in general, trains, ships and aircraft.

From 200601-201582 mechanical Q codes are applied in two other areas: namely, Q5 (Engines; pumps; compressors, fluid pressure actuators) and Q6 (Engineering elements), either when:

- (i) The patent is in a transportation technology (indicated by the presence of the Q11-Q25 class) and the Q5 and Q6 code provides a more detailed breakdown of the patent novelty than any of the Q11-Q25 codes applied; or
- (ii) The patent has an unspecified application, though one that could be of use in the transportation field, e.g. a novel piston for an internal combustion engine of unspecified application.

#### **Packaging Codes**

Mechanical packaging Q3\* codes are applied to all patent documents from 201201 and are applied to highlight mechanical application or patents with mechanical novelty. The Q3\* codes are designed to be used in conjunction with one another in the same way as the electrical manual codes are assigned, and they may also be applied in conjunction with the electrical manual codes when appropriate.

#### **General and Mechanical Codes**

From 201501 DWPI Manual Codes are applied to all P\* classes and to Q41-Q49, Q71-Q79 classes.

From 201601 DWPI Manual Codes are assigned to all P\* and Q\* classes including Q5\* and Q6\* classes irrespective of technology area, so that from 201601 all Engineering P-X classes must have corresponding manual codes.

#### **Layout of the Manual**

The manual is arranged in two sections:

#### Part 1

Codes in the eight sections P, Q, S-X are listed in alphanumeric order with details including the code definition, scope notes and associated search terms. For codes introduced post-1980 the year of introduction is indicated.

An annotated example of a typical entry in the manual is shown below:

Manual Code  Additional search terms	X25-A08  3D printing / additive m Details of 3D scanners are of See also X25-A06 for electric plastics.  3D replicator, rapid prototype fabrication, SFF, 3D modell.	coded under T04-M05. ical aspects of working ning, solid freeform	Year of code introduction	
Code Title	X25-A08A 3D printing / additive m methods X25-A08B	[2016] anufacturing [2016]		
Expanded details and scope notes	3D printing / additive manufacturing apparatus  Computer control details of 3D printing / additive manufacturing machines are coded under T01- J07B3. For details of 3D scanners see T04-M05. For ink-jet printhead details see S06-G03.  Extruder			

#### Part 2

This comprises an overall keyword index to Part 1 of the manual, with 8 appendices as follows:

- 1 Brief Summary of EPI Subject Matter Coverage
- 2 Subject Index highlighting EPI Manual Coding Criteria
- 3 IPC EPI Manual Code Approximate Concordance
- 4 Concise Guide to EPI and Mechanical Transportation Classification
- 5 Nanotechnology: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Nanotechnology industries
- 6 Green Technology: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Green technology
- 7 Internet-of-Things: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Internet-of-Things (IoT) technology
- 8 Digital Health: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Digital Health

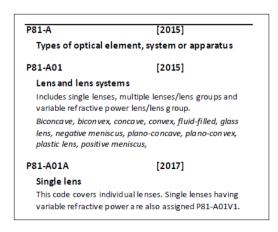
#### **Code Heading and Definition**

In this new edition, many of the code descriptors have been re-worded and expanded to include details on how the code is applied and to provide references to other Manual Codes which might be of interest to the searcher for retrieval purposes.

#### Additional Search Terms

Additional terms immediately follow most code definitions. These comprise individual terms or groups of terms which might assist users in devising search strategies. The terms have been derived intellectually by Clarivate coders aided by online searches to determine the most frequently occurring terms in titles of records to which the code has been assigned.

In order to enhance retrieval, the searcher may also wish to use terms of interest in the code title definition itself and in the accompanying scope notes. In addition, terms appearing against higher level codes in the hierarchy may be employed, e.g.



In this example, users interested in stators for optical lenses (P81-A01A) should consider terms of interest (e.g. plano-convex) under the broader code P81-A01, where terms equally applicable to both sub-divisions are listed.

It should be stressed that the lists of search terms are not comprehensive and users may find it necessary to use additional terms.

#### **Year of Introduction**

The year of implementation of codes added after the initial introduction of EPI in 1980 is indicated in parentheses immediately alongside the code, e.g. [1987], indicates the code was introduced from the start of 1987. If such a code is not a subdivision of an existing code, then the code to be searched in order to retrieve earlier records is given in parentheses following the code heading. If no year is shown alongside a code, this indicates the code was applied from the start of EPI, i.e. Update 198018.

In a few cases, revision of the Manual Codes has resulted in a particular code or code group being discontinued. These codes, which are indicated in the manual by an asterisk (\*) following the code, remain valid for records prior to the year of revision.

#### **Keyword Index**

Part 2 of the GMPI & EPI Manual comprises an alphabetical index of the key terms appearing in the definition and associated with each Manual Code, together with the corresponding code. This index is used to guide the user to the correct code(s) in Part 1 of the manual, where in order to ensure correct retrieval the user should always consult the full definition for the code including any scope notes. To avoid ambiguity, the terms appearing in the index are mainly derived from the code definition and only a few of the additional search terms are indexed.

#### **IPC - Manual Code Relationship**

An IPC-to-Manual Code concordance at generic Manual Code level is provided at the end of this manual under Appendix 3. It should be noted that the concordance cannot be guaranteed and since the codes are intellectually applied, other codes may be assigned as appropriate according to the technical content of the patent.

#### **Online Searching of Manual Codes**

All Manual Codes are searchable in the Derwent World Patents Index online files.

Retrieval may be enhanced, depending on the scope of a Manual Code and the desired search, by combining it with other search terms, such as title/abstract words, title terms, IPCs, patentee names etc. These terms may be used to restrict the Manual Code to items of particular interest or to ensure full retrieval by defining the subject matter by use of other terms in addition to the Manual Codes. For additional information on online searching, please consult the relevant Clarivate Online User Guides for each of the hosts.

# PART 1: General and Mechanical Patents Index (GMPI) & Electrical Patents Index (EPI)

### **Section P: General**

INTRODUCTION	6
PART 1: GENERAL AND MECHANICAL PATENTS INDEX (GMPI) & ELECTRICAL P	
SECTION P: GENERAL	
P1: AGRICULTURE, FOOD, TOBACCO	14
P11: Soil Working; Planting	
P12: Harvesting	
P13: Plant culture; Dairy products	
P14: Animal Management and Care	
P15: Tobacco	24
P2: PERSONAL, DOMESTIC	25
P21: Wearing Apparel	25
P22: Footwear	
P23: Haberdashery and Jewellery	28
P24: Hand and Travelling Articles; Brushes	
P25: Office and Home Furniture	
P26: Chairs, Sofas and Beds	
P27: Shops and Household Furnishing	
P28: Kitchen and Sanitary Equipment	
P32: Dentistry, bandages, veterinary, prosthesis	
P33: Medical aids, oral administration	
P34: Sterilizing, syringes	
P35: Life-saving, safety, firefighting, fire extinguishing and fire prevention	43
P36: Sports, games, toys, amusements	47
P4: SEPARATING, MIXING	50
P41: Crushing, centrifuging, separating solids, sorting	50
P42: Spraying, atomizing, coating, surface treatment and liquid application	56
P43: Generating and using mechanical vibrations, cleaning, waste disposal	60
P5: SHAPING METALS	63
P51: Metal Rolling, Drawing, Extruding	63
P52: Metal Punching, Working and Forging	
P53: Metal Casting and Powder Metallurgy	
P54: Metal milling and other machining	
P55: Welding and Soldering	
P56: Machine Tools; Post-treatment for metal working	/4

P6: SHAPING NON-METALS	76
P61: Grinding and polishing of non-metals	76
P62: Hand tools, cutting	
P63: Working, preserving wood	82
P64: Working cement, clay, stone	84
P7: PRESSING, PRINTING	86
P71: Presses	86
P72: Working Paper	89
P73: Layered Products	91
P74: Printing and lining machines	92
P75: Typewriters, stamps, duplicators	94
P76: Books, special printed matter	95
P77: Writing, drawing appliances; Bureau /desk accessories	97
P78: Decorative art	99
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P81: Optics	101
P82: Photographic apparatus	
P83: Photographic processes/compositions	106
P84: Other photographic	
P85: Educational, cryptographic or advertising apparatus or systems	
P86: Musical instruments, acoustics	

#### P1: Agriculture, Food, Tobacco

#### P11: Soil Working; Planting

Electrical details are coded under X25-N01. From 2015, manual codes have been assigned for all mechanical details of soil working and planting.

P11-A [2015]

Soil working (mechanical)

P11-A01 [2015]

#### Soil working using hand tools

Covers spades, shovels, hoes, rakes, etc. *Rake* 

P11-A02 [2015]

#### Soil working using ploughs

Includes man-driven ploughs, animal-driven ploughs, tractor-driven ploughs and self-driven ploughs. Also includes ploughs with rotary driven tools.

P11-A03 [2015]

#### Soil working using harrows

For the use of harrows in all soil working.

P11-A04 [2015]

#### Raking

Gatherers for removing stones, undesirable roots or the like from the soil, e.g. tractor-drawn rakes.

P11-A05 [2015]

#### Tilling

Includes soil preparations such as stirring and overturning of soil.

Tillage

P11-A06 [2015]

#### Making, covering furrows

Includes the formation of furrows by digging or dragging soil or any other process. Also involves any process for covering furrows.

P11-A99 [2015]

#### Other types of soil working

Includes aerating, thinning, loosening soil, etc. Also covers soil working using rollers, drags, etc.

Crumbler roller

P11-B [2015]

Treating and fertilizing soil

P11-B01 [2015]

#### Fertilizing soil

Includes application of fertilizers, manuring, using dung distributors, etc.

P11-B02 [2015]

#### Other fertilizer related topics

Includes other fertilizer related topics like dung storage, aerating etc.

P11-B03 [2015]

#### Treatment of soil with agricultural actives

Includes e.g. in-furrow treatment of fungicides, herbicides, insecticides, plant-growth-regulators, etc.

P11-B04 [2015]

### Treatment of soil with other types of chemicals/gases/additives

Includes soil treatment with all other types of chemicals or additives, e.g. soil conditioning agents e.g. for increasing water retention of soils, or sterilizing soil by steam. Also includes stone powders.

P11-B05 [2015]

#### **Covering soil**

Includes covering soil by agricultural foils or mulch.

P11-B99 [2015]

Other types of agricultural processes for soil treatment

P11-C [2015]

**Planting and sowing** 

P11-C01 [2015]

#### **Treatment of seeds**

Includes coating / dressing seed, immunizing seed prior to planting.

P11-C02 [2015]

#### **Germination of seeds**

Includes germination of seeds and all testing or monitoring aspects of seeds before or during germination.

#### P11-C03 [2015]

#### Sowing and handling of seeds

Includes apparatus or methods for sowing/distribution of seeds and any other handling of seeds.

Seed sowing, seed handling

#### P11-C03A [2016]

#### Sowing

Includes sowing/distribution of seeds in earth or substrate.

Sowing

#### P11-C03B [2016]

#### Seed handling

Includes seed or seedling transfer apparatus or method.

Seed handling

#### P11-C04 [2015]

#### **Planting**

Includes methods/tools for planting seedlings/plants (including trees).

#### P11-C99 [2015]

### Other types of agricultural processes around sowing/planting

#### P11-E [2015]

#### Types of crop produced

Codes in this section are used only in combination with appropriate codes in P11-A to P11-C sections.

P11-E01 [2015]

Fruits and nuts

P11-E02 [2015]

#### Vegetables and pulse crops

Including vegetables, legumes, beans, sugar beet, etc.

P11-E03 [2015]

#### **Cereals and grasses**

Includes sugar cane, bamboo, rice, turf, lawn, etc.

P11-E04 [2015]

#### Oil seeds and oil fruits

Including e.g. rape, sunflower, olives, palm fruits, etc.

P11-E05 [2015]

#### Fiber plants

Including e.g. cotton, flax, sisal, etc.

P11-E06 [2015]

#### Tea, coffee and herbs

Including also hops, spices.

P11-E07 [2015]

Mushroom/Fungi

P11-E08 [2015]

**Flowers** 

P11-E09 [2023]

Latex, resin, sap, syrup

Natural rubber, maple syrup

P11-E99 [2015]

Other types of crops

#### P11-G [2015]

### Cleaning, maintenance/repair of soil working and planting systems

Includes sharpening of blades, etc.

#### P11-T [2015]

### Constructional details of soil working machines, tools

These codes can be used in conjunction with other P11 codes to highlight the tool, e.g. blades for harrows are coded under P11-A03 and P11-T01.

P11-T01 [2015]

#### Blades, teeth, discs

Sharpening of teeth and blades are also coded under P11-G.

P11-T02 [2015]

#### Frame, beam, handle

Frames, beams, handles of equipment or tools for soil treating are coded here.

P11-T03 [2015]

Lifting or adjusting arrangements for agricultural machines or implements

#### P11-T04 [2015]

### Tractor or other driven soil working vehicle construction

Include parts and accessories to tractors for the purpose of soil working, e.g. coupling devices between tractor and machine/tool device.

#### P11-T99 [2015]

### Other constructional details of soil working machines or tools

Includes devices specially adapted for connection between animals or tractors and agricultural machines or implements.

#### P12: Harvesting

Includes all stages of harvesting, instruments and machinery used, types of produce harvested. From 2015, manual codes have been assigned for all mechanical details of harvesting.

P12-A [2015]

Types of instruments and machinery for harvesting

P12-A01 [2015]

#### Hand instruments for harvesting

Includes all hand-cutting tools, such as scythes, rakes, forks, etc.

Sickles, knives, taps, augers

P12-A02 [2015]

#### Machines for harvesting; mowing

Includes digging machines, topping machines, mowers, lifters, and harvesters or mowers combined with threshing devices, or with apparatus performing additional operations while cutting, e.g. with haymakers or dispensing apparatus for e.g. fertilisers, herbicides etc. Also includes equipment for binding, packing or storing harvested produce.

Potato ploughs, grain crop lifters, combine harvester/mower, packers, knotters, needles, discharge arms, containers, sheaf counters, outside dividers

P12-E [2015]

Types of crop harvested

P12-E01 [2015]

Fruits and nuts

P12-E02 [2015]

#### Vegetables and pulse crops

Including vegetables, legumes, beans, sugar beet, etc.

P12-E03 [2015]

#### **Cereals and grasses**

Includes sugar cane, bamboo, rice, turf, lawn, etc.

P12-E04 [2015]

#### Oil seeds and oil fruits

Including e.g. rape, sunflower, olives, palm fruits, etc.

P12-E05 [2015]

#### **Fiber plants**

Including e.g. cotton, flax, sisal, etc.

P12-E06 [2015]

Tea, coffee and herbs

Including also hops, spices.

P12-E07 [2015]

Mushroom/Fungi

P12-E08 [2015]

**Flowers** 

P12-E09 [2023]

#### Saps and syrups

Includes tapping trunks of rubber, maple, birch, walnut, pine etc. trees for natural rubber, latex, resin, maple syrup or other syrup-like substances. Sapping, resin

P12-E09A [2023]

#### Natural rubbers and latex

Rubber tree

P12-E09B [2023]

#### Syrups

Includes tapping of e.g. acer and birch trees for saps / syrups.

Birch syrup, maple syrup

P12-E99 [2015]

Other types of crops

P12-G [2015]

Cleaning, maintenance/repair of harvesting tools and machines

P12-T [2015]

Constructional details of harvesting tools and machines

P12-T01 [2015]

Conveyors and other delivering mechanisms for harvesting machines

Conveyors, bunchers, standers, reels

P12-T02 [2015]

Sieving and separating mechanisms for harvesting machines

For separating stones or foliage etc.

P12-T03 [2015]

#### Centrifugal wheels, drums, or spinners

Scoop wheels, scoop tines, screening wheels

P12-T04 [2020]

#### **Cutting parts of harvesting machinery**

Includes blades, teeth, knives, cutting and picking mechanism.

P12-T05 [2020]

Handles, frames

P12-T10 [2015]

Safety mechanisms

P12-T15 [2023]

#### **Taps and collectors**

Includes taps and collection buckets used to collect latex, resin and syrup.

Tapping, sapping

P12-T99 [2015]

Other constructional details of harvesting tools or machines

#### P13: Plant culture; Dairy products

Covers horticulture, agriculture, new plants and processes, dairy products, etc.

From 2015, manual codes have been assigned for all mechanical details of plant culture and dairy products.

#### P13-A [2015]

#### Horticulture; Agriculture

Apart from soil working / harvesting (P11/P12).

#### P13-A01 [2015]

#### **Greenhouse cultivation, Cultivation rooms**

P13-A01 is a general code for greenhouses or greenhouse cultivation, used when specific codes below are not applied. P13-A01 is also used when novel greenhouse is claimed as a whole. Electrical details of greenhouses are coded under X25-N01. Also includes cultivation rooms to grow e.g. mushrooms.

#### P13-A01A [2015]

#### Regulation of temperature in greenhouse

Includes heating and cooling of greenhouse. *Heating, cooling* 

#### P13-A01B [2015]

#### Regulation of light in greenhouse

Regulation of light intensity or wavelength, artificial lighting.

#### P13-A01C [2015]

### Regulation of ventilation/gases in greenhouse

Ventilation and controlling gas supply to greenhouses (e.g.  $CO_2$ ).

#### P13-A01D [2015]

#### Regulation of watering in greenhouse

Includes watering methods/installations in greenhouses.

#### P13-A01E [2015]

### Monitoring, measuring, testing methods in greenhouses

Includes methods and apparatus for monitoring greenhouse atmosphere or plant parameters.

#### P13-A01F [2015]

### Other equipment or methods used for green houses

Includes conveyors in greenhouses.

#### P13-A02 [2015]

#### Plant receptacles, supports and barriers

Includes all containers, supports and barriers for plants.

#### P13-A02A [2016]

#### Pots, tubs and trays

Includes all plant containers, including cultivation bags and cultivation bottles.

#### P13-A02B [2016]

#### Trellis, supports and barriers

Includes damage protection barriers, root barriers for containment or protection, tree supports, climbing/growth supports etc.

Tree support, root barrier, trellis

#### P13-A03 [2015]

#### **Forestry**

Includes planting, transplanting, uprooting, felling or delimbing trees. See also P11 class for planting of trees.

#### P13-A04 [2015]

### Methods and apparatus for plant protection

Includes methods for treatment of plants for protection against diseases/insects (e.g. using sprayers) or other dangers; treating plants using gases; generating heat, smoke, or fog in gardens, orchards, or forests. Also includes apparatus e.g. sprayers.

#### P13-A05 [2015]

#### Methods and apparatus for plant feeding

Includes methods for feeding of plants as far as not covered in P11 e.g. methods for foliar treatments e.g. using sprayers. Also includes apparatus, e.g. spreaders or sprayers etc.

#### P13-A06 [2015]

#### Water supply and management

Includes watering gardens, fields, sports grounds, plant pots, etc. Also includes methods or systems for reducing water run-off, evaporation, etc. Includes means of preventing soil erosion due to water. See also Q42-A11 for prevention of soil erosion.

#### P13-A07 [2015]

### Other methods and apparatus for modifying growth of plants

Includes chemical or mechanical methods for modifying growth of plants except for protecting or feeding of plants (covered in P13-A04 and P13-A05 codes). Includes pruning. Also includes any tools or apparatus used for modifying plant growth.

#### P13-A08 [2015]

### Methods and apparatus for monitoring status of crops and fields

Monitoring e.g. disease activity, growth and health of plant, humidity, temperature etc. Also includes any equipment used to monitor growth activity or conditions.

#### P13-A09 [2023]

#### Latex, resin, sap, syrup

Natural rubber, maple syrup

#### P13-A10 [2016]

#### Flower handling

Includes apparatus or methods for flower arranging, binding bouquets or wreaths, all aspects of flower preserving etc.

Flower bouquet, floral wreath, flower preserve

#### P13-A99 [2015]

#### Other horticulture or agriculture aspects

Includes other types of agricultural or horticultural methods or equipment not covered elsewhere.

#### P13-B [2015]

#### Plant propagation and modification

This section includes plant propagation and processes for modifying genotypes, phenotypes or plant reproduction by tissue culture techniques etc.

#### P13-B01 [2015]

#### Propagation of vegetative material

Includes propagation from seeds, cuttings, bulbs, artificial or natural dispersal of plants. Also includes propagation by scions, tissue culture, grafting, extraction, germination of material from plant buds, creating "artificial seed material", preparation of culture medium, etc. For regular seed planting, see P11 class.

#### P13-B02 [2015]

#### New plants or plant breeds

Includes methods using selection, hybridization or genetic engineering to modify or produce new plants.

P13-E [2015]

#### Types of crop cultivated

P13-E01 [2015]

Fruits and nuts

P13-E02 [2015]

#### Vegetables and pulse crops

Including vegetables, legumes, beans, sugar beet, etc.

#### P13-E03 [2015]

#### **Cereals and grasses**

Includes sugar cane, bamboo, rice, turf, lawn, etc..

#### P13-E04 [2015]

#### Oil seeds and oil fruits

Including e.g. rape, sunflower, olives, palm fruits, etc.

#### P13-E05 [2015]

#### Fiber plants

Including e.g. cotton, flax, sisal, etc.

#### P13-E06 [2015]

#### Tea, coffee and herbs

Including also hops, spices.

#### P13-E07 [2015]

Mushroom/Fungi

P13-E08 [2015]

**Flowers** 

P13-E09 [2023]

#### Latex, resin, sap, syrup

Natural rubber, maple syrup

#### P13-E99 [2015]

Other types of crops

#### P13-F [2015]

**Dairy products** 

#### P13-F01 [2015]

#### Milking and primary milk treatment

Includes machines for milking or hand milking devices. Also includes primary milk treatment, i.e. sterilizing/pasteurizing processes.

#### P13-F02 [2015]

#### Secondary milk treatment

Includes cream, butter and cheese manufacture. Includes kneading machines or hand devices for butter, devices for shaping butter or cheese, tanks for treatment of cream, etc.

Cheese coating

P13-F50 [2015]

Characterized by dairy product

P13-F50A [2015]

Milk

P13-F50B [2015]

Cream

P13-F50C [2015]

**Butter** 

P13-F50D [2015]

Cheese

P13-F50X [2015]

Other dairy products

P13-F99 [2015]

#### Other dairy product processing

Includes extraction of nutrients from dairy products, fat skimming, etc.

#### P13-G [2015]

### Cleaning, maintenance/repair of equipment

This code should be used in conjunction with other P13 codes.

#### P14: Animal Management and Care

P14-A [2015]

**Animal husbandry; Animal care** 

P14-A01 [2015]

#### Housing and fencing; Animal training

Includes items for taming animals, such as noserings or hobbles.

Wing clamps

#### P14-A01A [2015]

#### Housing and fencing

Includes pigsties, dog kennels, rabbit hutches, and the cleaning equipment. Also includes tethering poles, incubators, floor grids for preventing cattle from straying (details of electrical fencing are coded under X25-X11 and X25-N02C), etc. Incubators are also coded under P14-A05. Insect/vermin traps placed in animal shelters should be coded in both P14-A01A and P14-B01. Also includes animal transit boxes, such as dog cages and crates.

Pasture, bird cages, chicken coops, brooders, poultry runs, dovecots, beehives, artificial honeycombs, rearing-boxes, aquaria, terraria, pens

#### P14-A01B [2015]

#### **Animal training**

Mazes, labyrinths, animal behaviour

P14-A02 [2015]

#### Feeding and drinking

Feed troughs, feed pails, licking stone holders

#### P14-A03 [2015]

#### Washing and grooming

Includes curry-combs, fetlock rings, tail-holders, protection against weather conditions or insects. Also includes tools, such as clippers and shavers, for removing fleece from sheep, etc.

Dehorners, horn trainers

#### P14-A04 [2015]

#### Animal wear, including horse tack

Includes horse blankets/covers, hoods, blinders/blinkers, saddles, etc. Also includes leads for pets and jackets for dogs and cats.

Muzzles, collars

#### P14-A05 [2015]

#### Animal breeding equipment

Includes rearing or breeding of animals, including new breeds of animals, and devices for assisting or preventing mating.

Incubators

#### P14-A06 [2015]

#### Shoeing

Covers shoeing of horses but also other animals such as oxen, etc. Includes horseshoes, horseshoe nails and tools used by a farrier, such as elastic inserts, calks, studs, etc.

Soles, ice-spurs, hoof care

#### P14-A07 [2015]

#### Milking

Electrical details of milking are covered by X25-N02B.

Milking station

#### P14-A99 [2015]

#### Other details of animal husbandry

Includes marking of animals, devices for sorting and cleaning eggs, tools for collecting honey, beesmokers, bee-keepers' accessories, such as veils, etc. Also includes animal transport, such as safety harnesses, car guards, animal ramps, restraints, etc.

Manure pouch, urine pouch, honey strainers, carriers, ear tag

#### P14-B [2015]

### Catching, hunting, trapping or scaring of animals; Fishing

#### P14-B01 [2015]

#### Scaring, catching or killing of animals; Insect repellent

Includes devices for attracting insects, devices for dispensing poison, bird-scarers, traps, etc. Also includes hunting appliances, such as shooting stands, beater rattles, decoys, etc. This code can be used with P14-E codes to highlight the type of animals scared, caught or killed. Insect/vermin traps placed in animal shelters should be coded in both P14-A01A and P14-B01.

Fly papers, fly-swatters, nets, fumigators, flamethrowers, scarecrow, mosquito repellent

#### P14-B02 [2015]

#### **Fishing**

Includes fishing nets, artificial baits, fishing rods, etc.

Landing-spoons, fish-spears, fishing lines

P14-E	[2015]
Types of animals	
P14-E01	[2015]
Classes of animals	
P14-E01A	[2015]
Mammals	
P14-E01B	[2015]
Birds	
Aviculture	
P14-E01C	[2015]
Fish	
P14-E01D	[2015]
Reptiles	
P14-E01E	[2015]
Amphibians	
P14-E01F	[2015]
Invertebrates Includes insects, millipede spiders, scorpions, etc.	
Crustaceans, apiculture, m	
P14-E02 Primary use of animal	[2015]
P14-E02A Livestock; Farming	[2015]
Includes cattle, piscicultur Horse, cows, sheep, pigs,	
P14-E02B	[2015]
<b>Domestic pets</b> Cats, dogs, ferrets, guinea chameleons	pigs, mice, fish,
P14-E02C	[2015]
Laboratory animals	
P14-E02X	[2015]
Other specific uses of	animals
P14-G	[2015]

Cleaning, maintenance/repair of equipment for animal care

P14-X [2015]
Other details of animal care

#### P15: Tobacco

From 2015, electronic cigarettes will not carry a P15 class anymore, but will solely be coded under X27-A02F.

P15-A [2015]

Types of tobacco

P15-A01 [2015]

Tobacco for pipes, cigars and cigarettes

Kretek, beedi, bidi

P15-A02 [2015]

Chewing tobacco: Snuff

Includes dipping tobacco. *Tobacco gum, snus* 

P15-A03 [2015]

Non-consumable tobacco

Includes tobacco water and topical tobacco paste.

P15-A09 [2015]

Other specific types of tobacco

P15-L [2015]

**Tobacco harvesting and processing** 

P15-L01 [2015]

Planting, irrigation and harvesting of tobacco

Electric details of soil working and harvesting are coded under X25-N.

P15-L05 [2015]

#### **Tobacco processing**

Includes sifting, sorting, removing impurities from tobacco, blending, roasting, cooling, stripping and cutting tobacco. Also includes arrangements for feeding tobacco leaves in the cutting apparatus and other tools used during the tobacco processing. Includes chemical and bio-chemical treatment of tobacco, e.g. to form reconstituted tobacco. Electrical details of tobacco manufacturing are coded under X25-P03.

Cleaning, curing, flavouring, puffing, crimpling, tobacco-twisting

P15-M [2015]

#### Manufacture of cigars and cigarettes

Includes forming tobacco bunches followed rolling, curing and wrapping final cigars. Also includes forming paper tubes, filling tubes, conveying cigarettes, branding each cigarette and packaging finished products. Packing details are coded under Q31 to Q34 codes, and electrical details of packing are also coded under X25-F03A. Also includes hand-driven devices for making cigarettes, such as cigarette rolling machines, rolling boxes, etc. *Packaging, rolling mat, rolling tray* 

P15-T [2015]

Constructional details of tobacco products and related accessories

P15-T01 [2015]

Filter tips; Mouthpieces

P15-T02 [2015]

#### Cigarette paper and tubes

Includes dipping tobacco.

Tobacco gum, snus

P15-T03 [2015]

#### Tobacco smoking paraphernalia

Includes pipes, hookahs, arghilas, etc. Includes support and cleaning implements, and seasoning of tobacco pipes. Mouthpieces of pipes are also coded under P15-T01.

Bowl, pipe cleaner, pipe tamper

P15-T04 [2015]

#### **Packaging of tobacco products**

Includes bands for cigars or cigarettes, and boxes for cigarette and cigarette papers. Packaging details are also covered under Q32, Q33 and Q34.

Cigar case, tobacco pouch

P15-T99 [2015]

#### Other constructional details

Includes matchboxes, tobacco stoppers, cigar/cigarette holders, ashtrays, cigar cutters, device for producing smoke images/rings, lighters, etc. Electrical details of lighters are coded under X27-G01.

Cigar slitters/perforators, humidors

P15-X [2015]

Other tobacco aspects

#### P2: Personal, Domestic

#### **P21: Wearing Apparel**

From 2015, manual codes have been assigned for all mechanical details of clothes. Electrical details are covered by X27-A02B code.

#### P21-A [2015]

#### T-Shirts, shirts and vests

Includes blouses, jerseys, sweaters, etc. *Cardigan* 

#### P21-B [2015]

#### Trousers and shorts; Skirts and dresses

#### P21-B01 [2015]

#### **Trousers and shorts**

Includes dungarees.

Bermuda, leggings, jeggings, chinos

#### P21-B02 [2015]

#### Skirts and dresses

Minis, micros, kilts

#### P21-C [2015]

#### **Coats and jackets**

Includes overcoats, raincoats, capes, etc.

#### P21-D [2015]

#### Sportswear (excludes sport shoes)

Includes swimwear (including swimming aids), wristbands and headbands used during sporting activities. Swimming aids are also coded under P21-N. Sport shoes, e.g. running shoes, are coded under P22 only. Swimming gloves, boxing/golf gloves are also coded under P21-H. See also P36-A08A for sportswear.

Bathing suits, trunks

#### P21-E [2015]

#### **Undergarments; Hosiery; Nightwear**

Includes underwear, bathrobes, pyjamas, nightdresses, nursing bras (also coded under P21-K), legwarmers, etc. Socks are also coded under P22-C. Also includes absorbing material embedded in e.g. underwear. Diapers are also coded in P32-A60.

Corsets, brassieres, knickers, underpants, petticoat, panti-hose, tights, stay-ups, stockings, drawers, girdles

#### P21-F [2015]

#### Headwear

Includes hats, caps, helmets (including chin straps and visors), wigs, masks and dominoes, veils and fascinators. Also includes artificial eyelashes and eyebrows. Includes face coverings worn in public places (shops, banks, public transport, etc) to protect the public from against germs/viruses spread through coughing or sneezing. These protective masks are also coded under P35-A03C.

Toupee, hair extensions, hairpiece

#### P21-H [2015]

#### Gloves and scarves; Ties and bow-ties

Includes operating gloves, swimming gloves, baseball/boxing/golf gloves, etc. Sporting gloves are also coded under P21-D.

Snood, mittens, head-scarf, necktie

#### P21-K [2015]

#### Baby/children clothes and linen

Includes bodysuits, swaddling cloths, bibs, etc. Nursing bras are also coded under P21-E. Also includes maternity clothing.

#### P21-L [2015]

#### Belts, suspenders and other fasteners

Includes braces, suspenders for socks or stockings. Also includes trouser clips used by cyclists. Shoulder strap

#### P21-M [2015]

#### Manufacture of clothes

Electrical details of clothes manufacturing are coded under X25-T codes. Includes tracing wheels, cloth holders, cushions or boxes for needles and pins, etc. Also includes patterns, dress forms and bust forms.

Tailor aids

#### P21-N [2015]

#### **Protective clothing**

Includes overalls, apron, knee protectors, etc. Also includes swimming aids. Safety shoes are coded under P22-F04 only.

Face masks, gaiters, surgeon gown, protective gloves, helmet

#### P21-T [2015]

#### **Constructional details**

This code should be used in conjunction with other P21 codes to highlight the garment.

#### P21-T01 [2015]

#### Collars, sleeves and pockets

Includes cuffs and lining.

Closures, collar-studs, stiffeners, armhole

#### P21-T50 [2015]

#### **Novel constructional materials**

Includes novel materials only. Can be used in conjunction with other P21 codes to indicate material application.

#### P21-T99 [2015]

#### Other specific constructional details

#### P21-X [2015]

#### Other wearing apparel

Includes handkerchiefs and artificial or natural feathers and flowers.

#### P22: Footwear

From 2015, manual codes have been assigned for all mechanical details of footwear. Electrical details are covered by X27-A02B1B.

#### P22-A [2015]

#### Shoes and sandals

Includes slippers and trainers. Sport shoes are also coded under P22-F03. Also includes over-shoes. Broques, court shoes, flats, loafers, pumps, wedges,

clogs, mules, ballerina, slip-on, dockside, flip flops

#### P22-B [2015]

#### **Boots**

Includes safety boots (see also P22-F04 for safety shoes)

Ankle boots, knee-length boots, rubber boots, booties, thigh-high, knee-high, cowboy boots

#### P22-C [2015]

#### Socks

Hosiery, e.g. tights and stockings, are coded under P21-E01. Includes arrangements for securing socks to shoes

#### P22-F [2015]

Main types of footwear

P22-F01 [2015]

Shoes for babies and children

P22-F02 [2015]

Shoes for dolls and other toys

P22-F03 [2015]

#### **Sport shoes**

Includes shoes and boots for activities such as athletic events, ball games, cycling, climbing, skiing, skating and dancing.

Running shoes, climbing shoes, football shoes, ski boots, tennis shoes, dancing shoes, skating boots, ballet

#### P22-F04 [2015]

#### Safety shoes, e.g. hospital footwear

Sport shoes e.g. football boots, are coded in P22-F03.

Nursing clogs, theatre mules, surgical clogs, safety boots

#### P22-F05 [2015]

#### **Orthopaedic shoes**

Includes ventilated shoes, shoes with specific footsupporting parts or shock absorbers, etc. Insert, in-step support, toe spacer, toe spreader

#### P22-M [2015]

#### Manufacture of footwear

Electrical details of clothes manufacturing are coded under X25-T codes. Includes machines for making laces.

Goodyear welt, lasts, shoemaking, presses, flexing, shoe gluing, heel cutter

#### P22-T [2015]

#### Constructional details of footwear

#### P22-T01 [2015]

#### Soles, insoles and heels

Includes details of separate inserts and detachable wheels attached on reverse of soles.

Stiffener

#### P22-T03 [2015]

#### Uppers, boot legs and tongues

Includes sandal straps (also coded under P22-T05).

#### P22-T04 [2015]

Welt and lining

#### P22-T05 [2015]

#### Laces and other fastenings

Includes hooks and eyelets for laces, zips, snap buttons, buckles, fasteners with toggle levers, etc. Hook and loop fastener, slide/glide fastener

#### P22-T06 [2015]

#### Wear-resisting and safety arrangements

Includes non-skid attachments e.g. ice-spikes, spurs, studs

Steel toe cap, metal plate, skid-proof

#### P22-T50 [2015]

#### **Novel footwear materials**

Includes novel materials used to form footwear. Can be used in conjunction with other P22-T codes to indicate material applications.

#### P22-T99 [2015]

#### Other constructional details

Includes decorative buckles.

Ornamental

#### **P23: Haberdashery and Jewellery**

From 2015, manual codes have been assigned for all mechanical details of haberdashery and jewellery. Electrical details of jewellery are covered by X27-A02B2.

#### P23-A [2015]

#### **Haberdashery**

Includes all types of closures. Tools used to manufacture clothes, such as tracing wheels, cloth holders, cushions or boxes for needles and pins, etc are coded under P21-M.

#### P23-A01 [2015]

#### **Buttons**

Includes press-buttons, and collar studs. *Press-studs, snap fasteners* 

#### P23-A03 [2015]

#### **Cuff-links**

Sleeve-links

#### P23-A04 [2015]

#### Retainers for ties and cravats

Includes retainers for neckties, cravats, neckerchiefs, such as tie-clips, spring clips, etc. *Tie pin* 

#### P23-A05 [2015]

#### **Pins**

Includes hat pins, scarf pins and safety pins. Tie pins are also coded under P23-A04.

Brooches

#### P23-A06 [2015]

#### **Buckles, Lanyards**

Includes buckles for safety belts. Safety belts are also coded under Q14-C01.

Seat belts

#### P23-A07 [2015]

#### Zippers and other slide fasteners

Fly

#### P23-A08 [2015]

### Hook and eye fasteners; hook and loop fasteners

Includes touch-and-close fasteners.

#### P23-A50 [2015]

#### Novel constructional materials for haberdashery

This code should be used in conjunction with other P23-A codes.

#### P23-A99 [2015]

#### Other types of haberdashery

Includes key-rings, and cards for buttons, collarstuds or sleeve-links.

#### P23-C [2015]

Jewellery and coins

#### P23-C01 [2015]

#### Brooches, clips, medals and badges

Brooches are also coded under P23-A05.

#### P23-C02 [2015]

#### Bracelets, necklaces, pendant and charms

Includes fastening arrangements for bracelets and wrist-watch straps. Pendants are coded under P23-C04 only. Constructional details of watches are coded under S04-A.

Rosaries, chains, watch-chains, wristband

#### P23-C03 [2015]

#### Rings, earrings and body piercing

Includes rings worn around the finger or toe. Also includes equipment for piercing the ear-lobes.

Finger rings, toe rings, signet ring, piercing rings, piercing bar

#### P23-C15 [2015]

#### Safety arrangements

Includes arrangements for securing the item of jewellery, e.g. bracelet, to the wearer to prevent loss or theft.

Safety chains

#### P23-C20 [2020]

#### **Gem settings**

Includes arrangements for securing the gem to the piece of jewellery. This code should be searched in conjunction with other P23-C codes. Also includes setting tools. Manufacturing details are coded under P23-M.

Bezel, channel, claw, prong, rose head, buttercup setting, illusion setting

#### P23-C30 [2015]

#### Coins

Includes gambling coins, slot machine tokens, cart tokens.

#### P23-C50 [2015]

### Novel constructional materials for jewellery and coins

This code should be used in conjunction with other P23-C codes.

#### P23-C99 [2015]

#### Other types of jewellery

Includes connectible jewellery, and fancy wear such as crosses and crucifixes.

#### P23-M [2015]

### Manufacture of haberdashery and jewellery

This code should be used in conjunction with P23-A or P23-C codes. Arrangements for securing the gem to the piece of jewellery are coded under P23-C20.

#### P24: Hand and Travelling Articles; Brushes

From 2015, manual codes have been assigned for all mechanical details of clothes. Electrical details are covered by X27 codes.

#### P24-A [2015]

### Walking sticks, umbrellas and handheld fans

#### P24-A01 [2015]

#### Walking sticks

Includes walking aids for blind persons, and walking sticks convertible into seats. Walking sticks convertible into umbrellas are also coded under P24-A02. Electric details of walking sticks are coded under X27-A02E.

Hunting sticks

#### P24-A02 [2015]

#### **Umbrellas**

Walking sticks convertible into umbrellas are also coded under P24-A01. Electrical details of umbrellas are coded under X27-A02.

Parasol

P24-A03 [2015]

**Handheld fans** 

#### P24-B [2015]

#### Purses, luggage, handheld bags and cases

Includes shopping bags, handbags, beach bags, bags for shoes, rigid and semi-rigid luggage, such as suitcases, trunks, travelling baskets, sleeves or socks for mobile phones, etc. Also includes sacks that can be transformed into a different article, such as a rucksack turning into a tent, a mattress, a coat, a sleeping bag, etc. This type of bag is also coded under P24-D (camping equipment). Also includes boxes or cases for specific items, such as hat boxes, cases for telescopes, pocket holders for stamps or coins, jewel boxes, water-tight boxes used during swimming, key wallet, camera cases, etc. Make-up boxes and lipstick cases are coded under P24-C04. Backpack, money-bag, wallet, guitar case, spectacle case, watch case, picnic box, protective shell, storage box

#### P24-C [2015]

### Hairdressing and shaving equipment; beauty and cosmetic treatment

#### P24-C01 [2015]

#### Hairdressing equipment

Includes equipment for hair-curling or hair-waving, hair pins, hair grips, hair combs, and equipment for hair salons, such as backward lavabos, hair-colouring caps, spray heads, hairdressers' chairs or portable wash stands. Also includes processes for waving, straightening or curling hair, such as chemical processes, and equipment used for attaching/removing hair extensions. Hairbrushes are also coded under P24-E.

Hair clamps, hair clasps, hair nets, hair protecting caps, hair extensions, eyelash curler

#### P24-C02 [2015]

#### **Shaving equipment**

Includes gloves or brush used for lathering, shaving mugs, containers for storing shaving paraphernalia. Also includes tweezers. Details of electric razors are coded under X27-A02A3B.

Shaving mirrors, skin stretchers, shaving brush

#### P24-C03 [2015]

#### Manicure and pedicure equipment

Includes nail clippers and nail files, cuticle sticks, finger-supports, and boxes for storing manicure/pedicure equipment. Also include artificial nails.

Nail cutters, nail-tip shapers

#### P24-C04 [2015]

### Accessories/container for toilet/cosmetic products

Includes accessories such as powder puffs, masks for marking lips or eyelashes, etc. Also includes containers such as perfume bottles, make-up boxes, lipstick, boxes for shaving soap, container for artificial teeth, etc. Details of packaging for cosmetic products are coded under Q32 to Q34 codes.

Cosmetic box

#### P24-C99 [2015]

#### Other toilet/cosmetic equipment

Includes pocket mirrors (shaving mirrors are also coded under P24-C02).

Hand mirror

#### P24-D [2015]

#### **Camping equipment**

Includes tents, water bottles, hammocks, hanging seats, mosquito nets, mini camping stoves, metal plates and mugs, etc. Bags, such as rucksacks convertible into e.g. a tent, a mattress, etc, are also coded under P24-B. Also includes attachments for fastening e.g. books, hats, etc to the tent, or hammocks, etc.

Tent spikes

#### P24-E

#### **Brushes**

Includes details of bristles, handles, integrated reservoir for e.g. paint, paste, water. Also includes paint rollers and accessories for brushes, such as protective covers and special devices for cleaning brushes after use.

[2015]

Details of electric toothbrushes are coded under X27-A02A3A.

Toothbrush, paint brush, hair brush, comb

#### P24-M [2015]

#### Manufacture details

This code should be used in conjunction with other P24 codes.

#### **P25: Office and Home Furniture**

From 2015, manual codes have been assigned for all mechanical details of office and home furniture. Electrical details are covered by X27-A03.

Does not include chairs, beds, sofas and mattresses; these are coded under P26 codes only. P25 codes cover tables, wardrobes and cabinets.

#### P25-A [2015]

#### **Tables**

Includes benches combined with such as school desks.

Nesting table, wall table

P25-A01 [2015]

Types of tables

P25-A01A [2015]

#### **Desks**

Includes school desks, writing tables, drawing desks, pulpits and lecterns. Desks for computers are also coded under T04-L codes.

School bench, workstation, conference table, computer desk

#### P25-A01B [2015]

#### **Bedside tables**

Dressing tables are also coded under P25-C01C.

P25-A01C [2015]

**Garden tables** 

P25-A01D [2015]

#### **Dining/breakfast tables**

Includes tables for restaurants and dining rooms. Also includes food trays.

Kitchen table, breakfast bar, coffee table

### P25-A01X [2015]

#### Other specific type of tables

Includes sewing tables, tea trolleys and game tables. Also includes operating tables.

Card table, ironing table, billiard table, table tennis table

P25-A02 [2015]

**Components of tables** 

P25-A02A [2015]

**Table tops** 

P25-A02B [2015]

#### Legs and underframe

Feet

#### P25-A02C [2015]

#### **Drawers**

Includes sliding arrangements and handles of drawers.

Sliding tray

#### P25-A02D [2015]

### Arrangements for modifying the size of the table

Includes folding and extending arrangements. Stowable table, extensible table, drop-leaves, telescopic table

#### P25-A02X [2015]

#### Other components of tables

#### P25-B [2015]

#### Wardrobes

Includes details of doors, hanging arrangements, interior drawers and wardrobe fixings such as hinges and handles. Also includes mirror attached to the doors.

P25-C [2015]

#### **Cabinets**

Includes racks and shelf units.

Cupboard

P25-C01 [2015]

**Types of cabinets** 

P25-C01A [2015]

#### **Bookshelves and office cabinets**

Bookcase, filing cabinet

#### P25-C01B [2015]

#### Kitchen and bathroom cabinets

Includes cocktail cabinets, cabinet for perishable items, such as meat safes, bottle racks, and fruit or vegetable storage cabinets.

Welsh dresser, medicine cabinet

#### P25-C01C [2015]

#### Bedroom and dining room cabinets

Includes chests of drawers, dressing tables (also coded under P25-A01B) and bedside cabinets. Also includes television stands (see also W03-A09C), radio stands, record cabinets.

#### P25-C01X [2015]

#### Other specific types of cabinets

Includes shoe cabinets and racks for skis or guns.

#### P25-C02 [2015]

#### **Components of cabinets**

Includes systems for modifying the size of the cabinet.

#### P25-C02A [2015]

#### Feet and casing

Carcass, partition wall, upright, strut, wheel

#### P25-C02B [2015]

#### **Shelves arrangements**

Includes book-ends. Shelving systems for e.g. supermarkets are also coded under P27-A01. Book trough

#### P25-C02C [2015]

#### **Drawers and doors**

Includes sliding arrangements.

#### P25-C02D [2015]

#### Handles and other fittings

Knobs, key plate, ornaments

#### P25-C02X [2015]

#### Other components of cabinets

#### P25-L [2015]

#### Convertible/stackable furniture; multipurpose furniture

Includes furniture that can be converted into other types of furniture. This code can be used in conjunction with other P25 codes to highlight the different functions. Also includes dual-purpose furniture, e.g. a table combined with a seat. Reconfigurable furniture for vehicle cabins are coded under Q14-T only.

Combination

#### P25-M [2015]

### Manufacture of office and domestic tables, wardrobes and cabinets

This code should be used in conjunction with other P25 codes.

#### P25-X [2015]

#### Other home and office furniture

Does not include chairs, beds, sofas and mattresses; these are coded under P26 codes only. Includes easels or stands for maps, blackboards, etc.

Umbrella stand

#### P26: Chairs, Sofas and Beds

From 2015, manual codes have been assigned for all mechanical details of chairs, sofa and beds. Electrical details are covered by X27-A03.

Does not include tables, wardrobes and cabinets; these are coded under P25 codes only. P26 codes cover chairs, beds, sofas, mattresses and all furniture for babies and children.

Prior to 2012, details of upholstery were coded under Q39.

Upholstery

#### P26-A [2015]

#### Chairs and benches

Stool, hassock, rocking chair, seat

#### P26-A01 [2015]

#### Types of chairs and benches

Children chairs are also coded under P26-E.

#### P26-A01A [2015]

#### Home or office chairs

Includes armchairs and garden chairs. Armchairs are also coded under P26-B01.

Workshop, high chair, gaming chair

#### P26-A01B [2015]

#### Hairdressers, barbers or dentist chairs

Includes disabled chairs. Electrical details of disabled chairs and dentist chairs are coded under S05-K and S05-E01, respectively.

Operating chair

#### P26-A01C [2015]

#### Theatre/cinema/church benches and chairs

Includes chairs/stools for restaurants.

Stadium chair, tipping-up chair, confessional bench, prayer stool, kneeling stool, public bench

#### P26-A01D [2015]

#### Folding/collapsible/stackable chairs

Includes dismountable chairs and booster seats attached to e.g. dining chairs.

Camping chair, garden chair, beach chair, trunk chair, inflatable chair, nesting chairs

#### P26-A01F [2015]

#### Vehicle seats

Includes seats for cars, bikes, scooters, etc. See also Q14-A.

#### P26-A01X [2015]

#### Other types of chairs

Milking stool, music stool, bean bag, rocking chair

#### P26-A10 [2015]

#### Constructional details of chairs and benches

#### P26-A10A [2015]

#### Seats, armrests, headrests and backrests

Includes details of folding and reclining arrangements, and seat padding. Footrests are coded under P26-A10B only.

Frame, cushion, back support

#### P26-A10B [2015]

#### Legs and feet

Includes footrests.

Caster wheel

P26-A10X [2015]

### Other constructional details of chairs and benches

Includes hooks to attach bag or coat, such as on theatre chairs. Also includes protective covers, e.g. to protect against rain.

Cup holder

#### P26-B [2015]

#### Sofas, armchairs and beds

Divan

#### P26-B01 [2015]

#### Sofas and armchairs

Includes armrests, footrests, hidden storage, feet and legs. Armchairs are also coded under P26-A01A.

Couch, settee

#### P26-B02 [2015]

#### **Beds**

Includes bedsteads and headboards. Beds installed in vehicles are also coded under Q14-B. Cots, day-bed, wall bed, hammock, suspended bed

#### P26-B03 [2015]

#### Sofa-beds, chair-beds and wardrobe-beds

Includes folding arrangements.

Futon, cabinet bed, table bed, trunk bed

# P26-C [2015]

#### **Mattresses and cushions**

Includes spring, foam or fluid mattresses. Pillows are coded under P27-B02. Seat cushions of chairs are also coded under P26-A10A.

# P26-E [2015]

# Furniture for children; Child-proofing arrangements

This code can be used in conjunction with P25 or other P26 codes to highlight the piece of furniture, e.g. chair, bed, etc. Includes high chairs, cradles, cots, but also other nursery accessories such as baby carriers, playpens, safety harnesses, etc. Electrical details of baby equipment are coded under X27-X01. Includes general child-proofing arrangements, such as corner protectors, window restrictors, anti-tip straps for heavy furniture, etc. This code is to be used in conjunction with other P codes to specify the type of furniture the child-proofing item is connected to, e.g. P25-C01B for kitchen and bathroom cabinets, X27-F01 for fridges, etc.

Dressing table, changing table, rocking chair, carrycot, baby gate, baby proofing kit

# P26-F [2015]

# Accessories for chairs, benches, sofas, beds and mattresses

This code is used in conjunction with P26-A or P26-B codes. Includes loose furniture covers and insect nets (see also P27-C). Bedspreads are also covered under P27-B02.

Throw

# P26-M [2015]

# Manufacture of chairs, sofas and beds

This code should be used in conjunction with other P26 codes.

# **P27: Shops and Household Furnishing**

From 2015, manual codes have been assigned for all mechanical details of shop and household furnishing. Electric details are coded under X27.

# P27-A [2015]

# Furniture and fittings for shops, restaurants and warehouses

Tables and chairs are coded under P25-A and P26-A, respectively.

# P27-A01 [2015]

# Racks and cabinets for displaying/storing merchandise

Includes dispensers for granulated materials, vending jars, display stands, dummies, etc. Refrigerated cabinets are also coded under X27-F. Also includes shelving units in warehouses or storage facilities.

Showcase, bust, wire figure, shop window display

# P27-A02 [2015]

# Shop, bar or bank counters

Includes paying counters.

Check-out counter

#### P27-A99 [2015]

# Other furniture and fittings for shops, restaurants and warehouses

Includes plastic protective screens used in e.g. checkout areas or bank counters to protect staff and customers against germs and viruses spread through coughing or sneezing.

Changing rooms, sneeze guards, protective counter screens

# P27-B [2015]

# Household and table equipment

Cookware, such as pots and pans, are coded under P28-A02 only. Details of tables per se are coded under P25-A.

# P27-B01 [2015]

### Mirrors and picture frames

Shaving mirrors are coded under P24-C02.

# P27-B02 [2015]

# **Bed linen and towels**

Includes bedspreads, sleeping bags, blankets, pillows and travelling rugs. Cushions are coded under P26-C02. Paper towels are coded under P28-B03

Throw

# P27-B03 [2015]

# Tableware, glassware, cutlery and table linen

Includes plates, bowls, serving dishes, glasses, jugs, cups, etc. Also includes table linen, such as napkins and tablecloths, and tea/coffee pot cosies. Knives, forks, spoons, wine decanter, crockery, tea pot, egg cup, sugar tongs, serving tray, drinking straw

# P27-B04 [2015]

### **Carpets and rugs**

Includes stair runners and stair rods.

# P27-B05 [2015]

## Clothes hangers and racks

Includes clothes racks, hat rack, coat hangers, umbrella stands, shoe horns, etc.

Hat holder, necktie holder

# P27-B06 [2015]

## **Religious decorations**

Includes altars, Christmas trees, Christmas decorations, religious shrines, fonts, etc.

Christmas tree stand

### P27-B99 [2015]

### Other household and table equipment

Includes screens such as fire screens, flower vases, wall boards, paper baskets, key holders, letter boxes, incense burners, etc. Incense burners used during religious celebrations are also coded under P27-B06 and incense burners used as mosquito repellent are also coded under P14-B01.

# P27-C [2015]

### **Curtains and blinds**

Includes curtain rods/rails, pelmets, runners, gliders, and arrangements for opening/closing blinds and curtains. Electrical details are coded under X27-T. Also includes mosquito nets (see also P26-F when the net is attached to e.g. a bed).

Pleat curtain tape, net curtain

# P27-M [2015]

# Manufacture of shops and household furnishing

This code should be used in conjunction with other P27 codes.

## **P28: Kitchen and Sanitary Equipment**

From 2015, manual codes have been assigned for all mechanical details of kitchen and sanitary equipment. Electrical details are covered by X27 codes.

# P28-A [2015]

## Kitchen equipment

Electrical kitchen appliances, such as toaster or coffee machines, are coded under X27-B. Cooking appliances are coded under X27-C. All details of refrigerators are coded under X27-F. Tableware, such a crockery, cutlery and glassware, are coded under P27-B03 only.

#### P28-A01 [2015]

# Food and beverages preparation

Includes kitchen gadgets and utensils such as vegetable slicers, juicers, garlic presses, zesters, egg slicers, ladles, mechanical timers and scales, etc. Also includes cafetieres and espresso makers. Citrus peeler, tin/can opener, coffee grinder, salt and pepper grinder, egg whisk, nutcracker, sifter, coffee mill

# P28-A02 [2015]

#### Cookware and ovenware

Includes saucepans, woks, oven trays, casserole dishes, poachers, fish tins, etc. Also includes dish warmers and barbecues.

Frying pan

### P28-A03 [2015]

#### Kitchen storage

Includes bread bins, spice racks, plastic containers for food, etc.

Bread box

# P28-A99 [2015]

#### Other kitchen equipment

Includes holders for cooking books, oven gloves, aprons, vacuum flasks, splashguard for sink, etc. *Cutting board* 

# P28-B [2015]

# Sanitary equipment and toilet accessories

Bathroom cabinets are coded under P25-C only.

# P28-B01 [2015]

### Wash-stands and sinks

Also includes stoppers for sinks and baths, and bathroom cabinets placed underneath sinks.

Wash-basins

# P28-B02 [2015]

#### **Baths and showers**

Includes bidets, shower screens, shower curtains, and anti-slip mats, etc. Bath stoppers are included in P28-B01. Electric details of baths and showers are coded under X27-A02A4.

Bath feet

# P28-B03 [2015]

#### **Bathroom accessories and linen**

Includes soap and toothpaste dispensers, soap holders and dishes, towels, toilet roll and towel holders/racks. Also includes washing accessories such as bathing sponges. Towels and anti-slip mats placed in the bath are also coded under P27-B02. Loofah, shower cap, toothbrush holder, bath mats, bathroom storage, bathroom bin, towel rail, bathroom caddy

# P28-B04 [2015]

#### **Toilets**

Includes flush-less toilets, such as chamber pots or urinals, hand tools for cleaning the toilet bowl, cover for toilet seat, and toilet seat specially adapted for children. Electrical details of toilets are coded under X27-L.

Hinge, toilet brush, toilet seat

### P28-B99 [2015]

#### Other sanitary equipment

Includes chairs/stools for restaurants.

# P28-C [2015]

### **Domestic cleaning and washing**

Electrical cleaning and washing appliances are coded under X27-D. All details of washing machines, dishwashers, tumble dryers, and vacuum cleaners are coded by X27-D01A, X27-D01B, X27-D02 and X27-D03, respectively.

Cleaning caddy

# P28-C01 [2015]

# **Equipment for cleaning windows**

Includes cloths, sponges, pads, and equipment for cleaning blinds.

Squeegee, wiper

# P28-C02 [2015]

# Equipment for cleaning floors, walls, carpets, and upholstery

Includes brooms and brushes, buckets, dustpans, and mops. Brushes for cleaning shoes are coded under P28-C04 only.

Upholstery/carpet beater

# P28-C03 [2015]

# **Equipment for cleaning/drying crockery**

Includes basins, draining boards, and equipment for polishing cutlery.

Sponge

# P28-C04 [2015]

# **Equipment for cleaning/polishing footwear**

Shoe brush

# P28-C05 [2017]

# **Equipment for cleaning/drying/ironing clothes**

Includes mechanical details only of clothes lines and ironing boards. Electrical details are coded under X27-L and X27-D09, respectively.

Clothes pegs, pedal washing machine

# P28-C99

[2015]

# Other specific cleaning or washing equipment

Sink plunger

# P28-M [2015]

# Manufacture of kitchen and sanitary equipment

This code should be used in conjunction with other P28 codes.

# P3: Health, Amusement

## P31: Diagnosis, surgery

From 2015, manual codes have been assigned for all mechanical details of diagnostic and surgical apparatus. Electrical details are covered by S05 class.

P31-A

[2015]

**Diagnosis or surgery apparatus** 

P31-A01

[2015]

# Surgical tools and instruments

Includes cutters e.g. scalpels; clamps and retractors; distractors and positioners; sealing and stapling devices; dilators, specula.

## P31-A05

[2015]

### **Diagnostic devices**

Includes measurement devices e.g. rulers, calipers; percussion instruments for tapping on a surface to determine the underlying structure; Auscultation devices e.g. stethoscopes.

Pleximeter

P31-A99

[2015]

# Other types of diagnosis or surgery apparatus and systems

For operating theatre and dental surgery equipment see P33-A10.

# P31-B

[2015]

# Storage and transport of diagnosis or surgery apparatus

Includes containers for storing and transporting surgical tools and equipment. See also Q31-Q34 codes.

P31-G

[2015]

Cleaning, maintenance/repair of diagnosis or surgery apparatus

P31-M

[2015]

Manufacture/Pre-use treatment of diagnosis or surgery components

P31-R

[2015]

Recycling of diagnosis or surgery components

# P32: Dentistry, bandages, veterinary, prosthesis

From 2015, manual codes have been assigned for all mechanical details of dentistry, bandages, veterinary, and prosthesis apparatus. Electrical details are covered by S05 class

P32-A [2015]

# Dentistry, veterinary, prosthesis apparatus and dressings

P32-A01 [2015]

# **Dentistry**

Includes mechanical aspects of dental tools and instruments, orthodontics, impressions. For dental chairs and accessories see P33-A10.

P32-A20 [2015]

### Veterinary

Surgical tools and instruments; supports, restraints and other auxiliary devices used during examination and surgery e.g. for holding animal's mouth open; treatment; reproduction or fertilization devices.

P32-A40 [2015]

#### **Prostheses**

Includes dental prostheses

P32-A40A [2015]

#### **Implantable**

Including stents for insertion in blood vessels.

P32-A40B [2015]

## Non-implantable

Includes artificial limbs.

P32-A50 [2015]

Eye and ear protection and/or treatment

P32-A60 [2015]

#### Bandages, dressings and first aid kits

Includes dispensers and auxiliary items. Also includes absorbent/antiseptic pads and swabs such as nappies, sanitary towels, diapers and tampons. Disposal of used dressings and bandages is coded by a combination of P34-W (medical waste disposal) and P34-A60.

P32-A99 [2015]

# Other apparatus and methods for dentistry, veterinary, prostheses

Includes dental auxiliary appliances (for dental chairs and work-stands see P33-A10). Also includes therapeutic heating devices, orthopaedic and contraceptive devices.

Hot-water bottle

P32-M [2015]

Manufacture/Pre-use treatment of dentistry, bandages, veterinary, prosthesis components

Includes coating of e.g. stents.

P32-R [2015]

Recycling of dentistry, bandages, veterinary, prosthesis components

# P33: Medical aids, oral administration

From 2015, manual codes have been assigned for all mechanical details of medical aids and oral administration apparatus. Electrical details are covered by S05 class.

P33-A [2015]

**Medical aids** 

P33-A01 [2015]

## **Patient transport**

Trolleys, wheelchairs, stretchers and other lifting devices, including those aspects as applied to vehicles such as ambulances.

P33-A02 [2015]

**Beds** 

P33-A03 [2015]

Hygiene and sanitary devices

Bed-pans

P33-A10 [2015]

# Other hospital and dental surgery equipment

Includes operating tables and dental chairs. Also includes trolleys for transporting medicines, food and other items.

P33-A20 [2015]

#### **Therapy**

Includes devices for massage, bathing and passive exercise.

Acupuncture

P33-A40 [2015]

**Funeral apparatus and accessories** 

P33-A50 [2015]

# Oral administration of medicines; Feeding devices

Includes feeding tubes, baby teething apparatus e.g. rings, feeding bottles. For syringes and subcutaneous, intra-vascular or intra-muscular devices see P34-A02.

P33-A99 [2015]

# Other types of medical aids and oral administration methods

Includes walking aids and crutches. Wrist band

P33-B [2015]

# Storage and transport

Includes containers for storing and transporting medical aids. See also Q31-Q34 codes.

P33-G [2015]

Cleaning, maintenance/repair of medical aids

P33-M [2015]

# Manufacture/Pre-use treatment of medical aids

Includes devices and methods for processing pharmaceutical products into physical forms suitable for oral administration.

P33-R [2015]

Recycling of medical aids

# P34: Sterilizing, syringes

From 2015, manual codes have been assigned for all mechanical details of sterilizing apparatus and syringes. Electrical details are covered by S05 class.

P34-A [2015]

Sterilization equipment, syringes

P34-A01 [2015]

# Sterilization and disinfection devices

For sterilization, disinfection, sanitizing and deodorizing of substances and materials including air, refuse, bandages and dressings (See P32-A60 for bandages per se), and contact lenses. Also includes sanitizing stations placed in public spaces to dispense e.g. antibacterial gel/wipes.

P34-A02 [2015]

# Syringes and other devices for introduction and removal of media from body

Syringes, needles, and irrigation devices; Inhalers; sprayers, atomizers and insufflators; subcutaneous, intra-vascular or intra-muscular devices; catheters and other drainage apparatus; applicators. Includes blood transfusion equipment. For oral administration devices and methods, see P33-A50.

P34-A10 [2015]

Anesthesia; relaxation

P34-A99 [2015]

Other types of sterilization equipment, syringes and introduction/removal devices

P34-G [2015]

Cleaning, maintenance/repair of sterilization equipment, syringes

P34-M [2015]

Manufacture/Pre-use treatment of sterilization equipment, syringes

P34-R [2015]

Recycling of sterilization equipment, syringes

# P34-W [2024]

### Medical waste disposal

Includes receptacles for clinical waste, such as used dressings, bandages, needles, sharps, etc. This code is to be used in conjunction with other P34 codes or P32 codes to specify the items to be disposed of, e.g. P34-A02 for needles, or P32-A60 for bandages. Constructional details of refuse receptacles are also coded under Q35-A01.

Needle disposing box

# P35: Life-saving, safety, firefighting, fire extinguishing and fire prevention

This class covers apparatus and methods for life saving and safety in a general sense and also for firefighting and fire extinguishing. For life saving and safety systems for specific purposes see the relevant class, for example water-based life-saving equipment such as lifebuoys is covered in Q24. From 2015 P35 manual codes have been assigned for all mechanical details of life saving, safety, firefighting and fire extinguishing. Electrical aspects are also covered in class X25. Fire alarms are not included and are covered by W05-B02 codes. Significant applications are indicated by assignment of P35-U codes in conjunction with other P35 codes as necessary.

# P35-A [2015]

# Type of life saving and safety systems

These codes are assigned to indicate the general type of life saving and safety system involved.

# P35-A01 [2015]

# Rescue equipment and methods

Covers equipment, and methods for using it, for rescuing people or animals from a dangerous situation such as a building during a fire, earthquake, etc. Water-based life-saving equipment such as lifebuoys and the like is covered by  $\Omega$ 24-X01 codes and equipment installed onboard an aircraft is covered by  $\Omega$ 25-B09 codes.

### P35-A01A [2015]

#### Hoists, winches, lifting equipment

Novel aspects of harnesses for supporting a person being rescued are also assigned P35-A03A.

Lowering, raising, winching, winding

# P35-A01E [2015]

#### Slides, chutes

Escape slides and similar emergency exit arrangements for aircraft are not included and are covered by Q25-B09E.

# P35-A01G [2015]

#### **Cushioning devices**

Includes use of devices providing a 'soft landing', e.g. for persons falling or jumping from a high point.

Cushion, inflatable, mat, pad

# P35-A01X [2015]

# Other types of rescue equipment or method

# P35-A03 [2015]

## Safety systems in general

These codes cover systems, protective clothing and other equipment for general safety purposes.

# P35-A03A [2015]

### Safety harnesses and belts

Includes harnesses for supporting workers, e.g. by anchoring to a building or other structure. Harnesses forming part of rescue equipment, e.g. to lift a person for escape purposes, are also assigned P35-A01A.

Builder, carabiner, construction worker, lineman, window cleaner

# P35-A03C [2015]

#### **Protective clothing**

P35-A03E

Includes helmets, masks, and the like to provide protection for humans and animals from adverse environments. Includes face coverings worn in public places (shops, banks, public transport, etc.) to protect the public against germs and viruses spread through coughing or sneezing. Face coverings are also coded under P21-F. Fireproof clothing is also assigned P35-C05. Arrangements for facilitating or enabling breathing are covered by P35-A05E which is also assigned as necessary. Systems and equipment for treating hazardous chemicals or biological agents to make them safe or to contain them are covered by P35-A03G.

# Environmental suit, hazmat suit, NBC suit

# Breathing equipment and protection against harmful gases

[2015]

Includes equipment for filtering gases hazardous to health of humans or animals and breathable gas supply systems providing e.g. oxygen or gas mixtures. Breathable gas supplies for medical purposes are not included and are covered by P34 codes. Covers equipment, and methods for removing or neutralizing the effects of hazardous gases in the air within a building, room, or other enclosed area. Electrical alarm systems warning of the presence of toxic gases are covered by W05-B07L codes and those warning of flammable or explosive gases by W05-B02A codes.

Chemical plant, filter, firefighter, mine, poisonous gas, rescue

# P35-A03E1 [2015]

## **Breathing masks**

Covers masks in the form of equipment carried by an individual and also those used in multiple-mask systems, e.g. on board an aircraft. From 2016 all other aspects of breathing equipment, installations and systems are covered by P35-A03E5. Includes masks and similar devices forming part of equipment protecting against harmful chemicals, e.g. protective clothing, which is also covered by P35-A03C. Masks with electrical communications equipment such as intercoms or portable transceivers are also assigned W01-C04A or W02-G02A1 respectively. Details of microphones, earphones and the like incorporated in masks are also assigned V06-V codes as appropriate.

Cartridge, crew radio, filter, interphone, walkie-talkie

# P35-A03E5 [2016]

# Breathing equipment, installations and systems

This code covers all aspects of breathing equipment and installations, e.g. oxygen generators, gas cylinders, hoses and pipes, except for masks and other devices fitting around the mouth and/or nose of the user which are covered by P35-A03E1. Includes equipment carried in backpack or other portable form and also installations in e.g. buildings, tunnels or vehicles, including those on-board an aircraft. Prior to 2016 these details were covered by P35-A03E or P35-A03E1 depending on novel aspects.

## P35-A03G [2015]

### **Protection against harmful chemicals**

Includes arrangements for making safe hazardous industrial chemicals and also chemical or biological warfare agents. Protective clothing and breathing equipment are not included and are respectively covered by P35-A03C and P35-A03E codes.

Biohazard, spillage, tanker, toxic waste

P35-A99 [2015]

Other types of life saving and safety systems

P35-C [2015]

# Type of firefighting, fire extinguishing or fire prevention equipment or method

The codes are assigned to indicate the general type of firefighting, fire extinguishing or fire prevention equipment or system involved.

P35-C01 [2015]

Fire extinguishing equipment and methods

#### P35-C01A [2015]

# Type of fire extinguishing material

P35-C01A codes are assigned to indicate in a general sense the type of fire extinguishing material used. When the material itself is novel P35-C01A8 is also applied, e.g. a novel chemical composition for extinguishing fires would be coded as P35-C01A2 and P35-C01A8.

P35-C01A1 [2015]

Carbon dioxide-based fire extinguishing CO<sub>2</sub>

P35-C01A2 [2015]

# Chemical-based fire extinguishing

Covers use of wet chemical-based extinguishing agents.

P35-C01A3 [2015]

Foam-based fire extinguishing

P35-C01A4 [2015]

Powder-based fire extinguishing

P35-C01A5 [2015]

### Water-based fire extinguishing

Includes water mist-based fire extinguishing systems.

P35-C01A8 [2015]

# **Novel materials for extinguishing fires**

This code is assigned in conjunction with a P35-C01A code to indicate the type of extinguishing material used. See also K01-A for novel materials and compositions for fire extinguishing.

P35-C01A9 [2015]

Other type of fire extinguishing material Sand

P35-C01C [2015]

Fire extinguishing equipment type

P35-C01C1 [2015]

Portable/hand-held extinguisher

P35-C01C3 [2015]

# Fixed installations and building-type extinguishing system

Covers permanently installed systems such as indoor sprinklers and outdoor installations such as fire hydrants. Fire alarms are not included and are covered by W05-B02 codes.

Bulb, fusible alloy, green bulb, red bulb, Wood's metal

# P35-C01C5 [2015]

## Mobile fire extinguisher

Covers fire extinguishing equipment or systems capable of being transported to the location of a fire, including extinguishers mounted on trolleys, aircraft, ships, trains, or land vehicles such as fire engines which are also covered in Q19-H02 or in X22-P10 if electrical aspects are involved. Fire extinguishing systems for putting out fires on-board vehicles themselves are covered by P35-C01C7 codes

Air tanker, crash tender, fire hose, fire train, fire truck, fireboat, forest fire, ladder, pump, turntable, waterbomber, wildfire

# P35-C01C7 [2015]

# Vehicle-type fire extinguishing system

Covers extinguishing equipment and systems for putting out fires in a vehicle itself. Vehicles used to transport extinguishing equipment to the location of a fire are covered by P35-C01C5.

On-board

### P35-C01C7A [2015]

# Aircraft and aerospace-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on an aircraft or space vehicle, for which Q25-B09A and Q25-S06 are also respectively assigned, but does not include aerial firefighting aircraft, which are covered by P35-C01C5.

## P35-C01C7C [2015]

# Land vehicle-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on land vehicles and does not include fire engines, which are covered by P35-C01C5.

### P35-C01C7E [2015]

# Ship-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on ships, for which Q24-B09A is also assigned, but does not include fireboats, which are covered by P35-C01C5.

#### P35-C01C7F [2015]

#### Rail vehicle-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on trains, for which Q21-J09 is also assigned, but does not include fire trains, which are covered by P35-C01C5.

#### P35-C01C9 [2015]

#### Other fire extinguishing equipment type

Beater, fire blanket, fire bucket

# P35-C03 [2016]

# Nozzles, hoses, pumps and delivery systems

Covers novel aspects of equipment for delivering or dispensing a fire-extinguishing agent.

## P35-C05 [2015]

# Fire prevention equipment and methods

Includes arrangements for containing or limiting the spread of fires, such as physical barriers, flame traps and the like, firefighting equipment other than extinguishers and also control of firefighting systems, electrical aspects of which are covered by X25-X05.

[2015]

Axe, fire doors

### P35-C99

Other types of firefighting, fire extinguishing or fire prevention equipment or method

#### P35-G [2015]

# Cleaning, maintenance/repair of life saving, safety, firefighting and fire extinguishing systems

This code is assigned with P35-A or P35-C codes as appropriate.

# P35-M [2015]

# Manufacture/pre-use treatment of life saving, safety, and firefighting/extinguishing components

Includes testing. This code is assigned with P35-A or P35-C codes as appropriate.

# P35-U [2015]

### **Applications**

These codes are assigned with P35-A or P35-C codes as appropriate to denote significant applications.

### P35-U01 [2015]

#### Domestic

Bathroom, bedroom, domestic appliance, fitted kitchen, home furnishings, household appliance, household product, living room

# P35-U02 [2015]

#### **Commercial**

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

Bar, business, café, commerce, commercial, department store, enterprise, hotel, office, restaurant, rest-room, washroom P35-U03 [2015]

**Vehicles** 

Includes all vehicles.

P35-U05 [2015]

**Agriculture; Farming** 

Arable, chickens, cows, crops, dairy, ducks, eggs, field, goats, greenhouse, harvest, irrigation, lambs, pigs, pigsty, planting, plantation, poultry, sheep

P35-U06 [2015]

Manufacturing plants

Factory, production line

P35-U07 [2015]

**Food industry** 

P35-U17 [2015]

**Civil Engineering; Construction; Buildings** 

P35-U18 [2015]

Mining

Coal, coalface, gallery, methane, seam, ventilation

P35-U20 [2015]

Waste disposal, waste treatment, pollution control and recycling

P35-U40 [2015]

**Industrial** 

This code is assigned for general industrial applications of life saving, safety, firefighting, fire extinguishing and fire prevention systems not covered elsewhere.

P35-U99 [2015]

Other specific applications

P35-X [2015]

Other aspects of life saving, safety, firefighting, fire extinguishing and fire prevention

## P36: Sports, games, toys, amusements

Covers saddlery from 201201, prior to 2012 this was classified as Q39.

# P36-A [2015]

# Type of sport and leisure activity

P36-A codes cover organized competitive sports and also analogous activities performed as a leisure pursuit or pastime. Electrical aspects of sports and leisure activities are covered by W04-X01 codes. Games which in general do not involve significant physical activity, e.g. indoor games, are covered by P36-C codes. Games involving throwing or hitting a ball with an implement such as a cue, e.g. billiards, are regarded as a sport.

## P36-A01 [2015]

# Sports using ball, puck, or shuttlecock

Badminton, baseball, basketball, billiards, bowling, bowls, cricket, croquet, curling, football, golf, hockey, petanque, pool, snooker, soccer, squash, rugby, table tennis, tennis, volleyball

# P36-A03 [2015]

# Athletics, cycling, racing, air and water based sports

Includes running on track, cross-country, or marathons, and sports based on jumping and throwing, e.g. high jump, javelin, shot-put etc. Heptathlon, horse riding, horseracing, marathon, motor racing, pentathlon, swimming, water skiing, snowboarding, skiing

# P36-A04 [2015]

#### **Combat-based sports**

Laser-simulated shooting is covered by W04-X01K4F

Boxing, martial arts, fencing, paintball, wrestling

### P36-A05 [2015]

### Archery, darts, shooting

This code covers archery in the sense of shooting at targets using longbow, crossbow, etc. Shooting animals while hunting is covered by P36-A07.

Bow, dart, dartboard, pistol, rifle, target

# P36-A06 [2015]

# Gymnastics, climbing and weightlifting

Covers rock climbing and mountaineering on natural features, and climbing walls and the like in indoor and outdoor sports facilities. Lifting of weights as part of general fitness training, i.e. 'weight training' is covered by P36-A08E.

Bar, dumbbell, lift, abseiling, crampons, harness, rope, alpine

# P36-A07 [2015]

## Fishing, hunting

This code covers fishing as a recreational or sporting activity only. Commercial fishing is not included and is covered by P14 in general and X25-N02 when electrical aspects are involved.

Angling, bait, bow, crossbow, decoy, float, line, rifle, rod, tracking

#### P36-A08 [2015]

# Sports equipment, sports facilities and sports training

These codes are assigned with other P36-A codes as appropriate.

# P36-A08A [2015]

#### Sports equipment and clothing

Includes items used by a player of a sport, e.g. horse racing, or a participant in leisure activities such as horse riding. See also P21-D for sportwear. Electrical details of sports equipment are coded under W04-X01E, and electrical details of clothing are coded under X27-A02B1.

Ball, bat, boots, bow, bowls, crampons, crossbow, cue, fishing rod, goggles, golf clubs, harness, kit, racquet, riding boots, running shoes, saddle, skateboard, skates, ski binding, skis, surfboard, training shoes, trampolines, wetsuit, whip

# P36-A08C [2015]

#### **Sports facilities**

Covers buildings, sports halls, pitches, sports grounds etc. Electrical details of sport facilities are coded under W04-X01F. Details of ice manufacture for e.g. ice rinks are coded under X27-F04.

AstroTurf®, arena, changing rooms, club, clubhouse, court, field, floodlights, goals, grass, gymnasium, ice rink, lockers, race course, race track, swimming pool, track

# P36-A08E [2015] Sports training and fitness training

This code is assigned with other P36-A codes as necessary i.e. training for specific sports is covered by P36-A08E together with the code for the particular sport. Inventions involving teaching of sports are covered by P85-A01N which is assigned with this code when both aspects are involved. Electrical aspects of sports training are covered by W04-X01A codes. Table tennis tables are also coded under P25-A01X.

Exercise bike, treadmill, table tennis

# P36-A99 [2015] Other aspects of sport and leisure

# P36-C [2015]

# Type of game

Electrical aspects of games are covered by W04-X02 codes, e.g. coin-operated games are covered by W04-X02A codes and video games by W04-X02C. Coin-operated games are also assigned T05-H05E.

# P36-C01 [2015]

#### **Board games**

Includes chess, checkers, draughts etc.

## P36-C03 [2015]

# Games involving tokens or pieces to be placed on a table or other flat surface

Includes dominoes and Mahjong.

# P36-C05 [2015]

# **Card games**

Inventions relating to card games played in a casino are also assigned P36-C09.

Bezique, blackjack, chemin-de-fer, clubs, deal, deck, diamonds, gin rummy, hearts, joker, Napoleon, pinochle, poker, rummy, shuffle, solitaire, spades, suit, trick, whist

# P36-C07 [2015]

### **Dice games**

Board or card games are covered by P36-C01 and P36-C05 respectively and this code is only assigned as well as those codes when the dice aspect is novel.

Die, face, marking, pips

# P36-C09 [2015]

### Casino games

Includes roulette. This code can be assigned with P36-C05 and P36-C07 respectively for casino games where the use of playing cards or dice is significant. P36-C09 also covers non-electrical aspects of coin- or token-operated 'amusement with prizes' ('AWP') games with spinning reels and the like. Coin-freed aspects of such games are covered by T05-H codes and electrical aspects by W04-X02A3.

Blackjack, chemin-de-fer, croupier, dealing shoe, deck, poker, roulette

### P36-C13 [2015]

# Games involving ball or balls confined by e.g. table.

This code includes pinball, bagatelle, ninepins etc. but not billiards, pool, snooker or table tennis, which are regarded as sports and covered by P36-A01.

Pachinko, table football, table hockey

# P36-C99 [2015]

## Other types of games

# P36-E [2015]

# Toys, playing equipment and novelty items

Electrical aspects of toys, playing equipment and novelty items are covered by W04-X03E codes.

# P36-E01 [2015]

#### Model vehicles

Includes model aircraft, boat, wheeled vehicle such as car or truck, racing track, train and train set, etc.

Model railway, model roadway

# P36-E03 [2015]

## **Construction toys and kits**

Includes toys comprising miniature bricks or basic mechanical elements which may be used to assemble model buildings, machines etc. and also kits of parts to assemble a specific model. Kits which can be made up into model vehicles are also assigned P36-E01.

Building set, construction set, self-assembly

### P36-E05 [2015]

### Dolls, stuffed toys, figures

Includes animated figures and puppets.

Character figure, knitted toy, marionette, plush toy, teddy bear, toy soldier

### P36-E07 [2015]

#### Outdoor toys and playing equipment

Includes skateboards, scooters and other ride-on vehicles for children, balls, slides, swings, for home/garden use and as playground equipment. Tree houses are also covered under Q46-B99.

Kite, merry-go-round, roller skates, roundabout, see-saw, tree house

## P36-E15 [2015]

## **Novelty items**

Includes tricks, humorous items such as jokes, collectible items etc. and complementary toys offered with fast-food meals or other products.

Cracker, favor, pennant, puzzle

#### P36-E99 [2015]

# Other aspects of toys, playing equipment and novelty items

# P36-F [2015]

# Entertainment and other venue-related equipment and systems

This code covers equipment and systems for use in venues for entertainment and similar purposes. Electrical aspects are covered by W04-X03G codes. Auditorium, cinema, concert hall, fairground, show ground, stage, theater, theme park

# P36-G [2015]

# Cleaning, maintenance/repair of sports, games, toys

This code is assigned with P36-A, P36-C, P36-E or P36-F codes as necessary.

# P36-M [2015]

# Manufacture/Pre-use treatment of sports, games, toys

This code is assigned with P36-A, P36-C, P36-E or P36-F codes as necessary.

# P36-X [2015]

Other aspects of sports, games, toys, amusements

# P4: Separating, Mixing

# P41: Crushing, centrifuging, separating solids, sorting

From 2015 manual codes have been assigned for all mechanical details of crushing, centrifuging, separating solids, and sorting. In this class the group codes P41-A, P41-E, P41-J and P41-K respectively refer to apparatus and methods for:
(i) crushing, pulverizing, disintegrating, and milling;

- (ii) separating solids (covered by P43 before 2015);
- (iii) centrifuging; and;
- (iv) sorting objects (covered by P43 before 2015).

To indicate novel constructional details suitable P41-T codes are also assigned and novel materials used in construction of apparatus are indicated by also assigning P41-T50. Materials processed or handled are indicated where possible in the respective code groups, otherwise by assigning P41-V codes with the code describing the equipment or process involved in the invention. Significant applications are indicated by assignment of P41-U codes.

# P41-A [2015]

# Crushing, pulverizing, disintegrating, milling

Although based on the use of similar processes the terms 'crushing' and 'milling' are used here as generally understood, e.g. 'milling' usually referring to production of smaller particles or powders and with regard to producing an output product with specific size or properties. For specific materials processed or handled search with P41-V codes. Milling of metals in the sense of surface cutting is not included and is covered in class P54. Crushing, pulverizing and disintegrating as part of a chemical engineering process is covered by class J02.

P41-A01 [2015]

Type of crushing equipment or process used

P41-A01A [2015]

Jaw crusher

Blake, Dodge, toggle, universal

P41-A01C [2015]

Cone crusher

Compound, multi-cylinder, Symons, single cylinder

P41-A01E [2015]

**Roll crusher** 

P41-A01G [2015]

**Gyratory crusher** 

Eccentric

P41-A01J [2015]

#### Hammer and impact crusher

Excludes mills such as hammer mills which are covered by P41-A03G.

Horizontal, vertical shaft impactor

P41-A01X [2015]

Other type of crushing equipment or process

P41-A03

Type of milling equipment or process used

Type of filling equipment of process used

[2015]

[2015]

P41-A03A Roller mill

P41-A03C [2015]

Disc mill

Buhrstone, flour mill, grist mill

P41-A03E [2015]

Ball mill/Tumbler mill

Cylinder, grinder, planetary, powder

P41-A03G [2015]

Hammer mill

P41-A03J [2015]

**Drum mill** 

P41-A03L [2015]

Stamp mill

P41-A03X [2015]

Other type of milling equipment or process

Includes jet mills.

P41-A04 [2015]

## Disintegrating based on cutting or tearing

Includes disintegrating using rotating or reciprocating knives, including shredders.

Cross-cut, paper shredder

P41-A05 [2015]

# External energy input for crushing, pulverizing, disintegrating, or milling

Includes driving of equipment using motors, engines, water or wind power and also secondary energy input using additional energy sources to facilitate the process, e.g. use of heating or ultrasonic energy to assist in breaking-up material. Novel electrical aspects are covered by X25-J.

Belt, chain, drive, gear, shaft

# P41-A07 [2015]

#### Pre-treatment of substances or materials

Novel arrangements for removing foreign bodies or unwanted materials from substances to be processed are covered by P41-T01C.

Tempering

P41-A07A [2015] Removing husks from e.g. grain Hulling

P41-A07X [2015]

Other pre-treatment of substances or materials

P41-A99 [2015]

Other aspects of crushing, pulverizing, disintegrating, milling

# P41-E [2015]

# **Separating solids**

P41-E codes cover the separation, e.g. in a stream, of solids from other solids and also from gases or liquids. Codes in this group are assigned together as necessary, e.g. dry separation of solid materials by means of screens or sieves is represented by P41-E01 and P41-E06; wet separation of solids involving pneumatic tables by P41-E03 and P41-E05. Novel details of apparatus for solid separation are indicated by assignment of an appropriate P41-T03 code with P41-E codes. Separation with the emphasis on sorting or grading is covered by P41-K codes. Separation as part of a chemical process such as evaporation, crystallization, solvent extraction, chromatography etc. is covered by class J01. Electrical aspects of separation are covered by X25-H codes.

# P41-E01 [2015]

#### Dry separation of solids

Covers separation of two kinds or sizes of solid material in a dry medium.

# P41-E03 [2015]

# Wet separation of solids and separation from gases

Covers separation of two kinds or sizes of solid material in a liquid medium and also separation of solids from liquids and from gases. Includes use of techniques such as filtering and (differential) sedimentation. Electrostatic precipitation of solid particles from a gas stream or cloud involving voltages applied from power supplies and the like is covered by X25-H02 codes.

#### P41-E05 [2015]

# Separating of solids using mechanical agitation

Includes use of pneumatic tables. This code is assigned with P41-E01 or P41-E03 codes as appropriate. Novel details of the agitating arrangement are also assigned P41-T03E.

# P41-E06 [2015]

## Separating solids based on size or weight

This code covers separation of solids based on size and weight where the solid materials are mixed together, including mixtures with liquids or gases. Sorting and grading of discrete objects, e.g. to separate them into distinct categories or in a 'pass/fail' test, is not included and is covered by P41-K codes.

# P41-E07 [2015]

# Separating solids using magnetic effects

Includes separation by magnetic/non-magnetic or paramagnetic/diamagnetic properties based on use of permanent magnets only. Magnetic separation using electromagnetism is covered by X25-H01.

# P41-E99 [2015] Other aspects of separating solids

#### P41-G [2015]

# Cleaning, maintenance or repair of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus

This code covers novel aspects of cleaning, maintenance or repair of apparatus covered by P41-A, P41-E, P41-J and P41-K codes which are also assigned as appropriate.

#### P41-J [2015]

# Centrifuges and centrifuging; cyclone apparatus

This code covers novel centrifuges and their use in separating, mixing, or other processes and also cyclones and similar devices based on vortex flow. Novel electrical aspects of centrifuges are covered by X25-J. Centrifuges and processes involving centrifuging for chemical engineering are covered in class J01.

Cyclonic separation, dust, hydrocyclone, particle, rotor, vessel

# P41-K [2015]

# Sorting and grading objects

These codes cover the sorting and grading of discrete objects, e.g. to separate them into distinct categories or in a 'pass/fail' test, as opposed to separating continuous streams of material as covered by P41-E06 codes. Electrical aspects of sorting are covered by T05-K codes and X25-F06.

## P41-K01 [2015]

# Sorting and grading objects based on specific property

Novel aspects of measurement of properties such as dimensions or weight are covered by S02 codes.

### P41-K01A [2015]

# Sorting and grading objects based on dimensions

Area, circumference, diameter, length, size, thickness, volume, width

#### P41-K01C [2015]

Sorting and grading objects based on weight

Mass

### P41-K01E [2015]

# Sorting and grading objects based on density

Buoyancy, floating, sinking

# P41-K01X [2015]

Sorting and grading objects based on other specific property

P41-K05 [2015]

### Sorting mail

Electrical aspects of mail sorting are covered by T05-K02.

P41-K99 [2015]

Other sorting and grading of objects

# P41-M [2015]

# Manufacture and testing of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus

This code covers novel aspects of manufacturing and testing of apparatus covered by P41-A, P41-E, P41-J and P41-K codes which are also assigned as appropriate.

# P41-T [2015]

# Constructional details of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus

These codes are assigned with P41-A, P41-E, P41-J and P41-K codes which are also assigned as appropriate to denote the type of apparatus or process in which they are used. For example P41-A01A is assigned with P41-T01A for novel details of hoppers for jaw crushers.

# P41-T01 [2015]

# Constructional details of crushing, pulverizing, disintegrating, or milling apparatus

This code and its subdivisions are assigned to highlight novel aspects of the construction of crushing, pulverizing, disintegrating, or milling apparatus and are assigned with P41-A codes as appropriate.

# P41-T01A [2015]

# Feeding arrangements, hoppers

Covers novel details of apparatus for introducing material to be processed to a crusher, mill, etc.

### P41-T01C [2015]

# Removing foreign bodies or unwanted materials

Includes arrangements to remove metal objects from e.g. crushers or mills and safety measures. Hydraulic relief system

### P41-T01E [2015]

#### Casings, frameworks

This code covers the main structural aspects of crushing, milling and similar machines as specified by P41-A codes, rather than the parts performing the crushing, milling, etc.

Case, enclosure, housing

# P41-T01F [2015]

# **Crushing elements**

Covers details of the part of a crusher that performs the actual crushing process, such as jaws (with P41-A01A).

Cone, hammer, impactor, roller

# P41-T01H [2015]

### Milling elements

Covers details of the part of a mill that performs the actual milling process, such as a millstone (with P41-A03C).

Ball, bedstone, buhrstone, burrstone, cylinder, roller, runner stone

# P41-T01J [2015]

### Sizing elements

Covers elements used in crushers or mills to control the size of material produced, e.g. by adjustment of crusher or mill components or the use of sieves or screens for which P41-E06 is also assigned.

#### P41-T01X [2015]

Other constructional details of crushing, pulverizing, disintegrating, or milling apparatus

# P41-T03 [2015]

# Constructional details of apparatus for separating solids

These codes are assigned with P41-E codes as appropriate to denote the type of apparatus in which they are used. For example P41-T03E is assigned with P41-E05 for novel details of vibrating or agitating devices used in separation.

# P41-T03A [2015]

# Feeding arrangements, hoppers

Covers novel details of apparatus for introducing material to be processed to a solid material separator.

#### P41-T03C [2015]

#### Filters, screens, sieves

Covers novel details of filters, screens, or sieves. The general code for apparatus and processes using this technique, P41-E06, is also assigned.

#### P41-T03E [2015]

# Mechanical agitators or shakers

Includes pneumatic tables and similar devices.

# P41-T03G [2015]

#### **Magnetic elements**

This code covers novel details of permanent magnets only and is assigned with the general 'magnetic separation' code. Magnetic separation using electromagnets is covered by X25-H01.

#### P41-T03X [2015]

# Other constructional details of solid separation apparatus

# P41-T05 [2015]

# Constructional details of centrifuge and cyclone apparatus

This code and its subdivisions are assigned with P41-J to denote novel details of apparatus based on centrifuging or cyclones.

# P41-T05A [2015]

# **Feeding arrangements**

Covers novel details of apparatus for introducing material to be processed to a centrifuge.

Inlet, outlet, stream

P41-T05C [2015]

## Housing, casing

Lid, vessel

P41-T05E [2015]

Rotor, sample or substance holder

P41-T05G [2015]

#### **Drive mechanism**

Novel electrical details are covered by X25-J. *Belt drive, gear, planetary* 

### P41-T05X [2015]

# Other constructional details of centrifuge apparatus

#### P41-T07 [2015]

## **Constructional details of sorting apparatus**

This code and its subdivisions are assigned with P41-K codes to denote novel details of apparatus based on sorting and grading objects.

# P41-T07A [2015]

# Feeding arrangements

Covers novel details of apparatus for introducing objects to be sorted.

P41-T07C [2015]

Housing, casing

P41-T07E [2015]

#### Discriminating arrangements

Covers novel details of apparatus for distinguishing objects to be sorted, e.g. weighing apparatus for which P41-K01C and S02-D codes are also assigned.

# P41-T07G [2015]

# **Output arrangements**

Includes bins or other receptacles receiving sorted articles and packing arrangements.

### P41-T07X [2015]

# Other constructional details of sorting apparatus

# P41-T50 [2015]

#### Novel constructional material

This code is used in conjunction with other P41-T codes to indicate the use of a novel material in a machine or similar. Specific details of novel materials are represented by codes outside P41, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.

#### P41-T99 [2015]

Other constructional details of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus

# P41-U [2015]

# Applications of crushing, pulverizing, disintegrating, milling, centrifuging or sorting apparatus

These codes are assigned as necessary to indicate significant applications of crushing, pulverizing, disintegrating, milling, centrifuging or sorting apparatus.

# P41-U01 [2015]

#### **Domestic**

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

Bathroom, bedroom, domestic appliance, fitted kitchen, home furnishings, household appliance, household product, living room

# P41-U02 [2015]

# Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

Bar, business, café, commerce, commercial, department store, enterprise, hotel, office, restaurant, rest-room, washroom

# P41-U03 [2015]

#### **Vehicles**

Includes land, air and space vehicles and watercraft.

# P41-U05 [2015]

#### Agriculture; Farming

Arable, chickens, cows, crops, dairy, ducks, eggs, field, goats, greenhouse, harvest, irrigation, lambs, pigs, pigsty, planting, plantation, poultry, sheep

# P41-U06 [2015]

#### Manufacturing plants

Factory, production line

# P41-U07 [2015]

# Food

Includes meat, fish, milk, dairy products and food processing in general as well as alcoholic and non-alcoholic beverages.

Baked goods, bakery, beer, biscuits, blast chill, bottling plant, brewery, butter, canned drinks, canned food, cheese, cider, corned beef, conveyor freezer, conveyor oven, cream, curing, distillery, dough, eggs, flash freezing, juice production, margarine, meat processing, mechanical recovery, pasteurizing, poultry, pressing, sterilizing, tinned food

# P41-U08 [2015]

### **Tobacco**

Cigar, cigarette, curing, drying, harvesting, planting

P41-U09 [2015]

# Packaging; Canning; Tinning; Bottling

Novel aspects of packaging are covered by codes in classes Q31 to Q34.

P41-U13 [2015]

Pharmaceutical; Medical

P41-U14 [2015]

Laboratory

P41-U17 [2015]

**Civil Engineering; Construction; Buildings** 

P41-U18 [2015]

Mining

P41-U20 [2015]

# Waste disposal, waste treatment, pollution control and recycling

Can be assigned with other specific codes as appropriate, e.g. P41-U03 for scrapping/crushing motor cars. Includes incineration of waste.

# P41-U99 [2015]

Other specific applications

# P41-V [2015] Materials processed or sorted

These codes are assigned to indicate that an invention is intended to process or handle specific materials. For materials used in the construction of apparatus covered in this class see P41-T50.

P41-V01	[2015]
Metals	
P41-V01A	[2015]
Iron	
P41-V01A1	[2015]
Cast Iron	
P41-V01B	[2015]
Aluminum	
P41-V01C	[2015]
Copper	
P41-V01D	[2015]
Lead	
P41-V01E	[2015]
Magnesium	
P41-V01F	[2015]
Zinc	
P41-V01G	[2015]

Titanium

P41-V01H	[2015]
Tin	
P41-V01P	[2015]
Alloys	
P41-V01P1	[2015]
Steel	
P41-V01P2	[2015]
Brass	

P41-V01X [2015]

Other types of metal

P41-V11 [2015]

Wood

Includes wood shavings or saw dust. *Timber* 

P41-V11A [2015]

**Fiberboards** 

P41-V12 [2015]

**Paper** 

P41-V13 [2015]

**Plastics** 

Covers processing or sorting of synthetic polymer materials. Novel aspects of such materials are represented by codes in section A.

P41-V14 [2015]

Glass

P41-V15 [2015]

Ceramic

P41-V20 [2015]

Concrete

P41-V22 [2015]

Stones; Rocks; Slate

Prior to 2016 crushing or milling of coal was covered by this code. From 2016 this topic is covered by P41-V28.

Boulder, ore

P41-V23 [2015]

**Bricks** 

P41-V28 [2016]

Coal, graphite

Prior to 2016 crushing of coal was covered by P41-V22.

P41-V50 [2015]

### **Composite materials**

This code can be used in combination with other P41-V codes to highlight the different components of the composite material.

P41-V60 [2015]

Agricultural produce

Arable, crops, field, greenhouse, harvest, irrigation, plant, plantation

P41-V60A [2015]

Grain

P41-V60C [2015]

#### Fruit or vegetables

Apples, bananas, beans, bilberries, blackberries, blueberries, cabbages, cauliflowers, courgette, gourds, grapes, legumes, lettuces, mangoes, marrows, nuts, parsnips, pears, peas, potatoes, raspberries, root-crops, strawberries, swedes, tomatoes, turnips, vegetables, yams

P41-V60X [2015]
Other agricultural produce

P41-V65 [2015]

Manufactured or processed foodstuffs

P41-V99 [2015]

Other materials processed

P41-X [2015]

Other aspects of crushing, centrifuging, separating solids, and sorting

# P42: Spraying, atomizing, coating, surface treatment and liquid application

From 2015 manual codes have been applied for mechanical aspects of apparatus and processes involving the handling of liquids and other flowing substances, e.g. for coating, surface treatment or other purposes.

# P42-A [2015]

# Type of spraying or atomizing apparatus

P42-A codes cover the type of apparatus for producing a spray, mist, jet etc. irrespective of its purpose and should be searched with P42-T for constructional details, and P42-U codes to link them to a specific application. Manufacture of apparatus for producing a spray, mist, jet etc. is covered by P42-M which is assigned with P42-A codes as appropriate. Liquid application arrangements involving direct contact between a surface to be coated and a liquid-carrying vessel or liquid-bearing element such as a roller are covered by P42-B codes. Details of spraying equipment for electrostatic coating are included as appropriate but electrical details are covered by X25-K01.

## P42-A01 [2015]

# Single nozzle or jet arrangements

Covers arrangements with a single aperture through which the flowing material passes.

#### P42-A03 [2015]

# Multiple nozzles or jet arrangements

Includes multiple nozzles or multiple apertures.

### P42-A03A [2015]

Spray nozzles or jets arranged in circular, spiral, rectangular or square pattern

Includes shower heads.

### P42-A03C [2015]

# Spray nozzles or jets arranged in linear pattern

Includes spray booms

Crop spray

#### P42-A05 [2015]

# Spray, jet or atomizing arrangements with variable characteristics

Covers arrangements involving variable characteristics of the nozzle, jet or other application arrangement itself and also variation in operation produced externally, e.g. by moving the whole apparatus, deflecting a jet, etc.

### P42-A99 [2015]

### Other aspects of spraying or atomizing

## P42-B [2015]

# Contact-based liquid application arrangements

Arrangements for applying liquids by means of spraying are covered by P42-A codes.

#### P42-B01 [2015

Involving immersion or passage through liquid bath

# P42-B03 [2015]

# Involving pouring or flowing of liquid over surface

Includes spin coating.

Spinner

P42-B05

[2015]

# Involving use of roller, brush or other liquid-bearing element

Includes use of spreaders.

P42-B99 [2015]

Other contact-based liquid application arrangements

#### P42-E [2016]

# Novel aspects of coating processes and related processes

P42-E codes are intended to focus on novelty in processes associated with applying coatings, whether equipment involved is novel or not.

#### P42-E01 [2016]

# **Novel coating processes**

All aspects of flocking are covered by P42-E05A which is assigned with P42-E01 as necessary.

#### P42-E03 [2016]

# Pre-treatment of surfaces to be coated and treatment of applied coatings

This code covers processes and methods for treating surfaces prior to coating and also processes and methods for treating a coating after it has been applied.

Baking, cleaning, degreasing, heating, smoothing

#### P42-E05 [2016]

# Processes for creating special textures or effects

This code covers processes and methods for creating a surface coating having specific properties.

Anti-adhesive, anti-corrosion, anti-friction, anti-slip, corrosion-proof, corrosion-resist, fine-textured, low-friction, lubricating, matt, matte, non-corrosive, rough-textured, rust-proof, rust-resist, texture

# P42-E05A [2016] Flocking

This code is assigned with P42-E01 to denote novel flocking processes.

Charge, electrostatic, fabric, fiber, particle, particulate, wallpaper

# P42-E99 [2016]

# Other aspects of coating and related processes

# P42-G [2015]

# Cleaning, maintenance/repair of spraying, atomizing, coating, surface treatment and liquid application apparatus

This code covers novel aspects of cleaning, maintenance and repair of apparatus covered by P42-A and P42-B codes which are also assigned as appropriate.

# P42-M [2015]

# Manufacture and testing of spraying, atomizing, coating, surface treatment and liquid application apparatus

This code covers manufacture and testing of apparatus covered by P42-A and P42-B codes which are also assigned as appropriate.

### P42-T [2015]

# Constructional details of spraying, atomizing, coating, surface treatment and liquid application apparatus

This code covers novel constructional aspects of apparatus covered by P42-A and P42-B codes which are also assigned as appropriate.

# P42-T01 [2015]

# Constructional details of arrangements for spraying, atomizing and directly applying fluids

These codes cover constructional details associated with the fluid atomizing, spraying, or liquid application apparatus itself. Arrangements for moving or modifying operation of spraying devices are covered by P42-T05 codes and details of housings and the like are covered by P42-T20.

### P42-T01A [2015]

# Constructional details of nozzles and spray heads

Includes shape, layout of spray head orifices, etc. as covered by P42-A codes. Arrangements for modifying the shape, form or direction of liquid spray or jet, whether by moving the whole spraying assembly or by the use of variable jets, are also assigned P42-T05A.

Aperture, shower head

#### P42-T01C

[2015]

# Constructional details of direct liquid application apparatus

Includes arrangements for pouring or otherwise transferring liquid to the surface being coated or treated, as covered by P42-B codes.

Brush, pad, roller, spout

#### P42-T01X

[2015]

Other constructional details of arrangements for spraying, atomizing and directly applying fluids

### P42-T03 [2015]

# Constructional details of baths or tanks for fluids

Includes containers for storing fluids and also for immersing surfaces to be treated or coated.

Bottle, reservoir, vat, vessel

#### P42-T05 [2015]

# Driving arrangements of spraying, atomizing, coating, surface treatment and liquid application apparatus

Covers constructional aspects of arrangements for moving or modifying operation of spraying, atomizing or direct liquid application devices, moving or agitating fluids, and moving surfaces to be coated or treated.

#### P42-T05A [2015]

# Driving or modifying operation of spraying, atomizing, and liquid application apparatus

Includes arrangements for varying operation by moving the spraying or atomizing head or the equipment as a whole, and also for changing part of the spraying or atomizing head e.g. to modify jet characteristics.

Angle, controllable, cross-section, deflect, variable

# P42-T05C [2015]

## **Driving fluids**

Includes pumps, compressors, etc., e.g. for pressurizing liquids and also arrangements for agitating or heating. Electrical aspects of spraying apparatus for electrostatic coating are covered by X25-K01.

Agitator, color changer, delivery control, gas, mixer, piston, pump, pressure, vibrate

# P42-T05E [2015]

# **Driving and holding workpieces**

Includes arrangements for moving the surface being coated or treated through the equipment or system.

Chain, conveyor, immersing, paint hanger, plunging

## P42-T05X [2015]

Other driving arrangements for spraying, atomizing, and liquid application apparatus

# P42-T20 [2015]

## Casings, frameworks and housings

Includes constructional details of enclosures and equipment as a whole.

Brace, bracket, drying booth, mounting, spray booth

# P42-T50 [2015]

### **Novel constructional material**

This code is used in conjunction with other P42-T codes to indicate the use of a novel material in a machine or similar. Specific details of novel materials are represented by codes outside P42, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.

# P42-T99 [2015]

Other constructional details of spraying, atomizing, coating, surface treatment and liquid application apparatus

# P42-U [2015]

# Applications of spraying, atomizing, coating, surface treatment and liquid application apparatus

These codes are assigned as necessary to indicate specific applications in conjunction with other P42 codes. In 'multiple use' cases the codes are not applied, or are only applied at a general level.

# P42-U01 [2015]

#### **Domestic**

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

Bathroom, bedroom, domestic appliance, fitted kitchen, home furnishings, household appliance, household product, living room

## P42-U02 [2015]

#### Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

Bar, business, café, commerce, commercial, department store, enterprise, hotel, office, restaurant, rest-room, washroom

## P42-U03 [2015]

#### **Vehicles**

Includes all land, air and space vehicles and also watercraft.

# P42-U05 [2015]

## **Agriculture; Farming**

Arable, chickens, cows, crops, dairy, ducks, eggs, field, forestry, goats, greenhouse, harvest, irrigation, lambs, logging, pigs, pigsty, planting, plantation, poultry, sheep

### P42-U06 [2015]

### Manufacturing plants

Factory, production line

### P42-U07 [2015]

### Food

Includes production of beverages such as soft and alcoholic drinks, as well as tea/coffee, processing of milk and dairy products, fish, meat and processed foods in general.

# P42-U08 [2015]

#### Tobacco

Cigar, cigarette, curing, drying, harvesting, planting

#### P42-U09 [2015]

# Packaging; Canning; Tinning; Bottling

Novel aspects of packaging are covered by codes in classes Q31 to Q34.

### P42-U13 [2015]

Pharmaceutical: Medical

P42-U14 [2015]

Laboratory

P42-U17 [2015]

**Civil Engineering; Construction; Buildings** 

P42-U19 [2015]

**Furniture** 

P42-U30 [2015]

## Sports, toys, entertainment and leisure

Includes sports equipment, sports stadiums, ice rinks, ski slopes, entertainment venues, leisure pursuits, games and toys. Specific details of inventions in these fields are covered by P36 codes in general and W04-X codes in the case of electrical aspects.

P42-U37 [2015]

Scented/therapeutic/insect repellent

P42-U40 [2015]

Industrial

Covers general or non-specific industrial applications not covered by other application codes.

P42-U41 [2015]

**General functional applications** 

P42-U41E [2015]

Insulating

P42-U41F [2015]

Waterproofing

P42-U41H [2015]

Coating

P42-U41H1 [2015]

Painting, lacquering, applying protective

coatings

P42-U50 [2015]

**Personal** 

P42-U99 [2015]

Other specific applications

P42-X [2015]

Other aspects of spraying, atomizing, coating, surface treatment and liquid application

# P43: Generating and using mechanical vibrations, cleaning, waste disposal

From 2015 manual codes have been applied for mechanical aspects of generation and use of mechanical vibrations, cleaning, and waste disposal. Prior to 2015 this class included separation of solids and sorting, now respectively covered by P41-E and P41-K codes.

# P43-A [2015]

# Generating and using mechanical vibrations

These codes cover the generation and use of mechanical vibrations for performing mechanical work and not for the purpose of generating audible sound. Audio transducers are covered by V06-V codes and sound production in general by P86 codes.

# P43-A01 [2015]

# Vibration generators

Electrical aspects of small-scale vibration generators are covered by V06-V04C and other V06 codes as appropriate. Large-scale (i.e. industrial) vibration generators with electrical aspects are covered by X25-L05.

## P43-A05 [2015]

# Coupling or transmitting mechanical vibrations

# P43-A99 [2015]

# Other aspects of generating and using mechanical vibrations

# P43-B [2015]

# Cleaning in general

See also under the specific item or substance being cleaned. P43-B01 codes and P43-B05 are assigned according to the form of the substance performing the actual cleaning. For example, a water tank for steam cleaning equipment is coded as P43-B01C and not P43-B01A. Dry cleaning (of textiles and garments) is not included and is covered by F03-J04 with electrical aspects also covered by X25-H09 (industrial scale) or X27-D09 (domestic scale).

#### P43-B01 [2015]

# Cleaning involving liquids, vapors or steam

# P43-B01A [2015]

# Cleaning involving liquids

Covers cleaning using liquid-phase materials only. The use of vapors, mists or aerosols of condensed fluid droplets is covered by P43-B01C.

Fluid, solution, solvent

### P43-B01C [2015]

## Cleaning involving vapors or steam

Includes steam cleaning and suspensions of e.g. fluid droplets in air.

Aerosol, droplet, mist, vapor

#### P43-B05

[2015]

## Cleaning involving air or gas flow

Includes use of gases or gas mixtures made up of substances normally existing in a gaseous state and also suction-based cleaning excluding domestic suction cleaners which are covered by X27-D04 codes. Cleaning using vaporized substances is covered by P43-B01C.

Air line, blast, canned air, compressed air

#### P43-B07

[2015]

# Cleaning involving external energy

Covers application of energy to the item or substance being cleaned to perform or expedite cleaning.

#### P43-B07A

[2015]

# Cleaning involving large-scale mechanical agitation

Agitate, shake, stir

#### P43-B07C

[2015]

# Cleaning involving sonic or ultrasonic energy

Electrical aspects of ultrasonic cleaning are covered by X25-H09A.

# P43-B07X

[2015]

### Cleaning involving other types of energy

Involves application of mechanical energy, e.g. in the form of impacts.

# P43-B08

[2015]

#### Measures to avoid the need for cleaning

Covers arrangements for confining dirt, dust, contaminants, etc. and also selection of surface characteristics to reduce adhesion of unwanted substances.

Contamination, contour, deposition, form, fouling, fumes, shape

#### P43-B99

[2015]

#### Other general cleaning

#### P43-E

[2015]

### **General solid waste disposal**

Dump, garbage, MSW, municipal solid waste, refuse, rubbish, tip, trash

# P43-E01 [2015]

## Solid waste disposal by burning

Novel aspects of apparatus for combustion are covered by Q73 codes.

Furnace, incinerator

#### P43-E03

[2015]

# Solid waste disposal by burying or dumping

Includes landfill disposal.

Bury, cover, compact

#### P43-E05

[2015]

# Solid waste disposal by treating or converting

Covers treatment of waste to reduce e.g. odor and conversion into useful product.

Deodorize, detoxify, make safe, recycle

#### P43-E99

[2015

# Other aspects of general solid waste disposal

# P43-G

[2015]

# Cleaning, maintenance/repair of apparatus for generating and using mechanical vibrations, cleaning or waste disposal

This code covers cleaning, maintenance or repair of apparatus or systems covered by P43-A, P43-B, P43E, and P43-J codes which are also assigned as appropriate.

Maintain, service, schedule

# P43-J

[2015]

#### Contaminated soil or ground treatment

Includes treatment of ground contamination to remove biohazards, toxins, and the like following chemical accidents or spillages or to reduce the effects of industrial pollution.

Reclamation

#### P43-M

[2015]

# Manufacture and testing of apparatus for generating and using mechanical vibrations, cleaning or waste disposal

This code covers manufacture of apparatus or systems covered by P43-A, P43-B, P43E, and P43-J codes which are also assigned as appropriate.

Build, evaluate, production line, QA, quality assurance

#### P43-T

[2015]

# Constructional details of mechanical vibration generators, cleaning and solid waste disposal apparatus

These codes are assigned with P43-A, P43-B, P43E, and P43-J codes which are also assigned as appropriate to denote the type of apparatus or process in which they are used. For example P43-A01 is assigned with P43-T01A for novel constructional details of driving arrangements for vibration generators. When novelty involves materials used in e.g. part of a machine, P43-T50 is also assigned.

#### P43-T01

[2015]

# Casings, housings and frames of mechanical vibration generators, cleaning and solid waste disposal apparatus

Case, enclosure, framework

#### P43-T05

[2015]

# Driving arrangements of mechanical vibration generators, cleaning and solid waste disposal apparatus

This code covers gearing and other mechanical aspects of equipment and machines. Novel electrical aspects are not specifically included and are covered by X25 codes and V06 or X11 codes for electric machine details.

Ball-race, bearing, clutch, crown-gear, drive-belt, gearbox, idler, lever, linkage, mechanical, mechanism, motor, pinion, pivot, pulley, rack-and-pinion, reciprocating, rotating, shaft, v-belt, worm-gear

### P43-T50

[2015]

#### **Novel constructional material**

This code is used in conjunction with other P43-T codes to indicate the use of a novel material in a machine or similar. Specific details of novel materials are represented by codes outside P43, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.

### P43-T99

[2015]

Other constructional details of mechanical vibration generators, cleaning and solid waste disposal apparatus

### P43-U

[2015]

# Applications of mechanical vibration generators, cleaning and solid waste disposal apparatus

These codes are assigned as necessary to indicate significant applications of apparatus for generating and using mechanical vibrations, cleaning, or waste disposal.

# P43-U01 [2015]

#### **Domestic**

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

# P43-U02 [2015]

#### Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

# P43-U03 [2015]

#### **Vehicles**

Includes all land, air and space vehicles and also watercraft.

P43-U05 [2015]

Agriculture; Farming

P43-U06 [2015]

Manufacturing plants

P43-U07 [2015]

Food

P43-U08 [2015]

**Tobacco industry** 

P43-U09 [2015]

# Packaging; Canning; Tinning; Bottling

Novel aspects of packaging are covered by codes in classes Q31 to Q34.

P43-U10 [2015]

Cooking and baking

P43-U13 [2015]

Pharmaceutical; Medical

P43-U14 [2015]

Laboratory

P43-U17 [2015]

**Civil Engineering; Construction; Buildings** 

P43-U18 [2015]

Mining

P43-U25 [2015]

Chemical engineering; Refinery/chemical

plant

P43-U26 [2015]

Metallurgy

# P43-U30 [2015]

# Sports, toys, entertainment and leisure

Includes sports equipment, sports stadiums, ice rinks, ski slopes, entertainment venues, leisure pursuits, games and toys. Specific details of inventions in these fields are covered by P36 codes in general and W04-X codes in the case of electrical aspects.

P43-U99

[2015]

Other specific applications

P43-X [2015]

Other generation and use of mechanical vibrations, cleaning, or waste disposal

# P5: Shaping metals

# P51: Metal Rolling, Drawing, Extruding

Electrical details of metal rolling, drawing and extruding are coded under X25-A02B and T06-D05A1 (control details).

General metal working where the technique is not specified is coded under P56-X.

# P51-A [2015]

# Metal rolling

Includes hot rolling, cold rolling, roll bending, roll forming, flat rolling, ring rolling, structural shape rolling and tube rolling.

Foil rolling

# P51-B [2015]

## **Metal drawing**

Includes sheet metal drawing and bar, tube and wire drawing. Electrical details of wire drawing are coded under X25-A02E.

Deep drawing

# P51-C [2015]

### Metal extruding

Includes hot, cold and warm extrusion.

Metal extrusion

# P51-G [2015]

# Maintenance and repair of rolling, drawing, extruding systems

Roll maintenance, de-scaling

# P51-R [2015]

# Recycling of rolling, drawing, extruding components

Electrical details of recycling systems are coded under X25-W04.

#### P51-T [2015]

# Constructional details of rolling, drawing, extruding systems

### P51-T01 [2015]

# Rolls; Rolling balance system

Includes backup rolls, work rolls, etc. Also includes roll mountings, arrangements to maintain correct position of rolls and roll changing devices.

Roller, rolling stand frame, interchanging rolls, overhead crane

# P51-T02 [2015]

## **Drive motors; Pinions; Gearing**

In-depth details of motors are covered by X11 codes.

Spindle

P51-T03 [2015]

Drums

Capstan

P51-T04 [2015]

**Grippers** 

P51-T05 [2015]

# Dies; Mandrels; Presses; Stocks

Includes draw bench. Also includes guides and supports of mandrels.

Die holder, extrusion press

#### P51-T20 [2015]

# **Control and safety arrangements**

Includes arrangements for freeing jammed rolls, preventing fracture of rolls or removing fumes. Electrical details are covered under T06-D05A1.

Breaker blocks, protection

# P51-T22 [2015]

#### **Cooling and lubrication arrangements**

This code can be used in conjunction with other P51-T codes, i.e. cooling arrangements of mandrels are coded under P51-T22 together with P51-T13. Includes cooling of finished workpieces.

Phosphate coating, cooling beds

#### P51-T25 [2015]

# Work feeding/guiding arrangements; Coiling

Includes arrangements for moving work between different stations/steps, turning over sheets, etc, arrangements for dealing with multi-layer sheets of metal, e.g. for separating the different sheets of metal after the rolling process, and for separating the work from the mandrel. Also includes arrangements for coiling metal wire or band.

# Carriage, drive

# P51-T99 [2015]

# Other constructional details of rolling, drawing, extruding systems

Includes arrangements for removing machining waste from the machine and storage of finished items.

Debris disposal, coilers, uncoilers, rams, plungers

P51-U [2015]

**Applications** 

P51-U03 [2015]

**Vehicles** 

Planes, cars, ships

P51-U40 [2015]

# **Industrial**

This code is applied for manufacture of industrial parts, such as blades, etc. Manufacture of vehicle parts are coded under P51-U03 only.

P51-U99 [2015]

Other specific applications

# P52: Metal Punching, Working and Forging

With the exception of metal punching, P52 codes cover metalworking processes where the workpiece is reshaped without adding or removing material.

Electrical details of metal forging are coded under X25-A02C and T06-D05A (control details), and electrical details of metal hammering, bending and punching are coded under X25-A02D and T06-D05A (control details).

# P52-A [2015]

#### **Preliminary treatment**

Includes preparation of metal stock. This code can be used in conjunction with P52-B, P52-C, or P52-D codes.

# P52-B [2015]

# **Metal punching**

Perforating, stabbing, piercing

P52-C [2015]

Metal

# forging/hammering/pressing/riveting

Forge furnace

P52-D [2015]

Metal working (excluding metal punching or forging)

P52-D01 [2015] Metal straightening/stretching

P52-D02 [2015]

#### Metal bending

Includes metal corrugating, metal coiling, flanging and edge-curling.

Twisting

P52-D03 [2015]

Stamping

P52-D04 [2015]

Spinning

P52-D05 [2015]

#### Metal drawing

Cold drawing, deep drawing

P52-D06 [2015]

#### Wire working

Includes wire coiling, bending, twisting, cutting, splitting, straining, etc.

# P52-D99 [2015]

### Other metal working processes

Includes flanging, etc. Also includes finishing details such as attaching head to a drawing-pin, and metal shaping using fluid pressure, shock waves, etc.

Chemical explosives, edge-curling, edgestrengthening, edge armoring

# P52-G [2015]

Maintenance and repair of punching, working and forging systems

# P52-R [2015]

# Recycling of punching, working and forging components

Electrical details of recycling systems are coded under X25-W04.

#### P52-T [2015]

# Constructional details of punching, working and forging systems

Constructional details of presses are also covered under P71, and constructional details of furnaces are also covered under Q77.

P52-T01 [2015]

**Bolster plates** 

P52-T02 [2015]

Dies; Die cushions

Die holder, die mounting

P52-T03 [2015]

Rams; Anvils; Hammers

P52-T04 [2015]

**Blank holders** 

Mounting

P52-T05 [2015]

Frames; Casing

Supports, feet

P52-T08 [2015]

**Mandrels** 

P52-T10 [2015]

**Burr prevention/removal arrangements** 

Shoulder prevention

P52-T20 [2015]

# **Control and safety arrangements**

Barrier guards, protection

# P52-T22 [2015]

# **Cooling and lubrication arrangements**

Includes cooling arrangements of finished workpieces.

Cooling beds

# P52-T25 [2015]

# Workpiece feeding/guiding arrangements

Includes feeding of wire.

# P52-T99 [2015]

# Other constructional details of punching, working and forging systems

 $Includes\ storage\ of\ finished\ items.$ 

Debris disposal

P52-U [2015]

**Applications** 

P52-U03 [2015]

**Vehicles** 

P52-U40 [2015]

#### Industrial

Manufacture of vehicle parts is coded in P52-U03 only. Also covers manufacture of tools, including garden tools, and locksmith items.

Propeller blade, turbine blade, nails, blacksmith, chain, key

P52-U50 [2015]

Personal

Hair pins

P52-U50A [2015]

**Jewellery** 

P52-U50B [2015]

**Haberdashery** 

P52-U99 [2015]

# Other specific applications

Includes manufacture of cutlery.

## P53: Metal Casting and Powder Metallurgy

# P53-A [2015]

# **Foundry Moulding**

Includes manufacture of moulds, cores and patterns. Details of cores/moulds per se are coded under P53-T02. Includes details for coating surfaces of mould / core / pattern and other finishing processes.

P53-B [2015]

**Metal Casting** 

P53-B01 [2015]

Types of metal casting

P53-B01A [2015]

**Continuous casting** 

P53-B01B [2015]

**Expendable mould casting** 

P53-B01B1 [2015]

Sand casting

P53-B01B2 [2015]

**Investment casting** 

Lost wax

P53-B01C1

P53-B01B9 [2015]

Other types of expendable mould casting

[2015]

P53-B01C [2015]

Non-expendable mould casting

Permanent mould casting

•

P53-B01C2 [2015]

Die casting

P53-B01C9 [2015]

Other types of non-expendable mould casting

Centrifugal casting

P53-B01X [2015]

Other types of mould casting

P53-B04 [2015]

**Pre-casting treatment** 

# P53-B05 [2015]

## **Post-casting treatment**

Includes removing castings from moulds, cooling castings (see also P53-T25) and cutting-off surplus material.

# P53-C [2015]

#### **Powder Metallurgy**

Fiber reinforcement is coded in M22-H03D. Post treatment/impregnation is coded in M22-H03E. Composite layers and materials are coded in M22-H03F. Metal matrix composites are coded in M22-H03F1. Ceramic matrix composites are coded in M22-H03F2.

# P53-C01 [2015]

#### Powder manufacture

Powder manufacture is also coded in M22-H01.

P53-C02 [2015]

**Powder blending** 

#### P53-C03 [2015]

# Compacting and/or sintering

Compacting only is also coded in M22-H03A, sintering only is also coded in M22-H03B, and compacting and sintering is also coded in M22-H03C. Selective laser sintering is coded under X25-A08C3.

# P53-C99 [2015]

# Other powder metallurgy details

#### P53-G [2015]

Maintenance and repair of foundry moulding, metal casting and powder metallurgy systems

Includes removal of tundish skulls. Skimming

# P53-R [2015]

# Recycling of foundry moulding, metal casting and powder metallurgy components

Electrical details of recycling systems are coded under X25-W04.

# P53-T [2015]

Constructional details of foundry moulding, metal casting and powder metallurgy systems

# P53-T01 [2015]

# Constructional details of moulding machines

Includes details of the system conveying liquid material to the mould such as gating system, riser and riser aids, ladles and tundishes.

Mould table, flask, sprue, pouring cup, gates, runners

# P53-T02 [2015]

### Moulds, cores or patterns

Includes additives for e.g. separating the casting from the mould, protecting the casting, etc. Machines used to make the moulds, cores or patterns are coded under P53-T01.

Binding agents, grain structure

P53-T05 [2015]

**Lubrication details** 

P53-T20 [2015]

### Control and safety arrangements

Barrier guards, supervision

P53-T25 [2015]

# Cooling arrangements of finished workpieces

Cooling of cast workpieces are also coded under P53-B05.

Cooling beds

P53-T99 [2015]

# Other constructional details of metal casting and powder metallurgy systems

Includes storage of finished items.

Debris disposal

P53-U	[2015]	
Applications		
P53-U03	[2015]	
Vehicles		

P53-U40 [2015]

Industrial

Turbine blade, engine valves, machine components

P53-U99 [2015] Other specific applications

P53-V	[2015]
Types of materia	als processed

P53-V02 [2015]

Ferrous metals

P53-V02A [2015]

**Cast iron** 

P53-V02B [2015]

Steels

P53-V02F [2015]

# Nickel-free special alloys

Additional code for special alloys, e.g. for medicinal devices.

P53-V02X [2015]

Other iron alloys

P53-V03 [2015]

**Light metals** 

P53-V03A [2015]

Aluminum (alloys)

P53-V03B [2015]

Magnesium (alloys)

P53-V03C [2015]

Titanium (alloys)

P53-V03X [2015]

Other lightweight alloys

P53-V04 [2015]

Group 11 elements; Coinage metals

P53-V04A [2015]

Copper

P53-V04A1 [2015]

Brass (Cu/Zn alloys)

P53-V04A2 [2015]

Bronze (Cu/Sn alloys)

P53-V04A9 [2015]

Other copper alloys

P53-V04E [2015]

Silver (alloys)

Ag

P: General P53-V04F [2015] Gold (alloys) Au P53-V04X [2015] Other precious metals/alloys P53-V05 [2015] **Refractory metals** P53-V05A [2015] **Chromium (alloys)** P53-V05B [2015] Molybdenum (alloys) P53-V05C [2015] Tungsten (alloys) P53-V05E [2015] Manganese This code is always applied even when a minor component. P53-V05X [2015] Other refractory metals and their alloys P53-V06 [2015] Soft metals P53-V06A [2015] Lead (alloys) P53-V06B [2015] Tin (alloys) P53-V06C [2015] Zinc (alloys) P53-V06X [2015] Other soft metals and their alloys P53-V07 [2015] Nickel (alloys)

[2015]

[2015]

This code is always applied even when a minor

P53-V08

P53-V09

component.

Cobalt (alloys)

Rare earth metals

P53-V10 [2015]
Composites with non-metallic inorganic materials

Non-metallic components are always coded even when a minor component.

P53-V10A [2015]

Silicon, silicides

P53-V10B [2015]

Boron, borides

P53-V10C [2015]

Carbon, carbides

P53-V10D [2015]

Oxygen, metal oxides

P53-V10E [2015]

Chalcogens (S, Se, Te)

P53-V10F [2015]

Silicates, glass, ceramics

P53-V10X [2015]
Other inorganic materials

P53-V11 [2015]

Composites with organic components, polymers

Includes metal/polymer composite materials, but not binders, lubricants or other auxiliaries.

# P54: Metal milling and other machining

P54 codes cover metal machining involving removal of material.

From 2015, electroworking details have been removed from P54 and are coded by X25 and X24-F (electric discharge machining). P54 remains searchable for electroworking for records prior to 2015.

General metal working where the technique is not specified is coded under P56-X.

P54-A	[2015]	
Turning		
P54-B	[2015]	
Boring and drilling		
P54-C	[2015]	
Milling		
P54-D	[2015]	
	volving removal of ng turning, boring and	
P54-D01 Planing; Slotting	[2015]	
	[2015] [2015]	
Planing; Slotting P54-D02		
Planing; Slotting P54-D02 Shearing P54-D03	[2015]	

# Filing; Rasping; Grinding Also includes abrading, honin

Also includes abrading, honing, lapping and sharpening of e.g. metal blades, razors or engine cylinders. Prior to 2021, grinding, filing and rasping of metal elements were coded by the combination of P61-A01 codes and P61-V26.

# P54-D06 [2021]

### **Polishing**; Burnishing

Prior to 2021, polishing and burnishing of metal elements were coded by the combination of P61-A03 and P61-V26.

Stropping, buffing

# P54-D99 [2015]

Other metal working involving removal of material (excluding turning, boring and milling)

Includes reaming bored holes.

# P54-E [2015]

Making gears or toothed racks
This code can be used in conjunction with other

P51 to P54 codes to highlight the method used.

P54-F [2015]

#### Thread cutting

This code can be used in conjunction with other P51 to P54 codes to highlight the method used. Includes cutting threads in screws, bolt heads and nuts.

# P54-G [2015]

# Maintenance and repair of milling and machining systems

Includes sharpening of saw teeth.

# P54-H [2015]

#### Small-scale/handheld machines

This code should be used in conjunction with P54-A, P54-B, P54-C or P54-D.

Watchmaker, portable

# P54-R [2015]

# Recycling of milling and machining components

Electrical details of recycling systems are coded under X25-W04.

# P54-T [2015]

Constructional details of milling and machining systems

P54-T01 [2015]

### Lathes

Includes lathes beds, headstocks and tailstocks.

# P54-T02 [2015]

# **Drives; Gears**

If part of a lathe, P54-T02 should be used together with P54-T01.

#### P54-T03 [2015]

#### Tools; Tool holders; Chucks; Mandrels

If part of a lathe, P54-T03 should be used together with P54-T01. Includes saw blades and arrangements for securing the tool in place.

Reamer, hacksaw, saw blade

P54-T05 [2015]

Frames; Casing Supports, feet

P54-T20 [2015]

**Control and safety arrangements** 

Barrier guard, safety guard, protection

P54-T22 [2015]

**Cooling and lubrication arrangements** 

P54-T25 [2015]

### Workpiece feeding/guiding arrangements

Also includes arrangements for ejecting finished workpiece.

P54-T99 [2015]

### Other constructional details of milling and machining systems

Debris disposal, scraping

P54-U	[2015]	
<b>Applications</b>		
P54-U03	[2015]	
Vehicles		
P54-U17	[2015]	
Building, constructi	on industry	
P54-U31	[2015]	
Weapons		
P54-U40	[2015]	
Industrial		
P54-U50	[2015]	
Personal items		
P54-U50A	[2015]	
Jewellery		
P54-U99	[2015]	
Other specific appli	ications	

#### P55: Welding and Soldering

From 2015, P55 manual codes have been assigned for mechanical details of soldering and non-electric welding. X24 codes should be used for electric welding, e.g. laser welding, arc welding, etc.

P55-A [2015]

#### **Pre-treatment**

This code should be used in conjunction with P55-B or P55-C for soldering/brazing or welding, respectively.

Preparation of surfaces, degreasing, oxides removal

P55-B [2015]

#### Soldering and brazing

See also X24-A codes.

P55-B01 [2015]

Soldering

P55-B02 [2015]

**Brazing** 

P55-B03 [2015]

Desoldering

Unsoldering

P55-C [2015]

#### Welding

Welding systems using electricity, such as arc welding, laser welding, ultrasonic welding, etc, are only coded under X24. Also includes details of scarfing two surfaces using flames.

P55-C01 [2015]

#### Gas welding/cutting

Includes gas cutting torches.

Gas flame welding, butane, propane

P55-C02 [2015]

#### Solid state welding

Includes cold pressure welding, diffusion welding, explosion welding, forge welding, friction welding, hot pressure welding and roll welding.

P55-C99 [2015]

#### Other types of welding

Includes exothermic welding.

P55-D [2015]

Soldering and welding media

P55-D01 [2015]

Solder, flux

Includes details of solder manufacture. See also X24-A01A.

P55-D03 [2015]

#### Welding rods and electrodes

Welding rods and electrodes feeders are coded under P55-T02B.

Wire

P55-D99 [2015]

Other soldering and welding media

P55-G [2015]

Repair and maintenance of soldering and welding systems

P55-R [2015]

Recycling of soldering and welding components

P55-T [2015]

# Tools; Protective equipment; Control; Feeder and Dispensers

Includes soldering/brazing and welding tools. (De)soldering irons are also coded under X24-A02A.

P55-T01 [2015]

#### Soldering torches; (De)soldering irons

Includes arrangements for guiding or supporting torches

Propane torch, soldering bit

P55-T02 [2015]

Feeders, dispensers and conveying systems

P55-T02A [2015]

Solder dispensers

Solder melting pan

P55-T02B [2015]

#### Welding rods and electrodes feeders

Details of welding rods and electrodes per se are coded under P55-D03.

#### P55-T02C [2015]

# Work conveying/supporting systems; Automatic welding systems

Includes arrangement for conveying work to be soldered/welded.

Driving mechanism, clamp

#### P55-T20 [2015]

# Control and safety arrangements; Protective equipment

Includes protective masks, goggles, etc. Includes details of fire protection (see also P35). From 2017, details of cooling and lubrication arrangements are coded under P55-T20 (previously coded under P55-T99).

Barrier guard, safety guard

#### P55-T99 [2015]

#### Other welding/soldering/brazing tools

Includes crocodile clips used as heat sinks, guides, cables and connectors. From 2017, details of cooling and lubrication arrangements are coded under P55-T20.

P55-U	[2015]	
<b>Applications</b>		
P55-U03	[2015]	
Vehicles		
P55-U17	[2015]	
Building, construction industry		
P55-U40	[2016]	

#### Industrial

Includes welding/brazing of pipes in air conditioning systems, in factory units, etc.

P55-U42	[2017]
Electronics	

Printed circuits

P55-U50 [2015]

**Personal items** 

P55-U50A [2015]

**Jewellery** 

P55-U99 [2015]

### Other specific applications

Includes details of specific structures made by soldering, welding or cutting, e.g. honeycomb structures.

# P56: Machine Tools; Post-treatment for metal working

Metal rolling, drawing and extruding are coded under P51. Metal punching, working and working are coded under P52. Metal casting and powder metallurgy are coded under P53. Metal milling and machining are coded under P54. Soldering and welding metal are coded under P55.

#### P56-A [2015]

#### Post-treatment for metal working

Includes treatment of finished surfaces/workpieces to improve resistance to wear or impact, etc. Knurling

#### P56-B [2015]

### Arrangements for setting precious stones to metal surfaces

Diamond, gemstone

#### P56-C [2015]

#### Copying

Includes methods and systems for copying directly from a master model.

#### P56-G [2015]

# General cleaning, maintenance/repair of machine tools

Includes restoring or reconditioning objects, such as repairing fractures or cracked metal parts.

#### P56-T [2015]

#### **Constructional details of machine tools**

Includes general details of machine tools. For specific applications, e.g. metal milling, metal rolling, etc, see P51 to P55 codes. Electrical details are coded under X25. Details of motors are coded under X11 and V06 for high power and low power, respectively.

### P56-T01 [2015]

#### Frames; Beds; Tool supports

Feet, casing, springs, tool holder

#### P56-T20 [2015]

#### Control, safety and cleaning arrangements

Includes protective covers, arrangements for preventing overload of tools, etc. Electric details are coded under X25 and T06 codes. Also includes cooling and lubrication arrangements, and cleaning arrangements for removing scrap from e.g. teeth of circular cutters, etc.

Control knobs, compensation, dust protection, splash guard

#### P56-T25 [2015]

### Workpiece holding/feeding/supporting arrangements

Includes arrangements for securing the workpiece in any desired position.

Clamps, index, guide

#### P56-T99 [2015]

#### Other details of machine tools

Includes equipment for storing tools when not in operation and combination of multiple metalworking machines.

P56-U	[2015]	
Applications		
P56-U03	[2015]	
Vehicles		
P56-U17	[2015]	
Building, constructio	n industry	
P56-U31	[2015]	
Weapons		
P56-U40	[2015]	
Industrial		
Tools		
P56-U50	[2015]	
Personal items		
P56-U50A	[2015]	
Jewellery		
P56-U99	[2015]	
Other specific applications		

### P56-X [2015]

# Unspecified metal working processes and systems

Includes general metal working where the technique is not specified.

### P6: Shaping non-metals

#### P61: Grinding and polishing of non-metals

From 2015, P61 has been subdivided to cover mechanical details of grinding and polishing equipment and processes. See also X25-A03C codes for electrical details. Shaping and working of metals are coded by P51 to P56 codes.

#### P61-A [2015]

#### Types of grinding and polishing systems

These codes are applied to highlight the general type of grinding/polishing machine/mechanism. Use with other P61 codes as appropriate.

#### P61-A01 [2015]

# Grinding, abrading, honing, lapping, sharpening

Prior to 2021, grinding, filing and rasping of metal elements were coded by the combination of P61-A01 codes and P61-V26. From 2021, these are now coded under P54-D05 only.

Sanding

P61-A01A [2015]

**Sharpening** 

P61-A01B [2015]

#### Honina

Includes honing of engine cylinders. See also Q51-A codes for IC engine details.

P61-A01C [2015]

Lapping

P61-A03 [2015]

#### Polishing, burnishing

Prior to 2021, polishing and burnishing of metal elements were coded by the combination of P61-A03 and P61-V26. From 2021, these are now coded under P54-D03 only.

Stropping, buffing

P61-A20 [2015]

**Grinding/polishing mechanism**Use with P61-A01 codes as appropriate.

P61-A20A [2015]

Rotary, e.g. using grinding/polishing discs

Angle grinder, rotary polisher

P61-A20B [2015]

Linear/reciprocating, e.g. using grinding/polishing belts

Belt sander

P61-A20C [2015]

Blasting with particulate material

P61-A20G [2015]

Portable grinding

P61-A99 [2015]

Other types of grinding and polishing systems

P61-F [2015]

# Measuring, indicating, controlling grinding/polishing equipment

Includes all control and monitoring details. Use with e.g. X25, T06 and S02 codes as appropriate.

#### P61-G [2015]

# Cleaning, dressing, maintenance/repair of grinding equipment

Includes cleaning of grinding/polishing equipment, dressing/conditioning of grinding surfaces, etc.

P61-M [2015]

# Manufacture of grinding and polishing apparatus/media

Includes manufacture of grinding/polishing machines and their parts.

P61-R [2015]

# Recycling of grinding and polishing components/media

Includes recovery and re-use or recycling of blast media, e.g. grit, soda.

P61-T [2015]

Constructional details of grinding and polishing systems

P61-T01 [2015]

Frames, beds, casings

Also see Q68 class.

P61-T02 [2015]

Headstocks; working spindles

#### P61-T03 [2015]

#### Work support, table, conveyor belts

Also see Q35-B for mechanical conveyors per se, and X25-F01 for electrical details.

Jigs

#### P61-T04 [2015]

#### **Drive devices**

Includes drive shafts, gearing, 90-degree drive adapters etc.

#### P61-T08 [2015]

#### Abrasion devices and media

Includes grinding/polishing discs, wheels and drums, grinding/polishing bands, and abrasion material blast devices and their media *Grinding pads, sanding belt, nozzle, impeller* 

P61-T10 [2015]

#### Safety devices

Includes protective guards.

#### P61-T12 [2015]

### **Dust extraction and suppression; Debris** collection

Includes devices for collecting/recovering materials resulting from grinding or polishing. Recycling of grinding and polishing media is covered by P61-R. *Dust cover* 

#### P61-T13 [2015]

#### **Cooling and lubricating equipment**

Includes cooling slots in grinding wheels as well as coolant/lubricant supply arrangements.

#### P61-T99 [2015]

### Other constructional details of grinding and polishing systems

### P61-U [2015]

#### **Applications**

See other P and Q classes for mechanical applications and S-X codes for electrical applications.

#### P61-U01 [2015]

#### **Domestic**

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

### P61-U03 [2015]

#### **Vehicles**

Includes motor vehicles, trains, boats and aircraft.

P61-U05 [2015] Agriculture; Farming; Logging

P61-U07 [2015]

#### Food

See D11-D14 codes for further details of foodstuffs.

P61-U08 [2015]

#### **Tobacco**

See P15 codes for details of tobacco per se.

#### P61-U13 [2015]

#### Pharmaceutical; Medical

See P3 codes for mechanical details of medical equipment.

#### P61-U17 [2015]

#### **Civil Engineering; Construction; Buildings**

Includes grinding of materials used in roads, railroads, waterways, canals, buildings. See Q4 codes for further details of civil engineering and construction.

Railway

#### P61-U18 [2015]

#### **Mining; Drilling**

See P61-V22 for grinding of ores, coal etc. See P61-A01A also for sharpening of drill bits.

#### P61-U19 [2015]

#### **Furniture**

Includes grinding and polishing of wood during cabinet making and furniture construction.

Chair, sofa, table, bed

#### P61-U20 [2015]

#### Waste disposal, waste treatment, recycling

Includes grinding materials for recycling. Can be assigned with other specific codes as appropriate, e.g. P61-U03 for scrapping/crushing motor cars.

### P61-U99 [2015]

Other specific applications

#### P61-V [2015

#### Materials ground or polished

#### P61-V11 [2015]

#### Wood

See X25-A10 for electrical details of wood working.

#### P61-V13 [2015]

#### Plastic; Composite; Rubber; Resin

See section A codes for polymers per se.

### P61-V15 [2015]

**Glass** 

See L01 codes for glass per se.

#### P61-V20 [2015]

#### Ceramic; Porcelain; Concrete

Includes grinding of tiles and bricks. See L02 codes for ceramics/cement per se.

#### P61-V22 [2015]

#### Stone; Rock; Ores; Slate, Minerals

Includes grinding of all rocks, stones, ores/minerals.

Granite, sandstone, coal, chalk, diamonds, sapphires, gemstones

### P61-V26\* [2015-2020]

#### **Metals**

\*This code is now discontinued and transferred to P54-D05 for grinding, honing and sharpening of metal elements, and P54-D06 for polishing and burnishing of metal elements. It remains searchable for records prior to 2021.

### P61-V99 [2015]

#### Other materials processed

#### P62: Hand tools, cutting

P62-A [2015]

Types of hand/portable power tools

P62-A01 [2015]

Pliers; tweezers

P62-A02 [2015]

Spanners; wrenches

Includes ring, open ended, ratchet wrenches and socket sets.

Torque wrench, spanner

P62-A03 [2015]

**Screwdrivers** 

Includes impact driver.

P62-A04 [2015]

Wire/strip fastening, connecting and tensioning tools

P62-A05 [2015]

#### Fastening/separating tools

Includes tools for fastening or connecting two or more parts together with or without deformation and for unfastening parts. For application of nails/staples see Q61-A06. Includes tools for inserting bearing races, cotter pins, bushes etc. and removing broken drill bits.

P62-A06 [2015]

#### Nailing and stapling tools

Includes hand-held stapling tools, and nail/staple punching, extracting and straightening tools. Includes tools for applying other fastening elements.

Nail gun, staple gun, stapler

P62-A07 [2015]

**Hammers** 

Includes all types of hammer.

Club hammer

P62-A08 [2015]

Chisels

P62-A75 [2015]

#### **Combination or multipurpose** hand/portable tools

Includes tools with multiple functions. Can be applied in conjunction with other individual tool types as required.

P62-A99 [2015]

Other hand/portable tools (except cutting)

[2015]

#### Hand cutting/perforating/punching tools

Includes tools for cutting, bevelling, grooving, slitting, punching, perforating, cutting-out, shaving.

P62-B01 [2015]

**Punching**; punches

Includes centre punches and other punching tools.

P62-B02 [2015]

**Perforating** 

P62-B04 [2015]

**Cutting-out; Stamping-out** 

Includes press-type tools.

P62-B05 [2015]

Knives

P62-B07 [2015]

Scissors; shears

Garden shears, pinking shears

P62-B08 [2015]

Clippers; shavers

P62-B09 [2015]

**Razors** 

P62-B10 [2015]

Axes; hatchets

P62-B50 [2015]

#### Severing/tearing devices

Includes arrangement for severing workpiece/material without cutting, e.g. by heating or squeezing.

P62-B99 [2015]

Other hand/portable cutting tools

P62-D [2015]

Workshop equipment; work holders; vices; clamps

P62-D01 [2015]

Work benches; stands; trestles; supports

Includes benches, tables, supports, jigs etc. on which workpiece is being machined/worked.

#### P62-D02 [2015]

#### Vices; clamps; gripping heads

Includes arrangements for gripping tools or workpieces. Includes magnetic and vacuum work holders.

Sash clamp, G-clamp, workpiece holder

### P62-D03 [2015]

#### Workpiece/material feeding

Includes arrangements for feeding workpiece being machined.

#### P62-D05 [2015]

**Tool storage** 

Includes tool storage boxes, racks, trays.

# P62-D08 [2015] Marking out or setting out work

Includes scribes.

### P62-D99 [2015]

#### Other workshop equipment

### P62-E [2015]

#### **Manipulators**

Includes mechanical details of manipulators. See also Q35-B. See X25-A03E for electrical details of manipulators.

#### P62-F [2015]

# Measuring, indicating, sensing, controlling hand/portable tools

Includes mechanical control elements and program control. See T06 for general electrical control and T01 for computer control as appropriate.

#### P62-G [2015]

### Cleaning, maintenance/repair of hand and cutting tools

Includes arrangements for cleaning, lubricating and sharpening tools. See P61-A01A for sharpening per se

Refurbishment

#### P62-M [2015]

# Manufacture/Pre-use treatment of hand and cutting tools

Includes equipment and methods of manufacturing the hand/cutting tool per se.

#### P62-T [2015]

### Constructional details of hand and cutting tools

#### P62-T01 [2015]

# Handles and handle attachment arrangements

#### P62-T02 [2015]

#### **Tool bits**

Includes screwdriver bits, wrench bits/sockets, and bit holders/chucks.

#### P62-T03 [2015]

Hammer heads

#### P62-T04 [2015]

#### **Drive arrangements**

Includes percussion arrangements, such as electromotors, electromagnetic drives, centrifugal and rotary drive arrangements, fluid pressure drives, e.g. using compressed air, IC engines or detonation of cartridge, and mechanical drives, such as ratchet mechanisms, cams, cranks, worms, gearing etc. Also includes joints, wrists and arms used in manipulators. See X25-A03 codes for electrical aspects of hand tools.

Drive mechanism

#### P62-T05 [2015]

#### **Noise/vibration dampers**

Includes vibration absorbing.

#### P62-T06 [2015]

#### **Dust/waste extraction**

Includes removal of waste material and dust.

#### P62-T07 [2015]

#### Safety devices

Includes guards and sheaths.

#### P62-T08 [2015]

#### Chambers

Includes chambers provided with manipulator devices or holes to allow working by hand.

#### P62-T10 [2015]

#### Heating and cooling arrangements

#### P62-T12 [2016]

#### **Cutting elements/blades**

Includes cutting surfaces and blades. Also see P62-B codes for type of cutting device.

Razor blade, cutter, knife

#### P62-T50 [2015]

#### **Novel constructional materials**

Novel materials only. Should be used in conjunction with other P62-T codes.

P62-T99 [2015]

Other constructional details

P62-U [2015]

**Applications** 

See S-X codes for electrical applications.

P62-U01 [2015]

**Domestic** 

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

P62-U02 [2015]

Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

P62-U03 [2015]

**Vehicles** 

Includes hand tools for assembling vehicles (see Q16-D codes also) or parts of vehicles.

P62-U05 [2015] Agriculture; Farming; Logging

Includes shears for shearing sheep and well as shears for cutting grass.

P62-U07 [2015]

Food

P62-U08 [2015]

Tobacco

P62-U13 [2015]

**Pharmaceutical; Medical** 

Includes fastening of wires/rods/bolts used in surgical applications.

P62-U17 [2015]

**Civil Engineering; Construction; Buildings** 

P62-U18 [2015]

Mining; Drilling

P62-U99 [2015] Other specific applications P62-V [2015]

Materials machined/cut

P62-V11 [2015]

Wood

See X25-A10 for electrical details of wood working/cutting.

P62-V12 [2015]

**Paper** 

P62-V13 [2015]
Plastic; Composite; Rubber; Resin

See section A codes for polymers per se.

P62-V15 [2015]

Glass

P62-V20 [2015]

Ceramic; Pottery; Porcelain; Concrete

P62-V22 [2015]

Stone; Rock; Ores; Slate, Minerals

Includes grinding of all rocks, stones, ores/minerals.

Sandstone, chalk, diamonds, sapphires, gemstones

P62-V31 [2015]

**Fabric: Leather** 

P62-V99 [2015]

Other materials processed

#### P63: Working, preserving wood

P63-A [2015]

# Types of wood working/preserving systems

Includes working and treating of bark, cane, cork, straw, reeds etc.

#### P63-A01 [2015]

#### De-barking; removing branches/twigs

Includes peeling of osier rods and stripping bark from tree trunks.

P63-A02 [2015]

**Splitting** 

P63-A03 [2015]

#### **Cutting**; sawing

Includes circular saws, gang saws, reciprocating saws, band saws, strap saws, chain saws, etc.

Saw wires, twisted saw strips, cylinder saws

#### P63-A05 [2015]

#### Planing; milling; sanding

See P61-A01 for grinding/sanding in general. *Grinding* 

P63-A08 [2015]

**Drilling** 

P63-A09 [2015]

Routing

P63-A10 [2015]

**Turning** 

Includes lathe to turn wood.

P63-A15 [2015]

#### **Joining**

Includes jointing, nailing, stapling, gluing and pressing.

Dovetails, mortises, tenons, dowels, biscuit

P63-A18 [2015]

#### Bending

Includes bending wood e.g. by steam or pressure.

#### P63-A30 [2015]

#### Wood treating/preserving

Includes staining, impregnating, dyeing, bleaching and dampening wood, reeds, cork etc.

#### P63-A99 [2015]

#### Other types of wood working/preserving systems

#### P63-G [2015]

# Cleaning, maintenance/repair of wood working/preserving systems

Includes arrangements for clearing sawdust and shavings from wood working tools. Includes sharpening of cutting blades and lubrication of tool drives. Includes cleaning of implements used to dye, varnish or stain workpieces.

#### P63-M [2015]

# Manufacture of wood working tools/workpieces

Includes methods of manufacturing wood working tools

#### P63-R [2015]

### Recycling/recovery of wood/timber; Use of waste material

Includes all processes for manufacturing wood wool, wood shaving/chips, wood fibers and wood powder / sawdust whether from waste wood/timber or not.

#### P63-T [2015]

# Constructional details of wood working and preserving systems

#### P63-T01 [2015]

#### Wood splitting tools

Includes wedges, knives, spreaders, chopping blocks etc. For splitting wood.

#### P63-T02 [2015]

#### Saw blades/cutting elements

Includes saw blades, chains, wires and toothed cylinders for all types of power and hand saws. Also includes saw blade tensioning arrangements.

Cutter blocks

#### P63-T03 [2015]

# Planes/Spokeshaves blades/blade adjusters

P63-T04 [2015]

#### **Sanding elements**

Includes wood sanding blocks.

#### P63-T05 [2015]

#### **Drive arrangements**

Includes drive shafts, gearings, worms.

### P63-T06 [2015]

**Braking arrangements** 

#### P63-T07 [2016]

#### **Drilling/honing/routing elements**

Includes auger/router bit and drill bits per se.

#### P63-T13 [2015]

### **Heating and cooling arrangements**

Includes hot tables for warming veneers.

P63-T14 [2015]

Lubricating arrangements

#### P63-T19 [2015]

# Fastener feeding, driving, bending arrangements

Includes feeding and inserting nails and staples.

#### P63-T20 [2015]

# Work benches; frames; pillars, workpiece guides; clamps

Includes guide fences and stops for saw mills or sawing machines, static and portable clamps, presses e.g. used to adhere veneer or form plywood, arrangements for feeding, loading, turning and conveying timber/wood and feed chains/rollers.

Work tables, stops, presses, workpiece feeders, G-clamp, sash clamp

#### P63-T99 [2015]

# Other constructional details of wood working/preserving systems

P63-U [2015]

**Applications** 

P63-U03 [2015]

**Vehicles** 

Includes wooden dashboards and other vehicle parts.

P63-U05 [2015]

Trees; Logging; Timber

Includes sustainable forest management.

P63-U08 [2015]

**Tobacco** 

Includes wooden pipes.

#### P63-U17 [2015]

#### **Civil Engineering; Construction; Buildings**

Includes recovery and reconditioning of railway sleepers. Also includes manufacture of wooden stairs, handrails. See Q4 codes for further details.

P63-U18 [2015]

**Mining; Drilling** 

Includes wooden mine props/supports.

P63-U19 [2015]

**Furniture** 

Includes manufacture of wooden chairs, tables, cupboards etc.

Sofa, bed

#### P63-U30 [2015]

#### Sports, toys, entertainment and leisure

Includes wooden bats and racquets, bowling pins etc. See P36 for sports equipment per se.

P63-U50 [2015]

Personal

Includes manufacture of wooden walking sticks and jewellery.

P63-U99 [2015]

Other specific applications

#### P64: Working cement, clay, stone

P64-A [2015]

Clay/Clay mixture production/processing

P64-A01 [2015]

#### Producing/processing clay suspensions

Includes production and processing of clay slurries and fluidic clay compositions, e.g. by blunging.

P64-A02 [2015]

### Producing/processing clay non-fluidic compositions

Includes homogenizing, comminuting and conditioning clay in non-fluidic condition.

P64-A99 [2015]

Other types of cement, clay, stone working systems

P64-C [2015]

Shaping clay/clay mixtures

P64-C01 [2015]

Casting

Includes centrifugal/rotational casting and slip casting.

P64-C02 [2015]

Moulding

Includes all types of moulding.

P64-C03 [2015]

#### Working shaped/moulded articles

Includes attaching handles and spouts as well as refinishing (corrugating, smoothing), removing burrs etc.

P64-C04 [2015]

#### Finishing shaped/moulded articles

Includes coating, glazing, curing, setting and hardening of moulded articles.

P64-C99 [2015]

Other cement/clay shaping

P64-E [2015]

Working stone/stone-like materials

P64-E01 [2015]

**Cutting**; splitting

Includes cutting stone into slabs, splitting slates etc.

P64-E03 [2015]

**Boring; drilling** 

P64-E05 [2015]

Turning; milling; planing

P64-E50 [2015]

**Working specific materials** 

P64-E50A [2015]

Stones; Rocks; Bricks; Concrete; Tiles

Includes working of granite, limestone, sandstone, chalk, bricks, tiles, concrete, pottery, mica, slate, schist etc.

P64-E50E [2015]

Gems; jewels; crystals

Includes precious stones.

P64-E50Z [2015]

Other specific materials

P64-E99 [2015]

Other stone working arrangements

P64-G [2015]

# Cleaning, maintenance/repair of cement, clay, stone working systems

Includes dressing milling discs and rollers. Also includes cleaning of clay/stone/cement machinery and produced articles.

P64-R [2015]

# Recycling/recovery of cement, clay, stone working components

Includes recycling of used clay/slip.

P64-T [2015]

Constructional details of cement, clay, pottery, stone working systems

P64-T01 [2015]

Moulds; cores; mandrels

Includes novel aspects of all types of mould, core or mandrels.

P64-T02 [2015]

Work/material

support/conveying/feeding/discharging

Includes feeding/discharging material as well as moving moulds on conveyor.

P64-T03 [2015]

**Cutting devices** 

Includes saws and chisels.

P64-T04 [2015]

**Drills; boring devices** 

Drill

P64-T05 [2015]

Turning/milling/grinding machines/devices

See also P61 for specific grinding/milling equipment in general.

P64-T10 [2015]

**Safety devices** 

Includes protective guards.

P64-T12 [2015]

**Dust extraction/suppression** 

P64-T13 [2015]

Heating; cooling; (de)humidifying

equipment

Includes means for heating or cooling material in mould.

P64-T99 [2015]

Other constructional details

### **P7: Pressing, Printing**

#### P71: Presses

Details of all types of presses and their operation and structure etc.

P71-A [2015]

**Press Type/Function** 

P71-A01 [2015]

**Types of presses** 

P71-A01A [2015]

#### Press brake; frame-type press

Includes C-frame presses, open-frame presses, open back inclinable presses and press brakes.

P71-A01B [2015]

**Horn press** 

P71-A01C [2015]

**Arch press** 

P71-A01D [2015]

Straight-side press

P71-A01E [2015]

**Turret press** 

Turret punch

P71-A01X [2015]
Other specific types of presses

Includes non defined press types and presses other than defined in A01A to A01F codes.

P71-A10 [2015]

Main press function

P71-A10A [2015]

#### Forming/Shaping

Includes using presses for bending, forming, drawing, cold-working, hot-working, seaming, stamping.

P71-A10C [2015]

Punching; blanking; broaching

Includes cutting shapes out of material, e.g. using blanking tool.

Broaching

P71-A10E [2015]

**Baling** 

Includes using baling press for e.g. waste paper.

#### P71-A10F [2015]

# Compacting/consolidating material, e.g. scrap material

Includes crushing for e.g. cars. Compacting press. *Car crusher* 

#### P71-A10H [2015]

#### Squeezing out liquids from materials

Squeezing-out liquid from liquid-containing material, e.g. juice from fruits, oil from oil-containing material, filtering, e.g. straining solids from liquids, using presses in combination with filtering elements expelling water from textile fabrics or laundry.

Fluid expel, oil expel, water expel

P71-A10X [2015]

Other specific press functions

### P71-B [2015]

#### **Press action**

Electrical details of presses are coded under X25.

#### P71-B01 [2015]

### Using press ram/platen

Includes presses using hydraulic/pneumatic drive, mechanical drive, levers, toggle mechanisms, screws, rack and pinion, and eccentric shafts, cams, cranks and knuckle joints.

Bramah press, chains, ropes

#### P71-B03 [2015]

#### **Using rotary press members**

Includes presses using rotary worms and screws, rotary rollers, rings and discs.

Rotary press, screw press

### P71-B99 [2015]

#### Using other press types/actions

Includes presses using deformable member, e.g. diaphragm, or endless steel bands used e.g. for producing chipboard.

Diaphragm press, filter press

P71-T [2015]

**Press construction** 

P71-T01 [2015]

#### Frames; Beds

Includes beds e.g. for solid-bed, open-bed and adjustable bed presses. Also includes supports and feet.

P71-T02 [2015]

**Bolster plates** 

P71-T03 [2015]

Platens; Rams; Anvils

P71-T05 [2015]

**Drive arrangements** 

Includes gears, brakes, clutches and flywheels.

P71-T07 [2015]

Dies; Die sets; Die shoes

Die cushions

P71-T08 [2015]

**Rollers: Screws** 

Includes pocketed rollers e.g. used to form tablets.

P71-T15 [2015]

Hydraulic and pneumatic systems

Includes press cylinders, pistons. *Cylinder* 

P71-T20 [2015]

**Control and safety arrangements** 

Includes measuring, indicating and controlling systems (mechanical details only).

Monitoring, safety

P71-T22 [2015]

Heating, cooling and lubrication arrangements

P71-T25 [2015]

Material feed/discharge/conveying

Includes blank holders.

P71-T50 [2015]

**Novel material details** 

Novel materials used for the press constructions only. Should be used in conjunction with other P71 codes as appropriate.

P71-T99 [2015]

Other constructional details

Includes press accessories such as knives, knife mountings, etc.

P71-U [2015]

**Application of Presses** 

Characterized by what the press is used for.

P71-U03 [2015]

**Vehicles** 

For scrapping/crushing motor cars, and other vehicles.

P71-U05 [2015]

**Agriculture; Farming** 

Includes arable farming, sowing and harvesting. See P71-A10E for baling.

Baler

P71-U06 [2015]

Manufacturing plants

Includes application of presses used in manufacturing plants.

P71-U07 [2015]

**Food industry** 

Includes food shaping, e.g. for shaping dough, and oil pressing.

Olive oil

P71-U11 [2015]

**Printing industry** 

Electrical details of printing presses are covered by S06-C codes.

P71-U13 [2015]

Pharmaceutical; Medical

P71-U13A [2015]

**Pharmaceutical** 

For tabletting pressing.

P71-U13B [2015]

Medical

Includes the use of presses for the medical industry.

P71-U20 [2015]

Waste disposal and recycling

Can be assigned with other specific codes as appropriate, e.g. P71-U03 for scrapping/crushing motor cars.

Biomass waste briquetting, wood waste for making fuel logs

P71-U99 [2015]

Other specific applications

Applications of presses for uses not mentioned above.

P71-V [2015]

Types of materials pressed

Characterized by the types of materials being pressed.

P71-V01 [2015]

Metals

### P71-V11 [2015]

Wood

E.g. for wood shaving or saw dust, forming chipboard.

Chipboard press

P71-V12 [2015]

Paper

P71-V13 [2015]

Plastic

P71-V99 [2015]
Other specific materials pressed

#### **P72: Working Paper**

Covers all paper working aspects, including the types of processing involved, apparatus used and types of paper articles worked.

#### P72-A [2015]

#### Paper working process and apparatus

This section covers all aspects of paper processing and apparatus.

#### P72-A01 [2015]

#### Folding or creasing

Covers all methods of folding or creasing paper for various paper processes.

Fold, crease

#### P72-A02 [2015]

#### **Shaping**

General shaping of paper or card.

#### P72-A03 [2015]

#### **Cutting or punching**

Any cutting aspects to do with working paper article. Includes perforating,

Slitting, trimming

#### P72-A04 [2015]

#### **Applying pressure**

Includes pressing or flattening of paper.

### P72-A05 [2015]

#### Applying heat or moisture

Any heating process to form paper or card product. Moistening/drying.

Heat process, heat treatment, moisten

#### P72-A06 [2015]

#### Bonding or attaching paper together

Using adhesives, taping, crimping etc. *Adhesive, crimping, bonding* 

#### P72-A07 [2015]

#### Deformation of paper or card

Covers methods for corrugating or embossing paper or card.

#### P72-A08 [2015]

#### Winding

E.g. for wound tubes or cones. See P72-B04. Winding, tube, cone

#### P72-A09 [2015]

#### Crêping paper

Includes forming Crêpe paper.

#### P72-A10 [2015]

#### Recycling

Includes adding products to the pulp, defibrating, or any other treatments for recycling.

Recycle

#### P72-A15 [2015]

#### Manufacturing equipment

Includes hand tools or machinery to produce paper articles.

#### P72-B [2015]

#### Types of paper articles and shapes

This section is characterized by types of the paper articles or structures produced.

#### P72-B01 [2015]

**Boxes** 

Includes cardboard boxes.

#### P72-B02 [2015]

#### Cartons

Includes paper cartons.

#### P72-B03 [2015]

Cups

Includes paper cups.

#### P72-B04 [2015]

#### **Tubes or cones**

Includes making tubes or cones or other wound shapes or cylinders from paper or card.

Paper tube, conical paper, paper cylinder

#### P72-B05 [2015]

#### **Envelopes**

Paper envelopes

#### P72-B06 [2015]

Bags

Paper bag

#### P72-B07 [2015]

#### Corrugated

Includes corrugated card.

### P72-B99 [2015]

### Other paper articles

Includes light shades, Chinese lanterns, labels or tags, honeycombed structures, cellular packaging articles etc.

Honeycombed

#### **P73: Layered Products**

Covers details of layered products including methods, apparatus used, application of producing layered products, and structure of layered products.

P73-A [2015]

Structure of layered product

P73-A01 [2015]

Characterized by shape

Includes tubular layered products

P73-A02 [2015]

**Characterized by structure** 

Includes flat, solid, ribbed, fibrous, cellular e.g. honeycombed, corrugated, etc.

P73-A03 [2015]

**Relationship between layers** 

Connections between each layer and separability. Joining similar or dissimilar materials.

P73-N [2015]

Methods and apparatus for producing layered products

P73-N01 [2015]

Methods for producing layered products

P73-N02 [2015]

Apparatus for producing layered products

P73-V [2015]

Layer materials

Characterized by type of material used in layered product.

P73-V01 [2015]

Metals

P73-V11 [2015]

Wood

P73-V12 [2015]

Paper; cardboard

P73-V13 [2015]

Plastic; cellulosic plastic substances

P73-V14 [2015]

Glass; glass fibers

P73-V15 [2015]

Ceramic; cement; plaster

P73-V16 [2015]

Rubber; Resin

P73-V19 [2015]

**Bituminous** 

P73-V30 [2015]

Mineral fiber

Rock wool

P73-V99 [2015]

Other specific materials

#### P74: Printing and lining machines

Covers all non-electrical aspects for printing and lining.

#### P74-A [2015]

#### Methods of printing characterized by type

These codes are for the methods of mechanical printing. The apparatus for printing is coded in P74-C. Electrical details of printing systems or electrical printing processes are coded under S06 class.

#### P74-A01 [2015]

#### **Press printing**

Includes letterpress printing, rotary press printing, offset press printing etc.

#### P74-A02 [2015]

#### Lithography

Covers all techniques using lithography. Offset lithography, offset printing

### P74-A03 [2015]

#### Intaglio

Covers all intaglio printing.

#### P74-A04 [2015]

#### Screen printing

Covers stencilling techniques.

Stencil, etymology, silkscreen, serigraphy, serigraph printing

#### P74-A10 [2015]

#### Other types of printing

Covers any types of mechanical printing not mentioned in P74-A01 to P74-A04.

#### P74-B [2015]

#### **Printing processes**

Covers specific or individual processes involved in various stages of printing.

#### P74-B01 [2015]

#### **Composition or typesetting**

Composing stick, typesetting

#### P74-B02 [2015]

#### **Imposition**

Includes forme preparation.

Forme

#### P74-B03 [2015]

#### **Printing surface preparation**

Covers all preparation for printing surface.

#### P74-B05 [2015]

#### Control aspects of printing

Covers all control aspects of all printing operations. Also covers safety aspects.

#### P74-C [2015]

#### Printing machinery and equipment

#### P74-C01 [2015]

### Apparatus used for composition

Includes details of, or accessories for, machines for mechanical composition. Includes all hand apparatus for composition e.g. chases, quoins, or galleys. Also covers machinery or mechanical apparatus for composing, e.g. moulding or casting apparatus, matrices etc. Does not include photographic or photo-electronic composing machines, these are covered in S06 class. Printing for record carriers is covered in T03 class. Chases, quoins, galleys, matrice

#### P74-C02 [2015]

#### **Printing machines or Presses**

Includes platen presses and cylinder presses. Details of presses are covered by P71 codes.

#### P74-C03 [2015]

#### **Rotary printing machines**

Includes rotary lithography, rotary intaglio or rotary press printing machines.

#### P74-C04 [2015]

#### **Screen printers**

Screen printing

# P74-C08 [2015] Inking arrangements or devices

Includes, inking units, ribbons, rollers, flat inking elements, troughs, reservoirs, pads, ducts etc.

#### P74-C09 [2015]

#### Media conveying/feeding arrangements

Covers all conveying or feeding apparatus for sheets through printing apparatus or machines. Includes grippers, pins, transfer drums etc. Paper feeding

#### P74-C10 [2015]

#### **Bronze printing machines**

Includes apparatus for bronze printing or for like operations.

### P74-C11 [2015]

Line printing machines

P74-C99 [2015]

### Other apparatus for printing

Includes cleaning arrangements, safety arrangements, smudging prevention devices etc.

#### P75: Typewriters, stamps, duplicators

P75-A [2015]

**Typewriters** 

P75-A01 [2015]

Casing; Framework

Includes supports, feet, dust excluders, etc.

P75-A02 [2015]

### **Keyboard arrangements; Hammers**

Includes locks, shift keys, key levers, key buttons, etc.

Tabulating, line spacing, character spacing, keys

P75-A03 [2015]

#### Media conveying

Includes sheet or web feeding. Details of ink ribbons feeding are coded under P75-A04 only. Rollers, holders, guides

#### P75-A04 [2015]

#### **Inking arrangements**

Includes ink ribbon feeding, correction bands and fluid.

Ribbon, ink rollers, ink discs, ink cartridges

P75-A05 [2015]

#### **Drive arrangements**

Includes gears, levers, sliding mechanisms, etc.

Mechanical power drives, fluid-pressure power
drives

P75-A06 [2015]

**Cooling arrangements** 

P75-A99 [2015]

#### Other typewriter details

Includes line counters, alarms when approaching end of line or end of sheet, etc.

P75-B [2015]

**Stamps** 

P75-B01 [2015]

#### **Handheld stamps**

Includes changeable characters, handles, details of stamping surfaces, stands, numbering devices, etc. Ink pads are coded under P75-B03 only. Also includes plier-like tools used for stamping e.g. train or cinema tickets, etc.

#### P75-B02 [2015]

#### Stamping machines

This code covers larger-size stamping machines where the media is held in place on/fed through the stamping machine. Includes details of sheet feeding, rollers, holders, guides, etc. Includes selection mechanism for successive stamping and numbering devices.

Ticket stamping machines

#### P75-B03 [2015]

#### Ink for stamps

Includes ink wells or reservoirs, ink ribbons or tapes, inking pads, etc.

### P75-B99 [2015]

#### Other types of stamps

Includes stamping using rollers with integral inksupply devices.

P75-D [2015]

**Duplicating or manifolding** 

P75-D01 [2015]

Using pressure-sensitive layers or intermediaries

Hectographic printing, carbon copying etc.

P75-D10 [2015]
Other types of duplicating

#### P76: Books, special printed matter

Includes aspects of book making and details of book structure or book features etc.

P76-A [2015]

**Book binding** 

P76-A01 [2015]

#### **Book binding methods**

Includes stitching, using clips, laces or ribbons, eyelets, applying glue or adhesive, collating or gathering of sheets, or binding using fingers, claws or ring-like elements. Also includes manufacturing bookbinding cases or covers.

Jacketing, casing, covering

P76-A02 [2015]

#### **Book binding tools or apparatus**

Includes hand tools or machinery.

P76-B [2015]

Book covers and page features

P76-B01 [2015]

#### **Book cover features**

Includes details of loose covers, hinges, locks or closures, ornamented covers, covers with column, line or heading marks or indicators, with means for holding books open, etc.

P76-B01A [2015]

#### Characterized by material

Characterized by material used for book covers.

P76-B02 [2015]

#### Page features and accessories

Includes book markers, leaf turners, form sets and calendar blocks.

P76-C [2015]

Special printed matter

P76-C01 [2015]

#### Newspapers or the like

Includes all printed new paper or the like matter.

P76-C02 [2015]

#### Post cards or the like

Includes greeting, menu, business or like cards; letter cards or letter-sheets.

P76-C09 [2015] Characterized by application

P76-C09A [2015]

### Information and security-bearing printed matter

Identity cards, passports, public transport or admission tickets, using data chips, bank notes, fingerprints, signatures, photographs, security threads, magnetic strips, diffraction gratings, watermarks, lottery tickets

P76-C09B [2015]

#### **Guilloche patterns**

Includes Guilloche patterns and other decorative printed matter of the like.

P76-C09C [2015]

Moiré effects

P76-C09D [2015]

### For use in medical treatment or therapy

Includes sterile or impregnated printed matter.

P76-C09E [2015]

**Perforations** 

P76-C09F [2015]

**Translucent or partly translucent parts** 

Windows

P76-C09M [2015]

**Comprising special materials** 

P76-C09M1 [2015]

**Liquid crystals** 

Printed matter that use liquid crystals.

P76-C09M2 [2015]

**Metallic materials** 

P76-C09M3 [2015]

**Special inks** 

P76-C09M4 [2015]

#### Absorbing or reflecting radiation

For absorbing or reflecting infra-red light, ultraviolet light, polarized light etc.

P76-C09X [2015]
Other specific applications

### P76-F [2023]

### **Filing and Folders**

Includes filing devices such as folders, portfolios, plastic pockets/wallets, document holders/wallets, magazine binders, collapsible file carry boxes, file dividers, etc. Filing cabinets are coded with office furniture under P25-C01A only.

#### P77: Writing, drawing appliances; Bureau /desk accessories

Covers all aspects of writing or drawing appliances. Includes inventions characterized by type, core material, constructional details and manufacture for writing or drawing appliances. From 2021, P77 also covers bureau / desk accessories.

P77-A		[2015]
Writing and	drawing	instruments

P77-A01 [2015]

Fountain pens

Includes nibs

Nib

P77-A02 [2015]

**Ballpoint pens** 

Rollerball pen

P77-A03 [2015]

**Felt-tip pens** 

Markers

P77-A04 [2015]

**Pencils** 

Includes propelling pencils and grease pencils. Pop-a-Point pencil, wax pencil, crayons

P77-A05 [2015]

Stylus

For use with e.g. touch screens.

P77-A99 [2015]

#### Writing instruments using other writingpoints

Using coreless tubular writing-points, magnetically active writing-points etc.

Ink brush, quill, reed pen

P77-B [2015]

#### Core materials for writing or drawing instruments

P77-B01 [2015]

Graphite

Includes leads for propelling pencils.

P77-B02 [2015]

#### Metallic writing-core

Can be used in combination with other core material type, e.g. metallic ink, metallic graphite

P77-B03	[2015]
Wax	
Crayons	
P77-B04	[2015]
Slate	[====]
P77-B05	[2015]
Chalk	
P77-B06	[2015]
Ink	[=0.0]
IIIK	

#### P77-D [2021]

#### **Bureau / desk accessories**

Includes devices for opening or closing envelopes, paperweights, drawing pins, pen holders, etc. Desk furniture per se is not covered by this code, see P25-A01A instead.

#### P77-M [2015]

#### Manufacture of pens and pencils

Includes manufacturing method and apparatus.

#### P77-T [2015]

#### Constructional details of writing or drawing instruments

These codes can be used in conjunction with other P77 codes.

#### P77-T01 [2015]

#### **Propelling and retracting mechanisms**

Includes springs, sliders, buttons, twisting mechanisms etc. for pens or pencils.

P77-T02 [2015]

Nibs

Includes nib holders.

P77-T03 [2015] Sheathings; Casing; Cap

Sheathing, casing or caps for all types of writing or drawing implements. Includes rubber placed at end of pencil, the wooden sheathing of a pencil, or plastic sheathing of pen media etc. Pen/pencil casings, or pen/pencil caps etc.

Clip

### P77-T04 [2015]

### Ink supply/storage; Pencil leads

Includes details of ink reservoirs, ink cartridges and ink pads. Also covers pencil lead storage or supply containers etc. Novel ink and pencil leads are also coded by P77-B06 and P77-B01, respectively. *Ink well* 

#### P77-T99 [2015]

# Other constructional details of writing or drawing instruments

Includes writing or drawing implements in combination with other items or devices, e.g. with torches, lighters, toys etc.

Ink blotter

#### P78: Decorative art

Covers all aspects of decorative art, including types of, and methods of producing decorative art, designs, materials used etc.

P78-A [2015]

Types of artistic processes

P78-A01 [2015]

**Sculpturing or modeling** 

P78-A02 [2015]

Guilloching

P78-A03 [2015]

Carving

P78-A04 [2015]

**Branding** 

P78-A05 [2015]

Inlaying

P78-A06 [2015]

**Embossing** 

P78-A07 [2015]

#### **Painting or drawing**

Includes techniques in artistic painting or drawing e.g. oil painting, water painting, pastel painting, relief painting etc.

#### P78-C [2015]

#### Methods for producing decorative effects

Includes: sculpturing, stamping, modeling or bending etc., applying different materials of different shapes and sizes, applying transfer pictures etc., engraving or etching methods, stamping or pressing or inlaying ornamental designs onto/into or inlaying surfaces, or any other methods for decorative or ornamental production.

#### P78-C01 [2015]

#### Paper hanging

Machines, apparatus, tools, or accessories therefore for applying adhesive, for applying the paper to the surface to be covered or finishing operations.

#### P78-M [2015]

### Machines, apparatus or tools for artistic work

Includes all machinery or tools for producing all artwork or decorative work. Including tools and apparatus or equipment used for: painting, sculpturing, carving, inlaying etc., surface treatment equipment, holders or containers etc.

P78-P [2015]

Materials for artistic work

P78-P01 [2015]

#### Paints and other colored materials

Includes any paint or other substance that is used to create artwork.

P78-P02 [2015]

#### Wood or wood composites

Includes any wood structure or material used for artwork.

P78-P03 [2015]

**Paper** 

Includes paper to create artwork, but does not include paper canvass (see P78-P06).

P78-P04 [2015]

Metals

Includes metals used for artwork.

P78-P05 [2015]

**Plastic** 

Includes any plastic materials used in artwork.

P78-P06 [2015]

#### Canvas or other base sheet material

Includes materials for any base for applying artwork to.

P78-P15 [2015]

Other materials used for artwork

P78-S [2015]

**Special designs** 

P78-S01 [2015]

#### **Imitations**

Covers imitation of pictures, e.g. oil paintings, mosaic or tarsia-work patterns, ceramic patterns, imitating three-dimensional effects, pearl effects, or mother-of-pearl effects.

P78-S01A [2015]

Metallic or oxidized metallic surfaces

P78-S01B [2015]

**Crystalline structures** 

P78-S01C [2015]

**Stone surfaces** 

Marble

P78-S01D [2015]

**Wood grain effects** 

P78-S01E [2015]

Horn, ivory, or meerschaum surfaces

P78-S01F [2015]

Leather or fur

Includes real or imitation leather designs or effects.

Faux leather, faux fur

P78-S02 [2015]

Characterized by irregular areas

Mottled patterns

P78-S03 [2015]

**Light effects** 

Including color effects.

# P8: Optics, Photography, General

#### P81: Optics

From 2015 P81 manual codes have been applied for details of optical elements. The optical elements covered in this class may form part of optical equipment or systems covered by other classes such as:

- (i) P82 for photographic apparatus;
- (ii) P84 for other photographic aspects, including apparatus for photographic processing, holography and lithography;
- (iii) S06 for electrical aspects of photography; and (iv) W04 for digital and video cameras and
- (iv) W04 for digital and video cameras ar electronic image projectors.

#### P81-A [2015]

# Types of optical element, system or apparatus

### P81-A01 [2015]

#### Lens and lens systems

Includes single lenses, multiple lenses/lens groups and variable refractive power lens/lens group. Biconcave, biconvex, concave, convex, fluid-filled, glass lens, negative meniscus, plano-concave, plano-convex, plastic lens, positive meniscus

### P81-A01A [2017]

#### Single lens

This code covers individual lenses. Single lenses having variable refractive power are also assigned P81-A01V1.

#### P81-A01C [2017]

#### **Multiple lens systems**

This code covers two or more lenses used together. Where the ability to vary overall refractive power by movement is important, P81-A01V5 is also assigned.

Eyepiece, lens group, telephoto lens, zoom lens

#### P81-A01V [2017]

#### Variable power lenses

This code and its subdivisions are assigned with P81-A01A or P81-A01C as necessary.

Focus, variable magnification

#### P81-A01V1 [2017]

# Individual lens with variable refractive power

This code, normally assigned with P81-A01A, covers lenses whose refractive power can be varied electrically or by physical deformation, i.e. changing shape. Lenses of this type for use in digital or video cameras are also assigned W04-M01C1E.

Fluid-filled lens, liquid crystal lens, ring electrodes

#### P81-A01V5 [2017]

#### Variable power lens groups

This code, normally assigned with P81-A01C, covers two or more conventional lenses used together and having the ability to vary overall refractive power by physical movement, e.g. varying separation.

Gearing, slide, varifocal lens

#### P81-A03 [2015]

#### Mirrors

Includes mirrors with multiple surfaces.

Plane mirror, polygonal mirror, reflex reflector

P81-A05	[2015]
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**Filters** 

P81-A07 [2015]

Gratings

P81-A09 [2015]

#### **Light guides**

For details of light guides and optical fibers see V07-F codes.

P81-A11 [2015]

**Prisms** 

P81-A13 [2015]

Condensers

P81-A15 [2015]

#### **Polarizers**

Polarization gratings are also assigned P81-A07. Polarizers for optical fiber technology are also assigned V07-F02B. Polarized eyeglasses for 3D film or video projection viewing are also assigned P81-A50E1. The use of polarized eyeglasses for 3D TV viewing is covered by W03-A08E7E.

Circular, elliptical, left, right

#### P81-A50 [2015]

#### **Optical system function**

These codes are intended to indicate in a broad sense the main function of the novel optical element specified by other P81-A codes. In general more detail will be provided in the class referred to for the process or equipment in which the element is used. Application in a wider sense is indicated by assignment of P81-U codes.

#### P81-A50A [2015]

#### For viewing distant objects

Includes optical elements used in telescopes, sights and sighting tubes and binoculars.

Cassegrainian, catadioptric, Gregorian, Keplerian, monocular, Newtonian, opera glasses, reflecting, refracting

#### P81-A50C [2015]

#### For viewing nearby or close-up objects

Includes optical elements used in magnifiers and microscopes.

Magnifying glass

#### P81-A50E [2015]

# For projection and recording of images or patterns

#### P81-A50E1 [2015]

#### For displaying images or patterns

Includes optical elements used in projectors showing images or patterns on a screen or other surface. Electrical aspects of photographic projectors for slides or cine film are covered by S06-B06A and electronic display projectors based on the use of light valves, deformable mirror arrays or lasers are covered by W04-Q01 codes.

### P81-A50E3 [2015]

#### For lithography

Covers the use of optical elements in projection of images or patterns onto light-sensitive materials, e.g. for decorative design purposes or exposure of photoresist on a semiconductor wafer prior to etching. See U11-C04E codes for full details of photolithography for semiconductor device manufacture, and especially U11-C04E1A for optical elements and systems. Optical elements for recording images in photography are covered by P81-A50E5.

#### P81-A50E5 [2015]

#### For recording images in photography

Includes optical elements used in the recording of images in a camera and also projection printing onto photographic paper. Electrical aspects of filmbased cameras and projection printing apparatus are covered by S06-B codes and optical elements for video and digital cameras by W04-M01C codes.

#### P81-A50E9 [2015]

# For other projection and recording of images or patterns

#### P81-A50G [2015]

#### **Eyesight correction and protection**

Includes optical elements used in spectacles, sunglasses and contact lenses and also implantable lenses.

### P81-A50J [2015]

#### **Light control**

Includes control of light intensity, and also phase, polarization, color and direction, e.g. in optical scanning equipment. The 'light control' here is intended to be independent from the source of light itself and based on the use of filters, diffusers, and the like. Electro-optical control of these properties is covered by V07-K codes. Direct control of the intensity of light emitted by electrical light sources themselves, e.g. by varying voltage or current, is not included and is covered by X26-C codes in general and X26-H03C in the case of LED light sources.

#### P81-A50X [2015]

Other optical system function and optical apparatus

#### P81-A99 [2015]

Other type of optical element or system

#### P81-G [2015]

# Cleaning and maintenance of optical elements, systems or apparatus

This code covers novel aspects of cleaning and maintenance of apparatus covered by P81-A codes which are also assigned as appropriate.

Lens cleaner, polish, recondition, repair, service

#### P81-M [2015]

# Manufacture of optical elements, systems or apparatus

This code covers novel aspects of manufacturing and testing of apparatus covered by P81-A codes which are also assigned as appropriate.

Moulding, mounting, polishing

### P81-T [2015]

# Constructional details of optical elements, systems or apparatus

These codes are assigned with P81-A codes to indicate the novel aspects of optical elements, systems or apparatus.

#### P81-T01 [2015]

#### Housing, casing, frame, support

Includes mounting of lens, mirror, etc.

Aperture stop, internal construction

#### P81-T02 [2015]

#### Lens positioning systems

Includes arrangements for moving lenses, e.g. for changing focus or magnification, including control aspects.

Bearing, focus ring, slide

#### P81-T03 [2015]

#### **Protective coating**

Includes coatings to prevent unwanted effects such as reflection and also to protect from scratches and the like.

Anti-reflective, bloom, magnesium fluoride

#### P81-T50 [2015]

#### **Novel constructional material**

This code is used in conjunction with other P81-T codes to indicate the use of a novel material in an optical element or system. Specific details of novel materials are represented by codes outside P81, such as L01 codes for glass compositions or section A codes for plastics materials, which are also applied as appropriate.

#### P81-T99 [2015]

# Other aspects of optical element, system or apparatus construction

#### P81-U [2015]

#### **Applications**

These codes are intended to indicate in a broad sense the field of application of the novel optical element specified by P81-A codes and optical equipment using it as specified by P81-A50 codes.

#### P81-U01 [2015]

#### **Domestic**

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

#### P81-U02 [2015]

#### Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

#### P81-U03 [2015]

**Vehicles** 

Includes land, sea, air and space vehicles.

### P81-U13 [2015]

**Pharmaceutical**; Medical

P81-U14 [2015]

Laboratory

#### P81-U30 [2015]

#### Sports, toys, entertainment and leisure

Includes sports equipment, sports stadiums, entertainment venues, leisure applications, toys and games.

#### P81-U40 [2015]

#### Industrial

Covers general or non-specific industrial applications not covered by other application codes.

# P81-U41 [2015] General functional applications

### P81-U41D [2015]

#### Illuminating; Lighting

For specific details of optical elements for use in lighting applications see Q71-T codes and X26-D01 codes.

#### P81-U99 [2015]

Other specific applications

#### P81-X [2015]

Other aspects of optics

### P82: Photographic apparatus

P82-A [2015]

# Types of systems for taking or projecting photographic images

These codes can be used with other P82 codes as required.

P82-A01 [2015]

#### Photographic camera

Includes mechanical details of cameras. For video cameras see W04-M codes.

P82-A01A [2015]

Still camera

P82-A01C [2015]

Motion picture camera

Cine camera

P82-A02 [2015]

### Photographic projection; photograph viewers

Includes mechanical details of photograph projectors or viewers.

Projector

P82-A03 [2015]

#### Photographic printing

See G05 CPI manual codes for further details.

P82-A15 [2015]

Auxiliary photographic systems/operations

P82-A15A [2015]

#### Illuminating scene

Includes techniques for lighting the scene/object such as backlighting, forelighting, using diffusers/reflectors etc. See X26 codes for novel electric lighting per se.

Reflector, diffuser, floodlight

P82-A15C [2015]

#### Sound recording/reproduction

Includes adding of sound to film. See W04 codes for audio recording/reproduction per se.

Audio

riadio

P82-A99 [2015] Other photographic systems P82-B [2015]

**Special Photographic techniques** 

P82-B02 [2015]

#### **Color photography**

Includes color photographic techniques other than exposing a color film, such as by two, four or more color separation records or sequential/simultaneous recording/reproduction.

P82-B04 [2015]

Panoramic/wide screen/extended surface photography

P82-B06 [2015]

#### High speed photography

Includes equipment for capturing images at high speed.

P82-B08 [2015]

#### **Using non-optical waves**

Includes visual representation of images captured by other medium such as X-rays or ultrasonic waves.

P82-B99 [2015]

#### Other photographic techniques

Includes trick photography.

P82-F [2015]

# Measuring, indicating, sensing, controlling, testing of photographic apparatus

Includes focus and exposure control. See P82-T for novel exposure controlling diaphragms, filters and shutters and focus controlling drive components. Also includes testing of photographic equipment.

P82-G [2015]

# Cleaning, maintenance/repair of photographic apparatus

Includes cleaning of cameras and projectors.

P82-M [2015]

Manufacture of camera and projection apparatus/components

P82-R [2015]

# Recycling of photographic apparatus/components

Includes recycling of all photographic equipment and materials.

### P82-T [2015]

# Constructional details of photographic image taking/projecting/printing apparatus

Includes camera bodies, lenses, viewfinders, film winders, projectors, printing apparatus, projection apparatus etc. See S06 for electrical details of still picture cameras and projectors and W04-M codes for video cameras.

#### P82-T01 [2015]

# Exposing; Exposure making shutters; Diaphragms

Includes color photographic techniques other than exposing a color film, such as by two, four or more color separation records or sequential/simultaneous recording/reproduction.

#### P82-T03 [2015]

#### **Viewfinders; Focusing**

Includes focusing aids, optics, lenses and their adjustment.

P82-T05 [2015]

**Bodies; Housings** 

P82-T07 [2015]

Film handling

P82-T15 [2015]

**Printers; Printing** 

See S06 codes for further details of printers.

P82-T99 [2015]

Other constructional details of photographic image taking/projection/printing apparatus

#### P83: Photographic processes/compositions

#### P83-A [2015]

# Photographic photosensitive materials and compositions

See G06 CPI manual codes for further details of novel photographic compositions, agents and materials.

#### P83-B [2015]

Film packages; Wrapping materials for light-sensitive plates, films, or papers

Includes roll films.

#### P83-D [2015]

#### **Photographic processes**

See G06 CPI manual codes for further details.

### P83-D01 [2015]

#### **Multicolor processes**

Includes direct bleach-out processes, additive processes using color or lenticular screens, subtractive color and cinematographic processes and dye-inhibition processes. Also includes color processes using color-coupling substances.

#### P83-D03 [2015]

#### **Diffusion transfer processes**

Includes processes using substances transferred by diffusion consisting of inorganic compounds or of organo-metallic compounds derived from photosensitive noble metals.

#### P83-D05 [2015]

#### Stereo-photographic processes

Includes producing 3-D images, parallaxstereograms, vectographic images and anaglyphs.

#### P83-D99 [2015]

#### Other photographic processes

Includes retouching, varnishing, pasting, mounting, drying etc.

#### P83-R [2015]

# Recycling, regeneration or replenishment of photographic processing agents

Includes regeneration or replenishment of photosensitive material and removing emulsion from waste photographic material.

# P84: Other photographic

P84-A [2015]

Types of photographic system/process

P84-A01 [2015]

### **Photomechanical**

Photomechanical production of textured or patterned surfaces.

P84-A02 [2015]

Electrographic/electrophotographic

P84-A03 [2015]

Magnetographic

P84-A05 [2015]

### **Holography**

Includes holographic processes and apparatus for producing holographs. See V07 for further holographic details.

P84-A05A [2015]

### Using light, IR or UV waves

Includes production of holograms using optical waves.

P84-A05C [2015]

### Using ultrasonic, sonic or infrasonic waves

Includes production of holograms using sound waves.

P84-A05E [2015]

### Using other waves

Includes production of holograms using other waves while producing an optical image from them.

P84-A99 [2015]

Other photographic systems

P84-G [2015]

# Cleaning, maintenance/repair of photographic systems

Includes use of modular parts to enable maintenance of photographic apparatus.

P84-M [2015]

Manufacture of photomechanical, electrographic/electrophotographic, magnetographic etc. components and materials

P84-R [2015]

# Recycling of photographic materials components

Includes collection and recycling of waste toner.

P84-T [2015]

Photographic system construction/materials

P84-T01 [2015]

# Exposed photographic material processing apparatus

Includes containers, trays, clips, frames and darkroom equipment for treating exposed photographic material. Includes liquid and gas processing apparatus, diffusion development equipment and reversal processing apparatus.

P84-T02 [2015]

# **Photomechanical production apparatus**

Includes screens and exposure apparatus, color separation. Also includes originals for photomechanical production of textured or patterned surfaces. Includes masks, reticles, pellicles and mask positioning/registration.

Mask blanks

P84-T50 [2015]

### **Novel materials**

See E codes for further chemical aspects.

P84-T50A [2015]

# Image receiving materials; Photosensitive materials for photomechanical production

Includes photosensitive materials for photomechanical production.

P84-T50D [2015]

**Developers** 

P84-T50E [2015]

**Fixing agents** 

P84-T99 [2015]
Other photographic system details

# P85: Educational, cryptographic or advertising apparatus or systems

From 2015 manual codes have been applied for general details of educational, cryptographic or advertising apparatus and systems. Where use of electrical or electronic technologies is significant please refer to the following:

- (i) W04-W codes for educational equipment and systems.
- (ii) T01, W01, W02 and W04 codes for encryption, scrambling and concealment;
- (iii) W05-E codes for advertising.

### P85-A

# Types of educational apparatus or system, timetables and perpetual calendars

[2015]

When teaching aids involve the use of models P85-A05 is also assigned. Electrical aspects of educational apparatus and systems are covered by W04-W codes. General information systems such as maps, timetables and perpetual calendars are covered by P85-A50 codes.

### P85-A01 [2015]

# Educational apparatus or systems for specific purposes

Models for demonstration and illustration are covered by P85-A05.

Cards, charts

# P85-A01A [2015]

### Teaching shapes and spatial awareness

Includes blocks, construction toys with educational aspects. Construction toys are also assigned P36-F03.

Bricks, shape sorter

### P85-A01C [2015]

# **Teaching reading or writing**

Includes aids for learning the alphabet, recognizing letters and words, and for handwriting.

Braille, lipreading

# P85-A01E [2015]

# Teaching counting, arithmetic, mathematics

Abacus, blocks, counters

### P85-A01G [2015]

# Teaching science, medicine and dentistry

Includes aids for teaching botany, biology, chemistry, physics etc. and also veterinary medicine.

Atom, core, electron, neutron, nucleus, planetarium, proton, astronomy

# P85-A01J [2015]

# **Teaching music**

Metronome, practice

# P85-A01L [2015]

**Teaching languages** 

# P85-A01N [2015]

# Teaching sports, physical education

Covers games involving physical activity. Teaching of board games, card games and the like is covered by P85-A01P. Training for sports is covered by P36-A08E which may also be assigned as necessary. Electrical aspects of sports training are covered by W04-X01A codes.

PE, swimming

# P85-A01P [2015]

### Teaching game playing

Covers teaching of board games, card games and the like. Teaching of games involving physical activity, e.g. team sports, is covered by P85-A01N.

### P85-A01X [2015]

# Other educational apparatus or systems for specific purposes

Needlework, modelling

### P85-A05 [2015]

# Models for demonstration and illustration; simulations

Includes models of buildings, towns, geographical or geological features, living creatures, machines, vehicles, etc. See P85-A01 codes also to differentiate the specific field of teaching.

Cut-away view, engine, organ

# P85-A05A [2015]

### **Simulations**

Covers simulations for demonstrating a process or effect and also training simulators. Electrical aspects of training simulators are covered by W04-W07A and simulations for demonstration purposes by W04-W07C.

# P85-A07 [2015]

# Question and answer apparatus and systems

Electrical aspects of question and answer-type educational systems are covered by W04-W01.

### P85-A50 [2015]

# **General information presenting systems**

Covers timetables, perpetual calendars, town plans etc.

# P85-A50A [2015]

### **Timetables**

Covers timetables in e.g. printed form, for use on railways or other public transport systems and the like.

# P85-A50C [2015]

### **Perpetual calendars**

Covers calendars with movable discs, wheels, and the like for indicating the current date. Clocks and time-indicating devices in general are not included and are covered by S04 codes. Calendars involving tear-off sheets are covered in P76.

# P85-A50E [2015]

# Maps, guide, town plans and public information panels

The title of this code has been changed (2018) to indicate that public information boards and panels are included in addition to maps in general, maps of an immediate area such as town plans, and guides to places of interest. Timetables, e.g. for public transport, are covered by P85-A50A. Electrical aspects of these information-presenting items are covered by W04-W09. Displays and signs for advertising and commercial purposes are covered by P85-E01 codes and by W05-E03 codes if electrical.

### P85-A99 [2015]

# Other types of educational apparatus or system

### P85-C [2015]

# Types of cryptographic system

This code is intended for general arrangements for making a sequence of symbols (such as text characters) unintelligible, including the use of mechanical or electrical means. For specific information encryption, scrambling or concealment systems based on the use of electronics and computing techniques see the following:

- (i) T01-D01 for data encryption and decryption using computing techniques;
- (ii) W01-A05 codes for secret data communication;
- (iii) W02-F05A1 and W02-F10N1 codes for scrambling and encryption of video and TV signals;
- (iv) W02-L05 for general signal scrambling, including analogue signal scrambling;
- (iv) W04-F01L codes for encryption and scrambling in video recording;
- (v) W04-G01L codes for encryption and scrambling in audio recording.

### P85-E [2015]

# Types of advertising and displaying system

Electrical aspects of advertising and displays are covered by W05-E codes. Novel electronic displays are covered by U14 codes or W05-E codes, depending on technology. P85-E codes cover advertising with some visual element and also signs and labels in general. Use of electrical displays with computing equipment is covered by T04-H codes.

### P85-E01 [2015]

# Advertising and commercial signs, price labels

### P85-E01A [2015]

### Advertising signs and displays

Includes hoardings, billboards and the like.

# P85-E01C [2015]

### **General commercial signs**

Covers signs for shops or other businesses, including information on awnings, windows, etc.

### P85-E01E [2015]

# Signs involving movement

Includes signs moved by e.g. action of the wind. Electrically-moved advertising signs are covered by W05-E03A3.

# P85-E01G [2015]

### Advertising on other articles or items

Covers advertising on items used in e.g., restaurant or bar, such as glasses, napkins, ashtrays, promotional items, etc. And also advertising

information on vehicles.

# P85-E01J [2015]

# **Advertising in printed products**

Covers advertisements in newspapers, magazines or other publications.

# P85-E01L [2015]

### **Price tags and labels**

Covers labels attached to goods and also shelf labels and the like used in stores. Labels in general are covered by P85-E05. Electrical aspects such as antitheft tags are covered by W05-B01A2 codes and novel digital marking such as bar codes or RFID tags by T04 codes.

### P85-E01X [2015]

Other aspects of advertising and commercial signs

# P85-E03 [2015]

# Display cases and stands

Covers display equipment for advertising but also for general use in e.g. museums, etc.

### P85-E05 [2015]

### Labels in general

Covers labels and identifying tags in general, but not price tags or labels which are covered by P85-E01L.

### P85-E99 [2015]

Other types of advertising or displaying system

# P85-G [2015]

Cleaning, maintenance/repair of educational, cryptographic or advertising apparatus or systems

This code is assigned with P85-A, P85-C or P85-E codes as appropriate.

# P85-M [2015]

Manufacture of educational, cryptographic or advertising apparatus or systems

This code is assigned with P85-A, P85-C or P85-E codes as appropriate.

# P85-T [2015]

Constructional details of educational, cryptographic or advertising apparatus or systems

These codes are assigned with P85-A, P85-C or P85-E codes as appropriate.

P85-T01 [2015]

Housing, casing

P85-T05 [2015]

Internal constructional details

P85-T50 [2015]

**Novel constructional material** 

P85-T99 [2015]

Other constructional details of educational, cryptographic or advertising apparatus or systems

P85-X [2015]

Other aspects of educational, cryptographic or advertising apparatus or systems

### P86: Musical instruments, acoustics

From 2015 P86 manual codes have been applied for general and mechanical details of musical instruments and acoustic systems. Analysis and synthesis of speech and other sounds by electronic or computing devices is not included and is covered by W04-V codes. Electronic musical instruments and electrical aspects of musical instruments in general are covered by W04-U codes but common features or mechanical aspects are also covered by appropriate P86 codes. Music teaching is covered by P85-A01J and when specific to a particular type of instrument an appropriate P86-A code is also assigned.

# P86-A [2015]

# Types of musical instruments or musical accessory

### P86-A01 [2015]

# Musical instruments based on air or gas flow

Includes instruments operated by gases, gas mixtures such as air, or steam.

Aerophone

# P86-A01A [2015]

### Wind instruments

Covers instruments operated by a musician blowing into them. Instruments operated by flow of air or similar from a machine or hand-operated mechanism are covered by P86-A01C codes.

# P86-A01A1 [2015]

### Reed instruments

Covers instruments employing a reed in a mouthpiece that vibrates when the player blows into or across it.

Bagpipes, bassoon, clarinet, harmonica, mouth organ, oboe, saxophone

### P86-A01A3 [2015]

### Lip vibration instruments

Covers instruments in which the player's lips vibrate in a way analogous to a reed, such as trumpets or trombones.

Cornet, euphonium, French horn, horn, labrosone, tuba

### P86-A01A5 [2015]

### Air-reed instruments

Covers instruments in which sound is produced by a player blowing across an opening, such as flutes. Mechanical reed instruments are covered by P86-A01A1

Ocarina, panpipes, recorder

### P86-A01A9 [2015]

### Other wind instruments

Whistles are coded under P86-E01C5 only.

# P86-A01C [2015]

### **Organs**

Electronic organs are covered by W04-U codes. These codes cover instruments operated by flow of e.g. air produced mechanically, such as by blowers, bellows, pumps and the like. Instruments operated by air flow directly produced by the player blowing into them are regarded as 'wind instruments' and are covered by P86-A01A codes.

# P86-A01C1 [2015]

# **Reed organs**

Includes harmoniums, accordions, and concertinas. Bagpipes are regarded as being operated by the player's exhaled air and so are covered by P86-A01A1.

# P86-A01C3 [2015]

# Pipe organs

Church organ, steam organ

# P86-A01X [2015]

# Other musical instruments based on air or gas flow

### P86-A03 [2015]

### String instruments

Covers instruments based on vibration of a resonant string, whether struck, plucked or excited by other means, such as a bow.

Chordophone

# P86-A03A [2015]

# String instruments with keyboards

Covers instruments where depression of a key actuates a mechanism that strikes or plucks strings mounted on a soundboard or similar.

# P86-A03A1 [2015]

**Pianos** 

Pianoforte

# P86-A03A9 [2015]

### Other string instruments with keyboards

Includes harpsichords. Harps are regarded as instruments in which strings are plucked directly by the player and are thus covered by P86-A03E.

# P86-A03C [2015]

# String instruments normally played using a bow

Covers cello, violin etc. Bass, double bass, viola

### P86-A03E [2015]

# String instruments played by manually strumming, plucking or hitting strings

Includes instruments carried or supported by the player and those mounted on a support or stand, the strings being plucked or strummed by a player directly, using fingers, a plectrum or a hammer.

Banjo, guitar, harp, pedal steel guitar, zither

# P86-A05 [2015]

### **Percussion-based musical instruments**

Brushes, castanets, cow bell, cymbal, drum, drumsticks, hand bell, shaker, tambourine, timpani, triangle, xylophone

### P86-A30 [2015]

# Accessories for musical instruments and musical instrument playing

Case, music stand, tuning aid, tuning fork

# P86-A99 [2015]

Other types of musical instruments

# P86-E [2015]

Acoustic systems and sound-producing devices

### P86-E01 [2015]

# **Sound-producing devices**

Covers devices intended to produce sounds other than for musical purposes, e.g. for attracting attention or warning. Novel electrical aspects of such devices are covered by W05-A02A and electroacoustic transducers in general are covered by V06-V codes.

### P86-E01A [2015]

# Sound production by physical contact or impact

Includes percussion-based sound generation.

# P86-E01A1 [2015]

Bells, gongs, other resonating bodies

### P86-E01A5 [2015]

# Sound production by non-resonant bodies in contact

Includes rattles.

### P86-E01A9 [2015]

Other sound production by physical contact or impact

### P86-E01C [2015]

Sound production by air or gas flow

# P86-E01C1 [2015]

#### **Sirens**

Includes drive by motive device and also gas flow.

### P86-E01C3 [2015]

### Horns, klaxons

Covers sound generation using a vibrating diaphragm. Mechanical aspects of vehicle horns are covered by Q14-C04 and electrical aspects by X22-B03H.

# P86-E01C5 [2015]

### Whistles

Includes whistles producing sound beyond human audible range.

Dog whistle

# P86-E01C9 [2015]

Other sound production by air or gas flow

# P86-E01X [2015]

Other sound-producing devices

# P86-E05 [2015]

# Sound transmission, modification, and damping

These codes are intended to represent transmission, modification or damping of sound in a general sense. Codes elsewhere relating to specific equipment or applications should also be considered.

### P86-E05A [2015]

### Sound transmission

Includes acoustic coupling arrangements.

# P86-E05C [2015]

#### Sound modification

Covers use of passive resonators, acoustic lenses and reflectors and the like, e.g. to re-direct sound.

# P86-E05E [2015]

# Sound damping and masking

Covers passive systems, such as acoustic damping, use of absorbing materials, etc. Electronic systems for sound damping and masking, e.g. using interference effects and anti-phase sound, are covered by W04-V07 codes.

# P86-E05X [2015]

# Other aspects of sound transmission, modification, and damping

Includes acoustic impedance matching. For electrical impedance matching in general see U25-D05.

# P86-E99 [2015]

Other aspects of acoustic systems and sound-producing devices

### P86-G [2015]

# Cleaning, maintenance/repair of musical instruments or acoustic systems

This code is assigned with P86-A or P86-E codes as appropriate.

### P86-M [2015]

# Manufacture/Pre-use treatment of musical instruments or acoustic systems

This code is assigned with P86-A or P86-E codes as appropriate.

# P86-T [2015]

### **Constructional details**

These codes are assigned with P86-A or P86-E codes as appropriate and are intended to highlight specific novel aspects of musical instruments or acoustic systems and sound-producing devices.

### P86-T01 [2015]

Constructional details of musical instruments, acoustic systems and sound-producing devices

### P86-T01A [2015]

# Constructional details of devices generating sound

Covers devices producing the actual sound, such as reeds, strings, drum skins, etc. for musical instruments and e.g. a perforated disk in the case of a pneumatic siren.

Bridge, cavity, chamber

# P86-T01C [2015]

# Constructional details of devices controlling or modifying sound

Covers novel aspects of devices and systems for controlling sound, such as keyboards, stringtensioning devices, pedals etc. and automatic playing systems in the case of instruments and e.g. sound damping or directing devices in the case of acoustic systems and sound producing devices.

### P86-T01E [2015]

# Constructional details of musical instrument bodies and acoustic device housings

Covers construction of musical instruments, acoustic systems and sound producing devices as a whole, e.g. frames, outer casing, etc.

Lid, neck, soundbox

### P86-T01X [2015]

Other constructional details of musical instruments, acoustic systems and sound-producing devices

### P86-T50 [2015]

### **Novel constructional material**

This code is assigned in conjunction with other P86-T codes to indicate the specific aspect to which the material relates. Specific details of novel materials are represented by codes outside P86, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.

### P86-T99 [2015]

# Other constructional details of musical instruments and acoustic systems or devices

Includes constructional details of accessories for musical instruments and musical instrument playing, for which P86-A30 is also assigned.

# P86-X [2015]

Other aspects of musical instruments or acoustic systems

# Section Q: Mechanical

Q1 VEHICLES IN GENERAL	116
Q11: WHEELS, TYRES, CONNECTIONS	116
Q12: SUSPENSION	
Q13: POWERTRAIN/TRANSMISSION, SYSTEMS AND THEIR CONTROL	
Q14: VEHICLE ACCESSORIES	
Q15: TRANSPORTING SPECIAL LOADSQ16: VEHICLE SERVICING, MAINTENANCE, CLEANING EQUIPMENT, VEHICLE DESIG	
AND MANUFACTURE	
Q17: VEHICLE CONSTRUCTION, FITTINGS, PROPULSION ARRANGEMENTS	
Q18: BRAKE SYSTEMS, STEERING SYSTEMS, CONTROL	
Q19: VEHICLE APPLICATIONS	135
Q2 SPECIAL VEHICLES	137
Q21: RAILWAYS	137
Q22: HAND/FOOT/ANIMAL DRAWN VEHICLES	
Q24: SHIP; WATERBORNE VESSELS; RELATED EQUIPMENT	144
Q25: AIRCRAFT; AVIATION; COSMONAUTICS	150
Q3 CONVEYING, PACKAGING, STORING	156
Q31: PACKAGING PROCESSES AND EQUIPMENT	156
Q32: CONTAINER/CLOSURE TYPES, SPECIAL PACKAGING FEATURES AND TRANSIT	
PACKAGING	
Q33: PACKAGING CONTAINER AND CLOSURE MATERIALS	
Q34: TYPES OF GOODS PACKAGED, BOTTLED, BOUND, LABELLED, UNPACKED Q35: REFUSE COLLECTION; CONVEYORS	
Q36: HANDLING THIN MATERIALS	
Q37: CONTAINER TRAFFIC (PRE-1984 ONLY)	
Q38: HOISTING; LIFTING; HAULING; TRUCKS	
Q4: BUILDINGS; CONSTRUCTION	171
Q41: ROAD, RAIL, BRIDGE CONSTRUCTION	
Q42: HYDRAULIC ENGINEERING, SOIL SHIFTING AND SEWERAGE	
Q43: GENERAL BUILDING CONSTRUCTIONS	
Q44: STRUCTURAL ELEMENTS	176
Q45: ROOFING, STAIRS, FLOORS	177
Q46: BUILDING AIDS, SPECIAL STRUCTURES, LADDERS	
Q47: LOCKS, WINDOW AND DOOR FITTINGS	
Q48: BLINDS, SHUTTERS, DOORS AND WINDOWS	
O49: MINING	182

Q5 ENGINES, PUMPS, COMPRESSORS, FLUID PRESSURE ACTUATORS	184
Q51: INTERNAL COMBUSTION ENGINES; RECIPROCATING ENGINES; ROTARY ENG	
Q52: REACTION ENGINES; EXTERNAL COMBUSTION; GAS TURBINES; ROCKETS	
Q53: POSITIVE DISPLACEMENT FLUID ENGINES (I.E. DRIVEN BY FLUID)	
Q54: NON-POSITIVE DISPLACEMENT FLUID ENGINES (I.E. DRIVEN BY FLUID);	
MISCELLANEOUS MOTORS AND MACHINES FOR PRODUCING MECHANICAL	
POWER/THRUST	192
Q55: POSITIVE DISPLACEMENT FLUID MACHINES/PUMPS/COMPRESSORS (I.E. FOR	
DRIVING FLUID)	193
Q56: NON-POSITIVE DISPLACEMENT FLUID MACHINES/PUMPS/COMPRESSION (I.E	. FOR
DRIVING FLUID)	
Q57: FLUID PRESSURE ACTUATORS; HYDRAULIC/PNEUMATICS IN GENERAL	195
Q6 ENGINEERING ELEMENTS	196
Q61: FASTENING ELEMENTS; CONNECTIONS	196
Q62: SHAFTS AND BEARINGS	
Q63: COUPLINGS; CLUTCHES; BRAKES; SPRINGS; DAMPERS	199
Q64: BELTS, CHAINS, GEARING	201
Q65: PISTONS, CYLINDERS, PACKING, SEALS	202
Q66: VALVES; TAPS; COCKS; VENTS	
Q67: PIPES; JOINTS; FITTINGS	
Q68: OTHER ENGINEERING ELEMENTS	
Q69: STORING/DISTRIBUTING GAS/LIQUID	206
Q7: LIGHTING, HEATING	207
Q71: LIGHTING	207
Q72: STEAM GENERATION	209
Q73: COMBUSTION APPARATUS AND PROCESSES	211
Q74: HEATING, RANGES AND VENTILATING	214
Q75: REFRIGERATION AND LIQUEFACTION	217
Q76: DRYING	
Q77: FURNACES, KILNS, OVENS, RETORTS	
Q78: HEAT EXCHANGE	
Q79: WEAPONS, AMMUNITION, BLASTING	225

# **Q1 Vehicles in General**

# Q11: Wheels, Tyres, Connections

From 2006, manual codes have been assigned for all mechanical details of vehicle wheels, tyres and connections.

### Q11-A

### Wheels; Wheel assemblies

Includes novel aspects of vehicle wheels, including emergency space saver and spare wheels. This code can also be applied when the wheel assembly as a whole is being claimed and when no specific components of the wheel assembly are novel. Wheelend assembly

### Q11-A01

# Spoked wheels

Includes wheels with separable/replaceable spokes, nipples etc, such as bicycle wheels.

### Q11-A02

### Disc wheels

Includes wheels with single disc body, e.g. cast alloy wheels (with or without cut-outs to simulate spokes), and pressed steel disc wheels.

### Q11-A03

#### Rims

# Q11-A04

### Hubs

Includes hub bearing assemblies - see also Q62-G for more detail.

### Q11-A05

### **Axles**

Includes all axle details including quick release bicycle wheel axles.

### Q11-A06

### Wheel bearings

Also see Q62-G for specific bearing types. Tapered roller bearings

### Q11-A07

### Wheel covers

Includes covers for decorative or aerodynamic purposes.

Hub cap

### Q11-A08

### **Castors**

### Q11-A15

### **Traction increasing equipment**

Includes mechanical devices for increasing friction between wheel and the ground.

### Q11-A15A

### Lugs, spikes, snow chains etc.

Includes tyres with built-in or attachable spikes or chains removably fastenable to tyres.

### Q11-A15B

# Applying traction increasing material, e.g. sand

Includes dispensing particulate material, such as sand, in front of tyre path.

### Q11-A17

### Rail engaging arrangements

Includes wheels with flanged edges for engaging rails. See Q19-R02 for vehicles usable on road/rail, and possibly Q21 for railway vehicles per se.

### Q11-A19

# Wheel-axle combinations, e.g. wheel sets

Includes overall novel wheel/axle combination, e.g. the whole rear axle/wheel assembly used on a commercial lorry (also see Q19-C02).

### Q11-A20

### Wheel nuts/fastening elements

Includes wheel nuts and bolts and anti-theft locking wheel nuts (see also Q61-A codes). Also includes quick release wheel fastening elements. Spinner, skewer

### Q11-A28

# Wheel manufacture/ assembly/disassembly apparatus

Includes equipment for manufacturing and assembling/dismantling wheels, such as metal presses and casting equipment or jigs for enabling manual building of spoked wheels. For apparatus for (de)mounting wheel onto vehicle also see Q16-A02.

### Q11-A30

### Other wheel details

### Q11-B

**Tyres** 

### Q11-B01

Tyre type

### Q11-B01A

# Inflatable tyres

Can be used to highlight the fact that the tyre construction is applicable to a pneumatic tyre.

### Q11-B01A1

Inner tubes

### Q11-B01A3

### **Emergency or restricted use tyres**

Includes tyres that can be temporarily used in a damaged or deflated condition, e.g. using additional inflatable or non-inflatable supporting elements.

# Q11-B01A3A

### **Run-flat tyres**

Includes run-flat arrangements, e.g. by enabling folding of tyre side wall (see also Q11-B05).

### Q11-B01A5

# Folding tyres

See Q19-A01 for folding bicycle tyres, and e.g. Q11-B03 for Kevlar® beads per se.

### Q11-B01H

### **Heavy duty tyres**

Includes tyres used in general heavy duty applications. Can be used in conjunction with Q19 codes to further specify the type of heavy duty vehicle involved.

# Q11-B01S

### Solid tyres

Includes solid rubber tyres and tyres with a solid, e.g. foam material, insert.

# Q11-B01X

### Other tyre types

### Q11-B02

### **Valves**

See also Q66 codes for valves per se.

### Q11-B03

### **Beads**

Includes beads and other similar ply overlap arrangements for enabling tyre to seat on and be retained in wheel rim.

### Q11-B04

### Reinforcements or ply arrangements

Includes cross ply, reinforcing cords, layers, inlays

### Q11-B05

### Tyre sidewalls

Includes grooves and rib markings or coloured inlays, e.g. white walls.

### Q11-B06

### Tread bands, patterns and anti-skid inserts

Includes tread patterns, anti-skid inserts vulcanised into tyre and wear indicators.

### Q11-B15

# **Emergency/puncture repair arrangements**

Includes emergency use accessories such as tyre sealant sprays to temporarily repair tyre until it can be properly fixed/changed.

### Q11-B20

# Tyre manufacture, mounting and inspection

Includes all mechanical aspects of tyre manufacture such as vulcanising, or equipment for mounting of tyres on wheels (also see Q16-A02) or inspecting tyres. Also includes equipment for balancing wheels and associated balance weights (see also S02-J05 for static or dynamic balance testing per se).

# Q11-B30

### Other tyre details

Includes wheel tape used to cover spoke nipples to protect inner tube (see also Q19-A for bicycles). Also includes novel tyre materials and rubber compositions (see also relevant polymer section A indexing).

### Q11-C

### **Connections**

Includes assemblies between e.g. towing and towed vehicles.

# Q11-C01

# **Traction couplings or hitches**

Includes ball and socket hitches or bolt/shackle type hitches mounted on **towing** vehicle. For power take offs (PTOs) per se, e.g. used on agricultural tractors, see also Q19-G and Q13-C instead. Also includes fifth wheel traction couplings used on articulated lorries (see also Q19-C02). For electrical aspects such as 7pin electrics, see X22-X01A and V04-D codes instead.

Tractor-trailer

# Q11-C02

### Draw gear or towing devices

Includes e.g. V or Y shaped tubular frameworks and hitch arrangements forming part of **towed** vehicle. Also includes towing chains or ropes, and safety arrangements such as stabiliser bars fixed to towed vehicle for limiting sway of e.g. towed trailer/caravan.

# Q11-C05

# Fittings to facilitate pushing

### Q11-C07

# **Gangways for coupled vehicles**

Includes removable walkways between vehicles, e.g. between lorry cab and trailer.

# Q11-C09

# Other connection details

Includes damping arrangements for limiting vibration etc. between towing vehicle and towed assembly/trailer.

# Q12: Suspension

From 2006 Q12 covers all mechanical details of vehicle suspension systems. Prior to the introduction of Q12 manual codes in 2006, the Q12 class covered vehicle suspensions, heating, doors and screens.

### Q12-A

# Rigid suspensions; Rigid connection between axle and frame

### Q12-B

# **Resilient suspensions**

Includes independent resilient suspension for single wheels and resilient suspension for wheel sets or axles with inter-related movement, e.g. live axles.

#### Q12-B01

### **Spring arrangements**

Q12-B01A

Leaf

Q12-B01B

Coil

### Q12-B01C

**Torsion bar springs** 

### Q12-B01D

# Rubber springs

Includes elastomers.

### Q12-B01E

### Fluid springs

Includes hydraulic and air springs.

# Q12-B01F

### Combination of different spring types

Includes suspensions e.g. employing both coil springs and air springs.

# Q12-B02

### Vibration dampers; Shock absorbers

Damper

### Q12-B02A

### Mechanical damper

Includes coil springs used to provide a damping function.

### Q12-B02B

### Fluid damper

Includes hydraulic, pneumatic and quasi-fluid, i.e. having powdered medium, dampers.

### Q12-B02C

[2008]

### **Torsion damper**

Includes torsional damping arrangements.

### Q12-B02D

[2008]

### Rubber damper

Includes elastic material, e.g. rubber or elastomer dampers.

### Q12-B03

### Spring/damper combinations

Includes coil-over dampers. This code can be used in conjunction with other Q12-B codes to highlight the type of springs and dampers being used. Racing car. sports car

### Q12-B04

# Spring/damper characteristic adjustment; Vehicle ride height control

Includes control of air pressure within air springs. Also includes arrangements for adjusting caster/camber and toe-in/toe-out of vehicle wheels (see also Q12-B07 for suspension adjustment linkages per se).

Height control

### Q12-B06

### **Mountings; Brackets**

Includes suspension mounting arrangements such as bushes and brackets.

Nylon, poly, bush

### Q12-B07

### Suspension connections/linkages

Includes Panhard rods, Watt linkages, trailing arms, wishbones etc. Also includes upper and lower ball joints.

Double wishbones, outboard, inboard

### Q12-B09

### Roll/stability control arrangements

Includes mechanical anti-roll bars per se. *Stabiliser* 

### Q12-B15

### **Lubrication arrangements**

Oil, grease, nipple

# Q12-B16 [2022]

# Covers and protection for springs, dampers and suspension parts

Includes spring or shock covers for dust or weather protection.

# Q12-X

Other suspension details

# Q13: Powertrain/transmission, systems and their control

From 2006 Q13 covers all mechanical details of vehicle powertrains, transmission systems and their control. Prior to the introduction of Q13 manual codes in 2006, the Q13 class covered vehicle transmissions and controls, including propulsion unit mounting arrangements and fuel tanks.

### Q13-A

# Powertrain/Transmission systems and their control

For electrical aspects of transmission systems used in electric vehicles or motor vehicles, respectively see X21-A02A and X22-G codes only.

### Q13-A01

### **Transmission type**

### Q13-A01A

### **Automatic transmission**

Includes transmissions where gears are changed under load, so that power continues to be transmitted to drive wheels while shifting. Includes sun and planet gears, planet carriers etc.

### Q13-A01A1

### **Double clutch transmission**

Includes transmissions using two multiplate clutches arranged on drive side with next gear being preselected in transmission unit not currently transmitting power.

### Q13-A01C

### Continuously variable transmission (CVT)

Includes e.g. mechanical belt wrap transmissions. *Toroidal transmission* 

### Q13-A01E

### Semi-automatic

Includes manual transmissions where clutch is electronically disengaged during gear shifting, avoiding the need for a driver's clutch pedal. *Paddleshift, clutchless* 

### Q13-A01M

#### Manual transmission

Includes gearing and synchronisers, e.g. used to allow collar and gear to make frictional contact before dog teeth make contact to avoid the need for double declutching.

Synchromesh

### Q13-A01X

### Other transmission types

Includes derailleur type transmission assemblies used on bicycles (see also Q19-A). Also includes general hydrostatic transmission system (see Q13-A02 instead for hydraulic torque converters).

### Q13-A02

### **Torque converter**

Includes fluid coupling type torque converters used in multi-speed and automatic transmissions and lockup clutches used to lock the two halves of the converter together to eliminate slippage when the converter is up to speed. Also see Q13-A01A for automatic transmissions per se.

Hydrodynamic torque converter

### Q13-A03

### Clutch

Includes both wet and dry plate friction clutches. Also includes mechanical lock-up clutches used in e.g. torque converters (see also Q13-A02). Also includes clutch release bearings (see also Q62-G codes) and clutch pressure plates. Also includes flywheels (see also Q63-E02B) including dual mass flywheels prior to 2012. From 2012 flywheels are transferred to Q13-A04. Also see Q17-N for vibration reduction per se.

# Q13-A04 Flywheels

# [2012]

Includes mechanical details of all flywheels including dual mass flywheels (see also Q63-E02B). For vibration reduction per se see Q17-N.

### Q13-A05

### Retarder

Includes hydrodynamic retarders, including primary retarders fitted on drive input side, e.g. for low speed braking of buses, and secondary retarders fitted on drive output side, e.g. for higher speed or downhill braking of trucks.

### Q13-A07

#### **Drive shafts**

Includes prop shafts and half shafts. Also includes constant velocity joints and other connections (see also Q63-A codes).

CV joint, universal joint

### Q13-A09

### **Differentials**

Includes open and limited slip differentials (See Q13-A11 for 4WD diff locks). See also Q13-A11 for mechanical Torsen® differentials or viscous couplings used in all wheel drive off-road vehicles. LSD, open, diff, plate, Torsen®, viscous coupling, final drive unit, bevel gears

### Q13-A11

### All wheel drive

Includes both permanent and disengageable all wheel drive and four wheel drive systems. Includes viscous couplings, transfer cases and lockable differentials (see also Q13-A09). For electrical aspects of four or all wheel drive systems see X22-G05 instead, and for systems using intelligent brake application see X22-C02 codes.

AWD, 4WD, four-wheel drive, all-terrain, transfer case, Torsen (RTM) lock, viscous coupling, high-low range

### Q13-A15

### **Cranks**

Pedal arm

### Q13-A16

### **Pedals**

SPD, clipless

# Q13-A17 [2008]

# **Chainrings and sprockets**

Includes toothed chainrings and sprockets e.g. for bicycle (see also Q19-A).

### Q13-A18

### Chains/belts

Includes endless chains and belts.

### Q13-A20

# **Lubrication arrangements**

Includes oil seals and drain plugs e.g. for gearboxes or differentials.

# Q13-A22

### **Cooling arrangements**

Includes transmission oil coolers.

# Q13-A24 [2007]

### Gearing

Includes mechanical aspects of transmission gearing and gearboxes. Also covers gear locking or disabling mechanisms, e.g. for parking (also see Q18-A01P for parking brakes). See Q64-C for details of gearing in general.

Parking gear arrangements

# Q13-A26 [2008]

### **Mountings**

Includes gearbox, differential, drive train mounting arrangements and transmission noise control arrangements (see also Q17-N for noise reduction in general).

Bracket, rubber, bush

### Q13-A30

### Other transmission hardware

### Q13-B

# Powertrain/Transmission control arrangements

Includes gear levers per se and gear knobs. Also includes clutch control levers e.g. used on motorcycle (see also Q19-B) and mechanical/hydraulic clutch activation arrangements and clutch pedals.

Control

### Q13-C

# Auxiliary drives, e.g. from PTO, driven wheel

Includes power take-offs used on e.g. agricultural tractors (see also Q19-G). For mechanical aspects of hitches per se, see Q11-C01.

# Q13-X

# Other transmission details

Includes transaxles, i.e. where gearbox and differential etc. are combined into one unit.

#### O14: Vehicle Accessories

From 2006 Q14 covers all mechanical vehicle accessories. See X22-J instead for electrical vehicle accessories. Prior to the introduction of Q14 manual codes in 2006, the Q14 class covered electric propulsion and seating.

### Q14-A

**Seats: Saddles** 

Q14-A01 [2007]

### **Child seats**

Includes removable child seats, and child seats and booster cushions that are integral with vehicle seats. *ISOFIX* 

### O14-B

**Beds** 

### Q14-C

### **Safety devices**

For electrical aspects, see X22-J11 for general passenger safety devices.

### Q14-C01

### Safety belts; Body harnesses

See X22-J03B codes only for electrical aspects of seat belts.

Seatbelt

### Q14-C02

### Inflatable occupant restraints

Includes inflatable airbags, knee bolsters and side/curtain airbags. See X22-J07 only for electrical aspects of airbags.

SRS

### Q14-C02A [2008]

# For protecting specific occupant

The codes below are used to highlight whether a specific occupant is being protected. For e.g. curtain airbags designed to protect all vehicle occupants then no Q14-C02A codes need be applied.

Q14-C02A1 [2008]

For protecting driver

Q14-C02A2 [2008]

For protecting front seat passenger

Q14-C02A3 [2008]

For protecting rear seat passenger

Q14-C02C [2008]

### Specific inflatable restraint types

These codes can be applied to highlight specific types of inflatable occupant restraint.

Q14-C02C1 [2008]

Inflatable knee bolster

Q14-C02C2 [2008]

Side/curtain airbag

Q14-C02C3 [2008]

Dashboard/steering wheel mounted airbag

Q14-C02C4 [2008]

**Roof mounted airbag** 

### Q14-C03

### Visual signalling, e.g. reflectors

Includes optical signalling devices such as reflectors and e.g. posts mounted on bumper to highlight corner of vehicle for assisting parking or collision prevention. For reflectors built into vehicle light see X22-B and X26-D01A codes only.

### Q14-C04

# Audible signalling, e.g. horns

Includes mechanical devices only. See X22-B03H and W05 codes for electrical aspects of vehicle horns.

### Q14-C05

### Portable emergency signal devices

For portable illuminated signalling devices see X22-B03E and T07-X and possibly X26 or W05 codes only.

Warning triangle

### Q14-C06

### Crash bars, crash pads

See also Q19-A or Q19-B for bicycles and motorcycles respectively. Also includes side impact protection bars (also see Q17-A06 for doors). Includes flip-up rollover bars used in cabriolet vehicles (also see Q19-S).

### Q14-C07

### **Stabilisers**

Includes stabilisers used when learning to ride a bicycle (see also Q19-A). Also includes stabilisers and grounding members for construction vehicles (see also Q19-E). For suspension system stabiliser/anti-roll bars see Q12-B09 instead.

### Q14-C15

### **Pedestrian safety systems**

includes passive systems such as pedestrian friendly bonnets or deformable bumpers (see also Q17-A12).

### Q14-C16

# [2008]

# Vehicle specific clothing

Can be used for all mechanical aspects of vehicle specific clothing, including bicycle and motorcycle helmets, safety shoes and jackets with protective inserts.

### Q14-C20

# Other safety devices

Includes collision responsive collapsible steering columns (see also Q18-B01D5).

### Q14-D

# Anti-glare equipment; Sun shades; Visors; Curtains; Screens

For electrical aspects such as electrochromic window glass, see X22-X05.

# Q14-E

### Mirrors

See X22-J04 only for electrical aspects of vehicle mirrors.

Rear-view

#### Q14-F

### Luggage/item storage arrangements

### Q14-F01

### Interior compartments/fittings

Includes door pockets, cubby holes, cup holders etc. For kitchen cabinets etc, see Q14-X instead. AC Vent cup holder, fold-down tray

### Q14-F02

# Exterior fittings/racks e.g. for luggage/sports equipment

Includes panniers and cycle carriers. Also includes removable racks for carrying other equipment such as canoes. See Q15 codes for vehicles specifically designed to carry specific loads.

### 014-G

### **Sidecars**; Forecars

Also see Q19-B for motorcycles per se. *Motorcycle* 

### Q14-H

# **Anti-theft arrangements**

Includes steering column lock, steering wheel lock, locking wheel nuts (see also Q11-A15) and other mechanical anti-theft assemblies.

### Q14-H01

### Locks

Includes vehicle door lock assemblies. For electrical aspects of vehicle door locks see X22-D01 codes.

### Q14-I

### Steps, e.g. running boards

Includes lift arrangements, e.g. for disabled person. For disabled person aids used on disabled person-specific vehicles such as invalid carriages, see Q15-B13 also.

# Q14-J

### **Stands**

Includes on and off-board supports and holders and parking cycles (see also Q19-A). See X22-J20 for electrical details of cycle stands and supports for parking purposes, as well as T05 codes for parking fee charging details.

### Q14-K

### Mudguards; Chain guards; Weather guards

Includes bicycle mudguards (see also Q19-A) and waterproof car covers used when vehicle is parked to protect the whole vehicle or e.g. windscreen from frost.

### Q14-L

### Sanitation devices

Includes toilets and washing facilities. Also includes sewage and waste storage.

### Q14-M

# Heating/ventilating/air-conditioning systems

Includes mechanical aspects such as ducting and air directing nozzles. For electrical aspects see X22-J02 codes.

### Q14-N

# Windscreen wipers/washers

Includes all aspects of windscreen/window cleaning such as windscreen wiper blades, screen washers, windscreen scraper/sponge etc. For electrical aspects of vehicle windscreen wipers/washers see X22-J01.

### Q14-P

[2012]

### **Footrests**

Includes foot rest for supporting passenger's/driver's feet.

# Q14-R

[2013]

# Vehicle license plates

Includes mechanical details of vehicle number plates. See Q14-C03 also for novel reflectors and X22-B05 for illuminated number plates.

### Q14-T

[2024]

### Vehicle cabin equipment/furniture

Includes furniture such as desks, tables, stands etc. See Q14-A and Q14-B respectively for chairs and beds. Includes furniture that is reconfigurable for different uses such as office work or entertainment. See X22-J12 and X22-J13 for electrical office and entertainment devices per se. For kitchen and sanitation equipment see Q14-X.

Laptop stand

# Q14-X

### Other vehicle accessories

Includes removable aftermarket car mats. See Q17-A10 instead for permanent fixings and fixed interior trim/carpets. Also includes kitchen equipment used in caravan or camper van (see also Q19-F01 and Q19-F02 respectively).

Kitchen; kitchen sinks/worktops/equipment storage; cooker

# Q15: Transporting Special Loads

From 2006 manual codes have been applied to cover all mechanical arrangements for transporting special loads. Prior to 2006, the Q15 class covered these aspects.

### Q15-A

Vehicles for transporting special loads and modified to facilitate loading/unloading/consolidating

### Q15-A01

# Using tipping movement of load supporting surface

Includes dump trucks and tipper lorries (see also Q19-E for construction vehicles per se).

### Q15-A02

### Using endless chains and belts

Includes use of cargo (un)loading conveyor belts.

### Q15-A03

### **Using screw conveyors**

Includes used of screw conveyors e.g. to unload particulate material.

### Q15-A04

### **Using loading ramp**

Includes use of cargo bed that can be raised to an inclined position to assist unloading.

# Q15-A05

Using loading platform

### Q15-A06

**Using cranes** 

#### Q15-A07

**Using rollers** 

### Q15-A08

# Using vibrators or fluid in direct contact with load

See also V06-D for vibration generators, and X22 for electrical aspects of cargo handling arrangements.

### Q15-A15

# Other loading/unloading arrangements

### Q15-B

### Vehicle adapted to transport special loads

Also see Q19-C codes for further vehicle applications, e.g. Q19-C for commercial vehicles per se.

### Q15-B01

### For transporting prefabricated buildings

Includes vehicles or trailers specifically for transporting mobile homes.

### Q15-B02

# For transporting money or other valuables

Includes armoured cars.

### Q15-B03

# For transporting reels

Includes vehicle for transporting large cable or wire drums.

### Q15-B04

### For transporting animals/meat

Includes lorries or trailers for transporting live animals such as pigs, sheep or cows, or processed meat.

### Q15-B05

# For transporting refrigerated goods

Includes refrigerated lorries (see also Q19-C02). See also X27 for refrigeration systems per se.

### Q15-B06

# For transporting bottles

### Q15-B07

### Vehicle/crane transporter

Includes car transporter lorries.

# Q15-B08

### Tanker vehicles

Includes tanker lorries carrying fluids such as petrol, milk or chemicals.

### Q15-B09

# **Spraying vehicles**

### Q15-B10

# Vehicles with living accommodation

For caravans and mobile homes or camper vans per se, see Q19-F01 and Q19-F02 codes respectively.

# Q15-B11

# For transporting mixed concrete

Also see Q19-E for construction vehicles per se. *Concrete mixer* 

### Q15-B12

### For carrying long loads

# Q15-B13

# For transporting persons

Includes wheelchair lifting arrangements and other vehicle fittings specifically designed to adapt vehicle for solely transporting disabled persons, e.g. invalid carriages. For disabled person aids/accessories such as wheelchair lifts used on conventional vehicles see Q14-I instead. See Q19-H03 for ambulances per se. Electrical aspects of e.g. disabled person aids can be coded in X22-X and S05-K codes.

### Q15-B30

### Other vehicle adaptations/modifications

Includes vehicles specifically designed to carry other loads such as gas tanks/cylinders.

### Q15-C

# **On-board weighing arrangements**

Also see S02-D codes for weighing per se, and X22-X06K for electrical on-board vehicle weighing arrangements.

# Q15-D

### Securing of loads

Includes novel straps and tie-down assemblies for specific loads. Includes tarpaulins for covering lorry trailers (see also Q19-C02 and Q19-J) to prevent load from spilling.

### Q15-X

Other vehicles predominantly for carrying specific loads

# Q16: Vehicle servicing, maintenance, cleaning equipment, Vehicle design and manufacture

From 2006 Q16 covers all mechanical details of vehicle servicing, maintenance and cleaning equipment as well as vehicle design and manufacture. Prior to the introduction of Q16 manual codes in 2006, the Q16 class covered vehicle lighting and signalling. See X22-B codes for electrical details of lighting and signalling, and Q14-C03 and Q14-C04 codes for mechanical details of vehicle signalling. When a more specific code exists elsewhere, then Q16 codes are not required. For example, a wheel manufacturing apparatus can be adequately covered in Q11-A28 and does not require the application of a Q16-D code.

### Q16-A

# Vehicle servicing/maintenance/cleaning equipment

### Q16-A01

### Vehicle cleaning apparatus

See X25-H09C for electrical aspects of car washers.

### Q16-A02

# Servicing/repairing equipment

Includes all equipment/methods for servicing, maintaining and repairing vehicles. For electrical aspects of vehicle servicing equipment, see X22-X16. For off-board wheel balancer see S02-J codes and Q11-B20. Includes mechanical aspects of oil change/reconditioning apparatus and on-board systems that burn dirty oil in combustion chamber and replenish engine with clean oil. For electrical aspects see X22-A16.

### Q16-A03

# Vehicle supporting/lifting/manoeuvring apparatus

See X25-F05 codes for electrical aspects of e.g. vehicle engine hoists or drive-on ramps.

Axle stands, jack

### Q16-D

# Vehicle design/manufacture/assembly

This code is used to highlight a vehicle manufacturing aspect that cannot be covered elsewhere. For vehicle tyre manufacture see Q11-B20 instead. See T01 codes for electrical CAD/CAM systems.

# Q16-D01 [2007]

# Vehicle manufacture/assembly

See X25-X14 only for electrical aspects of industrial manufacturing/assembly equipment, and X25-F01 codes for e.g. conveyors per se.

### Q16-D01A

[2007]

# **Production line assembly equipment**

### Q16-D09

[2007]

### Vehicle design

See T01 codes for electrical CAD/CAM systems.

### Q16-R

# Vehicle salvaging; recycling

See X25-W04 for electrical aspects of vehicle/material recycling.

### Q16-X

Other vehicle servicing/manufacturing equipment not provided for

# Q17: Vehicle construction, Fittings, Propulsion arrangements

From 2006 Q17 covers all mechanical details of vehicle construction, fittings and propulsion arrangements. Prior to the introduction of Q17 manual codes in 2006, the Q17 class covered vehicle parts and fittings as well as servicing. See Q16-A02 instead of mechanical aspects of vehicle servicing or X22-X16 and X22-A16 for electrical aspects of vehicle/engine servicing. For mechanical details of vehicle engines also see Q51 codes.

### Q17-A

### Vehicle construction

### Q17-A01

# Under structures; Chassis; Subframe; Connections

Includes tubular spaceframe constructions. Also includes passenger protection arrangements such as crumple zones built into the chassis.

#### Q17-A02

# Superstructures; Superstructure sub units and connections

Includes side panels, door pillars, fixed roofs, floors etc.

### Q17-A03

# **Combined superstructure and frame; Monocoque**

Includes monocoques used in racing cars (see also Q19-F03).

# Q17-A04

### **Cycle frames**

Includes frames and forks used in cycles and motorcycles. Also See Q19-A for cycles, Q19-B for motorcycles and Q12 codes for novel details of suspension forks or rear suspension units. Also includes foldable bicycle frames.

Electric bike

# Q17-A05

### Streamlining arrangements

Includes spoilers and other valances or wind deflectors. For electrical aspects of exterior fittings such as speed responsive spoilers, see X22-X05 only.

### Q17-A06

### Doors; bonnets; tailgates

Includes mechanical aspects of openings such as doors, boots and bonnets. Gas struts are also coded in Q63-E01D for fluid springs. For electrical aspects such as electric sliding doors or electric door locks, instead see X22-X05 and X22-D01 codes respectively. Also includes side impact beams (see also Q14-C06 for crash bars per se).

### Q17-A07

### Windows

Includes window glass per se and mechanical winders for raising and lowering windows. See X22-H codes only for electrical aspects of power windows.

Windshield, windscreen

### Q17-A08

# Sunroof; Removable roof panels; Convertible soft top roof

For electrical aspects see X22-J08 only. Targa top, roadster

### Q17-A09

# **Sealing arrangements**

Includes rubber seals and other water-proofing arrangements.

Drainage channel, sealing strip

### Q17-A10

### **Body finishing arrangements**

Includes decorative trim elements such as external rubbing strips, all interior trim, and liners and covers for load compartments such as pick-up truck load beds. For car weatherproof covers used when vehicle is parked see Q14-K instead.

### Q17-A11

### **Dashboard: Instrumentation**

Includes plastic dashboard mouldings, mountings and clips. See X22-E only for electrical aspects of vehicle dashboards/instrumentation, and S02 codes for dials/displays.

### Q17-A12

### **Exterior fittings; Bumpers**

Includes bullbars and A-frames mounted on front of off-road vehicle.

### Q17-A13

# Spare wheel stowing, holding or mounting arrangements

### Q17-A14

# **Endless track arrangements**

Includes e.g. tank and bulldozer Caterpillar (RTM) tracks (see also Q19-D and Q19-E codes for military and construction vehicles per se). Also see Q19-X for unspecified type tracked vehicles.

### Q17-A15

### Air cushion vehicle equipment

See also Q19-R01 for air cushion vehicles per se. Includes inflatable skirts. Also see Q24 codes for hovercraft per se.

Hovercraft

### Q17-A20

# Other vehicle constructions/fittings

### Q17-E

### **Propulsion arrangements**

This code can be applied to highlight motor vehicle engine/motor application, especially novel internal details of internal combustion engines such as pistons (Q51-A03B), crankshafts (Q51-A03E) etc., though Q51 codes are the primary codes used to highlight novel internal combustion engines details per se. For novel engine parts that bolt onto the engine such as exhaust systems and intake manifolds see Q17-E15 instead. For electrical aspects of vehicle engines see X22-A codes only. For mechanical details of electric vehicles also see Q19-P and for electric motors used to propel electric/hybrid vehicles see X21-A07.

# Q17-E01

### **Engine/motor mounting arrangements**

Includes mechanical engine mountings (see also Q51-X) or motor mountings (see also X11-J07\*). Mechanical vibration reduction mountings can also be coded in Q17-N. For electrically controlled vibration reducing engine mountings see X22-A12 only.

Bush

### Q17-E02

### **Engine/motor cooling arrangements**

Includes radiators per se. For electrical aspects of engine cooling, such as electric water pumps, see X22-A10 only. For electric motor cooling see X11-J06\* as well as X21-A07 for electric vehicle motors per se.

Water, cooling, antifreeze

### Q17-E03

### **Engine/motor lubricating arrangements**

Includes e.g. sumps and oil pick up pipes. See X22-A09 for electrical IC engine oil pumps etc. See X11-J07A for lubricating motor bearings.

### Q17-E04

# **Fuel supply arrangements; Fuel tanks**

Includes tanks for storing petrol, diesel, hydrogen etc. For electrical fuel supply arrangements see X22-A02 codes and X22-A03A codes for corresponding control details.

Fuel, tank, carburettor

### Q17-E05

### **Propulsion unit control arrangements**

Includes e.g. throttle cables, accelerator pedals, hand controls etc. For electrical aspects such as electronic throttle controls and electric pedal details see X22-A03B and X22-X12 codes instead.

Control

### Q17-E09 [2009]

### **Exhaust systems**

Includes novel primaries, collectors and silencers of motor vehicle exhaust systems. See also Q51-J codes for IC engine exhausts per se. See X22-A07 for electrical aspects of vehicle exhaust systems.

### Q17-E15

### Other propulsion details

Includes engine heating/warming arrangements (see also Q51-L), e.g. using diverted exhaust gas. From 2009 novel mechanical aspects of vehicle exhaust systems have been transferred to Q51-E09.

### Q17-N

# Noise/Vibration/Harshness reduction arrangements

Includes all mechanical aspects associated with reducing noise, vibration and harshness within vehicle, such as use of sound deadening materials. This can be used in conjunction with other Q codes as appropriate, e.g. with Q12 for suspension based NVH reduction. For electrical NVH aspects see the relevant X22 codes such as X22-G03N for transmission based NVH reduction, X22-X08 for general passenger compartment noise reduction and X22-A12 for engine noise/vibration reduction. See Q51-J01 instead for vehicle exhaust silencers.

# Q17-X

Other vehicle construction; fittings, Propulsion arrangements not provided for

# Q18: Brake systems; Steering systems; Control

From 2006 Q18 covers all mechanical details of vehicle brake and steering systems and their control. Prior to the introduction of Q18 manual codes in 2006, the Q18 class only covered brake control systems. See X22-C02/X22-C05 codes for electrical details of vehicle braking and steering systems.

### Q18-A

# **Braking systems; Control**

For electrical aspects of braking systems, see X22-C02 codes only.

### Q18-A01

# **Braking system components**

These codes are applied to highlight specific novel components of the braking system, such as novel brake discs per se (Q18-A01A). If the braking system as a whole is novel, rather than a specific individual part of it, then apply Q18-A03 codes instead, e.g. Q18-A03A for novel disc brake assemblies.

### Q18-A01A

#### Discs

Includes novel brake discs per se.

### Q18-A01B

### Drums

Includes novel brake drums per se.

### Q18-A01C

### Pads and shoes

Includes novel brake pads and shoes and their materials.

### Q18-A01D

### **Callipers**

Includes novel hydraulic brake callipers and mechanical cable operated callipers.

4-pot, V, side-pull, cantilever

### Q18-A01E

### Cylinders/reservoirs, e.g. master cylinder

### Q18-A01F

#### **Valves**

### Q18-A01G

### **Brake force control**

Includes brake bias valves (also see Q18-A01E). Includes all systems and methods for adjusting braking force. See X22-C02C for electrical brake pressure control systems.

### Q18-A01H

### [2013]

### **General brake hydraulics**

Includes general hydraulic aspects of vehicle brakes such as brake pipes, hoses, hydraulic lines, clips etc.

### Q18-A01J

### [2007]

### Air brakes

Includes e.g. air compressor arrangements for compressing air used in brakes of heavy vehicle such as truck (see also Q19-C02). For novel reciprocating air compressors see also Q55-A.

### Q18-A01P

### [2007]

### **Parking brakes**

Includes mechanical details of hand brakes or foot actuated parking brakes. See also Q18-A07 codes for novel details of the parking brake actuating arrangement per se. Also includes parking brakes acting by locking vehicle transmission/drive (see also Q13-A24).

### Q18-A01X

# Other brake system components

# Q18-A03

#### **Brake assemblies**

These codes are only applied when the brake system as a whole is novel. For individual novel brake system components such as discs or callipers see the relevant Q18-A01 codes only.

### Q18-A03A

### Disc brake assemblies

### Q18-A03B

### **Drum brake assemblies**

# Q18-A03C

# Brake assemblies with braking member acting on periphery of drum or wheel rim

Includes bicycle cantilever brakes (see also Q19-A).

### Q18-A03P

# Brake systems controlled by backpedalling

Includes hub brakes and brakes built into bicycle (see also Q19-A) transmission utilising e.g. disks, drums, contacting coaxial cones, or expanding brake bushings, that are actuated upon backpedalling, See Q63-B05 for freewheels and freewheel clutches.

### Q18-A03X

# Other brake assemblies

### Q18-A05

# **Brake cooling arrangements**

### Q18-A07

# **Brake action initiating devices**

Includes mechanical driver actuated devices. For electrical aspects of brake actuation devices see X22-X12 and X22-C02 codes.

### Q18-A07A

#### Foot control

Includes brake pedal per se and after-market alloy drilled pedal pads or rubber covers. See X22-X12 only for electrical aspects of brake pedals. Foot pedal

### Q18-A07B

### Hand control (e.g. brake lever)

Includes brake levers (also see Q19-A for bicycles and Q19-B for motorcycles).

### Q18-A07C

### **Automatic brake initiation**

For electrical aspects of automatic brake initiation see X22-C02D codes only.

# Q18-A10

### Portable wheel chocks

Includes portable chocks e.g. for preventing vehicle from moving during servicing or wheel changing.

### Q18-A15

### **Brake safety devices; Monitoring**

Includes mechanical aspects of e.g. brake safety such as brake pad wear indicators (see also Q18-A01C).

### Q18-A30

### Other brake systems

Includes deployable braking parachutes. Also includes exhaust braking, e.g. used on dieselengined trucks (see also Q19-C02 and Q51-D03) for sustained slowing down long hills, to prevent overheating of mechanical friction brakes (also see Q51-J07 for exhaust systems per se).

### Q18-B

### Steering systems; Control

For electrical aspects of steering systems, see X22-C05 codes only.

### Q18-B01

### Steering controls

For electrical aspects of steering wheels, see X22-C05C codes only.

### Q18-B01A

# Hand wheels; Steering wheel

Includes steering wheels per se and covering elements. See Also Q14-C02 for steering wheel mounted airbags.

### Q18-B01B

### **Hand levers**

### Q18-B01C

### Handlebars; Grips; Stems

Includes handlebars, grips, stems, bar-ends etc. (also see Q19-A for bicycles and Q19-B for motorcycles per se).

### Q18-B01D

### Steering column

Includes column per se.

### Q18-B01D1

# Rake/reach adjustment mechanisms

Includes telescopic and tiltable steering columns to enable adjustment of driving position.

### Q18-B01D3

### Clamps

Includes steering column mounting clamps.

# Q18-B01D5

### [2008]

### Collapsible steering column

Includes steering columns designed to collapse during vehicle collision for safety purposes (see also Q14-C20 for driver safety).

### Q18-B01X

### Other steering controls

### Q18-B02

# Steering gears/racks

Includes steering racks and associated pinion gears.

### Q18-B02A

# **Mechanical type**

Includes steering arrangements utilising a mechanical rack/gear arrangement. If hydraulic power assistance is also used see Q18-B06C as well.

# Q18-B02B

### **Hydraulic type**

Includes systems using hydraulic piston/cylinder assemblies instead of a mechanical rack arrangement to displace steering arms. Also see Q18-B06C for hydraulic power steering.

### Q18-B03

# Steering linkages; Stub axles or their mounting

Includes universal joints, e.g. for interconnecting upper and lower steering columns, and tie rod ends.

### Q18-B06

# Power assisted steering systems

For electrical power assisted steering systems see X22-C05A codes only.

### Q18-B06A

# Mechanical, e.g. using power take-off

### Q18-B06C

### Fluid

Includes hydraulic power assistance.

### Q18-B07

# **Automatic steering control arrangements**

For electrical automatic steering systems see X22-C05B only.

# Q18-B09

# Other deflectable wheel steering apparatus

Includes passive four wheel steering (4WS) systems (see X22-C05A1 only for electrical 4WS systems).

### Q18-B12

# Steering non-deflectable wheels, i.e. endless tracks

Includes steering of tracked vehicles. (also see Q19-D for military tanks and Q19-E for bulldozers).

### Q18-B15

# Other steering arrangements not provided for

Includes other steering devices such as steerable skis for snow mobiles (see also Q19-F04).

# Q19: Vehicle applications

From 2006 Q19 covers vehicle applications. Prior to the introduction of Q19 manual codes in 2006, the Q19 class only covered air-cushion vehicles. From 2006, see Q19-R01 and Q24-P10 for air-cushion vehicles such as hovercraft.

### Q19-A

# **Cycles**

Includes bicycles, unicycles, tricycles, tandems, recumbent cycles. For electrical aspects or accessories for bicycles, see X22-P01 only.

### Q19-B

# **Motorcycles; Scooters; Mopeds**

See X22-P02 only for electrical aspects of motorcycles.

# Q19-C

### **Commercial vehicles**

See X22-P05 codes only for electrical aspects of commercial vehicles.

### Q19-C01

### **Bus/Coach**

See X22-P05A for electrical aspects of buses and coaches.

### Q19-C02

### Lorry/Truck

Includes tractor-trailer over-the-highway vehicles. See X22-P05B for electrical aspects of lorries. Articulated lorry, HGV

### Q19-C03

### Taxi

See X22-P05C for electrical aspects of taxis.

### Q19-C04

### Refuse collecting vehicle

See X22-P05X for electrical aspects of dust carts.

### Q19-C05

# Snow removing vehicle; Snow plough; Road cleaning vehicles

See X25-U05 for electrical aspects of road cleaning and X22-P05X e.g. for snow ploughs.

Road sweeper

### Q19-C06

### Forklift truck

See X25-F05A and X21-A01B or X22-P05F for electrical aspects of forklift trucks.

### Q19-C07

### Hearse

### Q19-C09

### Other commercial vehicles

Includes milk floats, pick-up trucks and commercial vans.

### Q19-D

# Military vehicles

Includes tanks, armoured personnel carriers etc. See W07 and possibly X22-P06 for electrical aspects of military vehicles.

### Q19-E

### **Construction vehicles**

Includes bulldozers, excavators and cranes. See X25-U (construction), X25-D01 (earth mover) and X22-P07 for electrical aspects. For unspecified use tracked vehicles see Q19-X instead.

### Q19-F

### **Recreational vehicles**

Includes MPVs (multipurpose vehicles), SUVs (sports utility vehicles), people carriers and quad bikes. See X22-P08 for electrical aspects of recreational vehicles.

RV

### Q19-F01

### Caravan; Trailer tent

### Q19-F02

### Camper van; Motorhome

For equipment adapting vehicle to provide living or sleeping accommodation see Q15-B10.

# Q19-F03

### Racing/sports cars; Go-carts

See Q22-C instead for children's push-along gokarts.

# Q19-F04

### **Snow mobile**

For sledges see Q22-C01 instead.

### Q19-G

### **Agricultural vehicles**

Includes tractors, combine harvesters and agricultural implements. See X22-P09/X22-X11 and X25-N codes for electrical aspects of agricultural vehicles per se.

### Q19-H

### **Emergency vehicles**

See X22-P10 only for electrical aspects of emergency vehicles.

# Q19-H01

Police car

### Q19-H02

Fire engine

### Q19-H03

**Ambulance** 

# Q19-J

### **Trailers**

See also Q19-C02 for articulated lorry trailers. For electrical aspects of trailers see X22-P11 only.

# Q19-L

### **Driverless/autonomous vehicles**

Includes mechanical details of vehicles that can drive themselves, such as novel interior design/seating/function that takes advantage of reduced need for conventional driver controls. See X22-P15 and X21-A01L for electrical details of autonomous motor vehicles and electric vehicles respectively.

### Q19-P

# Electric vehicles; fuel cell vehicles

Only mechanical aspects of electric vehicles are coded here. See the electrical X21 codes only, when the novelty is electrical in nature. *FCV* 

### Q19-Q

### **Hybrid vehicles**

Only includes mechanical aspects of hybrid vehicles.

### Q19-Q01

### **Hybrid-electric**

Includes series/parallel/mixed hybrid-electric and hybrid-fuel cell vehicles. See X22-P04 and X21-A01D codes only for hybrid electric vehicles where the novelty is electrical in nature.

### Q19-Q05

### **Hybrid-mechanical**

Includes hybrid-flywheel and hybrid-pneumatic vehicles.

### Q19-R

# Convertible vehicles (usable on/in different terrain)

### Q19-R01

# Amphibious vehicles; Air cushion vehicles, e.g. for transporting heavy loads over small distances

Includes hovercraft type vehicles. Also see  $\Omega$ 24-P10 and  $\Omega$ 24-P30 for mechanical aspects for marine hovercraft and amphibious vessels respectively, or W06-C codes for electrical aspects.

### Q19-R02

# Vehicles usable on road/rail

Includes motor vehicles with outriggers to allow travel on railway track. Also see Q21 for mechanical railway details, or X22-X and X23-A codes for electrical aspects.

### Q19-R03

### Vehicles convertible into aircraft

Also see Q25 for mechanical aspects of aircraft, or W06-B codes for electrical aspects.

### Q19-R09

# Other convertible vehicles usable in or on different media

### Q19-S

# [2007]

### Soft top/cabriolet vehicles

Includes vehicles that have a soft-top roof or a foldable hard roof, e.g. on coupe/convertible cars. See also Q17-A08 for novel convertible roofs per se. See Q14-C06 for flip-up rollover bars used cabriolet vehicles.

# Q19-X

### Other vehicle types

Includes unspecified use tracked vehicles (see Q17-A14 for endless track arrangements per se).

# **Q2 Special Vehicles**

### Q21: Railways

From 2006 manual codes have been assigned for all mechanical railway details. For electrical aspects of railways see X23 codes instead.

### Q21-A

# Railway track arrangements/construction

### Q21-A01

# Track construction per se

Includes mechanical aspects such as track rails and sleepers per se. Also includes track maintenance assemblies and maintenance vehicles. For track inspection, see Q21-C03I instead. Further includes mechanical details of track changing arrangements, track switches and crossings.

# Q21-A02

Railway stops fixed to permanent way; Track brakes; Sand tracks; Buffers

### Q21-A03

### Stations; Station equipment

Includes platform doors, turnstiles etc. See X23-A09A for electrical offboard/station aspects.

### Q21-A04

# Track/station based equipment for transferring passengers, articles or freight to or from train

Includes gangplank and ramp assemblies. For train mounted aspects, see Q21-J06 and Q21-J07 codes instead.

### Q21-A05

# Track based rail or wheel flange lubrication devices

### Q21-A06

**Turntables; Traversers** 

### Q21-A07

Shunting or short distance haulage devices

### Q21-A08

# Track mounted derailers; Apparatus for placing vehicles on track

Includes portable or fixed track mounted jacks and hoists for lifting rail cars. For train mounted lifting apparatus see  $\Omega21\text{-}M03$  instead.

# Q21-A12 [2010]

# **Bridges and tunnels**

(Q21-A15)

Includes constructional details of railway bridges and tunnels.

Viaduct

### Q21-A15

# Other railway track arrangements

### Q21-B

### Railway type

### Q21-B01

### **Elevated railways**

See also Q21-B02 for monorail systems.

### Q21-B01A

### With suspended vehicles

# Q21-B01B

### Without suspended vehicles

#### Q21-B02

### **Monorails**

See also Q21-B01 for elevated monorail systems.

### Q21-B03

# Rope/cable railways

Includes aerial runways. See also Q21-C01D1 for novel traction arrangements utilising cables, ropes or chains.

# Q21-B03A

### Tramway or funicular systems

Includes tramways or funiculars using rigid tracks and cable or chain traction. For trams per se see  $\Omega$ 21-C03G instead. For novel cable/chain traction assemblies see  $\Omega$ 21-C01D1 also.

### Q21-B03B

# Power-and-free systems

Includes overhead systems with suspended vehicles that can be engaged with drive train when powered or disengaged when in free unpowered or stopped mode. For power and free conveyors see Q35 class or X25-F codes if electrical.

### Q21-B03C

# Ski lift, sleigh lift or trackless systems with guided towing cables only

### Q21-B04

### Rack railways

### Q21-B05

# Sliding or levitation systems

### Q21-B05A

# **Magnetic suspension arrangements**

See X23-A01A4 and X12-C codes for electrical aspects of magnetic levitation systems and electroand super-conducting magnets per se.

### Q21-B06

### **Underground railways**

Also see Q21-A codes for constructional details of underground railway tunnels, platforms, stations etc.

Subway, metro

### Q21-B09

### Other railway types

Includes tunnel systems. Also see Q35 class for e.g. pneumatic tube conveying arrangements or X25-F codes for electrical conveying systems.

### Q21-C

### Locomotive/motor railcar type

These codes are applied to classify the locomotive type when the novelty being coded is mechanical. If the novelty is electrical in nature then see X23 and other EPI codes instead.

# Q21-C01

# Type of propulsion for locomotive or railcar

### Q21-C01A

Steam locomotives or railcars

### Q21-C01B

**Electric locomotives or railcars** 

### Q21-C01C

# IC engined or gas turbine engined locomotives or motor railcars

See also Q21-C01B for diesel-electric locomotives.

### Q21-C01D

Other propulsion systems for locomotives or motor railcars (e.g. with propulsion devices between or alongside rails, e.g. pneumatic systems)

### Q21-C01D1

# Tractive effort applied to cables or chains

See also Q21-B03 codes for e.g. funiculars.

### Q21-C01D2

Tractive effort applied to racks

### Q21-C01D3

Tractive effort applied or supplied by aerodynamic force or fluid reaction

### Q21-C03

### Type of carriage or wagon

These codes are intended to highlight specific types of carriage or wagon construction.

### Q21-C03A

### **Passenger carriages**

This code is mainly applied when the novelty relates to the carriage superstructure itself or fittings such as windows, doors or bulkheads etc. permanently mounted to/inside the carriage. Novel accessories such as seats used in a passenger carriage are not normally included here (see Q21-J03).

# Q21-C03B

### Wagons or vans

Includes freight wagons.

### Q21-C03C

### Tank wagons or carrying fluent materials

Includes tankers for carrying liquids.

### Q21-C03D

### **Hopper cars**

Includes e.g. wagons for carrying particulate material with dispensing openings at bottom of wagon.

# Q21-C03E

### **Tipping wagons**

### Q21-C03F

### Mine cars

See X25-D02 for electrical aspects of mining vehicles.

### Q21-C03G

# Tramway vehicles

The code is applied for novel trams per se. For cable/rope driven tram or funicular railways in general see Q21-B03A instead.

### Q21-C03H

### **Buffer cars**

### Q21-C03I

### **Railway inspection trolleys**

Includes all types of railway inspection vehicles. For novel track maintenance vehicles, also see Q21- A01.

### Q21-C03X

# Other railway vehicles

Includes rail vehicles convertible for use on road (see also  $\Omega$ 19-R02).

# Q21-D

# Rail vehicle construction; fittings; Underframes; Suspension; Transmissions

### Q21-D01

#### **Superstructures**

Includes wall panels, floors, bulkheads and roofs etc. For movable roof assemblies see Q21-D17 instead

### Q21-D02

### **Underframes**; Chassis

### Q21-D03

#### **Bogies**

Includes wheel/axle assemblies fastened to chassis.

### Q21-D04

# Connections between underframes and bogies, e.g. to allow relative movement

Includes suspension arrangements. See X23-A01C for electrical aspects of railway suspension systems.

### Q21-D05

# Adjustment of wheel axles or bogies when rounding curves

Includes e.g. passive carriage tilt control. See X23-A01C for railway train active suspension/carriage tilt control. Also includes arrangements for adjusting orientation/steering of wheels e.g. when rounding bend to reduce wheel flange and rail head wear.

### Q21-D06

### Axle boxes and their mounting

Includes wheel bearing arrangements inside axle

### Q21-D07

### Lubrication assembly for axle box

Includes lubrication arrangements and oil sumps for axle box wheel bearings.

### Q21-D08

# Arrangements to allow use on tracks of different width

Includes systems for adjusting wheel spacing to allow train to run on different gauge tracks.

#### Q21-D09

# **Derailment preventing equipment**

### Q21-D10

# Rail engaging elements, e.g. wheels or

Includes wheels and other assemblies for engaging tracks, overhead rails etc.

### Q21-D10A [2007]

### **Traction increasing equipment**

Includes dispensing of particulate material such as sand under train wheels on railway track to increase grip. See  $\Omega$ 21-F09 also, if sand is dispensed specifically to improve braking.

### Q21-D11

# Wheel guards; Bumpers; Obstruction removers

#### Q21-D12

### Couplings; Draught or buffering appliances

### Q21-D12A

### Couplings

Includes couplings between carriages.

### Q21-D12B

**Draw gears** 

### Q21-D12C

**Buffers** 

### Q21-D13

### **Transmission systems**

Includes power transmission arrangements.

Drive shaft, gearing

# Q21-D14

# Aerodynamic modifications to reduce air resistance

Includes spoilers and other wind deflectors, especially for high speed trains.

Q21-D15

**Doors** 

Q21-D16

Windows

Q21-D17

# **Movable roofs; Covers; Tarpaulins**

For fixed roofs see Q21-D01 for novel train superstructures.

### Q21-D25

# Other rail vehicle constructions, fittings

Includes constructions/fittings designed for safety purposes, such as fire resistant bulkheads (see also  $\Omega$ 21-D01). Accessories such as fire extinguishers are included in  $\Omega$ 21-J09 only.

# Q21-F

# **Brake systems**

See X23-A01B for electrical braking systems. Q18-A codes may also need to be applied when they provide a more detailed breakdown of the brake system.

### Q21-F01

### Braking arrangements acting on wheels

### Q21-F02

# Brakes with braking members co-operating with track

# Q21-F03

# Hydrostatic, hydrodynamic or aerodynamic brakes

Includes air brakes.

### Q21-F04

### Brake wear compensating mechanisms

Includes mechanical adjusters to compensate for brake pad wear.

### Q21-F05

### **Brake actuation mechanisms**

Includes brake actuating levers.

# Q21-F09

### Other braking arrangements

Includes other braking systems and brake system components

Brake pipes, clamps, clips, hoses

### Q21-J

### Rail vehicle accessories

See X23-A13 for electrical train accessories. Other Q14 codes may also need to be applied when a more detailed breakdown exists.

### Q21-J01

### Sleeping accommodation; Beds

See X27-A03 for electrical aspects of furniture per se.

### Q21-J02

# Heating; cooling; ventilating; airconditioning

Includes mechanical ducting and vents.

#### Q21-J03

**Seats** 

### Q21-J04

# **Sanitation arrangements**

Includes toilets and washing facilities.

### Q21-J05

### Steps

Includes all train mounted arrangements for assisting boarding of passengers such as fixed or movable steps, or wheelchair lifting or ramp assemblies etc.

### Q21-J06

# Cargo/luggage loading and unloading arrangements

Includes cargo loading ramps and hoists. For platform based cargo/passenger handling, see Q21-A04 instead.

# Q21-J07

# Cargo/luggage storing/securing arrangements

Includes cargo storage compartments and restraining devices such as luggage nets or straps.

[2007]

# Q21-J08

Railway safety systems

Includes systems for evacuating passengers from train during emergency and e.g. glass hammers mounted inside train. Also includes fire fighting equipment such as fire extinguishers. See Q21-D05 for train constructional features designed specifically for safety purposes such as fire-resistant bulkheads.

Fire-extinguisher, emergency, safety, escape slide, escape hatch

### Q21-J09

### Other rail vehicle accessories

Includes any other rail vehicle accessories that can not be coded elsewhere.

### Q21-M

# Locomotive servicing/maintenance; Cleaning; Train/track design and manufacture

For track maintenance equipment see  $\Omega 21$ -A01 instead. Track inspection vehicles are coded in  $\Omega 21$ -C03I only.

### Q21-M01

# Train cleaning apparatus

Includes equipment for washing the exterior of the train or train specific equipment for cleaning the inside of the train.

### Q21-M02

# Locomotive servicing equipment, e.g. filling locomotive with water or sand

Includes water columns and coal bunkers (see also Q21-C01A for steam locomotives). Also includes tools used during servicing and maintenance operations.

### Q21-M03

# Rail vehicle mounted locomotive supporting/lifting/manoeuvring apparatus (e.g. breakdown recovery train)

Includes train mounted cranes for manoeuvring train after derailment or accident. For track mounted equipment such as cranes and jack assemblies, see Q21-A08 instead.

### Q21-M05

# Train design/manufacture/assembly/refurbishment

See e.g. T01 codes for computer/CAD/CAM systems for train design and manufacture.

### Q21-M09

# Other locomotive servicing/manufacturing equipment not provided for

# Q21-N [2007]

# Noise/Vibration/Harshness reduction arrangements

Includes all aspects of reducing noise, vibration or harshness on-board railway train, and also offboard aspects such as track mounted arrangements for reducing noise from passing train (see also Q21-A15).

### Q21-S

### Safety and signalling equipment

For electrical aspects of railway safety or signalling see X23-B codes.

### Q21-S01

# Points and signalling

See X23-B03 for electrical aspects of points and signals and their operation.

#### Q21-S01A

# Points and scotch blocks and their operating devices

Includes locking mechanisms for points.

### Q21-S01C

# Signals and their operating devices

For warning signals used at level crossing to warn motorists, see Q21-S07C.

### Q21-S01C1

# Visible signals

Includes flags, semaphores and reflectors. See X23-B03 for electrical/illuminated signals.

### Q21-S01C2

### **Audible signals**

Includes pneumatic horns.

### Q21-S01C3

# Signalling indicators on train

### Q21-S01E

# Arrangement for interlocking between points and signals

See X23-B04A codes for electrical interlocking between points and signals.

### Q21-S05

### Train traffic control; Track/station blocking

Includes arrangements for dividing track into block sections so that multiple trains are not present in a signal block, to reduce the risk of collisions. See X23-B04C for electrical aspects of track/station blocking.

Anticollision

### Q21-S05A

# For controlling traffic in one direction only

One-way

# Q21-S05C

# For controlling traffic in two directions over same pair of rails

Includes e.g. using token system, tablets, staffs etc.

# Q21-S07

# Safety systems for rail/road crossing traffic

See X23-B05A and maybe T07-B05A for electrical aspects of railway crossing systems.

# Q21-S07A

# **Guards**; Gates

Includes mechanical gates and barriers per se.

# Q21-S07B

# **Operation of gates**

Includes actuating arrangements for opening and closing gates/barriers.

# Q21-S07C

# Warning devices for road traffic

See T07-A05A for electrical aspects of railway crossing road traffic warning systems.

# Q21-X

# Other locomotive aspects

Includes locomotive aspects that are not covered elsewhere.

#### Q22: Hand/Foot/Animal Drawn Vehicles

From 2006 Q22 covers all mechanical details of hand/foot and animal drawn vehicles such as carts, wheelchairs, sledges and horse-drawn carriages. Prior to the introduction of Q22 manual codes in 2006, the Q22 class covered hand and motor vehicles which included carts, sledges, steering systems/controls, vehicle under/super structures, trailers and vehicle design, manufacture and (dis)assembly.

#### Q22-A

#### Hand carts

#### Q22-A01

## With single axis carrying transport wheels

Includes wheelbarrows.

#### Q22-A02

## With more than one axis carrying transport wheels

Includes four-wheeled barrows and mechanical aspects of shopping trolleys (see X25-F05A for electrical aspects of shopping trolleys).

#### Q22-A03

#### **Accessories for hand carts**

Includes handle grips and brakes.

#### Q22-B

## **Carriages for children; Perambulators**

Pram, pushchair

#### Q22-B01

## With single wheel axis

### O22-B02

#### With more than one wheel axis

Includes three and four wheeled, twin axle pushchairs.

### Q22-B03

## Accessories for children's carriages/perambulators

Includes luggage racks, bottle holders etc.

#### Q22-C

## Other hand propelled vehicles

Includes unpowered children's go-karts.

#### Q22-C01

## Sledges/ice boats

Toboggan

#### Q22-C02

#### Wheelchairs

See S05-G02A for electrical aspects of wheelchairs, and X21-A01A and S05-K01 for electrical aspects of mobility vehicles.

#### Q22-C03

### [2007]

## Accessories for other hand propelled vehicles

Includes seats, handles, foot rests, etc.

#### Q22-D

## Land vehicles drawn by animals

Includes e.g. horse-drawn carts.

Sulky

#### Q22-M

### [2007]

## Foot propelled vehicles

Includes stand on scooters and skateboard type devices propelled by user's feet. See W04-X codes for electrical aspects of toy skateboards. See Q19-A instead for bicycles and P36 for novel roller skates or ice skates.

## Q22-X

[2007]

## Other carts/carriages/vehicles

## Q24: Ship; Waterborne Vessels; Related Equipment

From 2006 manual codes have been assigned for all mechanical ship, waterborne vessel and port details. For electrical aspects of ships see W06-C codes instead.

## Q24-A

## Ship construction; Fittings

#### Q24-A01

#### Hulls

Includes surfboard constructions.

#### Q24-A01A

## Hydrodynamic or hydrostatic features

Includes e.g. hydrofoils and hydroplanes. Also includes shock-wave/drag reducing bow assembly.

### Q24-A01B

**Hull shells** 

#### Q24-A01C

**Frames** 

#### Q24-A01D

#### Keels

Includes permanently fixed, non-movable keels.

#### Q24-A01D1

#### Movable/drop keels/centre boards

See Q24-E05A instead for movable rudders.

#### Q24-A01E

**Stern posts** 

#### Q24-A01G

Stems

## Q24-A01H

#### **Decks**

Includes flooring.

#### Q24-A01I

#### **Bulkheads**

Also see Q24-B09H for watertight arrangements for bulkheads.

## Q24-A01J

### Gratings

#### Q24-A01K

**Panellings; Linings** 

#### Q24-A01L

## Reinforcements for carrying localised loads

#### Q24-A01M

## Collapsible; foldable; inflatable hulls

Includes inflatable dinghy hull assemblies and cushions for hovercraft (see also Q24-P10).

#### Q24-A01N

## Ballasting; Self-bailing equipment; Scuppers

Includes bilge pumps.

#### Q24-A01P

#### Multiple hull arrangements

Includes catamaran twin hull and trimaran triple hull arrangements.

### Q24-A01X

[2007]

Other hull details

#### Q24-A03

Windows; Doors; Ports

#### Q24-A03A

**Windows; Port holes** 

## Q24-A03B

**Doors** 

## Q24-A03C

**Ports; Hatches** 

### Q24-A05

## Superstructures; Masts

Includes conning towers. See W06-A codes for radar installations and W02 codes for radio masts etc.

## Q24-A15

## Other ship construction; fittings

#### Q24-B

## Ship accessories

Includes mechanical aspects of shipboard lighting and signalling (see also X26 for lighting per se).

#### Q24-B01

Passenger/crew accommodating arrangements; Cabins; Galleys

#### Q24-B01A

## Furniture - vessel specific

Includes furniture specifically designed for marine/ship application, such as seats and beds etc.

#### Q24-B01C

#### Sanitation arrangements

#### Q24-B01C1

**Toilets** 

#### Q24-B01C2

## **Washing facilities; Showers**

See X27-A02A4 for electrical aspects of showers and wash basins, and X27-E03A for electrical aspects of water heating.

#### Q24-B02

## Load accommodating arrangements

#### Q24-B02A

## Load accommodating compartments

Includes e.g. movable/detachable decks, and storage tanks.

#### Q24-B02C

## Ship-board load handling arrangements

Includes e.g. derricks, cranes, winches, chutes, cableways, conveyors for loading/unloading.

## Q24-B02E [2007]

## Ship-board passenger handling arrangements

Includes ship-mounted extendable gang planks or platforms lowerable into the water or onto dry land to aid boarding or alighting of vessel. For shore mounted passenger handling arrangements see Q24-R03 instead.

## Q24-B03

#### Heating; Ventilating; Air-conditioning

Includes mechanical aspects only. See W06-C01C5 for electrical aspects of HVAC systems.

Duct, vent

#### Q24-B05

#### Instrumentation

Includes e.g. mechanical gauges, periscopes. See S02 codes for further details of instrumentation per se, and W06-B01B codes for electrical instrumentation details.

#### Q24-B07

## Desalination plants - fresh water production

#### Q24-B09

#### **Emergency/safety equipment**

Includes shipboard safety devices. For personal equipment such as life jackets and life rings, see Q24-X01A.

#### Q24-B09A

Fire fighting equipment

#### Q24-B09C

Life boat equipment

#### Q24-B09C1

Fastening or storage on deck

#### Q24-B09C2

#### **Deployment devices**

Includes e.g. hoists, davits, winches.

#### Q24-B09E

### Apparatus to control vessel attitude

Includes equipment to decrease roll, pitch or like unwanted vessel movement. Includes arrangements to reduce the risk of capsizing or sinking.

## Q24-B09E1

#### By improving stability

Includes use of e.g. ballast tanks.

#### Q24-B09E3

## By improving buoyancy

Includes use of e.g. buoyancy chambers.

#### Q24-B09G

## Anti-collision arrangements, e.g. feelers

#### Q24-B09H

#### Watertight arrangements

Includes e.g. watertight doors/bulkheads (see also Q24-A03B and Q24-A01I respectively).

### Q24-B09X

#### [2007]

## Other safety/emergency equipment/systems

Includes emergency escape equipment such as escape shaft in vessel, e.g. between sunken vessel and rescue vessel.

#### Q24-B10

## Waste water/Sewage treatment plants

See Q24-B01C for sanitation and toilet systems per se.

## Q24-B99 [2010]

Other ship accessories.

## Q24-C

## Tying-up; anchoring, towing/pushing equipment

#### Q24-C01

## **Mooring equipment**

For mooring against jetty, pier or other vessel.

#### Q24-C02

#### **Anchoring arrangements**

E.g. when using ground-engaging anchor.

#### Q24-C02A

**Anchors** 

#### O24-C03

**Boat hooks** 

### Q24-C04

**Towing/pushing equipment** 

## Q24-C05

## Ancillaries, e.g. chains; ropes; clamps; bollards; fairleads; hawsers

Includes ancillaries used for e.g. mooring, anchoring or tying up. Includes fenders used to protect side of ship's hull.

#### Q24-E

## Marine propulsion and steering

#### Q24-E01

### **Propulsive elements**

These codes describe the type of propulsion used on the ship and are only applied when the type of propulsion system has some bearing on the novelty.

### Q24-E01A

## Directly acting on water

Includes water jet propulsion (see Q24-P21 for jet-skis).

#### Q24-E01A1

#### Of rotary type

#### Q24-E01A1A

#### **Propellers**

Includes propellers per se and propeller driven vessels when the propulsion aspect is important.

#### Q24-E01A1C

#### Paddle wheels

Paddle steamer

#### Q24-E01A3

#### Of non-rotary type, e.g. flaps

Includes oars (see also Q24-E01G for muscle power).

#### Q24-E01C

#### Directly acting on air (e.g. for hovercraft)

Also see Q24-P10 for hovercraft per se, and Q24-P30 for swamp boats having large propeller acting on air.

#### **Q24-E01E**

## Directly acted on by wind (e.g. sails, Magnus effect)

Includes sails per se. See Q24-A05 for masts per se.

## Q24-E01G

#### Using muscle power

Includes use of e.g. oars, movable thwarts, foot rests, sculls.

#### Q24-E01X

## **Using other means**

Includes e.g. using water currents, e.g. tidal flow, or direct engagement with water bed.

#### Q24-E02

## **Propulsion power plant**

The codes in this section describe the type of propulsion used on the ship and are generally only applied when the type of propulsion has some bearing on the novelty.

## Q24-E02A

#### Using internal combustion engines

## Q24-E02A1

Outboard motors

#### Q24-E02A3

**Inboard motors** 

Q: Mechanical

#### Q24-E02B

## Using external combustion engine, e.g. gas turbine

For gas turbine engines per se, see also Q52 codes.

Q24-E02C

**Using steam** 

Q24-E02C1

**Using steam turbine** 

Q24-E02C3

Using positive displacement steam engine

Q24-E02D

Using hydraulic fluid motor

Q24-E02E

Using nuclear energy

Q24-E02F

Using land vehicle supported on vessel

Q24-E02G

Using land based animal/vehicle, e.g. horse

Q24-E02M [2008]

#### **Fuel supply arrangements**

Includes fuel tanks and associated pipework. For IC engine and gas turbine engine fuel supply aspects see Q51-H01 and Q52-C codes respectively.

Q24-E02X

[2007]

Other propulsion power plant

Q24-E03

**Transmission systems** 

Includes novel drive trains.

Q24-E03A

Gearing

Q24-E03C

Clutch

Q24-E03E

Drive shafts; propeller shafts; shaft tubes; seals etc.

Q24-E05

Steering arrangements

#### Q24-E05A

#### Steering by rudders

Includes rudder and tiller assemblies per se.

#### Q24-E05C

### Steering by propulsive elements

Includes systems changing direction of propeller

#### Q24-E05E

Steering/slowing by extensible flaps

#### Q24-E05G

#### Steering by deflecting propeller slipstream

Includes rudder type elements in propeller slipstream.

#### Q24-E05X

Other steering arrangements

## Q24-M

## Military equipment

See W07 codes for electrical aspects of military equipment and W06-C codes for electrical aspects of ships. See Q24-P30 for military vessel application.

### Q24-M01

Offensive equipment

#### Q24-M01A

#### **Guns and missile launchers**

See W07-E05 for electrical aspects of weapons launching systems. Also includes torpedo launchers.

#### Q24-M01B

Mine and depth charge launchers

#### Q24-M01E

Ammunition stores and handlers

## Q24-M03

#### **Defensive equipment**

Includes e.g. camouflage. For electrical aspects of active camouflage see W07-F03 instead.

#### Q24-M03A

#### Mine sweeping/clearing

E.g. using towed mechanical cables. For electrical aspects of mine detection/sweeping/clearing see e.g. W07-F05 and W06-C codes instead.

### Q24-N

[2007]

## Noise/Vibration / Harshness reduction arrangements

Includes all ship-board arrangements for reducing noise, vibration or harshness, e.g. use of sound-deadening material.

#### O24-P

Vessels or floating structures adapted for special purposes

Q24-P01

Pipe laying vessels

Q24-P02

Cable laying vessels

Q24-P03

Ice breakers

Q24-P04

## **Fishing vessels**

Includes small fishing boats and large commercial trawlers.

Q24-P05

**Barges or lighters** 

#### Q24-P06

## Environmental vessels, e.g. for collecting pollution from open water

Includes vessels adapted to clear up or contain environmental disasters such as oil spillages.

## Q24-P07

For transporting marine vessels

## Q24-P08

## Floating buildings, drilling platforms, workshops

Includes floating vessels normally designed to be static at a fixed location.

Q24-P09

**Canal boat** 

Q24-P10

Waterborne air cushion vehicle

Includes hovercraft.

Q24-P11

Submarines; submersible craft

Semi-submersible

#### Q24-P12

## Flying vessels

Includes airfoil boats and ground effect craft. See Q25-P04 for flying boats and sea planes.

#### Q24-P13

## Military vessels

Includes e.g. aircraft carriers, destroyers, frigates. For electrical aspects of military ships see W06-C and W07 codes respectively.

Q24-P14

**Ferries** 

Q24-P15

Tugs

Q24-P16

**Light ships** 

#### Q24-P17

## **Pontoons**

See Q24-R15 instead for ground-engaging piers/jetties.

Inflatable

#### Q24-P18

## **Buoys**

See W06-C07C for electrical aspects of buoys.

#### Q24-P19

**Rafts** 

Q24-P20

Canoes; Kayaks

#### Q24-P21

## Sports/pleasure equipment, e.g. surfboards, sailboards, water skis

Includes all recreational vessels such as small recreational boats (see also Q24-P22 for sailing boats), personal watercraft, jet-skis, surfboards etc. Boogie board, kite surfing, sail board

#### Q24-P22

[2010]

### Sailing boats

Includes all sail powered vessels such as sailing boats and yachts. See Q24-E01E for sail arrangements per se.

#### Q24-P24

[2008]

#### **Tanker vessels**

(Q24-P30)

Includes marine vessels that transport fluids such as crude oil, water, fuels etc.

#### Q24-P25

[2007]

#### **Commercial vessels**

(Q24-P30)

Includes general non-specific commercial ships. Use other Q25-P codes instead when a more specific commercial vessel is specified.

#### Q24-P28

[2007]

#### **Emergency services vessels**

(Q24-P30)

Includes coastguard vessels, police boats, fire tenders etc. For lifeboats and lifeboat equipment on-board e.g. ferry, see Q24-B09C (and Q24-P14 for ferry) also.

#### Q24-P30

#### Other special purpose vessels

Includes swamp boats and amphibious vessels (see also Q19-R01).

## Q24-R

#### Port, harbour, marina equipment

#### Q24-R01

**Dry-docks** 

#### Q24-R02

## Vessel launching/hauling-out

Includes slipways and boat hoists.

### Q24-R03

## Passenger handling equipment

Includes steps and other dockside passenger handling equipment.

### Q24-R05

#### Load/vehicle handling equipment

Includes vehicle loading ramps.

## Q24-R09

## Marine craft servicing and maintenance equipment

See W06-C07 for electrical aspects of ship maintenance

#### Q24-R10

#### Cleaning equipment

Includes hull scrapers.

#### Q24-R15

### Other ground/port based equipment

Includes piers and jetties (see also Q21-P17 for inflatable jetties/pontoons).

#### 024-X

## Other waterborne vessel details and related equipment

#### Q24-X01

Life saving in the water

### Q24-X01A

Life jackets; Vests; Buoyancy aids; Rings

#### Q24-X01B

**Shark screens; Nets** 

#### Q24-X04

**Diving equipment** 

#### Q24-X05

### Ship/boat manufacture

See W06-C08 for electrical aspects of ship manufacture. See Q51-M or Q52-M respectively for manufacture of IC and gas turbine engines used in ships.

#### Q24-X06

### Salvaging equipment

#### Q24-X07

### Ship design and testing

Includes e.g. using towing tanks or model basins for designing. See T01 codes for computerised (CAD) ship design.

### Q24-X11

## Boat trailers; other over-land boat transportation devices

See also Q19-J for trailers per se. For vehicles specifically designed to carry specific loads such as vehicles or boats, see Q15-B07.

### Q25: Aircraft: Aviation: Cosmonautics

From 2006 manual codes have been assigned for all mechanical aircraft, aviation and cosmonautic details. See Q25-S for cosmonautics per se and Q25-X for non-specific aircraft/spacecraft systems such as aircraft/spacecraft manufacture (Q25-X05). For electrical aspects of aircraft and space vehicles see W06-B codes instead.

#### Q25-A

## Aircraft construction; Fittings

#### Q25-A01

### **Fuselages**

Includes aircraft body construction and interior trim. Includes nose cones.

#### Q25-A01A

#### Air frames

Includes fuselage subframes/chassis.

#### Q25-A01C

#### **Decks**

Includes flooring.

#### Q25-A01E

**Bulkheads** 

#### Q25-A01G

Skins; panels; linings; insulation

## Q25-A02

Wings

#### Q25-A02A

Ribs; spars; stringers

#### Q25-A02C

Skins; panels

### Q25-A03

Windows; doors; hatches

#### Q25-A03A

Windows

#### Q25-A03A1

**Blinds** 

### Q25-A03C

**Doors** 

#### Q25-A03E

#### **Hatches**

#### Q25-A04

#### Stabilising/aerodynamic surfaces

Includes tail planes; nose planes; fins; nacelles. For control surfaces per se, such as moveable flaps and rudders, see Q25-C05 codes instead. For nose cones per se, see Q25-A01 instead.

#### Q25-A05

#### Undercarriages; alighting gear

#### Q25-A05A

#### Wheels assemblies

Includes aircraft wheels and tyres. For novel tyres etc. see also Q11 codes for a more detailed breakdown.

#### Q25-A05B

Skis; runners

#### Q25-A05C

#### Float assemblies

Includes buoyant floats for landing on water. See also Q25-P04 for sea planes per se.

#### Q25-A05F

#### Air cushion alighting gear

## Q25-A05G\* [2006-2007]

## Arrestor hooks, e.g. for use on aircraft carrier

\*This code is now discontinued and transferred to Q25-A07G. Q25-A05G remains searchable for patents from 200601-200682. Includes all arrangements for slowing or stopping aircraft, including air brake parachutes.

## Q25-A07 [2007]

## **Brake systems**

Includes mechanical brake system components such as novel brake pad friction materials.

#### Q25-A07A [2007]

#### Air brakes

Includes deployable air-brake parachutes.

## Q25-A07G

## Arrestor gear/hooks, e.g. for use on aircraft

[2007]

## **carrier**Includes hydraulic arrestor gear cooperating with

Includes hydraulic arrestor gear cooperating with arrestor hook for stopping military aircraft (see also Q25-P13) on board aircraft carrier. See Q25-A05G prior to 200701.

### Q25-A07X

[2007]

#### Other braking systems

#### Q25-B

#### Aircraft accessories

Includes aircraft lighting/signalling.

#### Q25-B01

## Passenger/crew accommodating arrangements; Cabins; Galleys

Includes mechanical aspects of kitchen equipment, e.g. food carts. Also includes retractable steps to assist boarding of crew/passengers.

#### Q25-B01A

## Furniture - aircraft specific

Includes e.g. aircraft specific tables, trays and seats, including ejector seats (see also Q25-M for military aircraft).

#### Q25-B01C

#### Sanitation arrangements

Includes waste water and sewage processing systems.

#### Q25-B01C1

**Toilets** 

## Q25-B01C2

Washing facilities; Showers

#### Q25-B02

## Load accommodating arrangements

## Q25-B02A

#### Load accommodating compartments/decks

Includes luggage and cargo holds and passenger compartment overhead storage compartments.

## Q25-B02C

## Aircraft-board load handling arrangements

Includes e.g. derricks, cranes, winches, chutes, cableways and conveyors for loading/unloading. See Q25-R05 for airport based load handling equipment.

#### Q25-B03

## Heating; Ventilating; Air-conditioning

Includes ducting etc. For electrical aspects of HVAC systems used in aircraft, see W06-B01C5 instead.

#### Q25-B04

## **De-icing arrangements**

Includes e.g. using ducted hot gas. For electrical de-icing arrangements see W06-B01C4 and X25-B codes for electrical heating per se.

#### Q25-B05

### Instrumentation (mechanical aspects)

For electrical aspects of aircraft instrumentation see W06-B01B and S02 codes.

#### Q25-B09

## On-board safety/emergency equipment

See W06-B01C8 for on-board electrical security systems e.g. to prevent hi-jacking.

#### Q25-B09A

#### Fire fighting equipment

Includes fire blankets and extinguishers used onboard aircraft.

#### O25-B09C

## **Emergency oxygen supplies**

See W06-B01C9 for electrical aspects of emergency oxygen supply systems.

#### Q25-B09E

## Escape slides (and other emergency exit arrangements)

Includes inflatable emergency slides. See also Q25-B01A for ejector seats.

### Q25-B09G

#### **Parachutes**

## Q25-B15

## Other aircraft accessories

E.g. includes dropping, releasing articles and liquids, e.g. to fight forest fire or for crop spraying (see X25-X05 and X25-N01B respectively for electrical aspects of fire-fighting and crop spraying).

#### Q25-C

## Aircraft propulsion and steering; attitude/altitude control

### Q25-C01

#### **Propulsive elements**

These codes describe the type of propulsive elements being used and are generally only applied when the type of propulsive elements has some bearing on novelty.

#### Q25-C01A

#### Directly acting on air

## Q25-C01A1

## **Rotary propellers**

See also Q25-C02B for turboprop external combustion engine propulsion. Also includes helicopter rotors (also see Q25-C05C if rotor control surface positioning/feathering is detailed). *Turboprop* 

#### Q25-C01A3

## Of non-rotary type, e.g. flappable wings

Also see Q25-P03 for ornithopters per se.

#### Q25-C01E

## Directly acted on by wind

Includes e.g. hang glider canopy.

### Q25-C01G

#### Using muscle power

Includes use of pedal power.

#### Q25-C01X

Using other means

#### Q25-C02

## **Propulsion power plant**

These codes describe the type of propulsion used on the aircraft and are generally only applied when the type of aircraft propulsion has some bearing on the novelty.

#### Q25-C02A

#### Using internal combustion engines

#### Q25-C02B

## Using external combustion engine

For gas turbine engines per se, see also Q52 codes. Gas turbine, RAMJET, SCRAMJET, turbojet, turboprop

#### Q25-C02G

## Using land based animal/vehicle

Includes e.g. using vehicle to tow glider during take-off.

## Q25-C02M [2007]

## **Fuel supply arrangements**

Includes fuel tanks and associated pipework. For gas turbine engine fuel supply aspects see Q52-C codes. Also includes mechanical aspects associated with in-flight refuelling.

### Q25-C02X

Other propulsion power plant

[2007]

#### Q25-C03

**Transmission systems** 

#### Q25-C03A

Gearing

#### Q25-C03C

#### Clutch

Includes novel drive trains.

#### Q25-C03E

Drive shafts; propeller shafts etc.

#### Q25-C05

Steering/attitude/altitude control arrangements; stabilisation

#### Q25-C05A

By rudders

#### Q25-C05C

## By flaps/control surfaces

Includes aerodynamic control surfaces and their control, e.g. flaps in aircraft wings.

## Q25-C05E

#### By propulsion plant

Includes use of e.g. tiltable turbine engines to achieve steering/attitude control.

## Q25-C05G

## Aircraft stabilisation

Includes e.g. transferring fuel to adjust trim, or ballast supply/discharge.

#### Q25-C05H

## Influencing air flow over aircraft surfaces

Includes boundary-layer flow control, and e.g. use of slots, ducts, porous or rough surfaces, magnus effect of shock wave generators to adjust air flow over aircraft surfaces. For use of flaps and other movable control surfaces to adjust air flow, see Q25-C05C instead, and for fixed aerodynamic assemblies such as tail or nose planes, see Q25-A04 instead.

#### Q25-M

## Military equipment

Respectively see W07 and W06-B codes for electrical aspects of military equipment and aircraft per se. Includes both offensive and defensive equipment. See Q25-P30 instead for military aircraft applications per se.

#### Q25-N

#### [2007]

## Noise/Vibration / Harshness reduction arrangements

Includes all aircraft-board arrangements for reducing noise, vibration or harshness, including use of sound deadening material.

#### Q25-P

## Aircraft adapted for special purposes

#### Q25-P01

Lighter-than-air aircraft

Q25-P01A

**Airship** 

Q25-P01B

**Balloon** 

Q25-P02

Rotorcraft; Helicopter

#### Q25-P03

## Ornithopter

Includes aircraft utilising a wing flapping motion.

## Q25-P04

### Sea plane

Includes amphibious aircraft and flying boats. Flying ground effect aircraft are coded in  $\Omega$ 24-P12 only.

Q25-P05

Glider

Q25-P06

Microlight

Q25-P07

Hang-gliders and para-gliders

#### Q25-P08

VTOL (Vertical-take-off and landing) aircraft

#### Q25-P09

#### Kites

#### Q25-P10

#### Convertible aircraft

Includes e.g. motor vehicle convertible into aircraft (see also Q19-R03).

## Q25-P13 [2007]

#### Military aircraft

For mechanical military equipment used onboard aircraft, see Q25-M. See W07 and W06-B codes for electrical aspects of military aircraft.

## Q25-P15 [2007]

#### **Unmanned aerial vehicles**

Includes mechanical aspects of UAVs and micro UAVs used for geophysical surveying or military reconnaissance, imaging etc.

## Q25-P25 [2007]

#### Commercial aircraft

(Q25-P30)

Includes general non-specific commercial aircraft.

#### Q25-P30

### Other special purpose aircraft

#### Q25-R

## Airport, ground or aircraft carrier equipment

#### Q25-R01

## Aircraft storage; Hangars

Includes moorings for airships.

## Q25-R02

#### Airfield/runway construction

Includes airfield construction methods and e.g. mechanical aspects of runway lighting.
Helipad/landing pad. (also see W06-B02E and X26).

#### Q25-R03

## Passenger handling equipment

Includes steps and aircraft stands.

#### Q25-R05

#### Load handling equipment

See Q25-B02 codes for aircraft mounted load handling equipment.

#### Q25-R07

## Aircraft launching/towing gear; Arresting gear

#### Q25-R09

Aircraft servicing and maintenance equipment

#### Q25-R10

**Cleaning equipment** 

#### Q25-R15

Other ground/aircraft carrier based equipment

#### Q25-S

## Space/cosmonautic vehicles/equipment

See W06-B03 instead for electrical aspects of space/cosmonautic vehicles. These codes are used in isolation and are not intended to be used in conjunction with other Q25 codes, except Q25-X codes for non-specific aircraft/spacecraft systems and equipment.

#### Q25-S01

#### Cosmonautic vehicle type

## Q25-S01A

#### **Artificial satellites; Space stations**

For satellite communication systems per se, see W02-C03B1 codes only.

#### Q25-S01B

**Space shuttles** 

#### Q25-S01C

**Space rockets** 

#### Q25-S01D

#### **Extra-terrestrial vehicles**

Moon buggy

## Q25-S02

#### **Navigation and position control**

Includes e.g. using jets, gyros, inertia, Earth's magnetic field, gravity gradient.

## Q25-S03

## Instrumentation

Includes mechanical aspects. See S02 for instrumentation in general and W06-B01B for electrical aspects of aircraft instrumentation.

#### Q25-S04

#### **Propulsion systems**

Includes solid rocket boosters (see also Q52-B03 for rocket engines per se).

#### Q25-S05

## Life support equipment

Includes mechanical aspects of heating and airconditioning equipment.

#### Q25-S06

## Protection/safety/emergency devices

Includes systems for protecting the space craft per se. For astronaut protecting space suits see Q25-X01 only.

#### Q25-S06A

**Protection against radiation** 

#### Q25-S06B

## Protection against meteorites/foreign bodies

#### Q25-S06C

### Thermal protection

Includes mechanical heat shields and tiles. Also includes thermal insulation on spacecraft to protect astronauts from extreme temperatures.

## Q25-S07

Crew/passenger accommodation

### Q25-S07A

Sanitation arrangements

#### Q25-S08

## Systems for re-entry into Earth's atmosphere; retarding/landing devices

Includes parachutes, space capsules.

#### Q25-S09

### Coupling/separating equipment

Includes docking equipment. Also includes couplings between vehicles or parts of them, e.g. between separable rocket stages or between solid rocket booster and space shuttle.

#### Q25-S10

## **Ground equipment**

Includes rocket launching tower.

## Q25-S11 [2007]

## Load accommodating arrangements

Includes cargo bays and storage compartments, as well as load handling arrangements such as arms used to launch satellites. See W06-B03 and X25-F or X25-A03E codes for electrical aspects of load handling/manipulating equipment.

## Q25-S15

## Other space/cosmonautic equipment

#### Q25-X

Other aircraft/cosmonautic details and related equipment

## Q25-X01

Flying suits; Space suits

#### Q25-X03

Parachute training equipment

#### O25-X04

**Astronaut training equipment; Simulators** 

## Q25-X05

#### Aircraft/spacecraft manufacture

Includes both aircraft and spacecraft manufacturing systems, and (dis)assembly equipment and methods. See W06-B08 for electrical aspects of aircraft or spacecraft manufacture. See Q51-M or Q52-M respectively for manufacture of IC and gas turbine engines used in aircraft.

## Q25-X07

## Aircraft design and testing

E.g. using wind tunnels.

# Q3 Conveying, Packaging, Storing

Q3 manual codes have been applied from 2012 to primarily allow mechanical details of packages and packaging equipment to be highlighted.

## Q31: Packaging processes and equipment

From 2012 Q31 has been redefined to cover codes that are intended to highlight the equipment/methods etc. used for packaging/labelling material/goods during primary and secondary packaging. The type of container/bottle being filled/labelled/closed etc., as well as the container material can be specified by assigning Q32 and Q33 codes, respectively. The type of product being packaged/bottled can also be highlighted by the assignment of Q34 codes. For novel details of the actual container/bottle or its closure see Q32 codes instead. Details of transit packaging are coded under Q32-T. Prior to 2012 Q31 remains searchable for packaging and labelling in general.

#### Q31-A

## Packaging, Liquid Handling

Packaging/packing/bottling details with electrical content are coded under X25-F03A codes.

#### Q31-A01

## Packaging equipment, methods and control

#### Q31-A01A

#### Filling, bottling

Includes filling by gravity flow, rotary feeders (screw and centrifugal type feeders), vibratory feeders, pressure, pneumatic means, e.g. suction, etc. Also includes equipment for assisting filling, such as funnels or nozzles for introducing the articles or materials into containers. Also includes details for feeding blanks to the filling machine, for opening container, e.g. box or bag, and maintaining it in position during filling. Electrical details of Filling/bottling plant and processes are coded in X25-F03A1

Canning, tinning

## Q31-A01A1

Filling, bottling equipment and apparatus

#### Q31-A01A3

Filling, bottling methods, processes and control

#### Q31-A01B

## Closing and sealing packages or bottles

Details of Modified-Atmosphere Packaging (MAP) equipment and processes, such as gas flushing and compensated vacuum that re-balance gases inside the package to e.g. reduce levels of oxygen and to replace gases with Nitrogen or CO2, are coded under Q31-A01B1A and Q31-A01B3A, respectively. *MAP, vacuum packaging* 

#### Q31-A01B1

Closing and sealing equipment and apparatus

#### Q31-A01B1A

MAP and Vacuum equipment and apparatus

## Q31-A01B3

Closing and sealing methods, processes and control

#### Q31-A01B3A

MAP and Vacuum methods, processes and control

#### Q31-A01C

Opening packages/bottles

#### Q31-A01C1

## Opening equipment and apparatus

Includes manual and powered opening devices, such as can openers and slotted keys. Bottle and can openers with electrical content are also coded under X27-B04.

Corkscrew, bottle opener, can/tin opener, churchkey

#### Q31-A01C3

Opening methods, processes and control

## Q31-A01E

### Wrapping/bundling

Includes details for orientating the articles, e.g. cigarettes, filled bottles, biscuits, before being placed in crates, boxes, etc.

#### Q31-A01E1

Wrapping

## Q31-A01E1A

Wrapping equipment and apparatus

#### Q31-A01E1B

## Wrapping methods, processes and control

#### Q31-A01E2

## **Bundling**

Includes details for placing bottles in crates. Banding, strapping, bale

#### Q31-A01E2A

**Bundling equipment and apparatus** 

#### Q31-A01E2B

**Bundling methods, processes and control** 

#### Q31-A02

## Unpacking/emptying equipment, methods and control

For dispensing measured amounts of liquid, see Q31-A03 instead.

#### Q31-A02A

Unpacking/emptying equipment and apparatus

#### Q31-A02B

## Unpacking/emptying methods, processes and control

#### Q31-A03

## Dispensing equipment, methods and control

Includes details for dispensing a liquid into a recipient, such as a spirit measure attached to a bottle of spirit, device for dispensing beverages on draught or for dispensing beverages in bottles. Details of containers with removable pouring or dispensing arrangements, such as spout, spray pump, are coded under Q32-D06C only, and details of packaging with integral dispensing arrangements are coded under Q32-D06B only. Dispensing equipment, method and control details with electrical content is coded under X25-F03B. Dispensers for domestic alcoholic beverages with electrical content are coded under X27-X02. Bottling in general is coded in Q31-A0A codes only. Spirit measure, bar optic

### Q31-A03A

## Liquid/semi-liquid transfer equipment, methods and control

Includes transfer of liquids from storage containers or reservoirs into vehicles or portable containers.

#### Q31-A03B

## Solid/particulates/powder transfer equipment, methods and control

Includes transfer of particulates from storage containers or reservoirs into vehicles or portable containers.

#### Q31-A05

## Cleaning/sterilising equipment, methods and control

Includes devices and methods for cleaning or sterilising cans/tins, bottles, etc., including concurrent cleaning and filling of cans/tins, bottles, etc.

Autoclave, pasteurisation

#### Q31-A99

## Other packaging equipment, methods and control

#### Q31-B

#### Labelling; Tagging

Labelling/tagging equipment and methods with electrical content, including labels and tags per se, are coded under X25-F03A3C.

#### Q31-B01

Labelling equipment and methods

#### Q31-B01A

Labelling equipment and apparatus

#### Q31-B01B

Labelling methods, processes and control

#### Q31-B02

#### Labels

Includes labels directly glued on a container, such as adhesive labels, wraparound labels, etc. Also includes labels attached to a container using e.g. a string, ribbon or elastic, such as swing tag labels. Also includes cardboard sleeves. Details of labels for tracking/tracing the packaging are also coded under Q32-D03A.

#### Q31-B02A

## Food labelling regulations and standards

#### Q31-C

## Manufacturing details

Includes manufacturing details of packaging plant as well as manufacture of packaging containers/bottles themselves. Q31-C should be used in conjunction with other Q32 codes to highlight the type of container or closure being manufactured, e.g. bottle, jar, lid, etc. Also see section A for novel polymer details such as A12-P for packaging applications and A11-B/C for details of forming, moulding and heat sealing of polymers. Also see section L01 for manufacture of glass items such as L01-L06 for packaging applications as well as e.g. L01-E for manufacturing hollow containers. Includes manufacturing details of external and internal packaging elements.

## Q31-R

## **Recycling details**

Includes recycling details of containers, lids/caps and transit packaging. Electrical details of recycling are coded under X25-W04.

## Q32: Container/Closure Types, Special packaging features and Transit packaging

From 2012 Q32 has been redefined to cover container and closure types and special features of containers/packaging. Q32 codes should be used in conjunction with Q31, Q33 and Q34 codes as appropriate. Manufacturing and recycling details are covered by Q31-C and Q31-R, respectively. Prior to 2012 Q32 remains searchable for containers in general.

#### Q32-A

#### **Container Type**

These codes are used to highlight the type of container that is either novel per se or used in the packaging/bottling system/method.

Q32-A01

**Bottles** 

Q32-A02

**Ampoules** 

Q32-A03

#### **Cartons**

Includes containers made from liquid packaging board such as juice boxes, milk cartons, etc.

Q32-A04

Jars

Q32-A05

Cans; Casks; Barrels; Drums

Q32-A05A

**Aerosol containers** 

Q32-A05B

**Drums**; Tanks

Tank containers are coded under Q32-A30 only.

Q32-A05C

Casks; Barrels

Q32-A06 [2018]

#### **Capsules; Cartridges**

Includes coffee capsules, and ink cartridges. Ink cartridges for printers are also coded under S06-G06A.

Beverage pods

Q32-A08

**Boxes**; Crates

Q32-A09

Trays; Racks

Includes drawer-and-shell containers.

Q32-A10

**Baskets** 

Q32-A15

Sacks; Bags; Pouches; Envelopes

Includes plastic compost bags and paper bags.

Q32-A15A

Reclosable/resealable

Includes resealable freezer bags and other airtight bags.

Re-sealable, air-tight, zip (RTM)

Q32-A16

**Collapsible tubes** 

Includes tubes for toothpaste or ointment.

Q32-A17

Blister packaging; Skin packaging

Q32-A18

Wrapping films; Film laminates; Shrink

packaging

Q32-A18A

Shrink packaging; Shrink wraps/films

For shrink wrapping of multiple packages, e.g. for transportation see Q32-T01C instead.

Q32-A20 [2014]

Cups

Q32-A30 [2021]

Large containers

Includes tank containers, cargo containers, bulk storage containers and shipping containers.

Tanktainer, silo

Q32-A99

Other container types

Bucket

#### Q32-B

#### Container or bottle construction

Details of transit packaging elements, such as corner protectors, air pillows or polystyrene peanuts, are coded under Q32-T codes only.

#### Q32-B01

#### Walls

Includes lines of weakness to facilitate the opening of the container.

#### Q32-B02

#### Partitions/dividers

#### Q32-B03

## Reinforcements; strengthening arrangements

#### Q32-B04

#### Foldable; erectable containers

Includes containers formed from blanks such as cardboard boxes (see also Q32-A08 and Q33-C).

#### Q32-B05

## **Collapsible containers**

Includes containers that can be collapsed when not storing product.

#### Q32-B06

#### Handles; carrying aids

#### Q32-B99

## Other constructional details

Includes linings, drip catchers, internal/external coatings, inspection windows, spacers between containers, label holders. Details of handles are coded under Q32-B06 only.

Label/coupon holders, legs

### Q32-C

## Closure details, e.g. lids/caps

Q32-C codes are intended to highlight the type/construction of the actual closure/lid etc. for the package itself.

#### Q32-C01

## Removable lids/caps

## Q32-C01A

#### **Threaded**

Screw cap, pushdown and turn cap

#### Q32-C01B

#### **Snap-action**

Includes push-on caps.

#### Q32-C01D

#### Deformable/breakable

Includes deformable ring pulls as well as lids with integrated pull tabs for food cans/tins that do not require a can opener. Also includes crown caps used on beer bottles and closures with lines of weakness designed to be broken. Stay tabs for beverage cans are coded under Q32-C02 only.

Crown cap, crown seal, pull-off bottle cap, ring-pull, tape tab, tear strip, tearable wire

#### Q32-C01G

## **Bungs and corks**

Includes rubber or plastic stoppers and corks for wine bottles. Wine bottle foils or capsules are coded under Q32-D11 instead. Includes closures arranged within necks or pouring openings or in discharge apertures.

#### Q32-C01H

#### Films and seals

Includes lidding films used to form a sealed layer on yogurts, margarine tubs, packs of delicatessen, etc. Also includes disc-like seals for bottle opening. For novel seals used in re-sealable bags also see Q32-A15A.

Aluminium foil liner/gasket

## Q32-C01X

## Other removable closures

#### Q32-C02

## Non-removable closures/lids/caps

Includes lids that are hinged or slideable and remain attached to container whether open or closed, such as stay tabs for beverage cans. Also includes details of closing arrangements for bags and sacks, e.g. adhesive flaps, strings, etc. Stay-on-tab, gable top

## Q32-C99

## Other closure details

Includes details to prevent idle rotation of the cap (to prevent gravity from rotating the cap downwards when contents are discharged from the container). Anti-fogging lid

#### Q32-D

#### Special packaging features

#### Q32-D01

## Packaging providing special environment

Includes packaging keeping goods at specific temperature, pressure, moisture level, or oxygen level, or using fungicides, antimicrobials and nanocomposites for longer shelf life, etc. Includes moisture absorbers, e.g. desiccants, oxygen scavengers/absorbers, and the use of thermochromic inks to indicate a change in temperature.

Insulation, sterile

#### Q32-D01A

## Modified atmosphere packaging (MAP)

Includes "breathable" films used in equilibrium modified atmosphere packaging that passively control the atmosphere inside the package to prolong the life of the packaged goods.

Vacuum packaging, EMAP

#### Q32-D01C

#### **Barriers**

Includes gas barriers, e.g. oxygen barriers, moisture barriers and bacterial barriers.

#### Q32-D01X

## Other packaging providing special environment

Includes corrosion inhibitors.

## Q32-D02

## Self-heating/self-cooling packaging

Includes active packaging to heat food without external heat source or power, typically using an exothermic chemical reaction, esp. for military ready-to-eat meals. Also includes cooling contents using endothermic reaction.

## Q32-D03

## Safety features

#### Q32-D03A

## Trackable/traceable packaging

RFID details per se, including constructional details, are coded by T04-K codes only, and electrical details of goods tracking are coded by X25-F11. This code is used to cover attachment details of e.g. RFID chip to the packaging. Also includes codes used in the food industry e.g. 'family farm codes' on meat products so consumers can learn the location of the farm where e.g. chickens, cows, etc were raised, and in the medical industry to avoid drug

counterfeiting. If the codes are printed on/attached to the label, also include Q31-B02. Also includes special labels dedicated to barcodes. Details of barcodes per se, barcode writing and reading are coded under T04-C02, T04-A02B and T04-A03B1, respectively.

Trace code

#### Q32-D03B

## Tamper resistant; preventing unauthorised removal/refilling; Anti-counterfeit features

Includes child resistant caps, and valves used for preventing refilling of containers.

**Tamperproof** 

#### Q32-D03C

## Tamper evident

Includes pop-up caps on jam jars and breakable seals across cap/lid.

Wax seal

#### Q32-D03X

## Other safety features

Anti-explosion

#### Q32-D05

## Containers storing two or more different products

Includes containers with internal partitions or multicompartment containers for storing 2 or more samples of the same product or two or more different products. Also see Q32-B02 for novel partitions/dividers used in containers.

## Q32-D06

#### Dispensing features

This code is used in conjunction with Q34-A and Q34-B to highlight the type of product dispensed, e.g. liquid/semi-liquid or solid/particulates. Equipment/method/control details for dispensing contents into a container, e.g. for dispensing beverages in bottles, are coded under Q31-A03 only.

#### Q32-D06A

#### Controlled/metered dose

Includes details for dispensing a controlled quantity, such as for nasal sprays or inhalers. This code can be used in conjunction with Q32-D06B or Q32-D06C to specify whether the dispenser is removable or integrated within the container.

Spirit measure, bar optic

#### Q32-D06B

## Containers with integral dispensing arrangements

Includes containers with built-in dispensing arrangements. Spouts etc. that can be removably attached to the container, e.g. screwed on spouts, are coded under Q32-D06C only. Ring-pulls, stay tabs and ring pull type removable tin tops are coded In Q32-C instead.

#### Q32-D06C

## Containers with removable pouring/dispensing arrangement

Includes lids with spouts, e.g. screw on spouts. If spout is integrated within the container, see Q32-D06B instead. Includes screw-on (see also Q32-C01A) sport caps for drinks bottles with lift/flip up top to allow drinking.

Spray pump

#### Q32-D06D

## Preventing loss of cap/lid

Includes pull-off caps that are fixed to closure by tether.

#### Q32-D07

## Closures/lids/caps with means for preventing re-filling

Includes containers with single-use closures such as one-way valves or closures that are destroyed upon opening.

#### Q32-D08

## Closures/lids/caps with means for pressure application

Includes wire arrangement for applying pressure to cork used on champagne bottles.

### Q32-D11

#### **Decorative features**

Includes wine bottle foils or capsules, as well as wax seals.

#### Q32-D12

#### **Protective features; Secondary covers**

Includes secondary covers used to protect main closure from e.g. dirt, such as plastic caps covering drinking spout (see also Q32-D06) or sports cap for bottle (see also Q32-A01).

Dust, dirt, contamination, protection

#### Q32-T

## **Transit Packaging**

These codes are intended to highlight package accessories, e.g. straps, wrappers, cardboard edges to be fitted to outside of package to protect it during shipment etc.

#### Q32-T01

#### **External packaging elements**

#### Q32-T01A

## Plugs, Sleeves, Caps for protecting/bundling of articles

Includes protectors for screw threads, corner protectors, and end caps.

#### Q32-T01B

## Flexible elongated elements

Includes straps and cable ties. Use of cable ties in electronic equipment wiring or in cable installations in general is covered by V04-T01A and X12-G04A2 respectively.

#### Q32-T01C

## Wrappers or flexible covers and wrapping machines

#### Q32-T01D

## Pallets and palletizing equipment

#### Q32-T02

#### Internal packaging elements

Includes partitions and inner packaging pieces used to separate, cushion, suspend and fill irregular spaces within a container. Includes chips or peanuts made of polystyrene or recycled products, air pillows, foam packaging such as expanded polystyrene foam, polyethylene foam or polyurethane foam, and corrugated board.

Partitions or dividers placed inside a container for separating 2 or more products stored in the same container are coded under Q32-B02 and Q32-D05 only.

Air pouches, bubble wrap (RTM), encapsulated air plastic sheeting, EPS, foam-in-place, kraft paper, loose fill, PE, PU

## Q33: Packaging container and closure materials

From 2012 Q33 has been redefined to highlight the material the container or closure is made of. Q33 codes should be used with Q31, Q32 and Q34 as appropriate. Prior to 2012 Q33 remains searchable for closures in general.

#### Q33-A

#### Glass

#### O33-B

## Plastic; Polymer; Polystyrene; Thermocol

Fiberglass, ABS, rubber, resin, acrylonitrilebutadiene-styrene, terpolymer

#### Q33-C

### Paper; Card; Cardboard

#### Q33-C01

#### Treated paper, card and cardboard

Includes foil-lined containers for e.g. fruit juices.

#### Q33-D

#### Metal

Includes aluminium foil.

## Q33-E

### Wood

#### Q33-F

## **Ceramic; Earthenware**

#### Q33-G

#### Microwaveable packaging

Includes food packaging specially made for use in a microwave. Includes metalized film (metalized polyethylene, polypropylene, PET) or metalized cardboard (so called crisping sleeve) used as a subset for cooking in a microwave oven, to help make food crisp and brown. See also X27-C01 for microwave cookware.

#### Q33-H

## Cloth; Fabric

Includes details of packaging made from terry cloth, linen, cotton, fleece, microfibers, etc.

#### Q33-J

## Green/sustainable packaging

#### Q33-J01

### Biodegradable packaging

Includes compostable packaging.

#### Q33-J02

#### Made from renewable sources

Includes packaging made from renewable sources such as corn starch, sugarcanes, and tapioca products including roots, chips or starch. Also includes packaging made from recycled materials. PLA, Polylactide, Poly(lactic) acid, pea starch, bioplastic, PHB

#### Q33-J03

## Recyclable packaging; Reuseable packaging

This code includes packaging made from recyclable materials that can be used again after processing (e.g. made of glass, metal, card and paper). Also includes packaging that can be cleaned and reused, e.g. milk bottles. Packaging made from recycled materials is coded under Q33-J02 only. Details of edible packaging are coded under Q33-J04 only.

#### Q33-J04

#### **Edible packaging**

#### Q33-J05

## Reduced/minimal packaging

This code includes packaging made using minimal materials, leading to reduced layers of packaging, lower mass (product to packaging ratio), lower volume, etc.

#### Q33-J06

## **Energy efficient packaging**

Includes packaging with low carbon footprint and/or using renewable energy.

#### Q33-J99

## Other environmental aspects of packaging

## Q33-X

## Other packaging container/closure material

## Q34: Types of goods packaged, bottled, bound, labelled, unpacked

From 2012 Q34 has been redefined to highlight the type of product being packaged/bottled etc. and should be used in conjunction with other Q31-Q33 codes as appropriate. Prior to 2012 Q34 remains searchable for packaging elements/types in general (now covered in general by Q32).

#### Q34-A

## Fluent solids; Powders; Dry particulates

This code is used in conjunction with other Q34 codes as appropriate.

#### Q34-B

## Liquids; Semi-liquids; Gas

This code is used in conjunction with other Q34 codes as appropriate.

Paste

#### Q34-C

## Food for human consumption

These codes can be used in conjunction with Q34-A and Q34-B to indicate whether the food product is a liquid or a solid.

#### Q34-C01

## Meats; Poultry; Fish

#### Q34-C01A

### Raw meats/poultry/fish

Includes packaging of meat mince, sausages, and marinated raw meats/poultry/fish.

Bacon

#### Q34-C01B

#### Processed meats/poultry/fish

Includes packaging of all smoked, cured and cooked meat products, including salamis, pates and hams. Ready meals made using meat, poultry and/or fish are also coded under Q34-C08A. Packaging of mince, sausages and marinated uncooked meats are coded under Q34-C01A only.

Delicatessen, fish pastes, sardines

### Q34-C02

## Vegetables; Fruits; Produce

Includes packaging of fresh and processed vegetables/fruits/etc, including pre-cut salads, diced carrots, peeled potatoes, tinned tomatoes, fruit compotes, etc.

#### Q34-C02A

#### **Vegetables**

Beans, soya, legumes, peanuts, garlic

#### Q34-C02B

#### **Fruits**

Includes packaging of dried fruits.

Raisins, fruit purees, fruit salads, olives

#### Q34-C02C

#### **Nuts and seeds**

Pecan, almond, cashew, sesame

#### Q34-C02X

### Other vegetables/fruits/produce

#### Q34-C03

#### Cereals

Includes packaging of grains, rice, flour, breakfast cereals, etc.

#### Q34-C04

#### **Dairy**

Includes packaging of fresh and processed dairy products, such as milkshakes, powdered eggs, etc.

### Q34-C04A

#### Milk; Yoghurt

Includes packaging of cream, ice cream, butter, milkshakes, etc. Also includes packaging of lactose-free milk

Powdered milk, UHT milk, buttermilk, baby milk

#### Q34-C04B

## Eggs

Dried eggs

## Q34-C04C

#### Cheese

## Q34-C04X

#### Other dairy products

#### Q34-C05

## **Bakery; Confectionery; Pasta**

Includes packaging of breads, cakes, biscuits, pasta, crisps and sweets.

Cookies, spaghetti, macaroni, rice, candies, chewing gum

#### Q34-C06

## **Condiments; Sauces; Sugars; Oils**

Salts

#### Q34-C06A

#### **Herbs**; Spices

Includes packaging of fresh, frozen and dried herbs. Herb pastes, such as basil or coriander pastes, are coded under both Q34-C06A and Q34-C06B. Packaging of mustard is coded under Q34-C06B only.

#### Q34-C06B

## Sauces; Soups; Pastes

Includes packaging of pasta sauces, curry pastes, sauce pouches, mayonnaise, tomato sauce, etc. Herb pastes, such as basil or coriander pastes, are coded under both Q34-C06A and Q34-C06B.

Tomato puree, dry sauce mix, mustard, marinade

#### Q34-C06C

#### **Oils; Vinegars**

Includes packaging of cooking oils, such as olive oil, sunflower oil. Also includes packaging of salad dressing.

Vinaigrette

#### Q34-C06D

### Sugar and sweeteners

Includes packaging of sugar cubes, loose sugar, syrups, but also sugar substitutes/artificial sweeteners.

Caramel, honey

#### Q34-C07

#### **Drinks and beverages**

This code does not include milk packaging, which is coded under Q34-C04A only.

#### Q34-C07A

#### Water and soft drinks

Includes packaging of still/sparkling water, fruit juices, squashes and concentrates.

Cordial

#### Q34-C07B

#### Tea and coffee

Includes packaging of ground and instant coffee, coffee beans, coffee machine pods, one-cup coffee filters, syrups (chicory), loose tea, tea bags and chocolate drinks. Also includes packaging of filter papers used in coffee makers.

#### Q34-C07C

## Alcoholic drinks

Beer, wine, whisky

## Q34-C08

#### Specialty foods and meals

#### Q34-C08A

#### Whole or partially prepared meals

Includes meal kits, and marinated uncooked meats.

Sushi, pizza, burger, ready-made sandwiches

#### Q34-C08B

## **Baby foods**

Includes packaging of powdered milk, long-life milk, food pouches, etc. Packaging of milk products is also coded under Q34-C04A.

#### Q34-C08C

## Food supplements and vitamins

Includes packaging of slimming milkshakes.

#### Q34-C08D

## Parenteral and enteral feeding

#### Q34-D

## Food for animal consumption and supplements

#### Q34-D01

#### **Animal food**

Includes packaging of pet food or livestock feed. Fodder, pet treats

## Q34-D02

## Animal supplements/health products

Includes packaging of vitamins, cod liver oil, animal grooming products, etc. Also includes packaging of animal health products, such flea products, ointments, etc. These are also coded under Q34-J01 for pharmaceuticals.

#### Q34-E

## **Textiles; Clothing; Garments; Shoes**

#### Q34-F

### Paper; Sheets; Magazines; Newspapers

Includes packaging details of toilet paper. Also coded under O.34-J.03.

### Q34-G

#### **Building/construction materials**

Includes packaging for tiles, bricks, windows, glass panels/sheets, etc. Also includes packaging for waste materials from building sites, such as rubbles. Packaging for asbestos is also coded under Q34-H99.

#### Q34-H

#### Hazardous and waste materials

Includes corrosive materials.

#### Q34-H01

#### **Chemicals: Fertilizers**

Insecticide, pesticide

#### Q34-H02

#### **Fuels: Oils**

Includes oil, such as machine or engine oil. Cooking oils are coded under Q34-C06C only.

Petroleum

#### Q34-H03

## Hospital waste/Bio-hazards

#### Q34-H04

#### Nuclear materials/Radioactive waste

Rods

### Q34-H05

#### [2015]

#### Household waste and garbage

Includes biodegradable and recyclable waste.

#### Q34-H99

#### Other hazardous materials

Asbestos, explosive materials, ammunitions, refrigerant, paint, poison, dead organisms/creatures

#### Q34-J

## Pharmaceuticals; Medical; Cosmetics; Cleaning products

#### Q34-J01

### **Pharmaceuticals**

Includes packaging of pharmaceuticals for internal and external usage. Includes packaging of food supplements, such as vitamins. Packaging of meal replacements and diet products, such as slimming milkshakes or soups, are coded under Q34-C08C only.

Medicine, tablets, ointment, inhaler, flea products

## Q34-J02

## Medical

Includes packaging of medical instruments such as needles, dressings, etc. Special carriers for e.g. human organs with integrated cooling systems are also coded under Q32-D01. Packaging of tablets and medicines are coded under Q34-J01 only.

LifePort®, sterile bandages, blood, medical packs/kits

#### Q34-J03

#### Cosmetics: Toiletries: Skincare

Packaging details of toilet paper is also coded under Q34-F.

Antibacterial hand gel, baby wipes, make-up, razor blades, shampoo, soap, sun lotion, toothpaste

#### Q34-J04

## **Cleaning products**

Does not include packaging of toiletries; these are coded under Q34-J03 only.

Antibacterial wipes, antibacterial spray, cleaning foam, cleaning wipes, washing up liquid, clothes conditioner

#### Q34-K

## Vehicle parts; Tyres; Machine parts; Tools

#### Q34-K01

## **Vehicle parts; Tyres**

Includes packaging details of parts for cars, airplanes, boats, trains, bikes, etc.

#### Q34-K02

## **Machine parts; Tools**

Includes packaging of gardening equipment, and welding electrodes. Also includes packaging of screws, nails, drill bits, etc.

#### Q34-L

## **Tobacco products**

Includes packaging of cigarettes, cigars, pipes etc. Includes packaging of filters and cigarette papers. Packaging of electronic cigarettes are coded under Q34-M02 only.

Cigarillos, blunt, corona, kretek, tobacco pouch, cigarette holder

#### Q34-M

#### **Electrical/electronic equipment/parts**

#### Q34-M01

#### White goods and kitchen appliances

Washing machine, microwave, cooker, blender, coffee maker, toaster, fridge

#### Q34-M02

## **Electronic goods**

Includes packaging of musical instruments, toys and sport equipment with electrical content e.g. keyboards, battery-operated toys, and electronic cigarettes. Packaging of musical instruments, toys and sport equipment are also coded under Q34-T. *LCD*, television, display, game console

#### Q34-M99

## Other electrical/electronic equipment/parts

Includes packaging of electrical beauty products (electric razors, massagers, etc.), batteries, solar/photovoltaic panels/cells, lightbulbs and tubes, gas/electricity/water meters, etc.

## Q34-N

Smart meter

### Household/domestic

Includes packaging of non-electrical items, such as crockery, furniture, cleaning accessories (e.g. cleaning mops, cloths, washing gloves, etc). Packaging of kitchen appliances, white goods (washing machines, microwaves, etc) and electrical beauty products is coded under Q34-M codes only. Packaging of household waste/garbage is coded under Q34-H05 only.

Watch, jewellery, clock

## Q34-T

#### Musical instruments; Toys; Sport

Packaging of musical instruments, toys and sport equipment with electrical content, e.g. keyboards, battery-operated toys, game consoles, are also coded under Q34-M02.

#### Q34-X

## Other specific goods

Includes packaging for stationery, plants, flower bulbs and seeds.

Pencils, pen erasers, staplers

## Q35: Refuse Collection; Conveyors

From 2012 manual codes have been assigned for all mechanical details of refuse collection and conveyors.

#### Q35-A

#### **Refuse Collection**

#### Q35-A01

#### **Refuse receptacles**

Includes cleaning/sterilizing equipment integrated with the refuse receptacle. Details of cleaning/sterilizing equipment including electrical details are coded under X25-H09. Receptacles for medical/clinical waste disposal, e.g. for used needles or bandages, are also coded under P34-W. Bin bag, dustbin, wheelie bin, dumpster, needle disposal bin

#### Q35-A02

#### Vehicles to collect refuse

Details of e.g. vehicle gears, motors, etc, are also coded under Q19. Includes details of front loaders, rear loaders and compactors. Includes cleaning/sterilizing equipment integrated with the vehicle. Details of cleaning/sterilizing equipment including electrical details are coded under X25-H09.

Garbage truck, trash/dump truck, grapple truck, bin wagon, dustcart, dustbin lorry, garbage scow

### Q35-A99

#### Other refuse collection details

## Q35-B

### **Conveyors**

Includes details of belts, gears, chutes, safety equipment, etc. Also includes lubricating and cleaning/sterilizing equipment. Details of cleaning/sterilizing equipment including electrical details are coded under X25-H09. Electrical details of conveyors, including control details, are coded under X25-F01 codes only. Details of elevators, escalators, lifts or moving walkways are coded under Q38-A only.

Roller conveyor

## **Q36: Handling Thin Materials**

From 2012 manual codes have been assigned for all mechanical details of thin material handling.

#### Q36-A

## Handling of piles

Includes supports and trays containing the piles of articles, device for feeding, separating, moving and orientating articles from piles, e.g. conveyor belts, grippers.

Feeder, gauge pin, feed table

#### Q36-B

## **Handling of webs**

Continuous sheets of metal, paper

## Q36-C

## Handling of thin materials

Fabric

#### Q36-D

## **Handling of filamentary materials**

Cable, string, wool

## Q36-E

## **General handling**

Includes details of delivering or advancing articles from a machine, collating articles, storing materials on e.g. reels, spindles, bobbins, etc, adjusting tension in material, driving gear, recirculation system, securing material to cores, etc. This code can be used in conjunction with other Q36 codes to specify the type of thin materials handled.

## Q37: Container Traffic (Pre-1984 Only)

## Q38: Hoisting; Lifting; Hauling; Trucks

From 2012 manual codes have been assigned for all mechanical details of hoisting, lifting, hauling and trucks.

## Q38-A

## Elevators, escalators, lifts, moving walkways

Details of conveyors are coded under Q35-B only. Electrical details of elevators, escalators, lifts and moving walkways, including control details, are coded under X25-F04 codes only.

Goods lift

#### Q38-B

## Cranes, capstans, winches, tackles, trucks

Includes mechanical details of cranes, capstans, hoists, winches, tackles, trucks and factory/robotic vehicles. See X25-F05 codes for electrical details of cranes, winches, trucks etc. For mechanical details of forklift trucks see Q19-C06.

Hoist, block and tackle

## Q39: Liquid handling, saddlery, upholstery

\*This class is now discontinued. Liquid handling has been transferred to Q31, saddlery has been transferred to P36 and upholstery has been transferred to P26. Q39 remains searchable for records prior to 2012

## **Q4: Buildings; Construction**

#### Q41: Road, rail, bridge construction

From 2015 manual codes have been assigned for all mechanical details of road, rail, and bridge construction.

Q41-A [2015]

**Bridges** 

Q41-A01 [2015]

**Types of bridges** 

Q41-A01A [2015]

Suspension or cable-stayed bridge

Q41-A01B [2015]

Arch-type bridge

Q41-A01C [2015]

Truss-type bridge

Q41-A01D [2015]

Movable, portable or floating bridges

Q41-A01F [2015]

**Bascule** 

Swing or drawbridges

Q41-A01X [2015]

Other specific types of bridges

Q41-A05 [2015]

**Constructional details of bridges** 

Q41-A05A [2015]

**Structural components** 

Q41-A05B [2015]

**Foundations** 

Q41-A05G [2015]

**Novel constructional materials** 

Q41-A10 [2015]

Safety equipment/components

Crash barriers

Q41-A20 [2015]

#### **Applications of bridges**

Details of the structure carried by the bridge.

Q41-A20A [2015]

**Road bridges** 

Q41-A20B [2015]

Rail bridges

Q41-A20C [2015]

**Pedestrian bridges** 

Q41-A20D [2015]

## **Waterway bridges**

Bridges carrying rivers or canals.

Q41-A20H [2015]

Aqueducts, pipelines bridges

Q41-A20X [2015]

## Other types of bridges and platforms

Includes helicopter landing stages and bridges carrying airport runways.

Q41-B [2015]

Roads

Q41-B05 [2015]

#### Structural components

Includes pre-fabricated units.

Q41-B10 [2017]

#### Safety equipment

Includes barricade, crash barrier, reflectors.

Safety, indication, warning, road divider

Q41-B50 [2015]

#### **Novel road materials**

Includes novel materials for road surfaces and road foundations.

Asphalt, concrete, composite, bituminous, gravel, stone, brick, aggregate

Q41-E [2015]

Railways

Q41-E01 [2015]

Types of railways

Q41-E01A [2015]

Passenger

Q41-E01B [2015]

Industrial/Freight

Q41-E01C [2015]

Monorail

Q41-E01D [2015]

Funicular
Cable-operated

Q41-E01E [2015]

**Underground/metro** 

Q41-E01F [2015]

**Magnetic levitation** 

Maglev

Q41-E01X [2015]

Other types of railways

Q41-E02 [2015]

## **Constructional details of railways**

Includes constructional details of rails, sleepers, foundations and track ballasts.

Q41-E10 [2015]

## Safety equipment/components

Crash barriers, buffers

Q41-F [2017]

## **Sound damping**

Includes sound damping or masking in roads, bridges and railways.

Noise barrier, vibration damping

Q41-G [2015]

Cleaning, Maintenance and Repair

Q41-M [2015]

Manufacture

## Q42: Hydraulic engineering, soil shifting and sewerage

From 2015 manual codes have been assigned for all mechanical details of hydraulic engineering and sewerage systems. (See also X25-D).

Q42-A [2015]

Hydraulic engineering and soil shifting

Q42-A01 [2015]

**Canals** 

For locks see Q42-A04.

Q42-A02 [2015]

Coastal defenses and control of watercourses

Q42-A02A [2015]

**Barrages, Weirs** 

Q42-A02B [2015]

**Dams** 

Q42-A02B2 [2015]

Water collection

Includes pipelines and aqueducts used to collect and divert water into reservoir.

Q42-A02C [2015]

Quays, docks

Q42-A02D [2015]

**Embankments, levees and sea-walls** 

Q42-A03 [2015]

Water-power

Q42-A04 [2015]

Locks, ship-lifts

Includes locks and ship-lifts used in canals and docks. See also Q24 codes.

Q42-A05 [2015]

Irrigation and drainage

Q42-A10 [2015]

Dredging, soil shifting, excavations and foundations

Includes bulkheads, piles and caissons. For mining see Q49 codes.

Q42-A11 [2023]

#### Prevention of soil erosion

Includes means of preventing soil degradation due to water, wind, animal. See Q42-A02 codes for coastal defenses and control of watercourses, such as barrages, embankments, levees, etc. Means of preventing soil erosion due to water in e.g. fields are also coded under P13-A06.

Q42-B [2015]

**Underground or underwater structures** 

Includes tunnels.

Q42-D [2015]

Water supply

Water supplies for human and animal consumption. For irrigation see Q42-A05.

Q42-D01 [2015]

**Pipelines and aqueducts** 

Q42-D03 [2015]

**Tanks** 

Q42-E [2015]

Sewerage

Q42-E01 [2015]

Pipelines, drains and sewers

Q42-E02 [2015]

Sewerage processing plants

Includes sewage processing/treatment. See X25-H03 and Chemistry codes such as D04 codes as required.

Q42-F [2015]

Sanitary equipment

See X27-L for electrical details of toilets.

WC

Q42-M [2015]

Manufacture

Includes manufacture of sewage treatment and sanitary equipment.

Q42-P [2021]

**Pumping station** 

Includes fuel and water supply station arrangement.

Q42-S [2021]

## Service/Cleaning/Maintenance

Includes water supply, sewage pipeline cleaning.

## Q43: General building constructions

From 2015 manual codes have been assigned for all mechanical details of general building constructions.

## Q43-A [2015]

#### Types of building structures

General building structures. For details e.g. walls, see relevant code sections.

### Q43-A01 [2015]

## Walls and partitions

Includes load-bearing and non-load-bearing walls and partitions within buildings.

Q43-A02	[2015]
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**Roofs** 

Q43-A03 [2015]

**Ceilings** 

Includes fixed and removable e.g. false, ceilings.

Q43-A04 [2015]

**Floors** 

Q43-A05 [2015]

**Doors** 

Q43-A06 [2015]

Windows

Q43-A07 [2015]

#### Service and access structures

Structures associated with stairways, elevators, ducts, pipes.

## Q43-A08 [2020]

## **Bearings and connections**

Other general purpose structures within buildings. Also includes bearing-type supports and antivibration / anti-shock elements.

## Q43-A99 [2016]

## **General building insulation**

Pipe insulation

## Q43-D [2015]

#### **Light fittings**

Includes reflective natural light ducts/tubes. See also Q71 codes and X26 codes (for electrical details only).

## Q43-E [2017]

## Sound proofing

Includes sound proofing in walls, floors etc.

Damping, masking, noise suppression

#### Q43-F [2020]

#### Protection (other)

Includes protection against damp and pests by using e.g. impregnation of wood, ventilation.

## Q43-H [2021]

## Rain water harvesting systems

Include apartments, home water conservation aspects.

#### Q43-M [2015]

## Manufacture of building structures

## Q44: Structural elements

From 2015 manual codes have been assigned for all mechanical details of structural elements.

## Q44-A [2015]

## **Structural components**

Structural components of buildings. *Bricks* 

## Q44-A01 [2015]

## **Load-supporting components**

Includes joists, girders, trusses, lintels or transoms. For load-bearing walls see Q43-A01.

Q44-A01A	[2015]
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**Girders** 

Q44-A01B [2015]

**Pillars** 

Q44-A01C [2015]

**Trusses** 

Q44-A01D [2015]

**Mullions** 

Q44-A01G [2015]

## **Reinforcement components**

Includes details of grouting sleeves. Connector, joint

Q44-A01X [2015]

## Other supporting structures

Includes underfloor supports, roof supports.

Q44-A10 [2015]

Sheets, panels

Q44-M [2015]

**Manufacture of structural elements** 

## Q45: Roofing, stairs, floors

From 2015 manual codes have been assigned for all mechanical details of roofing, stairs and floors.

Q45-A [2015]

#### **Coverings**

Includes covering materials and components for roofs, walls, ceilings and floors e.g. slates, tiles, mosaic, carpets, laminated flooring, wallpaper.

Q45-A01 [2015]

**Roof covering** 

Q45-A01A [2015]

Slates, tiles, ceramics

Q45-A01B [2015]

**Sheets** 

Includes roofing felt, polyethylene.

Q45-A01C [2015]

**Sealants** 

Includes using bitumen on flat roofs.

Q45-A02 [2015]

#### Living roof; Thatched roof

Roofs which are partially or completely covered with living vegetation e.g. grass, sedum, planted in a growing medium on top of a waterproof membrane.

Q45-B [2015]

**Drainage** 

Q45-D [2015]

**Tools and equipment** 

Q45-E [2015]

Stairways and ramps

Q45-E02 [2015]

**Balustrades and handrails** 

Banister

Q45-F [2015]

**Flooring** 

Q45-F02 [2015]

#### **False flooring**

For use in offices to allow routing of e.g. computerrelated cabling.

Q45-M [2015]

Manufacture

## Q46: Building aids, special structures, ladders

From 2015 manual codes have been assigned for all mechanical details of building aids, special structures and ladders.

Q46-A	[2015]	
<b>Building aids</b>		
Q46-A01	[2015]	
Scaffolds		
Q46-A02	[2015	
Falsework, forming	, shuttering	
Includes supports.		

Q46-A03 [2015]

Access

Includes ladders.

Ramps

Q46-A03A [2015]

Ladders

Q46-A04 [2015]

## Safety and protective arrangements

Includes structures and equipment used to protect persons working on buildings and to protect the buildings from damage by e.g. weather, dust etc.

#### Q46-A05 [2015]

## Material handling and building repair

Preparation of concrete, brick-laying equipment. Repair and cleaning of existing buildings.

Q46-A05A [2021]

**Building demolition** 

Q46-A05B [2021]

## **Building relocation / moving**

For transportation and relocation of an entire building.

Q46-B	[2015]
<b>Special Structures</b>	
Q46-B01 Homes	[2015]
Q46-B02	[2015]
Offices	

## Q46-B03 [2015]

## Shelters, kiosks

Buildings and structures which provide protection against e.g. earthquakes, war, climatic conditions. Includes bus stops and railway platform roofs.

Q46-B04 [2015]

Garages, vehicle storage

Q46-B05 [2015]

**Public buildings, institutions** 

Q46-B05B [2015]

#### **Medical institutions**

This code covers hospitals, infirmaries and other buildings used for medical applications e.g. doctor's or dental surgeries.

## Q46-B05C [2015]

## **Educational, reference**

This code covers schools, universities, libraries and museums.

#### Q46-B05D [2015]

#### Leisure and entertainment facilities

Includes sporting arenas, theatres, swimming pools, fitness centers.

Q46-B05F [2015]

**Shops and Hotels** 

Q46-B07 [2015]

**Industrial** 

Q46-B07A [2015]

**Power generation** 

Q46-B07C [2015]

Manufacturing

**Factories** 

Q46-B10 [2015]

**Towers, chimneys** 

Q46-B11 [2015]

Monuments, statues

Q46-B12 [2015]

#### **Enclosures, fences**

For gates and other openings in fences and barriers, see Q48-N.

Q46-B15 [2015]

Tents, marquees

Q46-B99 [2023]

Other special structures

Tree house

Q46-M [2015]

Manufacture of building aids, special structures and ladders

# Q47: Locks, window and door fittings

From 2015 manual codes have been assigned for all mechanical details of locks, window and door fittings.

Q47-A [2015]

Locks

Q47-A01 [2015]

**Pin and Tumbler** 

Q47-A02 [2015]

Cylinder

Q47-A05 [2015]

**Permutation** 

Includes 'combination' padlocks.

Q47-B [2015]

**Door and window fittings** 

Q47-B01 [2015]

Hinges, brakes

Q47-B02 [2015]

**Handles** 

Q47-B10 [2015]

**Fasteners** 

See Q61 for general fasteners.

Bolt

Q47-M [2015]

Manufacture of locks, windows and door

fittings

Q47-U [2015]

**Applications** 

Q47-U01 [2015]

**Domestic** 

Q47-U02 [2015]

**Commercial** 

Q47-U03 [2015]

**Vehicles** 

For automobile door locks see also Q14-H01.

Q47-U40 [2015]

Industrial

Q47-U55 [2015]

### Safe deposit and security

Includes safes and other secure storage facilities for use in e.g. banks.

### Q48: Blinds, shutters, doors and windows

From 2015 manual codes have been assigned for all mechanical details of blinds, shutters, doors and windows.

### Q48-A\*

[2015-2015]

#### Blinds and shutters

\*This code is now retired. It remains searchable and valid for records produced in 2015. From 2016 see  $\Omega$ 48-L.

Q48-B [2015]

**Door and window frames** 

Q48-D [2015]

Door leaves, window sashes

Q48-J [2015]

Ventilation and sealing

Q48-K [2015]

#### **Gates and turnstiles**

For allowing access through and over structures such as fences and barriers.

Stile

Q48-L [2015]

Screens, blinds, shutters and other protective devices

Q48-M [2015]

Manufacture of blinds, shutters, doors and windows

Includes manufacturing methods and apparatus.

Q48-P [2015]

**Primary function** 

Q48-P05 [2015]

# **Protection against specific conditions**

Includes doors or windows designed for protection against specific conditions.

Q48-P05A [2015]

Security

Protection against theft, vandalism or military action.

Q48-P05C [2015]

Fire

Protection against fire, heat or explosions.

Q48-P05E [2015]

Gas

Protection against dangerous gases.

Q48-P05H [2015]

**Radiation** 

Protection against harmful radiations.

### Q49: Mining

From 2015 manual codes have been assigned for all mechanical details of mining and quarrying apparatus. Electrical details of mining are covered by X25-D02 codes.

Q49-A [2015]

Mining and quarrying equipment

Q49-A01 [2015]

#### **Extraction equipment**

Includes details of conveyors for extracting mined materials, e.g. coal, from the mines. Non-electrical details of conveyors are coded under Q35-B, and electrical details of conveyors are covered by X25-F01 codes.

Q49-A01A [2015]

**Drilling machines** 

Q49-A01C [2015]

**Cutting machines** 

Q49-A01H [2015]

**Support structures** 

Q49-A10 [2015]

**Tools** 

Includes drill bits, drilling rods, pipes, casings and tubing.

Q49-B [2015]

Mining and quarrying methods

Q49-B01 [2015]

**Extraction methods** 

Q49-B01A [2015]

**Percussion drilling** 

Q49-B01B [2015]

**Rotary drilling** 

Q49-B01C [2015]

Cutting

Q49-B01D [2015]

Blasting

Q49-C [2015]

Mining and quarrying structures

Q49-C01 [2015]

Ventilation

Includes air filtering and dust removal.

Q49-C03 [2015]

Drainage

Q49-C05 [2015]

#### Safety and protective arrangements

Includes structures and equipment used to protect persons working in mines and quarries. Includes fire prevention and extinguishing. Details of fire prevention and extinguishing systems are also coded under P35.

Q49-C08 [2015]

Shafts

Q49-C09 [2015]

**Roofs and supports** 

Q49-E [2015]

Mining and quarrying locations

Q49-E01 [2015]

Surface, open-cast

Q49-E03 [2015]

**Underground** 

Q49-E05 [2015]

Underwater

Q49-H [2015]

Maintenance equipment; equipment and methods for removing tools from mines, boreholes or wells

Q49-V [2015]

Material being mined or quarried

Q49-V01 [2015]

Metals

Q49-V01A [2015]

Iron

Iron ore

Q49-V01B	[2015]
Aluminum	
Bauxite	
Q49-V01C	[2015]
Copper	
Q49-V01H	[2015]
Tin	
Q49-V01J	[2015]
Gold	
Q49-V22	[2015]
Stone	
Granite, marble	
Q49-V28	[2015]
Coal	
Q49-V31	[2015]
Precious stones	
Diamond	
Q49-V35	[2015]
Fluids; Slurry	

Includes sand slurry.

# Q5 Engines, Pumps, Compressors, Fluid Pressure Actuators

# Q51: Internal Combustion Engines; Reciprocating Engines; Rotary Engines

From 2006 Q51 covers all mechanical details of positive displacement combustion engines. Prior to the introduction of Q51 manual codes in 2006, the Q51 class covered machines and engines in general including positive displacement engines, steam engines/turbines, engine valves, cooling, lubrication and silencing. Also see Q17-E for vehicle internal combustion engine propulsion arrangements. For electrical aspects of motor vehicle engines see X22-A codes only.

#### Q51-A

# Reciprocating positive displacement engines

#### Q51-A01

#### **Engine type**

These codes are normally applied when the engine type has a direct bearing on the novelty.

#### Q51-A01A

With single cylinder

# Q51-A01B

#### With multiple cylinders

This code is only applied when it is especially important to highlight the fact that an engine has multiple cylinders, or when the whole multi-cylinder engine is being claimed and further Q51 codes might not be applied. It is normally assumed that an engine will have multiple cylinders unless otherwise specified. Includes, in-line 4, V5, straight/V6, V8, W10, V12 etc. engines.

#### Q51-A01C

With multiple pistons in same cylinder

#### Q51-A01D

With movable cylinders

#### Q51-A01E

With precombustion chambers

#### Q51-A01G

#### [2007]

### With variable compression ratio

Includes engines with arrangements for varying the compression ratio in use.

#### Q51-A01J

#### [2007]

#### **Two-stroke**

Includes IC engines operating in two-stroke cycle, e.g. for moped (see also Q19-B).

#### Q51-A01X

#### [2014]

### Other engine types

Includes variable cycle engines, e.g. capable of running in two-stroke mode at low speed and 4-stroke mode at higher speeds. IC engines operating in two-stroke cycle, e.g. for moped (see also Q19-B).

Variable-cycle

#### Q51-A03

#### **Component parts**

#### Q51-A03A

# Cylinders; Cylinder heads

See Q51-D for valves. Includes precombustion chambers per se (see also Q51-A01E).

#### Q51-A03B

#### **Pistons**

Includes pistons with charge flow guides, i.e. scoops in piston head for swirl control.

Swirl control

#### Q51-A03C

#### Seals; Gaskets; Piston rings

Includes oil control rings.

#### Q51-A03D

#### Casings; Crankcases; Cam/rocker covers

#### Q51-A03E

# Piston to output shaft connections; Connecting rods

Includes con rods connecting pistons to drive shaft. For connections from drive shaft to other transmission shafts or wheels, see Q62 codes. Includes crankshafts per se.

#### Q51-A03X

#### [2007]

### Other reciprocating engine components

#### Q51-B

# Rotary or oscillating piston engines

#### Q51-B01

# **Rotary combustion engines**

Includes four-stroke, Otto cycle Wankel engines.

#### Q51-B01A

With single rotor

#### Q51-B01B

With multiple rotors

#### Q51-B03

**Component parts** 

#### Q51-B03C

**Rotor seals** 

#### Q51-B03E

#### Connections between piston and casing

Includes drive arrangements for cooperating members, e.g. for rotary piston and casing.

#### Q51-B05

#### Oscillating/swing piston engines

See Q53-C for fluid driven oscillating piston engines.

Oscillating, swing, opposed piston

#### Q51-B05A

[2014]

#### Free piston engines

Includes free-piston or "crankless" IC engines. See also Q51-A01J for two-cycle operation.

Dual piston, free piston, oscillating-piston

### Q51-C

#### Gas-driven positive displacement engines

See Q53-A instead for positive displacement engines driven by liquid.

#### Q51-C01

# Open cycle hot gas positive displacement engines; Steam engines

Includes reciprocating steam engines. See Q52 instead for non-positive displacement steam turbines. Can be used in conjunction with other Q51 codes as appropriate, e.g. Q51-A03B for steam engine pistons.

#### Q51-C02

# Closed cycle hot gas positive displacement engines

I.e. positive displacement engines that are operated by expansion and contraction of a mass of working gas that is heated and cooled. See X25-X08 for electrical aspects of Stirling engines.

Closed cycle, heat, cool, Stirling engine

#### Q51-C05

[2007]

# Air/gas driven positive displacement engines

Includes IC engines driven by compressed air supply and not involving combustion.

#### Q51-D

# **Engine/fuel type**

See X22-A20 for electrical aspects of vehicle engine/fuel types.

#### Q51-D01

#### Petrol/gasoline

This code is not routinely assigned, since engines are assumed to be petrol unless otherwise stated.

#### Q51-D03

#### Diesel

#### Q51-D05

#### **Mixed fuels**

Includes engines running on dual fuels such as petrol/alcohol or diesel/LPG.

### Q51-D07

#### Single unconventional fuel

Includes engines running on e.g. alcohol or biofuels.

#### Q51-D07A

#### **Gaseous fuel**

Using LPG, natural gas, hydrogen.

#### Q51-D07C

#### **Bio-fuel; Alcohol**

Includes engines running on free fatty acid methyl ester (bio-diesel) or alcohol such as methanol or ethanol.

#### Q51-E

#### Valve gear; Valve drive arrangements

Includes 4-valve drives for IC engines. For electrical aspects of vehicle engine intake/exhaust valve gear see X22-A11 and X22-A03G codes instead.

#### Q51-E01

### Lift valves; Poppet valves

Includes valve guides.

#### Q51-E02

#### **Gate or sliding valves**

See also Q51-A01J for reed valves used in twostroke internal combustion engines.

#### Q51-E03

# Rotary or oscillating valve gear

#### Q51-E04

Steam engine valve gear

#### Q51-E05

# Valve drive arrangements; Valve adjustment/control; Cam control

Includes mechanical valve clearance adjusters for motor vehicle engines.

Hydraulic lash adjusters

#### Q51-E05A

#### Camshafts; Cams; Eccentrics

#### Q51-E05B

#### Tappets; Pushrods; Rocking arms etc.

Includes hydraulic lash adjusters. *Hydraulic tappet* 

#### Q51-E09

### Other valve gear

#### Q51-F

#### Lubrication

See X22-A10 for electrical aspects of vehicle engine lubrication, such as electric oil pumps. For oil pressure monitoring for motor vehicle engines, see X22-E01C.

#### Q51-F01

#### **Pressure Iubrication**

# Q51-F01A [2014]

# Dry sump systems

Includes dry sump lubrication systems and associated oil tanks and pipework.

Dry-sump

#### Q51-F02

#### Mixed with fuel and/or air

Two-stroke

#### Q51-F03

#### **Breathing/ventilating**

Includes crankcase breathing and cam cover breathing. Includes feeding of crankcase or cam cover air and any entrained oil back into induction system or to oil catch tank/filter.

#### Q51-F05

[2007]

Oil filters

#### Q51-G

#### Cooling

See Q51-H05A for turbocharger intercooling.

#### Q51-G01

#### Air cooling

Includes forced air feeding, i.e. fans.

#### Q51-G02

#### Liquid cooling

#### Q51-H

#### Charge feed i.e. fuel or air supply

For electrical fuel/air supply aspects of motor vehicle engines see X22-A02 and X22-A03 codes instead.

#### Q51-H01

#### **Fuel feed**

For electrical vehicle fuel pumps and fuel control see X22-A02D and X22-A03A codes respectively. See Q17-E04 for vehicle engine fuel supply.

#### Q51-H01A

#### Carburettion (carburettors)

See X22-A02C for electrical aspects of IC engine carburettors.

#### Q51-H01B

#### **Fuel injection**

Includes fuel systems using compressed air or mechanical control. Can also be applied to highlight novel mechanical aspects of EM fuel injection valves (also see X22-A02A codes for electrical fuel injection apparatus). See X22-A03A1 codes only for electric fuel injection control.

#### Q51-H01B1

#### Common rail arrangement

For electrical aspects of common rail injection systems see X22-A02A3.

#### Q51-H01C

#### **Fuel pump**

E.g. using compressed air or mechanically controlled fuel injection pump. See X22-A02D for electric fuel pumps and X22-A03A3 for electric fuel pump control. Includes gear pumps and rotary vane type pumps.

#### Q51-H01D

#### Fuel pressure regulator

Includes pressure relief valves.

#### Q51-H01F

#### **Fuel filter**

See X22-A02B for electrical aspects of fuel filters.

#### Q51-H01G

#### **Fuel treatment**

Includes e.g. fuel additive arrangements or water injection.

#### Q51-H01X

#### Other fuel systems

Includes fuel lines, hoses and pipework. Includes fuel heating arrangements. See X22-A02B for electrical fuel heaters. Also includes fuel cooling (see also Q51-G).

# Q51-H02 [2010]

#### **Fuel vapour recovery**

(Q51-H01X)

Includes mechanical details of fuel vapour recovery systems. See X22-A02E instead for electrical details of fuel vapour recovery systems.

#### Q51-H05

### Air intake systems

See X22-A03B for electrical aspects of air intake systems/throttles.

#### Q51-H05A

### Supercharging; Turbocharging

Respectively see X22-A14 and X22-A03C for electrical aspects of motor vehicle super/turbo chargers and their control. Includes intercoolers.

#### Q51-H05C

#### Throttle valve

Intake air control valves.

#### Q51-H05E

#### Intake flow swirl/turbulisation control

Includes mechanical arrangements for promoting mixing of air and fuel, e.g. using scoops in piston head (see also Q51-A03B).

#### Q51-H05F [2007]

#### Air filters

Includes disposable paper air intake filters and reusable foam filters.

#### Q51-I

#### **Ignition systems**

Includes ignition systems using e.g. application of direct heat, incandescence, friction, pyrophoric or catalytic ignition. See X22-A01 codes for electrical ignition systems.

#### Q51-J

#### **Exhaust systems; Pollution control**

See X22-A07and X22-A03J for electrical aspects of vehicle exhaust/emissions control systems. Also includes exhaust braking, e.g. for diesel engined truck (see also Q18-A30).

#### Q51-J01

#### Silencing systems

Includes use of resonance, sound absorbing materials or baffles. For electrical aspects of engine noise reduction see X22-A12 (including active noise suppression - possibly see W04-V07 also).

### Q51-J02

#### **Exhaust gas cleaning systems**

See X22-A07 or X22-A03J for electrical aspects of motor vehicle engine exhaust gas cleaning and pollution control. See X22-A05 and S03-E codes for vehicle exhaust gas sensors per se.

#### Q51-J02A

#### **Exhaust gas filters**

Includes e.g. diesel particulate filters (see also Q51-D03).

#### Q51-J02B

#### Catalytic cleaning; Catalytic converters

Includes catalyst materials and catalytic converters, construction. For electrical aspects see X22-A07 only.

### Q51-J02C

#### Inertial or centrifugal separators

#### Q51-J02D

### Secondary air/fluid supply

For electrical aspects of secondary air control used in motor vehicle exhausts, see X22-A03L.

#### Q51-J02E [2008]

### **Exhaust gas recirculation**

Includes mechanical aspects of exhaust gas recirculation arrangements. See X22-A07 for electrical aspects of EGR or X22-A03A2C for EGR control.

EGR

# Q51-J02F [2010]

#### **Exhaust heat recovery**

Includes recovery of heat of vehicle exhaust e.g. for passenger compartment heating. For electrical details of exhaust recovery systems see X22-A17.

#### Q51-J07 [2007]

### **Exhaust braking**

Includes exhaust brakes and exhaust brake control, e.g. used for slowing diesel-engined truck (see also Q19-C02 for trucks and Q51-D03 for diesel engines) when travelling down long hill, to avoid overheating mechanical friction brakes. Also see Q18-A30 for exhaust braking prior to 2007. See X22-A03B5 and/or X22-A09 instead for electrical aspects of vehicle exhaust/engine braking.

# Q51-K

#### Starting systems

For motor vehicle IC engine electrical starting see X22-A08, or X22-A04 for electric starter motors per se. Also see relevant X11 and X13 codes for motor hardware and control respectively.

#### Q51-K01

# Using muscle power

E.g. using hand cranks, pull cords and motorcycle kickstarts (see also Q19-B).

#### Q51-K02

#### Using mechanical power storage

E.g. using springs or inertia.

#### Q51-K03

#### Using auxiliary engines

#### Q51-K09

#### Other starting arrangements

Includes e.g. using explosive cartridges.

## Q51-L [2007]

# **Engine heating/warming apparatus/method**

(Q51-X)

Includes use of exhaust gas heat to warm engine/coolant. See X22-A15 for electrical details of engine warming.

### Q51-M [2007]

# Engine manufacture/assembly/disassembly

Includes manufacturing and assembly aspects of engine and engine components, not specifically for transportation applications such as motor vehicle, boat, aircraft - see relevant Q17 (with Q16-D), Q24 and Q25 codes respectively.

### Q51-N [2010]

#### Noise, vibration and harshness reduction

See also Q17-N and Q17-E codes for mechanical details of motor vehicle engine noise reduction. See X22-A12 for electrical details of vehicle engine noise and vibration reduction.

#### Q51-X

### Other engine details

Includes IC engine details not already covered, such as engine mountings (also see Q17-E01 for vehicle engine mountings).

# Q52: Reaction Engines; External Combustion; Gas Turbines; Rockets

From 2006 Q52 covers all mechanical details of non-positive displacement combustion engines such as turbine and rocket engines. Prior to the introduction of Q52 manual codes in 2006, the Q52 class covered both positive displacement and non-positive displacement engines/turbines and their control. For power generation gas turbines see X11-C01, for aircraft gas turbines engines see W06-B01 codes and for electrical aspects of gas turbines used in land vehicle propulsion see X22-P03.

#### Q52-A

#### Gas/steam turbine engines

See Q25-C02B for aircraft gas turbine engines per se.

#### Q52-A01

**Turbine engine type** 

Q52-A01A [2007]

**Turbojet engines** 

Q52-A01C [2006]

**Turbofan engines** 

Q52-A01E [2007]

**Turboprop engines** 

Q52-A01S [2007]

#### **Steam turbines**

Includes non-positive displacement steam turbines. See X11 codes for power generation steam turbines, and see Q51-C01 instead for reciprocating piston steam engines.

# Q52-A01X [2007]

### Other turbine engines

Includes engines that are capable of running on variable cycles.

Variable-cycle

#### Q52-A02

#### **Component parts**

#### Q52-A02A

#### Rotor and stator

Includes manufacturing methods. Includes rotor and stator blades.

#### Q52-A02B

#### **Combustion chamber**

Includes charge flow guidance and cooling.

#### Q52-A02C

#### Nozzles, Nacelles

Also see Q25-A04 for aircraft engine nacelles per se.

#### Q52-A02D

#### **Afterburner**

#### Q52-A03

# Intake/exhaust configuration; Intake heating/cooling

Includes air intake ducts and lips etc.

#### Q52-B

#### Non-turbine reaction engines

#### O52-B01

#### Pulse jet

Includes pulse jet engine where gaseous fuel/air mixture is combusted in pulses to generate propulsive effort which is a reaction to the rearward flow of hot gases.

Pulsejet, deflagration

#### Q52-B01A [2007]

#### **Pulse detonation engines**

Includes pulse wave detonation engines that detonate fuel rather than deflagrate it.

PDE, PWDE, deflagration-to-detonation transition, DDT, high speed, high altitude, supersonic, hypersonic

#### Q52-B02

#### Ram jet

# Q52-B03

#### **Rocket engines**

Includes solid fuel engine constructions. Also see Q25-S04 for spacecraft propulsion systems per se.

### Q52-B04

# Composite pulse, ram, rocket engine combinations

Includes composite pulse, ram, rocket engines. Also includes hybrid pulse detonation engines capable of operating in air-breathing and rocket modes.

#### Q52-C

### **Fuel supply systems**

Also see  $\Omega$ 25-C02B for aircraft jet engines and their fuel supply per se.

### Q52-C01

### **Fuel heating**

#### Q52-C02

### **Fuel supply control**

See W06-B01A5 for aircraft engine electrical fuel supply.

#### Q52-C03

**Fuel injection** 

# Q52-C09

[2007]

### Other fuel supply aspects

### Q52-D

#### Starting systems

Includes fluid or mechanical drives e.g. using cartridges or starter turbines.

#### Q52-E

# **Ignition systems**

See W06-B01C9 for electrical ignition systems for aircraft turbine engines.

#### Q52-F

#### Lubrication

### Q52-G

[2007]

### **Engine cooling**

Includes overall cooling of gas turbine/external combustion engines. For gas turbine intake charge air cooling see Q52-A03 instead.

### Q52-M

[2007]

### Engine manufacture/assembly/disassembly

Includes manufacturing/assembly/disassembly aspects of gas turbine engines. For manufacture of aircraft or ship gas turbine engines also see Q25-C02B and Q24-E02B respectively (and possibly Q25-X05 or Q24-X05 for aircraft and marine vessel manufacture per se).

### Q52-X

### Other engine details

# Q53: Positive Displacement Fluid Engines (i.e. driven by fluid)

From 2006 Q53 covers all mechanical details of positive displacement fluid engines (i.e. driven by fluid). Prior to the introduction of Q53 manual codes in 2006, the Q53 class covered jet engines and fuel supply systems.

# Q53-A

### **Reciprocating piston fluid engines**

See Q51-A codes for positive displacement reciprocating engines driven by gas.

### Q53-B

### **Rotary piston fluid engines**

See Q51-B codes for positive displacement engines driven by gas.  $\,$ 

# Q53-C

### Oscillating piston engines

See Q51-B05 for oscillating piston engines driven by gas.

#### Q53-G

### **Component parts**

Includes valve gear, pistons, cylinders seals.

#### Q53-X

# Other positive displacement fluid engines/machines

# Q54: Non-positive Displacement Fluid Engines (i.e. driven by fluid); Miscellaneous Motors and Machines for Producing Mechanical Power/Thrust

From 2006 Q54 covers all mechanical details of non-positive displacement fluid engines (i.e. driven by fluid). Prior to the introduction of Q54 manual codes in 2006, the Q54 class covered starting and ignition systems. See Q51-K, Q51-I and Q52-D, Q52-E for starting and ignition systems for positive and non-positive displacement engines respectively.

#### Q54-A

#### Water turbines

Prior to 2007, this code was used for impulse engines having transportation interest. From 2007 this code has been expanded to cover all water turbines.

[2007]

#### Q54-A01

# Impulse turbines

(Q54-A)

Includes turbines that use nozzles to change water's potential energy into kinetic energy, with resulting high velocity water jet made to impinge upon curved turbine blades which reverse the flow, with the resulting change of momentum or "impulse" causing a drive force on the blades. Mainly used in very high head applications.

Pelton, Turgo, Michell-Banki, crossflow, Ossberger turbine

#### Q54-A05 [2007]

#### **Reaction turbines**

(Q54-B)

Includes turbines that are encased or fully submerged and are acted upon by water which changes pressure as it moves through the turbine and gives up its energy. Mainly used in low and medium head applications.

Francis, Kaplan, propeller, bulb, tube, Straflo, Tyson, Water wheel

#### Q54-B\*

#### [2006-2007]

#### **Reaction type engines**

\*This code is now discontinued and transferred to Q54-A05 from 200701. Includes e.g. Francis turbines, propeller turbines and Kaplan turbines. See Q51-C02 for closed cycle turbine engines driven by gaseous medium.

#### Q54-C

# **Friction type engines**

Using non-bladed rotors, e.g. serrated.

#### Q54-D

#### **Endless chain type engines/machines**

#### Q54-E

**Spring motors** 

#### Q54-F

# **Gravity and inertia motors**

Includes flywheel energy storage.

#### Q54-G

# Producing mechanical energy from wind, i.e. wind motors

For wind turbines used to generate electrical power, see X15-B instead.

#### Q54-H

# Producing mechanical energy from geothermal or solar energy

#### Q54-I

# Producing mechanical energy from muscle power

Includes treadmills or horse mills.

### Q54-X

# Other non-positive displacement fluid engines/machines; other mechanical energy systems

Includes perpetua mobilia using hydrostatic thrust, or using liquid flow, e.g. swinging flap type. Also includes ocean thermal energy conversion, using pressure or thermal differences, etc. Also see X15 codes for non-fossil fuel electricity generation.

# Q55: Positive Displacement Fluid Machines/Pumps/Compressors (i.e. for driving fluid)

From 2006 Q55 covers all mechanical details of positive displacement fluid machines/pumps/compressors (i.e. for driving fluid). Prior to the introduction of Q55 manual codes in 2006, the Q55 class covered machines and engines for liquids.

### Q55-A

#### **Reciprocating piston fluid machines**

Includes reciprocating piston positive displacement pumps and compressors.

#### Q55-B

#### **Rotary piston fluid machines**

Includes rotary piston positive displacement pumps and compressors.

### Q55-C

#### Oscillating piston fluid machines

Includes oscillating piston positive displacement pumps and compressors.

#### Q55-D

# **Diaphragm operated fluid machines**

Includes diaphragm operated positive displacement pumps and compressors.

#### Q55-E

#### [2007]

# **Scroll fluid machines**

(Q55-X)

Includes positive displacement scroll compressors or scroll pumps using fixed and orbiting Archimedean spiral scrolls.

### Q55-G

#### **Component parts**

Includes valves, seals, rotors, casings.

# Q55-X

# Other positive displacement fluid machines

# Q56: Non-positive Displacement Fluid Machines/Pumps/Compression (i.e. for driving fluid)

From 2006 Q56 covers all mechanical details of non-positive displacement fluid machines/pumps/compressors (i.e. for driving fluid). Prior to the introduction of Q56 manual codes in 2006, the Q56 class covered pumps.

### Q56-A

### **Radial flow fluid machines**

Includes centrifugal pumps and helic-centrifugal pumps or compressors.

#### Q56-B

#### **Axial flow machines**

Includes e.g. non-positive displacement screw type pumps. For scroll pumps/compressors see Q54-E instead.

### Q56-C

Fluid machines pumping fluid by direct contact of another fluid or using inertia of fluids to be pumped

#### Q56-C01

### Jet pumps

Includes pumps in which fluid flow is induced by pressure drop caused by velocity of another fluid flow.

# Q56-C02

**Diffusion pumps** 

#### Q56-D

**Siphons** 

#### Q56-G

# **Component parts**

Includes shafts, bearings, rotors, casings, cooling strainers, cavitation reducers used in pumps or compressors.

#### Q56-X

# Other non-positive displacement machines/pumps/compressors

Includes e.g. hydraulic rams.

# Q57: Fluid Pressure Actuators; Hydraulic/Pneumatics in General

From 2006 manual codes have been assigned for all mechanical details of fluid pressure actuators and hydraulics/pneumatics in general.

# Q57-A

Telemotors; with movement proportional to pump output

### Q57-B

Servomotors; with position of output conforming to input

### Q57-C

**Combined servo and telemotors** 

# Q57-D

#### **Pyrotechnic actuators**

For motor vehicle safety systems such as vehicle airbags, see Q14-C02 only.

### Q57-E

#### **Component parts**

Includes valve gear, guide vanes etc. used in fluid pressure actuators or hydraulics in general.

# Q57-X

# Other fluid pressure actuators and fluid dynamic control aspects

Includes general devices for influencing the flow of fluids and also manufacture and testing of devices covered in Q57.

# **Q6 Engineering Elements**

#### Q61: Fastening Elements; Connections

E.g. for securing machine parts together. Includes both male (bolt) and female (nut) fastenings. These codes are normally only applied when the fastening itself is novel.

#### Q61-A

#### Threaded fasteners

#### Q61-A01

#### Nuts

For lock nuts see also Q61-A07A.

#### Q61-A03

#### **Bolts**

For torque limiting break bolts see also Q61-A07C.  $\it Male$ 

#### Q61-A05

Screws

#### Q61-A07

#### Special purpose fastener action

#### Q61-A07A

#### **Locking fasteners**

Includes nylon insert locknuts (see also Q61-A01).

#### Q61-A07C

# **Torque limiting**

Includes e.g. break bolts (see also Q61-A03).

#### Q61-A07E

#### **Self-tapping**

Includes self-tapping screws (see also Q61-A05).

### Q61-B

#### Friction grip fasteners

Includes clamps, clips and shrinkage connections.

#### Q61-C

### **Key type connections**

Includes bayonet connections.

#### Q61-D

#### Rivet connections

Includes peel type rivets and rivnuts (also see Q61-A01).

#### Q61-E

#### Nails, staples; Dowels

Includes dowel and plug type connections that are inserted or screwed into hole, with e.g. expanding bodies or tabs engaging hole or gripping reverse side of wall.

Wall plug, Rawlplug (RTM)

#### Q61-F

#### **Anti-tamper connections**

Includes snap off fastener head that snaps off when predetermined tightening torque is reached to leave behind shaped anti-tamper head.

#### Q61-G

#### **Deformable connections**

Includes e.g. split pins.

#### Q61-H

# Washers; Lock washers; Spring washers

### Q61-J

### [2016]

#### Stuck or welded connections

Includes use of glue or welds to press or connect parts together. Also includes welding of nuts/bolts to part (also see Q61-A codes).

Cold pressure welding, adhesive

### Q61-R

#### [2007]

#### **Fastener installation tools**

(Q61-X)

Includes tools used to install or remove fastening elements used in transportation applications such as mechanical compressed air driven rivet guns used in aircraft manufacture (see also  $\Omega$ 25-X05). This code can be used in conjunction with other  $\Omega$ 61 codes to specify the type of fastening being installed/removed.

#### Q61-X

# Other fastening elements

Includes hooks and eyes, suction cups etc. Also includes tenons and male/female groove connections.

### Q62: Shafts and Bearings

#### Q62-A

Flexible shafts

#### Q62-A01

For conveying rotary movement

#### Q62-A02

For conveying sliding movement

#### Q62-B

Rigid shafts

#### Q62-B01

#### **Crankshafts**

See Q19-A and Q13-A15 for cycle cranks.

#### Q62-B01A

[2016]

## Adjustable cranks

(Q62-B03)

Prior to 2016 this topic was covered by Q62-B03.

#### Q62-B02

#### **Eccentric shafts (including camshafts)**

See Q51-E05A for motor vehicle internal combustion engine camshafts.

# Q62-B03\*

[2006-2015]

#### **Adjustable cranks**

(Q62-B01A)

\*This code is now discontinued and has been transferred to Q62-B01A from 201601. It remains searchable for records prior to 2016.

#### Q62-C

#### Rigid connections, fixed joints

### Q62-D

#### Pivots, pivotal connections

Includes ball joints, trunnions, crank pins.

#### Q62-G

#### **Bearings**

Q62-G codes Include bearing elements and their races and also hydrodynamic bearings. From 2016 Q62-G08 is introduced for constructional details of bearings and also housings, caps, covers and mounting arrangements, and is assigned with other Q62-G codes to denote bearing type. Prior to 2016 these aspects were covered by other Q62-G codes or Q62-X as appropriate.

#### Q62-G01

#### Sliding contact bearings

Includes plain bearings e.g. used as crankshaft and connecting rod bearings in motor vehicle piston engines. See also Q51-A03E for crankshafts and con rods per se. Includes nylon self-lubricating bearings and fluid film bearings using a film of lubricant between sliding surfaces.

Bushing, babbit, journal bearing

#### Q62-G02

#### Rolling contact bearings

Anti-friction bearings

#### Q62-G02A

### **Ball bearings**

Includes bearings e.g. used to support a shaft or pulley. They can handle both axial and radial loads, though are usually used when the loading is fairly small.

#### Q62-G02A1

#### **Ball thrust bearings**

Includes ball bearings subjected to axial thrust loading, such as those used in bar stools or Lazy Susan (RTM) turntables. These cannot handle much radial load.

#### Q62-G02C

#### **Roller bearings**

Includes roller bearings used in conveyors where heavy radially loads need to be supported. Also includes needle roller bearings having small diameter cylinders designed to fit into tight spaces.

#### Q62-G02C1

### Tapered roller bearings

Includes motor vehicle wheel bearings subject to axial (cornering force) and radial (vehicle weight) loads. They are usually mounted in pairs facing opposite directions so that they can handle thrust in both directions.

#### Q62-G02C3

#### Roller thrust bearings

Includes bearings used in gearsets such as those found in car transmissions between gears, and between the housing and the rotating shafts. These are suitable for handling large axial/thrust loads.

#### Q62-G02E

#### **Giant bearings**

Includes giant (1.5m diameter) ball bearings used under buildings to provide earthquake protection, or giant roller bearings used to move very heavy objects (also see Q62-G02A and Q62-G02C respectively).

#### Q62-G03

#### **Magnetic bearings**

Includes magnetic bearings used in high speed applications such as flywheel energy storage systems, where the flywheel rotating in excess of 50000 rpm can float on a magnetic field created by the bearing.

#### Q62-G04

#### **Elastic bearings**

#### Q62-G05

#### **Combination bearings**

### Q62-G06 [2023]

#### Fluid bearings

Includes bearings where load is supported by a thin layer of rapidly moving pressurized liquid/gas between the bearing surfaces.

Hydrodynamic, hydrostatic, fluid dynamic bearings

#### Q62-G07

#### Bearing play adjustment

### Q62-G08 [2016]

#### Constructional details of bearings

Includes constructional details such as balls, rollers, bushes, linings, ball cages, raceways, housings, caps, covers and mounting arrangements. Prior to 2016 these aspects of bearings were included in  $\Omega62$ -G codes or  $\Omega62$ -X as appropriate.

#### Q62-G09

### **Cooling and lubricating arrangements**

## Q62-G99 [2016]

### Other bearing aspects

Includes load-reducing or equalizing arrangements. The use of magnetic force for load-reducing or equalizing is also covered by Q62-G03. Prior to 2016 constructional aspects of bearings were included in Q62-G or Q62-X as appropriate but from 2016 are covered by Q62-G08.

#### Q62-H [2016]

# Maintenance and servicing of shafts and bearings

Includes cleaning. Prior to 2016 maintenance, servicing and cleaning were covered by Q62-M and Q62-X as appropriate.

#### Q62-M

# Manufacturing and testing arrangements for shaft or bearings

For electrical metal grinding operations see X25-A03C2.

#### Q62-X

# Other shaft or bearing aspects not provided for

Includes arrangements to reduce the effects of centrifugal force. Prior to 2016 this code included mountings, housings, caps and covers for bearings which are now covered by Q62-G08.

# Q63: Couplings; Clutches; Brakes; Springs; Dampers

#### O63-A

#### **Couplings for transmitting rotary motion**

#### Q63-A01

#### For rigidly connecting shafts

#### Q63-A02\*

[2006-2015]

# Controlled movement coupling e.g. elastic couplings

\*This code is now discontinued. From 2016 all couplings allowing relative movement between the coupled members are coded in Q63-A03.

#### Q63-A03

# Controlled movement couplings; Slip, yielding, impulse couplings

Includes couplings that permit relative rotational movement between the connected parts during drive; couplings that slip on overload and couplings that alternately accelerate/decelerate driven member. Includes universal joints and constant velocity joints.

Elastic coupling, UJ, CV joint

#### Q63-A04

#### Fluid couplings

#### Q63-A05

# Quick acting/release couplings

#### Q63-B

#### **Clutches**

For motor vehicle clutches see Q13-A03, and for electrical aspects of vehicle powertrain hardware see X22-G01.

#### Q63-B01

# Interengaging clutches

I.e. clutches with interengaging parts.

#### Q63-B02

#### **Friction clutches**

Includes wedge action clutches and wet and dry plate friction clutches.

#### Q63-B03

# Fluid actuated clutches; Fluid transmission clutches

Includes hydraulically actuated clutches. See Q13-A03 for motor vehicle clutches.

#### O63-B04

#### Mechanically operated clutches

Includes cable actuation arrangements.

#### Q63-B05

Freewheel clutches, freewheels

#### Q63-B06

Multiple/combination clutches

#### O63-B09

Other clutch details

# Q63-D

#### **Brakes**

For vehicle brakes see Q18-A codes only. For electrical aspects of brakes or brake wear indicators see X22-C02 and X22-E02A respectively.

#### Q63-D01

#### **Drum brakes**

See Q18-A01B for motor vehicle brake drums.

#### Q63-D01A

Fluid actuated drum brakes

#### Q63-D01B

Mechanically actuated drum brakes

# Q63-D01E

#### **Drum brake components**

Includes drums, brake shoes.

#### Q63-D02

#### Disc brakes

See Q18-A01A for motor vehicle brake discs.

#### Q63-D02A

Fluid actuated disc brakes

#### Q63-D02B

#### Mechanically actuated disc brakes

For electrically actuated motor vehicle parking brake see X22-C02A.

# Q63-D02E

#### **Disc brake components**

Includes discs, brake pads, callipers.

Q63-D03

**Band brakes** 

Q63-D03A

Fluid actuated band brakes

Q63-D03B

Mechanically actuated band brakes

Q63-D03E

#### **Band brake components**

Includes wear surfaces and adjusters.

Q63-D09 [2007]

Other brake details

#### Q63-E

#### Springs; Shock absorbers; Dampers

See Q12-B codes for motor vehicle suspension spring/damper arrangements. See X22-M instead for electrical aspects of motor vehicle suspensions.

#### Q63-E01

#### **Springs**

See Q12-B01 for motor vehicle suspension spring arrangements.

Q63-E01A

**Coil springs** 

Q63-E01B

Leaf springs

Q63-E01C

**Cup springs** 

Q63-E01D

Fluid springs

Q63-E01E

**Magnetic springs** 

Q63-E01F

**Torsion springs** 

Q63-E01G

Elastic members e.g. elastomers

#### Q63-E01X

Other springs

#### Q63-E02

# Shock absorbers; Dampers; Vibration suppression

See Q12-B02 for motor vehicle suspension dampers arrangements. For electrical aspects of vehicle dampers, including ride height control see X22-M codes.

#### Q63-E02A

Using damping fluid

#### Q63-E02B

#### Using damping mass/inertia

Includes flywheels, counterweights.

#### Q63-E02C

Using friction

Q63-E02D [2008]

#### **Elastic dampers**

Includes rubber and elastic material dampers.

#### Q63-E02E [2008]

#### **Magnetic dampers**

Includes magnetic fluid dampers.

#### Q63-E02G

#### Shock absorber/damper components

Includes seals, oil ports, split rings etc.

#### Q63-E02X

### Other shock absorbers/dampers

Includes torsion dampers.

#### Q63-E05

### Spring/damper combinations

Includes coil over dampers. Also see Q19-F03 for racing car independent coil over dampers.

# Q64: Belts, Chains, Gearing

#### Q64-A

#### **Driving belts**

Includes IC engine timing belt (see also Q51-E05), and belt tensioning arrangements.

Cambelt, timing belt

Q64-A01

V-belts

Q64-A02

Ropes or cables

### Q64-A03

# Belt fastening and tensioning arrangements

Includes turnbuckles, clamps and belt tensioning arrangements (see Q51-E for IC engine timing belt tensioning arrangements).

Q64-A04

**Pulleys** 

Q64-B

**Chains** 

Q64-B01

#### **Driving chains**

Includes IC engine timing chain (see also Q51-E05).

Q64-B02

**Hauling chains** 

Q64-B03

# **Chain fastening arrangements**

Includes links, shackles, hooks.

Q64-B04

**Sprockets** 

Q64-C

Gearing

Q64-C01

# Mechanical gearing

Includes toothed gearing, helical gearing, ball or roller gearing.

Q64-C01A

Cams, cam followers

Q64-C01B

**Toothed members; Worms** 

Q64-C01C

#### **Friction members**

Includes friction discs and pulleys.

Q64-C01L

Lubrication/cooling arrangements

Q64-C03

Fluid gearing

Q64-C05

### **Gearing control**

Includes gear levers per se. For electrical aspects of motor vehicle transmission control see X22-G03 codes.

Q64-C09

[2007]

Other gearing details

#### Q64-D

### **Transmission linkages**

Includes cam transmissions, wobble plate transmissions.

# Q65: Pistons, Cylinders, Packing, Seals

These codes are not applied when other specific transportation related codes can be applied. For example, a novel cylinder used in an internal combustion engine can be coded in Q51-A03A, and does not require application of a Q65-B code.

#### Q65-A

#### **Pistons; Plungers**

See Q51-A03B only for pistons used in internal combustion engines.

### Q65-B

# **Cylinders**

Includes running faces and cylinder liners.

### Q65-C\*

# [2006-2007]

#### **Pressure vessels**

\*This code is now discontinued. From 200701 pressure vessels used for transportation purposes have been coded in Q69-B01 instead.

### Q65-D

# Seals; Packing

Includes piston rings and sealing and packing arrangements in general.

# Q65-X

# Other piston, cylinder and seal details

# Q66: Valves; Taps; Cocks; Vents

For electrical aspects of mechanical valves see X25-L01 codes. See Q51-E only for valve gear used in internal combustion engine.

### Q66-A

#### Lift valves

Includes cut-off apparatus with closure members having component of their opening/closing motion perpendicular to closing faces.

#### Q66-B

### **Gate or sliding valves**

Includes cut-off apparatus with closure members having a sliding movement along the seat for opening and closing.

Reed valve

### Q66-C

### **Diaphragm valves**

Includes cut off apparatus with closure member deformed but not moved bodily.

#### Q66-D

### **Rotary valves**

#### Q66-E

Multiway valves; Mixing valves and fittings incorporating them

#### Q66-F

Valve construction

#### Q66-F01

Valve members; Valve seats; Seals

#### Q66-F02

Valve housings; Casings

#### Q66-J

#### Valve actuation arrangements

Includes use of floats. See X25-L01A and V02-E02A1 for electromagnetically actuated solenoid valves.

#### Q66-P

# **Functional valve types**

### Q66-P01

**Check valves** 

### Q66-P02

Safety valves; Equalising valves

#### Q66-P03

#### Vent valves

Includes venting or aerating arrangements.

### Q66-P04

### Fluid delivery valves

Needle valve

#### Q66-X

# Other valve/vent/tap details

# **Q67: Pipes; Joints; Fittings**

For electrical aspects of large scale pipelines see X25-Y02.

### Q67-A

#### **Pipes; Hoses**

See Q18-A01X for vehicle brakes pipes/hoses per se.

#### Q67-A01

### **Rigid pipes**

Includes copper pipes.

### Q67-A02

### Flexible pipes

Includes rubber hoses.

#### Q67-A03

# Pipe laying and repair

Includes pipe cleaning (See X25-H09 and X25-Y02 for electrical aspects).

Blockage removal

### Q67-B

# Pipe connections; Joints and Seals

### Q67-B01

### Pipe connectors/joints

includes quick acting connectors, i.e. quick release/fastening, compression joints etc. Hose nipple, end fitting, branching

#### Q67-B02

#### **Seals**

Includes rubber seals and gaskets.

# Q67-C

#### Pipe accessories

Includes e.g. pipe supports and holders such as hose clips.

Clamps, cleats, brackets

# Q67-D

# [2016]

### Pipe protection

Includes protection against corrosion, incrustation, wear, fire, etc. Also includes heating or cooling details for preventing damage (e.g. freezing) of pipes.

Protective tubing, thermal insulation, vibration damping

#### Q67-X

# Other pipeline details

# **Q68: Other Engineering Elements**

#### Q68-A

#### Frames; Casings; Beds; Supports

#### Q68-A01

#### Frames; Casings

From 2007 the scope of this code has been expanded to include all frames or casings e.g. for reciprocating or rotary engines, e.g. to facilitate engine assembly (see also Q51-M). From 2007 portable frames are specifically coded in Q68-A01A.

### Q68-A01A [2007]

#### **Portable frames**

Includes wheeled frames. For trolley jacks etc., also see Q16-A03.

#### Q68-A02

#### **Beds**

Includes mounting of engines on foundations, e.g. for test purposes.

#### Q68-A03

### **Stands; Trestles; Supports**

Includes movable stands and trestles for supporting various articles/equipment in various locations or orientations.

**Brackets** 

# Q68-B [2018]

#### **Boards; Panels; Sheets**

Layered products are covered under P73.

### Q68-L [2007]

#### **General lubrication systems**

Includes generally applicable lubrication systems. For specific lubrication systems such as IC engine lubrication, vehicle transmission lubrication or vehicle suspension lubrication systems instead see Q51-F, Q13-A20 and Q12-B15 codes respectively. Also includes cleaning details of lubrication systems.

# Q68-S [2007]

# **General safety devices**

Includes generally applicable safety devices such as safety guards or screens or other systems e.g. requiring the use of both hands.

### Q68-X [2018]

### Other engineering elements

This code covers engineering elements not covered by any other Q61 to Q68 codes.

# Q69: Storing/Distributing Gas/Liquid

### Q69-A

### Variable capacity gas holders

### Q69-B

# Fixed capacity gas holders

For motor vehicle hydrogen/natural gas etc. fuel tanks see Q17-E04 only.

# Q69-B01

### **Pressure vessels**

Includes pressurised vehicle fuel tanks, e.g. containing LPG. See also Q69-B for fixed capacity fuel tanks.

### Q69-B02

Vessels not under pressure

#### Q69-C

Vessel filling method or apparatus

### Q69-D

Vessel discharging method or apparatus

### Q69-E

**Pipeline systems** 

# Q69-M [2016]

### Gas/liquid holder/tank manufacture

Includes methods and equipment for manufacturing tanks and holders for gas/liquid.

# Q69-T [2016]

# Gas/liquid tank constructional details and accessories

Includes tanks details, reinforcing elements, stands etc.

# Q69-X [2014]

# Other gas/liquid handling systems

Includes steam traps.

# **Q7: Lighting, Heating**

#### Q71: Lighting

All details of electric lighting or illumination obtained by unconventional sources like LED, EL devices are coded under X26.

Q71-A [2015]

Type of light source

Q71-A01 [2015]

**Electric lighting** 

All details of electric lighting are coded under X26.

Q71-A02 [2015]

**Non-electric lighting** 

Q71-A02A [2015]

Incandescence

Q71-A02B [2015]

Luminescence

Includes crystalloluminescence, bioluminescence, chemoluminescence, thermoluminescence, phosphorescence or fluorescence.

Q71-A02X [2015]

Other type of non-electric light sources

Q71-A50 [2015]

Combustible/Flammable material used

Q71-A50A [2015]

Oil

Q71-A50B [2015]

Gas

Q71-A50C [2015]

Kerosene

Paraffin lamp

Q71-A50D [2015]

Wax

Candle, rushlight

Q71-A50X [2015]

Other combustibles

Q71-G [2015]

Maintenance and repair of lighting devices

Q71-M [2015]

Manufacture/Pre-use treatment

Includes pre-treatment of candle wicks.

Mordanting

Q71-R [2015]

Recycling of components from lighting devices

Electrical details of recycling systems are coded under X25-W04.

Q71-T [2015]

**Constructional details** 

Q71-T01 [2015]

Shades/globes/bowls/covers

Q71-T02 [2015]

**Refractors**; Reflectors

See also V07 codes.

Lens

Q71-T03 [2015]

Light filters; Light screens; Diffusers; Light quides; Polarizer

See also V07 codes.

Q71-T04 [2015]

Container for combustible material (e.g. oil)

Q71-T06 [2015]

Ignition of combustible; Arrangement for controlling quantity of combustible used

Flint, permanent match, spark wheel, adjusting wheel

Q71-T07 [2015]

Protection from damage/draughts; Protection for user

Includes shock-absorbers, thermal insulation, flame-retardant solutions. Also includes gas-tight, water-tight arrangements and draughts insulation.

Windproof, lightning protection

Q71-T99 [2015]

Other constructional details

Includes modular construction, candle holders, wicks and stiffeners for candle wicks. Also includes fastenings and suspending/attaching arrangements (see X26-R for electric lighting), and cooling details.

Q71-U Applications	[2015]
Q71-U03 Vehicles	[2015]
Q71-U13 Medical	[2015]
Q71-U32 Torches/flares	[2015]
Q71-U33 Lanterns Hurricane lamp	[2015]
Q71-U34 Lighters	[2015]
Q71-U35 Table lamps/floor lan	[2015] nps
<b>Q71-U36 Wearable</b> Lightsticks, handlamp	[2015]
Q71-U37 Scented/therapeutic/	[2015] 'insect repellent

Q71-U45 [2015]

General area/location of use

Q71-U45A [2015]

**Outdoors** 

General outdoor use.

Gardens, waterways, camping, roads

Q71-U45C [2015]

**Indoors** 

General indoor use. Furniture, mirror, oven

Q71-U45E [2015]

**Underwater use** 

Q71-U99 [2015]

Other specific applications

Christmas decorations

#### Q72: Steam generation

Electric steam boilers are coded under X25-W02.

Q72-A [2015]

Steam generation - Heating method

#### Q72-A01 [2015]

#### Using heat content from hot heat carriers

This code includes the use of hot slag, hot residues, molten metal, hot liquid or hot vapor, etc. as heat transfer medium.

Iron blocks

Q72-A02 [2015]

#### **Using combustion**

Details of combustion processes are covered by Q73 codes.

# Q72-A03 [2015]

# Pre-heating details (pre-heaters)

Includes water and air preheating systems, and combination of exhaust-steam and smoke-gas preheaters. Also includes details of thermal deaeration of feed-water and accumulators arranged within combustion chambers, combined with steam accumulators or directly connected to boilers.

Smoke-gas preheaters, exhaust-steam preheaters, feed-water heaters, accumulator

#### Q72-A04 [2015]

#### Superheating of steam

Covers the use of hot flue gases from the furnace, radiations or heat generated by chemical reactions, etc, to superheat the steam.

Q72-A05 [2015]

#### **Control and safety systems**

Includes arrangements for regulating steam temperature and superheat temperature by regulating flue gas flow, by indirectly cooling or heating the superheated steam in auxiliary heat-exchangers, by using injected water sprays, etc. Also includes control details of water feed.

Water-level, regulator, vent

Q72-A99 [2015]

Using a different heating method

Q72-B [2015]

**Types of boilers** 

Q72-B01 [2015]

Fire-tube boilers

Q72-B02 [2015]

#### Water-tube boilers

Flash boiler

Q72-B03 [2017]

#### **Biomass boilers**

See Q73 for combustion systems and Q74 for heating systems.

# Q72-B04 [2015]

### Fluidized bed combustion boilers

Includes atmospheric fluidized bed combustion boilers, pressurized fluidized bed combustion boilers and atmospheric circulating fluidized bed combustion boilers.

FBC, AFBC, CFBC

# Q72-B05 [2015]

#### Stoker fired boilers

Includes boilers using spreader stokers and chairgrate or traveling-grate stokers.

#### Q72-B06 [2015]

#### **Pulverized fuel boilers**

Pulverized coal

Q72-B07 [2015]

#### Waste heat boilers

Heat recovery steam generator

Q72-B08 [2015]

Superheated steam boilers

#### Q72-B99 [2015]

#### Other types of boilers

Includes instantaneous boilers.

# Q72-G [2015]

# Maintenance and repair of steam generating apparatus

Self-cleaning, de-sludging

Q72-M [2017]

Manufacturing details of boilers

Q72-T [2015]

Constructional details of steam generating systems

Q72-T01 [2015]

**Drums; Headers** 

Q72-T02 [2015]

**Fireboxes** 

Q72-T04 [2015]

Flues or fire tubes; Water tubes

Includes details of linings, inserts, fittings for preventing burning-off of tube edges, attachments and supports.

Tube bundle

Q72-T05 [2015]

**Boiler support, frame and casing** 

Stay-bolt connections

Q72-T07 [2015]

Arrangements for facilitating fluid circulation (air, water, etc.)

Includes details of valves, pumps, compressors, nozzles, injectors and arrangements for inducing draughts.

Ventilating shafts, baffles, saddles, propellers

Q72-T09 [2015]

**Heat exchangers** 

See also Q78 codes for details of heat exchangers.

Q72-T10 [2015]

**Insulation details** 

Heat shield

Q72-T11 [2015]

Chimneys

Exhaust

Q72-T99 [2015]

Other constructional details of steam generating systems

Includes steam traps, economizer, etc.

Q72-U [2015]

**Applications** 

Q72-U01 [2015]

**Domestic** 

Facial steamer

Q72-U03 [2015]

Vehicles

Q72-U16 [2015]
Power engineering; Power plants;

**Electrical power generation** 

Q72-U40 [2018]

Industrial

Q72-U41 [2015]

Cleaning

Q72-U99 [2015]

Other specific applications

### Q73: Combustion apparatus and processes

Details of internal combustion engines are coded under Q51 only.

Electrical details of combustion are coded under X25-X13 (industrial combustion) and X27-G (domestic combustion).

### Q73-A [2015]

# Types of combustion apparatus and processes

# Q73-A01 [2015]

# Combustion systems using catalytic material

Includes details of catalytic material.

## Q73-A02 [2015]

#### Burners

This code can be used in conjunction with Q73-A15 codes to highlight the type of fuel used.

Wick burner, radiant gas burner, cutting torch, vortex burner

### Q73-A03 [2015]

#### Start-up details/techniques

Pre-treatment of fuel is coded under Q73-T05A.

#### Q73-A04 [2015]

# Fluidized bed combustion

Includes stationary beds, circulating fluidized beds, vibratory fluidized beds, transport/flash reactors and annular fluidized beds. Details of fluidized beds are also covered under J04-E07A and J04-X03A. FBC, bubbling bed, CFB, FR, AFB

#### Q73-A05 [2015]

#### **Cremation furnaces**

Details of furnaces are coded under Q77. *Incinerator* 

### Q73-A15 [2015]

**Fuel used** 

#### Q73-A15A [2015]

### Solid fuel combustion

Includes details of pulverulent fuels. Coal, charcoal, wood, powder

#### Q73-A15B [2015]

#### Liquid fuel combustion

Includes wick burners and blue-flame burners.

Oil, diesel, petrol, kerosene, biodiesel

#### Q73-A15C [2015]

#### Gaseous fuel combustion

Includes burners that use gas stored under pressure as a liquid. Includes pre-mix and non-pre-mix gas burners, radiant gas burners, inverter burners and welding/cutting torches.

Natural gas, propane, landfill gas

#### Q73-A15D [2015]

#### **Biomass fuel**

This code is to be used in conjunction with other Q73-A15 codes for solid biomass (together with Q73-A15A), biodiesel (together with Q73-15B), biogas (together with Q73-A15C) or on its own if the type is not specified.

Landfill gas, biofuel

# Q73-A15X [2015]

Other fuels

#### Q73-A99 [2015]

# Other types of combustion apparatus and processes

Includes systems for returning solid combustion residues or flue gasses to combustion chambers. Also includes explosive combustion chambers.

#### Q73-B [2015]

#### Combustion control/regulation

Electrical details of combustion control are coded under X25-X13 (industrial combustion) and X27-G02 (domestic combustion).

# Q73-B01 [2015]

# Control by regulating fuel supply

#### Q73-B02 [2015]

## Control by regulating air supply or draught

Includes the use of bellows, diaphragms, etc. Details of air inlet arrangements are coded under Q73-T02 codes.

Air flo, cyclone, vortex

#### Q73-B09 [2015]

Other arrangements for regulating or controlling combustion

#### Q73-G [2015]

# Maintenance and repair of combustion apparatus

Includes method and apparatus for cleaning all surfaces contaminated by combustion products or combustion residues. This includes removing ash, clinker or slag from combustion chambers, and removing solid residues from passages or chambers beyond the fire, e.g. from flues by soot blowers

Nozzle cleaning, grate cleaning, purging

# Q73-R [2015]

# Recycling of components from combustion apparatus

Electrical details of recycling systems are coded under X25-W04.

# Q73-T [2015]

# Constructional details of combustion systems

# Q73-T01 [2015]

#### **Burner construction**

Details of air supply in burners are also coded under Q73-T02. Includes layout of burners to obtain a specific type of flames, e.g. pencil or sheet flames, loop flames, impacting flames or rotating flames.

# Q73-T01A [2015]

#### Mounting/supports of burners

# Q73-T01C [2015]

#### **Nozzles for burners**

Cleaning of nozzles is also covered under Q73-G.

# Q73-T01X [2015]

#### Other details of burners

Includes evaporator, burner head, wick, flame spreader, etc.

# Q73-T02 [2015]

#### Details of air/gas supply/airflow

Includes details for supplying air or other noncombustible liquids or gases (e.g. oxygen or steam) to the combustion apparatus. Also includes firebridges and arrangements for inducing draughts, such as ventilating shafts.

Mixing tube, air inlet, fan, blower, baffle, deflector, valve, damper

#### Q73-T02A [2015]

### Chimneys/flues

Includes details of linings, jackets, casings, joints, inlet holes and doors.

Connection, mouths, cover, gas outlet

# Q73-T03 [2015]

#### Combustion chamber

Includes details of casings, doors, linings and walls. Also include supervision window for observation. Also includes details of multiple combustion chambers, such as details of separate secondary combustion chambers, where the combustion chambers are arranged in series or parallel to one another.

Crown, roof

# Q73-T04 [2015]

#### Grates

Cleaning of grates is also covered under Q73-G. Includes constructional details of grates with hollow or solid bars, double grates, inclined grates, revolving/rocking grates and travelling grates.

Basket grates, telescoping grates, dumping-grates, end fittings, bearer, frame, spacer, support, fire-bars

#### Q73-T05 [2015]

#### **Fuel system**

Nozzles for burners are coded under Q73-T01C only.

### Q73-T05A [2015]

#### Pre-treatment of fuel

Includes pre-treatment details before feeding fuel to combustion apparatus. Includes mixing solid fuel with a liquid, mixing two or more liquid fuels, or pre-heating fuel.

Slurry, emulsion

### Q73-T05B [2015]

#### **Fuel feed systems**

Includes feeding details by piston, screw, by gravity, or using spreader stokers with or without moving hoppers.

Air blast, pump, free fall

#### Q73-T05C [2015]

#### **Fuel nozzles**

Nozzles for burners are coded under Q73-T01C only.

#### Q73-T06 [2015]

**Filters** 

#### Q73-T07 [2015]

# Treatment and removal of combustion products

Includes devices for treating smoke or fumes, e.g. for removing noxious materials from smoke or fumes using purifier or traps.

Q73-T09 [2015]

**Cooling arrangements** 

Q73-T10 [2015]

#### Fluidized bed construction

Includes details of air inlets, fuel feeders for fluidized beds. Also includes devices for removing material from bed.

Grids

Q73-T11 [2015]

### Igniters/lighter construction

Electrical igniters and cigarette lighters are included in X27-G01 only. Extinguishing devices are coded under Q73-T12 only. Includes details of casing, friction wheel, fuel container, wicks, flint, etc. Includes mechanical ignition (using friction or shock effects), lighters containing fuel and ignition by a pilot flame.

Q73-T12 [2015]

### **Extinguishing devices**

Includes devices for blowing-out or snuffing candle flames. Igniters are coded under Q73-T11 codes only.

Q73-T20 [2015]

#### **Safety arrangements**

Includes protection from flashback and blowback, and safety systems e.g. in case of failure of gas supply. Cooling arrangements are coded under Q73-T09.

Q73-T99 [2015]

# Other constructional details of combustion apparatus

Includes soot blower.

Q73-U [2015]

**Applications** 

Q73-U01 [2016]

#### **Domestic**

Electric details of domestic combustion are coded under X27-G. Electrical details of gas cookers are coded under X27-C05.

Cooking stove, boiler

Q73-U07 [2015]

**Food industry** 

Q73-U20 [2015]

# Waste disposal, waste treatment and recycling

Includes cremation of human or animal carcasses. *Incineration* 

Q73-U26 [2015]

Metallurgy

Q73-U27 [2015]

**Boilers** 

Includes steam boilers.

Q73-U40 [2015]

Industrial

Includes drying (see also Q76 for drying details). Also includes welding or cutting torches.

Q73-U45 [2015]

**Underwater use** 

Q73-U99 [2015]

Other specific applications

### Q74: Heating, ranges and ventilating

Cooling and refrigerating details are coded under Q75. Electrical details of HVAC systems are coded by X27-E codes.

### Q74-A [2015]

# Types of heating, ranges and ventilating

# Q74-A01 [2015]

#### Stoves and ranges

Includes closed stoves, stoves with open fires, freestanding stoves and ranges, integrated stoves and ranges and combined stoves and ranges.

Fireplaces, charcoal brazier, camping stove, back-to-back stoves

#### Q74-A02 [2015]

# Space heating and ventilating; Water heating

Electrical details are coded under X27-E01. HVAC, climate control system

#### Q74-A02A [2015]

# Fluid heating systems

Includes water and/or air heating systems, fluid heating systems using heat pump and storage heating systems.

Combination boiler, combi

### Q74-A02B [2015]

#### Air conditioning systems

Electrical details of air conditioning systems are coded under X27-E01B. Includes air conditioning systems with additional air treatment, such as combined with humidifiers or dehumidifiers. Electrical details of air humidifying systems are coded under X27-E01B2.

### Q74-A02C [2015]

### Air humidifying/de-humidifying systems

Electrical details of air humidifying systems are coded under X27-E01B2 only.

Includes details of air humidifying systems by evaporation of water using heated or unheated wet elements, by forming water dispersion in air or by injection of steam in air.

#### Q74-A02E [2015]

#### **Ventilation systems**

Includes natural ventilation systems, i.e. not using any mechanical systems, and ventilation systems using forced flow, e.g. using fans placed on doors/windows.

## Q74-A02F [2015]

#### Air-cleaning and filtration systems

Air purifier

### Q74-A02G [2015]

#### Air curtains

Includes air currents used for screening.

# Q74-A02H [2015]

#### **Portable HVAC units**

This code is to be used in conjunction with other Q74-A02 codes.

Mobile, collapsible

#### Q74-A02J [2015]

#### **Fixed HVAC units**

This code is to be used in conjunction with other Q74-A02 code(s). Includes wall-mounted units, ceiling-mounted units, under-floor units and roof-mounted units.

Integrated

### Q74-A25 [2015]

#### **Fuel used**

This code is used in conjunction with other Q74-A codes.

#### Q74-A25A [2015]

#### Solid fuel

Coal, charcoal, wood, wood pellets, powder

#### Q74-A25B [2015]

#### Liquid fuel

Oil, diesel, petrol, kerosene, biodiesel

#### Q74-A25C [2015]

#### Gaseous fuel

Natural gas, propane, landfill gas

# Q74-A25D [2015]

#### **Biomass fuel**

This code is to be used in conjunction with other Q74-A25 codes for solid biomass (together with Q74-A25A), biodiesel (together with Q74-A25B), biogas (together with Q74-A25C) or on its own if the type is not specified.

Landfill gas, biofuel

# Q74-A25E [2015]

#### **Electrical power**

Heating and air-conditioning devices powered by electricity are coded under X27 and X25.

#### Q74-A25F [2015]

#### Solar power

See also X15-A codes.

Q74-A25X [2015]

# Other types of fuel

Geo-thermal power

Q74-G [2015]

Maintenance and repair of heating, ranges and ventilating systems/parts

Q74-H [2015

Use of heat/steam recovery

See also X15-H codes.

Q74-R [2015]

# Recycling of heating, ranges and ventilating systems/parts

Electric details of recycling systems are coded under X25-W04.

Q74-T [2015]

# Constructional details of heating, ranges and ventilating systems

Details of heat exchangers are coded under Q78.

Q74-T01 [2015]

# Air ducting/circulation systems

Includes diffusers, louvres, grilles, flaps, guide plates, vertical ducts, air handler, plenum, air outlet and intake vents, fan, blower, etc.

Ductwork, flue, turning vane, stac, flex, AH, plenum space

Q74-T02 [2015]

**Pipes** 

Includes refrigerant pipings. Pipeline attachments (clamps, etc.) are coded under Q67-C.

Q74-T03 [2015]

# Casings; Covers; Doors; Supports

Includes details of solar guards, snow guards and decorative panels. Also includes screens and fuel guards of stoves and ranges.

Camouflage, wall attachments, mountings, feet

Q74-T04 [2015]

# Fireboxes; Fire grates; Fire irons; Hearth; Fuel containers

Includes details of frame, hood and heat deflectors. Also includes details of fuel containers, such as hods for coal storage, and tools for handling e.g. coal, such as tongs or shovel.

Fire surround, shaker grate, fire tools, shovel, tongs, poker, brush, hopper, hopper plate, coal box

Q74-T07 [2015]

Burners

Includes details of burner cap, burner ring, LPG conversion kit, cast iron pan supports, etc.

Bunsen burner, burner assembly

Q74-T08 [2015]

**Compressors; Evaporators** 

Q74-T09 [2015]

**Filters** 

Noise filters are coded under Q74-T15 only. Includes air filters and water filters.

Q74-T10 [2015]

**Radiators** 

This code can be used in conjunction with Q74-T03 to cover details of door, casing, mountings, etc.

Q74-T11 [2015]

Water tanks

Includes drip trays.

Water cylinder

Q74-T15 [2015]

# Arrangements for vibration or noise suppression

Vibration isolator, noise filter, sound attenuator

Q74-T16 [2015]

**Insulation; Seals** 

Noise insulation is coded under Q74-T15. Draught shield

Q74-T20 [2015]

**Control or safety systems** 

Electrical details are coded under X27-E01B. Control knob, protective guard, fire resistant

Q74-T99 [2015]

#### Other constructional details

Includes arrangements for preventing condensation, tiles and tiles attachments. Shim liner

Q74-U [2015]

**Applications** 

Q74-U01 [2015]

**Domestic** 

See also Q74-U10 for cooking and baking. Barbeques, camping stove Q74-U02 [2015]

Commercial

Includes shops, offices, sport halls, theatres, schools and universities.

Shops, offices, sports halls, theatre

Q74-U03 [2015]

**Vehicles** 

Q74-U06 [2015]

**Manufacturing plants** 

Q74-U07 [2015]

**Food industry** 

Q74-U10 [2015]

Cooking and baking

This code can be used in conjunction with Q74-U01 or Q74-U40 for domestic and industrial cooking and baking, respectively.

Q74-U14 [2015]

**Laboratories** 

Q74-U40 [2015]

**Industrial** 

Covers industrial applications not covered by other application codes.

Q74-U99 [2015] Other specific applications

# Q75: Refrigeration and Liquefaction

From 2015, X27-F codes only cover refrigeration with substantial electrical content. All mechanical details are now covered under Q75. Details of air conditioning systems are coded under X27-E01B (electrical content) and Q74 (mechanical content).

# Q75-A [2015]

# Types of refrigeration systems

Electrical details of refrigeration systems are coded under X27-F02A. Refrigerant lubricants are coded under H08-D11 only.

# Q75-A01 [2015]

# Non-cyclic refrigeration systems

Includes ice boxes.

Cabinet

# Q75-A02 [2015] Cyclic refrigeration systems

# Q75-A02A [2015]

# **Compression systems**

Includes refrigeration systems with multi-stage compression, compression systems using Joule-Thompson effect, using multiple cooling stages, using Stirling cycle or using turbines. Also includes refrigeration systems using multiple evaporator circuits, multiple condenser circuits, with cascade operation, using 3He-4He dilution, etc. Cryocooler

# Q75-A02B [2015]

### **Sorption systems**

Includes continuous and non-continuous sorption systems. Also includes refrigeration systems using endothermic solution of salt, using desorption of hydrogen from a hybrid, etc.

# Q75-A02C [2015]

#### **Heat pumps**

Includes compression-type and sorption-type heat pumps. Electrical details of heat pumps are coded under X27-F02B.

Absorption heat pumps

#### Q75-A02H [2015]

# Systems using combination of operation modes

Includes compression-sorption systems. Also includes combined heating and refrigeration systems.

### Q75-A02X [2015]

# Other types of cyclic-refrigeration systems

Includes refrigeration systems using evaporation of refrigerant without recovery of vapor, or using waste heat.

# Q75-A03 [2018]

**Defrosting and de-icing** 

#### Q75-A20 [2015]

#### Refrigerant used

Details of refrigerant are also coded under J07-A08. Refrigerant lubricants are coded under H08-D11 and J07-A10 only.

Q75-A20A [2015]

HFC

Q75-A20B [2015]

**HCFC** 

Q75-A20C [2015]

CFC

Q75-A20X [2015]

Other refrigerants

Q75-A99 [2018]

Other refrigeration details

#### Q75-E [2015]

# Production, storage and distribution of ice

From 2015, X27-F04 covers ice manufacture only with substantial electrical details. Includes production of ice with or without refrigeration. Also includes production of artificial snow (e.g. for winter sports), and specialized tools used during production of ice.

Harvesting tools, saw, ice shaving, ice presses

# Q75-F [2015]

Liquefaction, solidification and separation of gases by pressure and cold treatment

#### Q75-G [2024]

# Maintenance and repair of refrigeration and liquefaction components

Includes manufacturing methods and apparatus.

# Q75-T [2015]

# Constructional details of refrigeration, liquefaction and solidification systems

Constructional details of motors are coded under V06.

# Q75-T01 [2015]

#### Compressors

Electrical details of compressors are coded under X27-F02C1.

# Q75-T02 [2015]

# **Absorbers; Adsorbers; Boilers**

Electrical details of absorbers and adsorbers are also coded under X27-F02C. Also includes analyzers and rectifiers.

# Q75-T03 [2015]

# **Evaporators; Condensers; Heat exchangers; Valves**

Includes cold exchangers, accumulators, sub-coolers, desuperheaters and superheaters. Details of heat exchangers are coded under Q78. Electrical details of evaporators and condensers are coded under X27-F02C.

Expansion valves

# Q75-T06 [2015]

# Housings; Walls; Handles; Shelves

Includes cabinets, seals and feet. Also includes special inserts for doors (e.g. for bottles), ice trays and egg trays for domestic fridges and details of interior light. Fridge lights are also covered by X27-F02C2 and Q71.

Door, tray

# Q75-T08 [2015]

### Water and ice dispensers

Details of ice generation are also covered by Q75-E codes. Electrical details of ice generation are coded under X27-F04.

# Q75-T09 [2015]

# Arrangements for circulating cooling fluids

Includes air intake filters.

Pipe

# Q75-T20 [2015]

#### **Control and safety systems**

Includes guards, protective plates, etc. Electrical details are coded under X27-F03.

Defrosting, frost prevention

# Q75-T99 [2015]

# Other constructional details of refrigeration systems

Includes arrangements for preventing or removing deposits or corrosion, arrangements for transporting items to be cooled, etc.

Q75-U [2015]

**Applications** 

Q75-U01 [2015]

#### **Domestic**

Includes free-standing and integrated appliances, and combined fridge-freezers.

Wine cooler

Q75-U03 [2015]

**Vehicles** 

Includes cars, trucks, airplanes, boats, etc.

Q75-U07 [2015]

**Food industry** 

Kimchi

Q75-U30 [2015]

#### Sports, toys, entertainment and leisure

Includes ice rinks, ski slopes, etc.

Q75-U40 [2015]

Industrial

Includes cold rooms.

Q75-U99 [2015]
Other specific applications

Q76: Drying

Electrical details of drying methods and apparatus are coded under X25-G.

Q76-A [2015]

Pre-treatment (to facilitate drying)

Q76-B [2015]

**Drying method** 

Q76-B01 [2015]

# **Drying using heat**

Includes drying methods using heat convection, heat conduction, radiation (e.g. from the sun) or using heat created within the materials/objects to be dried (e.g. by friction).

Spray-drying, fluidised drying

Q76-B02 [2015]

# **Drying without using heat**

Includes drying by evaporation/sublimation of moisture (e.g. in a vacuum), by centrifugal force or by pressure. Includes the use of a freezing step. Also includes drying by suction, or by contact with sorbent bodies.

Clothes press, mangle, wringer

Q76-B03 [2015]

Drying using a combination of heat and heat-free processes

Freeze-drying

Q76-G [2015]

Cleaning, maintenance and repair of drying machines

Includes testing, lubricating and oiling arrangements.

Q76-M [2015]

Manufacture of drying machines/Pre-use treatment

Pre-treatment of items to be dried (to facilitate drying) are coded under Q76-A only.

Q76-R [2015]

Recycling of drying parts/components

Q76-T [2015]

**Constructional details of drying machines** 

Q76-T01 [2015]

**Drums/Chambers** 

Q76-T03 [2015]

Arrangements for conveying materials/objects to dry

Includes fluidised beds, rollers and belts. Includes stirring devices.

Trays, racks

Q76-T04 [2015]

# Arrangement and control of air/gas supply

Includes details of gas used during the drying process (if different than air). Includes mechanical control details only. Also includes filters.

Humidity, temperature, pressure, flow

Q76-T06 [2015]

# **Heating/refrigerating arrangements**

Includes details of combustion heating (see also Q73 codes), and tubes containing heated fluids. Refrigeration details are also covered under Q75. Freezing coil

Q76-T08 [2015]

Ventilation/cooling details of drying machine

macnine

Q76-T99 [2015]

Other constructional details

Safety system

Q76-U [2015]

**Applications** 

Q76-U01 [2015]

Domestic

Airing cupboard, washing line

Q76-U13 [2015]

#### Pharmaceutical/Medical

Medicine, tablets, antibiotics, medical ingredients, additives, blood plasma

Q76-U21 [2015]

Characterized by specific type of materials to dry

Q76-U21A [2015]

For drying elongated/long materials

Fabrics, fibres, yarns

Q76-U21B [2015]

For drying loose materials

Granules, pellets, cubes

Q76-U21D [2015]

For drying gas

Natural gas

Q76-U21E [2015]

For drying food/plants

Q76-U21E1 [2015]

For drying food

Instant coffee, milk powder, coffee, tea, eggs, cereal, spices, flavorings

Q76-U21E2 [2015]

For drying plants

Tobacco, flowers

Q76-U40 [2015]

**Industrial** 

Combine harvester, paint pigments, ceramic materials, catalyst supports, microalgae, paper pulp

Q76-U99 [2015]

Other specific drying applications

# Q77: Furnaces, kilns, ovens, retorts

Furnaces, kilns, ovens and retorts are also coded under J09. Details of combustion processes are also covered under Q73 codes.

Q77-A [2015]

Type of furnaces/kilns/ovens/etc

Q77-A01 [2015]

#### **Vertical furnaces**

Includes vertical furnaces with multiple shafts/chambers.

Blast furnace

Q77-A02 [2015]

# Horizontal/slightly inclined furnaces

Includes details of rotary furnaces. Includes externally and internally heated furnaces, tiltable furnaces or furnaces with multiple chambers/drums.

Q77-A03 [2015]

# **Hearth-type furnaces**

Includes details of reverberatory-type furnaces. Includes furnaces with single chamber/hearth, multiple chambers/hearths or with movable working chamber/hearth.

Q77-A04 [2015]

# Muffle furnaces; Retort furnaces

Includes furnaces muffle furnaces and retort furnaces with multiple chambers.

Q77-A07 [2015]

Fluidized-bed furnaces

Q77-A99 [2015]

# Other type of furnaces, kilns, ovens or

Includes bell-type furnaces, furnaces with stationary charge but moving kiln sections, open/uncovered sintering apparatus, crucible/pot furnaces and tank furnaces.

Vacuum furnace

Q77-B	[2015]	
Fuel used		
Q77-B01 Coal	[2015]	
Q77-B02 Oil	[2015]	

Q77-B03 [2015]

Gas

Natural gas

Q77-B04 [2015]

Wood

Q77-B99 [2015]

Other fuels

077-D [2015]

Management of waste heat and exhaust

gases

Q77-G [2015]

Cleaning, maintenance and repair of furnaces, kilns, oven and retorts

Q77-R [2015]

# Recycling of furnaces, kilns, ovens and retorts parts

Electric details of recycling systems are coded under X25-W04.

Q77-T [2015]

Constructional details of furnaces, kilns, ovens and retorts

Q77-T01 [2015]

Drum; casing; lining; wall; roofs; dividers

Includes details of refractory bricks, partitions and doors. Also includes sealing arrangements.

Blanket, muffle

Q77-T02 [2015]

### Air blowers/tuyeres

Includes details of blower motors (see also X11 codes), filters and blower chambers.

Q77-T03 [2015]

**Burners** 

Includes details of floor-mounted, wall-mounted or roof-mounted burners.

Q77-T04 [2015]

Radiant coils/tubes

Q77-T05 [2015]

Arrangement for charging/discharging charge

Feeders, hoppers, screw feeders

Q77-T06 [2015]

**Heat exchangers** 

See Q78 codes for more details.

Q77-T07 [2015]

Flue-gas stack

Includes stack dampers. Also includes details to enhance stability in e.g. strong winds.

Damper blade

Q77-T08 [2015]

**Dust collectors; Soot blowers** 

Q77-T10 [2015]

**Cooling arrangements** 

Q77-T20 [2015]

**Control and safety arrangements** 

See also J09-B04.

Q77-T99 [2015]

# Other constructional details of furnaces, kilns, ovens and retorts

Includes details for corrosion protection, arrangement for forming or maintaining specific atmosphere within chamber, and tools for stirring molten materials.

Sightglass

Q77-U [2015]

**Applications** 

Q77-U14 [2015]

Laboratory

Laboratory furnace

Q77-U20 [2015]

# Waste disposal, waste treatment and recycling

Includes cremation of human and animal carcasses. *Incineration* 

Q77-U26 [2015]

Metallurgy

Q77-U40 [2023]

Industrial

Includes glass and ceramic manufacture.

Q77-U99 [2015]

Other specific applications

### Q78: Heat exchange

Heat exchangers used in refrigeration systems are also coded under Q75.

Q78-A [2015]

Types of heat exchangers

Q78-A01 [2015]

Steam or vapor condensers

Q78-A02 [2015]

Characterized by the fluid direction

Q78-A02A [2015]

**Parallel flow** 

Co-current

Q78-A02B [2015]

**Cross-flow** 

Q78-A02C [2015]

Counter-current

Q78-A02D [2015]

#### **Multi-pass arrangements**

Includes combination of parallel and counter flows.

# Q78-A03 [2015]

#### Indirect contact heat exchangers

Includes shell and tube heat exchangers, shell and tube heat exchangers, plate heat exchangers, compact heat exchangers, adiabatic wheel heat exchangers, dynamic scraped surface heat exchangers, regenerative heat exchangers and phase-change heat exchangers.

Surface condenser, U-tube heat exchanger, double pipe heat exchanger, plate tin heat exchanger, CHEs, plate and shell heat exchanger, intermediate flow

Q78-A04 [2015]

### **Direct-contact heat exchangers**

Includes direct-contact trickle coolers, such as cooling towers.

Q78-A05 [2015]

Heat exchangers using a combination of indirect and direct heat exchanging methods

Q78-G [2015]

# Cleaning, maintenance and repair of heat exchangers

Includes supports/frames for attaching cleaning appliances, masks delimiting areas to be cleaned, etc. Includes cleaning by distortion, by vibration, by flushing e.g. chemical solvents, by combustion processes.

Abrasive tools, cleaning brushers, scrapers, hammers, cutters, self-cleaning

Q78-M [2015]

Manufacture/Pre-use treatment of heat exchangers

Q78-R [2015]

#### Recycling of heat exchanger components

Electric details of recycling systems are coded under X25-W04.

Q78-T [2015]

Constructional details of heat exchangers

Q78-T01 [2015]

**Tubular elements** 

Q78-T03 [2015]

# Casings; Header boxes; Heat/flow reflectors

Includes plates and other arrangements for increasing/decreasing heat transfer, e.g. for promoting droplets formation, affecting the flow pattern, turbulent flow to reduce skin-effect, etc. *End plate, baffle plate, impeller* 

Q78-T04 [2015]

**Sealing arrangements** 

Q78-T20 [2015]

**Control and safety arrangements** 

Q78-T99 [2015]

# Other constructional details of heat exchangers

Includes arrangements for preventing the formation of deposits/corrosion, for collecting and removing condensate, and for removing ice/water (to prevent clogging by frost). Also includes arrangement for suppressing noise.

Filters

Q78-U [2015]

**Applications** 

Q78-U03 [2015]

**Vehicles** 

Q78-U07 [2015]

**Food industry** 

Includes dairy industry.

Q78-U16 [2015]

Power engineering; Power plants;

**Electrical power generation** 

Q78-U17 [2015]

Hydraulic engineering; Water

management/treatment; Sewerage

Q78-U25 [2015]

Chemical engineering; Refinery/chemical

plant

Q78-U40 [2015]

Other industrial applications (not covered

by other Q78-U codes)

Includes reboilers.

Q78-U41 [2015]

**Heating/Cooling** 

Includes cooling of electronic devices (see also V04 codes).

Q78-U41A [2015]

Refrigeration/HVAC

See also Q75 and X27 codes.

Q78-U99 [2015]

Other specific applications

# Q79: Weapons, ammunition, blasting

See also K03.

Q79-A [2015]

Type of weapons

Q79-A01 [2015]

### **Cold weapons**

This code is applied for weapons projecting missiles WITHOUT the use of explosive or combustible propellant charge.

Q79-A01A [2015]

**Blow guns** 

Tube

Q79-A01B [2015]

Sling weapons

Catapults, slingshots

Q79-A01C [2015]

Bow/crossbows

Includes long bows and compound bows.

Darts

Q79-A01D [2015]

### Thrusting or cutting weapons

Includes sabres, cutlasses, swords, epees, daggers, stilettos, lances, pikes and harpoons.

Q79-A01X [2015]

# Other cold weapons

Includes batons, truncheons, sticks, shillelaghs, bolas, knuckledusters, spring guns, liquid ejecting guns, such as water pistols, and compressed gas guns, such as air guns or steam guns.

Friction-wheel operated launcher, speargun, toy gun

Q79-A02 [2015]

**Firearms** 

Q79-A02A [2015]

**Pistols** 

Non-lethal guns such as flare pistols are coded under Q79-A02F only.

Revolvers

Q79-A02B [2015]

#### **Shoulder-fired firearms**

Rifles, carbines, shotguns, gyrojets

Q79-A02C [2015]

#### Machine guns

Includes automatic and semi-automatic machine guns.

Q79-A02D [2015]

### **Artillery guns**

Cannons, carronades, falconets, field guns, Howitzers

Q79-A02F [2015]

#### Non-lethal guns

Includes rescue equipment guns, riot control guns and alarm pistols. Also includes starting pistols, tranquiliser guns and paintball guns.

Flare guns, Lyle guns, Very pistol, Flash-ball

Q79-A02X [2015]

#### Other types of firearms

Harpoon guns

Q79-A03 [2015]

**Flamethrowers** 

Q79-A04 [2015]

#### Launchers

Mechanical details of missile launchers attached to a vehicle are coded under Q24-M01A. Includes rocket/torpedoes launchers.

Q79-A05 [2015]

# Mines, e.g. landmines

Includes anti-personnel mines and anti-vehicle mines. Also includes fragmentation mines, blast mines and naval mines.

Anti-tank mines

Q79-A06 [2015]

#### Missiles and hand grenades

Includes air-to-air missiles, air-to-surface missiles, surface-to-air missiles and surface-to-surface missiles. Also includes stun grenades, chemical and gas grenades, tear gas grenades, etc. Anti-missile systems are coded under Q79-H.

Molotov cocktails, warheads, rockets, torpedoes

Q79-A09 [2015]

#### Blasting

Includes controlled use of explosives for e.g. rock blasting, etc.

Q79-A99 [2015]

# Other types of weapons

Includes fictional guns, such as ray-guns.

# Q79-E [2015]

# Training/practice weapons and facilities

Includes shooting/firing ranges and archery targets. Can be used with other Q79 codes to specify type of weapon, e.g. archery targets are also coded under Q79-A01C. Also see P36-A05 for archery/shooting target practice.

Bobbing targets, moving targets, clay-pigeon targets, bullet catcher

# Q79-F [2015]

#### **Fireworks**

See also K04-C codes.

# Q79-F01 [2015]

# Shell/container, includes wrapping

# Q79-F02 [2015]

# Star pellets

Includes arrangement of star pellets within the shell for specific display.

Palm, round shell, willow, chrysanthemum

# Q79-F03 [2015]

# Bursting charge; Mortar/launching arrangements

Also includes details of fuse/time delay. Compressed air, gunpowder

# Q79-F99 [2015]

Other firework details

#### Q79-G [2015]

# Cleaning, maintenance and repair of weapons

Includes testing, lubricating and oiling arrangements.

Scrapers, cleaning rods

# Q79-H [2015]

# Protection for weapons, personnel or equipment; Armoured vehicles

Anti-missile

# Q79-H01 [2015]

# Protection for personnel; Protective clothing

Includes military specific clothing, eye/ear protection and head protection.

# Q79-H03 [2015]

# Protection for weapons or equipment (not vehicle)

Includes decoys.

#### Q79-H04 [2015]

#### **Armoured vehicles**

See also Q19-D.

#### Q79-M [2015]

Manufacture/Pre-use treatment of weapons

# Q79-S [2015]

# Recycling and decommissioning of weapons

Decommissioning details of ammunitions are also covered by K03-A04. Alterations so that a gun can no longer be fired are also covered under Q79-T02X.

# Q79-T [2015]

# Constructional details of weapons and ammunitions

Details of explosives are coded under K04. Constructional details of practice targets, such as archery targets, are coded under Q79-E codes only.

# Q79-T01 [2015]

### **Constructional details of weapons**

Protective clothing is covered under Q79-H01.

# Q79-T01A [2015]

# **Bows; Bowstrings**

Includes details of bow-string drawing or releasing devices, bow stringers, bow wax, arrow rests, guides and bow stabilisers/dampers. Archery targets are also included under Q79-E. Arrows per se are coded under Q79-T02B.

Limbs, risers, tillers, bow sights, necking points, bracing height gauges, darts

# Q79-T01B [2015]

# **Handles; Crossquards**

Also includes butts and butt plates. Stocks, recoil absorbing pads

# Q79-T01C [2015]

# **Blades; Folding blades**

Includes details of the folding mechanism. Also includes concealment details, such as for swordsticks and cane-swords.

Q: Mechanical

# Q79-T01D [2015]

#### Holders, sheath or scabbards

Includes details of storage such as gun bags, gun cases, bow cases, quivers, etc.

Gun slip, gun holster

# Q79-T01E [2015]

#### **Barrels**

Rifled bores, smoothbores

# Q79-T01F [2015]

# Magazines; Arrangements for feeding/loading projectiles

Includes details of pump-action mechanism or lever-action mechanism. Details of ammunitions are coded under Q79-T02.

Rocking lever

# Q79-T01G [2015]

# **Triggers and other ignition mechanisms**

# Q79-T01H [2015]

#### Aiming mechanisms

Includes b-pods and shooting sticks. Also includes mounting arrangements, e.g. gun mountings on a vehicle.

Iron sights, turrets, monopod, target acquisition, trajectory compensation

#### Q79-T01X [2015]

#### Other constructional details of weapons

Includes high seats, recoil pads. Also includes details of gunshot sound and smoke simulation, such as shock-sensitive explosive compounds. Cartridges blanks are included under Q79-T02A. Details of gun decommissioning are coded under Q79-S.

Silencer

#### Q79-T02 [2015]

#### Constructional details of ammunitions

Tracer ammunition

# Q79-T02A [2015]

#### Cartridges/shells

Includes details of cartridge blanks. *Rubber bullets* 

# Q79-T02B [2015]

# **Bullets/projectiles**

Includes arrows and arrowheads. Rubber bullets are coded under Q79-T02A.

Pellet

# Q79-T02C [2015]

# Propellants, primers (to ignite propellant) and detonators

Includes details of fuse mechanism, delay arrangement, booster and main charge.

Gunpowder

# Q79-T02F [2015]

#### Storage of ammunitions

Includes details of ammunition belts or bags and ammunition boxes. Details of magazines are coded under Q79-T01F.

# Q79-T02X [2015]

# Other constructional details of ammunitions

# Q79-T10 [2015]

# **Safety arrangements**

Includes latch and double-trigger system for guns, device for absorbing or damping detonation-wave during explosions or protecting the user whilst firing the gun, etc.

Blasting mat

#### Q79-T50 [2015]

# Novel constructional material (weapons and ammunitions)

Should be used in conjunction with other Q79-T codes to indicate material application.

Fiberglass, rubber, stone, thermoplastics, HMPE

# Q79-T99 [2015]

#### Other accessories

Shooting mats

Q79-U [2015]

**Applications** 

Q79-U03 [2015]

**Vehicles** 

Q79-U17 [2015]

# **Civil Engineering; Construction; Buildings**

Includes demolition of e.g. buildings, chimney stacks, using blasting.

Building implosion

# Q79-U30 [2015]

# Sports, toys, entertainment and leisure

Includes martial arts weapons, paintball, fireworks and fire performances.

Sparklers, Catherine Wheels, fire-breathing, fireeating, hunting

Q79-U31 [2015]

Self-defence; military

Anti-riot

Q79-U31A [2015]

Military

Includes replica firearms for training.

Q79-U31C [2015]

**Self-defence** 

Q79-U45 [2015]

**Underwater use** 

Q79-U99 [2015]

Other specific applications

# PART 1 Electrical Patents Index (EPI)

# **Section S: Instrumentation, Measuring and Testing**

S01: ELECTRICAL INSTRUMENTS	231
S02: Engineering Instrumenation	240
S03: SCIENTIFIC INSTRUMENTATION	257
S04: CLOCKS AND TIMERS	277
S05: ELECTRICAL MEDICAL EQUIPMENT	280
SOA: PRINTING AND PHOTOGRAPHY	292

#### **S01: Electrical Instruments**

This section is restricted to measurements of electrical properties and values. It does not include other methods such as optical inspection of electrical and electronic apparatus, for which codes for the device under test, together with the appropriate code, in e.g. \$03, should be used.

#### S01-A

# Current and volt meters with pointer display

Does not include those used to display other measured variables e.g. on vehicle dashboard. For details of pointer displays in measurement, see S02-K06A. For vehicle dashboard instrumentation, see S02-K06X and X22-E codes.

Ammeter, coil, moving coil

#### S01-B

# Integrating power or current meters

Includes meters with electromechanical and electronic integration, e.g. kilowatt-hour meter. See S01-D02 for instantaneous power measurement. See also X12-H04 codes.

Hour, watt, energy, utility, disc, security

# S01-B01 [1992]

#### Remote meter reading

Includes monitoring of meter per se. See also S02-K08A. See also X12-H04A.

### S01-B03 [1997]

# **Digital electricity meters**

(S01-B)

#### S01-B05 [1992]

# **Protection against tampering**

See also T05-H06 for coin, token, or card-freed systems. Includes local or remote indication of tampering.

Security, anti-fraud

# S01-C

# Instruments displaying waveforms or digital values

Transient

#### S01-C01

#### Cathode ray oscilloscopes

See V05-D codes for details of CRTs per se. Oscillograph, CRO, vertical, trigger, horizontal, storage, vector

#### S01-C09

# Other instruments displaying waveforms or digital values

Includes instruments with other display types.

#### S01-D

# Measuring electric variables

#### S01-D01

# **Currents or voltages**

#### S01-D01A

#### **Functions of currents or voltages**

Amplitude, average

# S01-D01A1 [1983]

# Effective values

Includes r.m.s values. Root mean square

### S01-D01A3 [1992]

#### **Peak detection**

Maximum, hold, sample and hold

# S01-D01A9 [1992]

#### Other functions of currents or voltages

# S01-D01B

#### Indicating presence or sign

Polarity, offset, comparator

#### S01-D01B1

# **Indicating presence**

#### S01-D01B5

#### **Thresholding**

Includes indication of zero-crossing point of AC waveform.

Level reference, hysteresis

#### S01-D01C

# Using AC/DC, current/pulse conversion, etc.

A-D and D-A converters per se are covered by U21-A codes.

# S01-D01C1 [1983]

# DC to AC, digital

# S01-D01C1A [1992]

#### DC to AC

Includes chopper circuit. See U24-G01A1 and U24-G02E for instrumentation chopper amplification circuits.

S01-D01C1B [1992]

**Digital** 

S01-D01C5 [1983]

AC to DC

Rectifier, bridge, detector, full-wave rectifier

S01-D01D [1992]

# 'Indirect' measurement techniques

Includes non-contact measurement techniques and those involving transformation into non-electric quantity.

S01-D01D1 [1992]

# Using inductive or magnetic measurement

Clamp ammeter

S01-D01D1A [1992]

# **Using current transformer**

See also V02-G01B and X12-C01, respectively for low and high power transformers per se.

Core, coil, primary, secondary, phase

S01-D01D3 [1992]

#### Using electrostatic effects

Includes capacitive measurement, CVTs, etc.

S01-D01D5 [1992]

# **Using optical transformation**

See also V07-K for light property such as polarisation varying in proportion to electric quantity.

Pockel's effect, Electrochromic, Faraday rotation

S01-D01D7 [1992]

#### Using particle beam

Includes measurement using e.g. electron beam probing circuit, and also measurement by deflection of beam. See also V05-F01 codes and V05-F08B.

S01-D01D9 [1992]

Other indirect current/voltage measurements

S01-D01X

Other current/voltage measurements

#### S01-D02

### Power, power factor or energy

Includes instantaneous power measurement. Integrating meters are covered by S01-B. Includes measurement of RF power (with S01-H05).

Thermocouple, heating effect, remote indication

#### S01-D03

#### Frequency; analysing frequency spectra

#### S01-D03A

# By conversion to amplitude or phase shift

Resonance, tuned circuit, integrato, frequency to voltage converter

#### S01-D03B

# By pulse counting

Clock, gate, digital frequency meter, bit rate

#### S01-D03C

# **Analysing frequency spectra**

S01-D03C1 [1992]

#### Frequency sweeping apparatus.

Includes 'spectrum analyser' and panoramic receivers. Measurement receivers per se are covered by W02-G03 codes, monitoring of transmission systems in general by W02-C05 codes and band scanning by U25-J01 codes.

#### S01-D03C3 [1992]

# **Fourier analysis**

See T01-J04B for implementation by data processing circuitry.

#### S01-D03C5 [1992]

# Distortion and harmonic content measurement

THD, total, distortion factor meter, nonlinear

S01-D03C9 [1992]

Other frequency spectra analysis

#### S01-D03X

Other frequency aspects

#### S01-D04

# Phase angle between voltages and currents

See U23-C for phase comparator per se. Lissajous figure

#### S01-D05

### LCR and impedance-based measurements

Codes in this section relate to the measurement of impedances per se (S01-D05B), resistance (S01-D05B1), impedance related measurements such as reflection coefficient (S01-D05B5), four terminal network characteristics (S01-D05C), and measurement of inductance, capacitance, quality factor etc (S01-D05A codes). For bridge measurements see S01-F01 also. For high-frequency measurement use S01-H05 also. For measurements on passive components, use S01-G12 codes also.

#### S01-D05A

# Inductance, capacitance, Q factor, loss factor, dielectric constant

[1992]

AC bridge

S01-D05A1

Inductance measurement

Self, mutual

S01-D05A3 [1992]

# Capacitance and dielectric constant measurement

Permittivity

S01-D05A5 [1992]

# **Quality/loss factor measurement**

Tan delta, loss angle, Q-factor, dissipation factor

### S01-D05B

# Resistance and reflection-based measurements

Includes general measurement of impedance. Measurement of resistance, or predominantly resistive impedance, is covered by S02-D05B1.

S01-D05B1 [1992]

Resistance measurement

S01-D05B5 [1992]

### **Reflection-based measurements**

For measurements on antenna feeder e.g. VSWR, gain etc, see W02-B08A1 also.

Reflectometer, time domain

S01-D05B5A [1992]

# **Characterising circuit**

Includes e.g. scattering parameter measurements. S-parameter

S01-D05B9 [1992]

Other 2-pole measurements

S01-D05C [1980]

### 4-pole characteristics

Includes measurement of 4-terminal network (i.e. 2-port network) characteristics such as attenuation, phase or amplitude as a function of frequency, Nyquist diagram, Bode plot, etc.

Gain, gain-bandwidth, insertion loss, roll-off, stability, transient response, transmission loss

#### S01-D06

# Pulse characteristics (individual pulses)

Measurement and monitoring of pulse trains are covered by U22-D03.

Duration, rise-time, fall-time, overshoot

S01-D07 [1992]

# **Electric and electromagnetic fields**

(S01-D09)

Measurement of magnetic field strength is covered by S01-E01 codes.

S01-D07A [1992]

#### **Electrostatic fields**

Includes measurement of point charges. See also S01-H02 for high voltage applications.

S01-D07A1 [1997]

**Using optical techniques** 

S01-D07B [1992]

# **Electromagnetic fields**

See also S01-H05 for RF field strength measurements.

S01-D07B1 [1992]

#### Antenna radiation diagram

See also S01-G08A5 and W02-B08A1.

S01-D07B3 [1997]

**Using optical techniques** 

S01-D08 [1992]

Modulation and noise

(S01-D09)

S01-D08A [1992]

# Modulation index or depth

See also S01-G08A1 and W02-G01 for transmitter testing. Modulators per se are coded in U23.

Cross-modulation, AM, FM, frequency, deviation, sideband

#### S01-D08B [1992]

#### Noise power; noise figure

See also S01-G08A3 and W02-G03 codes for receiver testing.

S-N, signal-to-noise, ratio

#### S01-D08B1 [1997]

# For electronic amplifier

(S01-D08B) See U24 codes

#### S01-D08B3 [1997]

# For optical amplifier

(S01-D08B)

See also S02-J04A1C and V07-K01C.

#### S01-D09

#### Other electrical variable measurements

Includes measurement of turns ratio and number of turns. (See also V02/X12).

Piezoelectric

#### S01-E

# Measuring magnetic variables

Resonance, free induction decay signal coil, NMR. field, nuclear, echo, spin echo, magnetometer, magnetise, Hall-effect, flow

# S01-E01

# Direction/ magnitude of magnetic field/ flux

Gradiometer, permanent

#### S01-E01A [1992]

# Using superconductive quantum interferometer

See also U14-F02B.

S01-E01A1 [1997]

DC squid

(S01-E01A)

S01-E01A3 [1997]

RF squid (S01-E01A)

S01-E01B [1992]

#### Using galvano-magnetic devices

Includes use of Hall-effect devices.

#### S01-E01B1 [1992]

#### Detector device per se

See also U12-B01A for Hall-effect devices.

### S01-E01C

[1992]

# **Using magneto-optical devices**

Includes use of Faraday Effect devices. See also V07-K03.

S01-E01C1

[1992]

Detector device per se

S01-E01D

[2005]

Using magnetoresistive devices

S01-E01D1

[2005]

Device per se

S01-E01X

[1992]

Other magnetic variable measurement (including magnetostrictive)

S01-E02

**Magnetic properties** 

#### S01-E02A

[1992]

# **Quantised spin properties**

See S03-C02F and S03-E07 codes. S01-J02 code is used for cooling arrangements.

S01-E02A1

[1997]

**NMR** 

(S01-E02A)

S01-E02A1A

[1997]

### Sample handling

(S01-E02A)

Includes spinning mechanism.

S01-E02A2

[1997]

MRI

(S01-E02A)

# S01-E02A2A Image enhancement

# [1997]

(S01-E02A)

Includes artefact suppression. See S05-D02B2 for medical application. See S03-E09X for contrast agents.

S01-E02A3

[1997]

# **Nuclear Quadrupole Resonance**

NQR

### S01-E02A4 [1997]

#### **ESR/EPR**

(S01-E02A)

Spin, paramagnetic, resonance, electron

#### S01-E02A8 [1997]

# Quantised spin measuring device details

(S01-E02A)

Refers to all devices within the scope of S01-E02A.

# S01-E02A8A [1997]

# **Coils and waveguides**

(S01-E02A)

Includes coils for RF excitation and detection. Does NOT include coils for generating magnetic fields, e.g. gradient coils. For coils generating magnetic fields, see S01-E02A8E. Also includes antennae. See also V02-F01G and X12-C codes.

#### S01-E02A8C [1997]

# Signal and image processing

(S01-E02A)

See T01-J04B for use of Fast Fourier Transform. *Fourier Transform* 

# S01-E02A8E [1997]

#### Magnets

(S01-E02A)

Includes coils for generating magnetic fields, e.g. gradient coils, electromagnets. See also V02-E codes.

Electromagnetic, superconducting

# S01-E02A8P [2005]

# **Pulse sequences**

Covers methods and apparatus which control the timing, shape and duration of the RF pulses.

# S01-E02A8Q [2005]

# **Control and operation**

Covers all systems for operation and control of NMR equipment other than RF pulses.

#### S01-E02A8X [1997]

# Other quantised spin properties measuring device details

(S01-E02A)

#### S01-E02A9 [1997]

#### Other quantised spin properties

(S01-E02A)

#### S01-E02X [1997]

#### Other magnetic properties

(S01-E02)

See S03-E11 for investigation of materials using magnetic variables.

Ferromagnetic, eddy, susceptibility, coercivity, excitation, permeability

#### S01-F

# Measurements involving comparison with a reference

Ratio, standard

#### S01-F01

# **AC or DC bridges**

See S01-D05 also for appropriate measurement. Resistance, capacitance, inductance, Wheatstone, transformer

# S01-F01A [1992]

# With transducer forming part of bridge

Includes Wheatstone bridge circuit with resistance strain gauge e.g. for force measurement (see also S02-F01C), or weighing (see also S02-D01B).

#### S01-F09

#### Other reference measurements

Polarity

# S01-G

# Testing electric properties; locating electric

See general scope note for S01 section. Includes power supply fault, energy quality, energy efficiency, etc.

# S01-G01

#### **Electronic circuits**

Covers measurements at nodes of circuits which may be discrete or integrated.

#### S01-G01A

#### **Digital circuits**

Includes logic tester/analyser.

VLSI, integrated, IC, ROM, EEPROM

# S01-G01A1

[1992]

# **Testing integrated circuits**

Measurements on IC regarded as functional block are covered by S01-G02B. Includes use of electron beam probe techniques (see also S01-D01D7), and boundary scan testing (see also S01-G01A5). For on-chip test circuits, see U11-F01D2, U13-C07 also.

S01-G01A3 [1992]

**Testing modules or cards** 

S01-G01A5 [1992]

Logic analyser

S01-G01A9 [1992]

Other digital circuit testing

S01-G01B

Printed circuit boards

See V04-R06 codes.

Contact, mount, probe, pin, PCB

S01-G01B1 [1987]

Bare PCB i.e. before component mounting

Tracks, continuity, short circuit

S01-G01B3 [1987]

**Assembled PCB, including ATE** 

See S01-H03 codes for probe details. Suction, board positioning, 'bed-of-nails', component

S01-G01C [1992]

**Analogue circuits** 

S01-G01C1 [1992]

**Analogue integrated circuits** 

See note for S01-G01A1.

S01-G01C3 [1992]

**Analogue circuit modules** 

S01-G01C9 [1992]

Other analogue circuit testing

S01-G01D [2006]

# Using external optical/ thermal/ other stimulation

Includes measurement where circuit is stimulated by external energy to induce voltage/current/ resistance change, which is then used for failure detection/ testing operation of circuit. For any subsequent non-contact measurement of voltages/currents, see also S01-D01D.

EBIC, OBIC, OBIRCH, voltage contrast

S01-G02

Tubes and semiconductor devices and display panels

Characteristic, curve, acceptance test

S01-G02A [1992]

**Tubes** 

See also V05-L07E1 codes and X26-A03 for tube and discharge lamp testing respectively. Valve, CRT

S01-G02B [1992]

Semiconductor devices

Codes in this section are used to denote testing of a semiconductor device as a "functional block" or "black box". See S01-G01A1 and S01-G01C1 for testing involving measurement of voltages and currents within the circuit itself.

Note, also includes unspecified electrical testing of semiconductor devices.

Bipolar, unipolar, FET, MOS, CMOS, integrated circuit, IC, transistor, thyristor, SCR, triac, diac, diode, rectifier, varactor

S01-G02B1 [1992]

At wafer or die level

See U11-F01D codes also. Defect, fault, mark, identify

S01-G02B5 [1992]

Completed (encapsulated) device

See also U11-F01C codes.

IC, integrated circuit, transistor, SCR, triac, diac, diode. rectifier. varactor

S01-G02C [2006]

**Display panels** 

Electrical measurements relating to display panels, e.g. LCD, PDP, FED, and associated circuitry. See also S02-J04A3A for LCD testing

S01-G03

Materials, for dielectric strength or breakdown voltage

Includes arc detection in general.

HV, discharge, withstand, tracking, arcing, insulator

S01-G04

Testing for short circuits, discontinuity and leakage

Cable core identifier, plug/socket connection tester, continuity tester

S01-G04A [1992]

Short circuit and leakage

S01-G04A1 [1992]

**Short circuit** 

S01-G04A5 [1992]

Leakage

S01-G04A5A [1992]

With preset threshold

S01-G04C [1992]

**Checking continuity** 

S01-G04C1 [1992]

Without resistance measurement

S01-G04C5 [1992]

With resistance measurement

S01-G04C5A [1992]

With pre-set threshold

#### S01-G05

#### Locating faults in cables or networks

Used for 'installed' cables and transmission lines. See also X12-G01C for power cables W02-C01D for communication cables.

Telecommunication, break point, capacitance

#### S01-G06 [1983]

#### **Batteries**

See X16-H also which includes non-electric testing, e.g. of specific gravity, not coded in S01-G06. Charge, terminal, accumulator, ampere-hour, capacity

S01-G06A [1992]

# Measurement of remaining battery capacity

Reserve, residual, discharge

S01-G07 [1983]

#### **Electrical machines**

See V06-M11 and X11-J codes also.

Winding, coil, phase, rotating, rotor, stator, motor, generator, dynamo, alternator, dynamoelectric

S01-G08 [1992]

# Radio equipment and related systems

(S01-G09)

See also W02-C05 and W02-G, and also relevant S01-D codes for specific electrical measurement aspect, e.g. from S01-D07 and S01-D08.

S01-G08A [1992]

#### **Testing methods for equipment**

The codes in this section are used when the method of testing is intended for a specific type of equipment.

S01-G08A1 [1992]

Transmitters, repeaters

S01-G08A3 [1992]

**Receivers** 

S01-G08A5 [1992]

Antennae

S01-G08A9 [1992]

Other equipment testing

S01-G08B [1992]

#### **Equipment for testing**

The codes in this section are used when the novelty resides in the test equipment itself.

S01-G08B1 [1992]

#### Signal sources

Includes signal generators, noise generators, etc.

S01-G08B3 [1992]

# **Equipment with measuring facility**

Includes e.g. RF power meter, noise-measuring receiver etc.

S01-G08B5 [1992]

#### Screening arrangements

Includes e.g. RF Faraday cage. See also S01-J02.

S01-G08B9 [1992]

Other radio test equipment

S01-G08C [1992]

# **Electromagnetic compatibility testing**

See S01-D08B for noise figure measurements and S01-G08B5 for Faraday cage measurements. Covers tolerance of circuits to EM interference and output interference of device to other devices (e.g. effect of electric motor on TV).

**EMC** 

#### S01-G09

#### Other electrical property tests

Includes non-specific aging testing.

# S01-G10 [1992]

#### Switches and switchgear

(S01-G09)

Includes circuit breaker and relay testing. See also V03 and X13 codes.

Contact, contactor, breaker, relay, reed

# S01-G12 [1992]

# **Passive components**

Use with S01-D05 codes as appropriate, e.g. for measurement of resistance of an inductor, search S01-D05B1 and S01-G12E5.

# S01-G12A [1992]

#### Resistors

See V01-A04H1 (or X12-A if power type) also.

# S01-G12C [1992]

#### **Capacitors**

See also V01-B01G7C (electrolytic), V01-B04C (non-electrolytic), or X12-B (power capacitors).

#### S01-G12E [1992]

#### **Inductive components**

See also V02-H codes for low power components and X12-C01D3.

S01-G12E1 [1992]

**Transformers** 

S01-G12E5 [1992]

Coils

S01-G13 [2011]

# Insulators

Testing of all electrical insulators.

#### S01-G14 [2006]

#### Wires or cables

See also relevant X12-G codes.

# S01-H

#### **Electrical instrument details (general)**

Non-electric, or non-specifically electric, instrument details are covered by S01-J codes.

# S01-H01 [1983]

# Testing, calibrating, monitoring and compensation

Also includes arrangements to prevent and/or indicate fraudulent use and for signalling faults. Reference, standard, setting-up, compare, monitor, self-check

# S01-H01A [1992]

#### Compensation

Includes compensation for e.g. noise effects, temperature variation etc. See also S02-K02 codes for compensation aspects of measurement systems in general.

### S01-H01A1

# **Noise reduction**

(S01-H01A)

S01-H01B [2005]

**Testing** 

S01-H01C [2005]

**Calibration** 

S01-H02 [1983]

### For high voltage/current networks

HV, power line

# S01-H03 [1983]

#### **Probes, contacts**

PCB, electronic circuits

# S01-H03A [1992]

### Multiple probe arrangement

Includes probe board, pin network, 'bed-of-nails' etc. See also S01-G01B for measurements on PCBs. Integrated circuit, IC, wafer, circuit board, card, automatic test equipment, ATE

# S01-H03B [1992]

# Single probe

Includes probe for e.g. multimeter, or oscilloscope. Test prod, clip, alligator, crocodile

#### S01-H04 [1997]

#### **Multimeters**

(S01-H09)

#### S01-H05 [1987]

#### For high-frequency measurements

Use with other codes where HF effects dictate measurement techniques. NMR and MRI are no longer coded in this section, see relevant S01-E02 codes.

Microwave, probe, RF, capacitance, inductance, skin effect, leakage

### S01-H07 [1992]

# **Processor-controlled instrument**

Includes computer control of operation. See also T01-J08A.

# S01-H07A [1992]

# Interfacing and remote control

Includes data transfer arrangement for multiple instrument systems. See T01-J08A and T01-C/T01-H codes also.

#### S01-H09 [1992]

# Other electrical instrument details

From 2009 power supply for instrumentation are coded in S01-J04 instead.

#### S01-J

# Instrument details (classes S01 to S03)

Codes in this section relate to non-electrical and electrical instruments.

# S01-J01

# Housing

Housings for electrical equipment in general are covered by V04-S codes.

Meter, lock, seal, case, wall, tamper, access, hinge, cover, enclosure

#### S01-J02

# Indicating elements, cooling, screening

See S03-A04 for cooling arrangement for optical measuring instruments.

Shielding, set-up, adjustment, standard, reference

# S01-J02A [1992]

### **Indicating elements**

Scale, meter, printer, display, read-out

# S01-J02C [2005]

Cooling, screening

# S01-J03 [2006]

#### Instrument manufacture

Includes all manufacturing of instrumentation included in S01, S02 or S03 classes. Search with apparatus or method codes in addition to this code for specific instrumentation manufacturing details.

# S01-J04 [2009]

# **Power supply**

Includes power supply for all instrumentation devices in S01, S02 and S03.

Voltage source, current source

# S01-J05 [2018]

# Cables, terminals

Includes wires, cables, terminals, etc, for all instrumentation devices in S01, S02 and S03. See also V04 codes.

Switching box

#### S01-J09

# Other instrument details (incl. vibration dampening)

Includes supports, arrangements adjusting position or attitude, compensating for effects of tilting.

Mount, vibration, insulation, installation, bracket

# **S02: Engineering Instrumentation**

#### S02-A

# Measuring, dimensions, angles, areas, contours, roughness

Codes in this section are applied in the hierarchy according to the primary method of measurement, e.g. a Vernier caliper using an electrical transducer to produce reading on a display would be coded under mechanical measurement.

#### S02-A01

#### Mechanical measurement

Slide, scale

#### S02-A01A

### Rules, micrometers, wheels

Tape, mark, edge

#### S02-A01B

#### Gauges (e.g. feeler-pin or thread gauges)

Caliper, feeler, probe, dial, tool, vernier

#### S02-A01C\*

# Measuring arrangements (for)

\*This code is now discontinued and transferred to S02-A10 together with S02-A01 from 201401. It remains searchable for records prior to 2014.

Position, configuration, curve, displacement, distance, dimension, height, shape

#### S02-A01C1\*

#### Diameter

\*This code is now discontinued and transferred to S02-A10A together with S02-A01 from 201401. It remains searchable for records prior to 2014. *Radius, circle* 

#### S02-A01C2\*

# Length, width, thickness

\*This code is now discontinued and transferred to S02-A10B together with S02-A01 from 201401. It remains searchable for records prior to 2014.

# S02-A01C3\*

# Spacing, depth, contour

\*This code is now discontinued and transferred to S02-A10B together with S02-A01 for spacing and depth, and S02-A10C together with S02-A01 for contour, from 201401. It remains searchable for records prior to 2014.

#### S02-A01C4\*

# Angles, alignment, position, area

\*This code is now discontinued and transferred to S02-A10D together with S02-A01 for angles, orientation and alignment, S02-A10C together with S02-A01 for area and S02-A10G2 together with S02-A01 for position from 201401. It remains searchable for records prior to 2014.

Includes measuring orientation.

#### S02-A01C5\*

# Roughness, deformation

\*This code is now discontinued and transferred to S02-A10E together with S02-A01 for roughness, S02-A10F together with S02-A01 for deformation from 201401. It remains searchable for records prior to 2014.

Surface, flat, smooth

#### S02-A01X

#### Other mechanical measurements

#### S02-A02

# Electrical or magnetic measuring arrangements

Transducer

#### S02-A02A\*

### Diameter, spacing

\*This code is now discontinued and transferred to S02-A10A together with S02-A02 for diameter and S02-A10B together with S02-A02 for spacing from 201401. It remains searchable for records prior to 2014.

Distance, displacement, gap, radius

# S02-A02B\*

#### Thickness of sheet or coating

\*This code is now discontinued and transferred to S02-A10B1 together with S02-A02 from 201401. It remains searchable for records prior to 2014. Capacitance, magnetic, eddy current, film

#### S02-A02C\*

# Length, width or thickness

\*This code is now discontinued and transferred to S02-A10B together with S02-A02 from 201401. It remains searchable for records prior to 2014.

#### S02-A02D\*

# **Deformation**

\*This code is now discontinued and transferred to S02-A10F together with S02-A02 from 201401. It remains searchable for records prior to 2014.

Strain gauge, distortion

#### S02-A02E\*

#### Depth, contour

\*This code is now discontinued and transferred to S02-A10B together with S02-A02 for depth and S02-A10C together with S02-A02 for contour from 201401. It remains searchable for records prior to 2014.

Curve, profile

#### S02-A02F\*

#### Angles, alignment, position

\*This code is now discontinued and transferred to S02-A10D together with S02-A02 for angles and alignment and S02-A10G2 together with S02-A02 for position from 201401. It remains searchable for records prior to 2014.

Includes measuring orientation.

#### S02-A02G\*

[1997-2013]

### Roughness

(S02-A02X)

\*This code is now discontinued and transferred to S02-A10E together with S02-A02 from 201401. It remains searchable for records prior to 2014. Smooth, surface

#### S02-A02X\*

# Other electrical or magnetic measuring arrangements

\*This code is now discontinued and transferred to S02-A10 together with S02-A02 from 201401. From 201401, details of area measurements are coded under S02-A10C together with S02-A02. S02-A02X remains searchable for records prior to 2014.

Includes area.

Surface, cross-section

### S02-A03

#### **Optical measurement**

Note - codes in this section cover disclosures where light is the primary means of measurement irrespective of subsequent treatment or processing, such as in CCTV system.

Beam, laser, reflect, grating

#### S02-A03A

#### Interferometers

Fabry-Perot

# S02-A03B\*

# Measuring arrangements (for)

\*This code is now discontinued and transferred to S02-A10 together with S02-A03 from 201401. It remains searchable for records prior to 2014.

#### S02-A03B1\*

#### Thickness of sheet, diameter, coating

\*This code is now discontinued and transferred to S02-A10B1 together with S02-A03 for thickness of sheet or coating, and S02-A10A together with S02-A03 for diameter from 201401. It remains searchable for records prior to 2014.

Radius, circle

#### S02-A03B2\*

# Length, width, thickness, spacing

\*This code is now discontinued and transferred to S02-A10B together with S02-A03 from 201401. It remains searchable for records prior to 2014. Distance, displacement

#### S02-A03B3\*

# Deformation, depth or contour

\*This code is now discontinued and transferred to S02-A10B together with S02-A03 for depth, S02-A10F together with S02-A03 for deformation, and S02-A10C together with S02-A03 for contour from 201401. It remains searchable for records prior to 2014.

Profile, curve, strain, irregularity, undulation

#### S02-A03B4\*

#### Angles, alignment, position

\*This code is now discontinued and transferred to S02-A10D together with S02-A03 for angles and orientation, and S02-A10G2 together with S02-A03 for position from 201401. It remains searchable for records prior to 2014.

Includes measurement of orientation, tapers or optical axes alignment.

3D position

# S02-A03B5\*

#### Area, roughness

\*This code is now discontinued and transferred to S02-A10C together with S02-A03 for area and S02-A10E together with S02-A03 for roughness from 201401. It remains searchable for records prior to 2014

Flat, smooth, surface, cross-section

#### S02-A04

#### Measuring arrangements using fluids

Inclination, liquid, spirit-level, bubble, pneumatic, hydraulic, air, gas

#### S02-A05

#### Measuring using radiation, sound

# S02-A05A [1983]

#### **Radiation**

Includes dimensional measurements using e.g. electron microscope.

### S02-A05A1 [1997]

# **Using microwaves**

(S02-A05A)

Includes use of terahertz radiation.

#### S02-A05A3 [1997]

# Using atomic or nuclear radiation

(S02-A05A)

Includes electrons, X-rays, gamma radiation etc. *X-ray, gamma ray* 

#### S02-A05B [1983]

#### Sound

See W06-A05 for sonar systems, S03-E08 or S05-D03 for materials testing or medical systems respectively.

Ultrasonic, echo, propagation time, round-trip

# S02-A05B1\* [1997-2001]

#### Diameter

(S02-A05B)

\*This code is now discontinued and transferred to S02-A05C1 together with S02-A05A/B between 2002 and 2013, and to S02-A10A together with S02-A05A/B from 201401, but remains searchable and valid for records from 1997 to 2001.

# S02-A05B2\* [1997-2001]

# Length, width, thickness

(S02-A05B)

\*This code is now discontinued and transferred to S02-A05C2 between 2002 and 2013, and to S02-A10B together with S02-A05A/B from 201401, but remains searchable and valid for records from 1997 to 2001.

# S02-A05B3\* [1997-2001]

# Deformation, depth, contour

(S02-A05B)

\*This code is now discontinued and transferred to S02-A05C3 between 2002 and 2013. From 201401, deformation measurements are coded under S02-A10F together with S02-A05A/B, depth under S02-A10B together with S02-A05A/B and contour under S02-A10C together with S02-A05A/B. S02-A05B3 remains searchable and valid for records from 1997 to 2001.

# S02-A05B4\* [1997-2001]

# Angles, alignment, position

(S02-A05B)

\*This code is now discontinued and transferred to S02-A05C4 between 2002 and 2013. From 201401, angle and alignment measurements are coded under S02-A10D together with S02-A05A/B, and position under S02-A10G2 together with S02-A05A/B. S02-A05B4 remains searchable and valid for records from 1997 to 2001.

#### S02-A05B5\*

[1997-2001]

### Area, roughness

(S02-A05B)

\*This code is now discontinued and transferred to S02-A05C5 between 2002 and 2013. From 201401, area measurements are coded under S02-A10C together with S02-A05A/B, and roughness under S02-A10E together with S02-A05A/B. S02-A05B5 remains searchable and valid for records from 1997 to 2001.

#### S02-A05B9\*

[1997-2001]

# Other dimensional measurement using sound

(S02-A05B)

\*This code is now discontinued and transferred to S02-A05C1 between 2002 and 2013, and to S02-A10X together with S02-A05A/B from 201401, but remains searchable and valid for records from 1997 to 2001.

#### S02-A05C\*

[2002-2013]

[2002-2013]

#### Measuring arrangements, (for)

\*This code is now discontinued and transferred to S02-A10 from 201401, but remains searchable and valid for records from 2002 to 2013.

Codes in this section are used with S02-A05A or S02-A05B codes to specify what is being measured.

#### S02-A05C1\*

### Thickness of sheet, diameter, coating

\*This code is now discontinued and transferred to S02-A10A for diameter, and S02-A10B1 for thickness of sheet or coating from 201401, but remains searchable and valid for records from 2002 to 2013.

Radius, circle

#### S02-A05C2\*

[2002-2013]

#### Length, width, thickness, gap, spacing

\*This code is now discontinued and transferred to S02-A10B from 201401, but remains searchable and valid for records from 2002 to 2013.

#### S02-A05C3\* [2002-2013]

#### Deformation, depth, contour

\*This code is now discontinued and transferred to S02-A10F for deformation, S02-A10B for depth, and S02-A10C for contour from 201401 but remains searchable and valid for records from 2002 to 2013.

#### S02-A05C4\*

[2002-2013]

#### Angles, alignment, position

\*This code is now discontinued and transferred to S02-A10D for angles and alignment, and S02-A10G2 for position from 201401 but remains searchable and valid for records from 2002 to 2013. Includes measurements of orientation.

#### S02-A05C5\*

[2002-2013]

#### Area, roughness

\*This code is now discontinued and transferred to S02-A10C for area, and S02-A10E for roughness from 201401 but remains searchable and valid for records from 2002 to 2013.

### S02-A05C9\*

[2002-2013]

# Other dimensional measurement using radiation, sound

\*This code is now discontinued and transferred to S02-A10X together with S02-A05A/B from 201401, but remains searchable and valid for records from 2002 to 2013.

#### S02-A06\*

[1992-2013]

#### Coordinate and position measurement

\*This code is now discontinued and transferred to S02-A10G from 201401, but remains searchable and valid for records from 1992 to 2013.

The emphasis is on relative measurement to any arbitrary coordinate system, e.g. Cartesian or Polar, rather than absolute measurement.

#### S02-A06A\*

[1992-2013]

#### **Coordinates**

\*This code is now discontinued and transferred to S02-A10G1 from 201401, but remains searchable and valid for records from 1992 to 2013.

#### S02-A06A1\*

[1992-2013]

### Mechanical

\*This code is now discontinued and transferred to S02-A10G1 together with S02-A01 from 201401, but remains searchable and valid for records from 1992 to 2013.

#### S02-A06A2\*

[1992-2013]

#### **Electrical/magnetic**

\*This code is now discontinued and transferred to S02-A10G1 together with S02-A02 from 201401, but remains searchable and valid for records from 1992 to 2013.

#### S02-A06A3\*

[1992-2013]

### **Optical**

\*This code is now discontinued and transferred to S02-A10G1 together with S02-A03 from 201401, but remains searchable and valid for records from 1992 to 2013.

#### S02-A06A9\*

[1992-2013]

# Other coordinate type measurement

\*This code is now discontinued and transferred to S02-A10G1 together with S02-A09 from 201401, but remains searchable and valid for records from 1992 to 2013.

#### S02-A06C\*

[1992-2013]

#### **Position**

\*This code is now discontinued and transferred to S02-A10G2 from 201401, but remains searchable and valid for records from 1992 to 2013. For determining location in space rather than orientation.

# S02-A06X\*

[1992-2013]

# Other relative measurement

\*This code is now discontinued and transferred to S02-A10G9 from 201401, but remains searchable and valid for records from 1992 to 2013.

# S02-A07

[1992]

### Calibration, compensation and testing

# S02-A08\*

[1992-2013]

# **Combination of measuring methods**

\*This code is now discontinued from 2014, but remains searchable and valid for records from 1992 to 2013. From 201401, a combination of S02-A01 to S02-A05 codes is used to highlight the use of more than one measuring method. When the measuring method is not specified, only S02-A10 codes are applied to highlight what is measured.

Codes in this section are used to indicate the use of one or more than one method from the preceding groups, e.g. electrical and optical measurement, or where the primary method of measurement is unclear.

# S02-A08A\* [1992-2013]

#### Thickness of sheet, diameter

\*This code is now discontinued and transferred to S02-A10A for diameter and S02-A10B1 for thickness of sheet from 201401, but remains searchable and valid for records from 1992 to 2013.

[1992-2013]

#### S02-A08B\*

# Length, width, spacing

\*This code is now discontinued and transferred to S02-A10B from 201401, but remains searchable and valid for records from 1992 to 2013.

# S02-A08C\* [1992-2013]

#### Deformation, depth or contour

\*This code is now discontinued and transferred to S02-A10F for deformation, S02-A10B for depth, and S02-A10C for contour from 201401 but remains searchable and valid for records from 2002 to 2013.

# S02-A08D\* [1992-2013]

# Angles, alignment, position

\*This code is now discontinued and transferred to S02-A10D for angles and alignment, and S02-A10G2 for position from 201401 but remains searchable and valid for records from 2002 to 2013. Includes measurements of axes, tapers, orientation, etc.

# S02-A08E\* [1992-2013]

# Area, roughness

\*This code is now discontinued and transferred to S02-A10C for area, and S02-A10E for roughness from 201401 but remains searchable and valid for records from 2002 to 2013.

# S02-A08X\* [1992-2013]

#### Other combined measuring

\*This code is now discontinued and transferred to S02-A10X from 201401, but remains searchable and valid for records from 1992 to 2013.

#### S02-A09

#### Other measuring methods

This code is applied for measuring methods that cannot be coded under S02-A01 to S02-A05 codes. When the measuring method is not specified, only S02-A10 codes should be applied to highlight what is being measured.

#### S02-A10 [2014]

#### Measuring arrangements (for)

Codes in this section are used to indicate what is being measured, and should be applied together with other S02-A codes to indicate the method of measurement.

#### S02-A10A [2014]

#### **Diameter**

(\$02-A01C1, \$02-A02A, \$02-A03B1, \$02-A05C1, \$02-A08A)

Radius, circle

# S02-A10B [2014]

# Length, Width, Thickness, Spacing, Depth

(\$02-A01C2, \$02-A01C3, \$02-A02A, \$02-A02C, \$02-A03B2, \$02-A05C2, \$02-A05C3, \$02-A08B, \$02-A08C)

Gap, clearance, displacement

# S02-A10B1 [2014]

# Thickness of sheet or coating

(S02-A02B, S02-A03B1, S02-A05C1, S02-A08A)

### S02-A10C [2014]

#### Contour, Area

(\$02-A01C3, \$02-A01C4, \$02-A02E, \$02-A02X, \$02-A03B3, \$02-A03B5, \$02-A05C3, \$02-A05C5, \$02-A08C, \$02-A08E)

Includes shape measurements.

Curvature, spherometer

# S02-A10D [2014]

# **Angles, Orientation, Alignment**

(\$02-A01C4, \$02-A02F, \$02-A03B4, \$02-A05C4, \$02-A08D)

# S02-A10D1 [2014]

#### **Angles, Orientation**

(S02-A01C4, S02-A02F, S02-A03B4, S02-A05C4, S02-A08D)

Inclination, taper

# S02-A10D2 [2014]

# **Alignment**

(S02-A01C4, S02-A02F, S02-A03B4, S02-A05C4, S02-A08D)

Perpendicularity

#### S02-A10E [2014]

#### Roughness

(S02-A01C5, S02-A02G, S02-A03B5, S02-A05C5, S02-A08E)

Flat, smooth

### S02-A10F [2014]

#### Deformation

(\$02-A01C5, \$02-A02D, \$02-A03B3, \$02-A05C3, \$02-A08C)

Mechanical strain gauge, resistance strain gauge, straightness

#### S02-A10G [2014]

#### **Coordinates, Position**

(S02-A06)

The emphasis is on relative measurement to any arbitrary coordinate system, e.g. Cartesian or Polar, rather than absolute measurement.

### S02-A10G1 [2014]

#### Coordinates

(S02-A06A)

# S02-A10G2 [2014]

### **Position**

(S02-A06C)

For determining location in space rather than orientation.

### S02-A10G9 [2014]

# Other relative measurements

(S02-A06X)

# S02-A10X [2014]

#### Other measuring arrangements

#### S02-B

#### Surveying and navigation

Position, scan, infrared, IR, laser optical

# S02-B01

# Measuring distances in line of sight; optical rangefinders

See W06-A06 for laser 'radar' systems. Rangefinders for photographic cameras are also coded in S06-B01A.

Range, light, beam, modulate, reflect, camera

#### S02-B01A [2005]

# Large scale position and location measurement

Includes mining and pipeline machinery position location. Does not include RADAR, GPS systems (see W06).

Co-ordinate measurement, displacement

#### S02-B02

# Measuring height; Leveling; Profile tracing

Includes leveling between separated points using e.g. direct/barometric/stradia/fly leveling. Also includes measuring distances transverse to line of sight and tracing profiles of land surfaces using e.g. a vehicle moving along the profile to be traced, or cavities (such as tunnels).

Surveyor's level, differential leveling

#### S02-B02A [2005]

# Measuring altitude

(S02-B02)

#### S02-B03

# Measuring inclination

Level, spirit, liquid, bubble, inclinometer, clinometer, angle, plumb, bob, slope, slant, gradient, grade

#### S02-B04

# Photographic surveying; open-water surveying

Includes electronic imaging surveillance from e.g. orbiting space vehicle. Electrical aspects of photographic cameras are covered by S06-B codes, video cameras by W04-M01 codes.

Photogrammetric, aerial, aircraft, satellite, map, plane, sea

#### S02-B05

# Measuring angles (incl. theodolites; sextants)

Angular, axis

#### S02-B05A [2005]

#### Measuring attitude and orientation

#### S02-B06

# **Compasses**

Electrical aspects of compasses are also coded in W06-A09.

Magnetic, magnetometer, elevation, azimuth, pole, vehicle

#### S02-B07

#### **Gyroscopes**

See also W06-A07 for electric/electro-optical details.

Gyro, rotating, angular, rate, axis

# S02-B07A

[1992]

#### With electric transducer

Coriolis, vibration

# S02-B07B [1992]

# **Using optical effects**

Includes Ring Laser Gyroscopes and optical fiber gyroscopes. See V08-A01A1 for Ring Laser Gyroscopes and V08-A codes for laser details. See V07-N01 or optical fiber gyroscopes specifically and V07-K codes for light control aspects.

Fiber-optic, Sagnac effect, RLG, beam, relativistic, counter-propagating

#### S02-B08

# **Navigational techniques**

See also W06-A codes. For systems specifically for aircraft, ships and land vehicles, see also W06-B01B1, W06-C01B and X22-E06 codes respectively. Road, display, indicate, route, map, moving map, update, coordinate

S02-B08A [1997]

# **Using radio**

(S02-B08)

S02-B08C [1997]

#### **Satellite**

(S02-B08)

See W06-A03A for Global positioning System. X22-E06B covers GPS as applied to vehicle navigation. GPS, Global Positioning System, NAVSTAR

# S02-B08E [1997]

#### Display and indication aspects

(S02-B08)

For novel visual display aspects see S02-K04C; for audio output, see S02-K04A and possibly also W04-V for speech synthesis; for haptic output, see S02-K04D.

# S02-B08G [1997]

### Computer/processor

(S02-B08)

Includes software. See also T01-J06B codes.

# S02-B08X [2005]

#### Other navigation techniques

(S02-B08)

Includes inertial and dead reckoning techniques.

### S02-B09

# Other surveying/navigation

Includes electrical aspects of telescopes.

#### S02-B10 [1992]

Testing, calibration and monitoring of surveying/navigation equipment (S02-B09)

# S02-B11 [1992]

# **Instrument combinations**

(S02-B09)

Includes measurement of two or more variables.

# S02-B12 [1992]

# Distance recording devices

(S02-B09)

# S02-B12A [1992]

#### For vehicles

Includes odometers. For electrical aspects see also X22. (Tachographs are coded in T05-G01 and X22-E05).

Hodometer, tachometer

#### S02-B12B [1992]

#### Non-vehicle travel recorder

Includes pedometers.

#### S02-C

Measuring volume, volume flow, mass flow or liquid level; metering by volume.

Meter, water, air, gas, fluid

# S02-C01

# Continuous volume/mass flow meters

Pressure, valve, pipe, rate, fuel, transducers

#### S02-C01A

#### Mechanical

#### S02-C01A1

# Using rotating vanes; using pressure/pressure difference measurement

Wheel, turbine, blade, Bernoulli, Venturi

#### S02-C01A9

# Other mechanical flow measurement (incl. dynamic effects)

Vortex, float, swirl, Karman

#### S02-C01B

Using electric, magnetic, wave propagation or thermal effect

S02-C01B1 [1983]

**Wave effects** 

Ultrasonic, Doppler, blood, velocity, acoustic, sonic, sound, medical

S02-C01B4 [1983]

**Electric or magnetic effects** 

Electromagnet, coil

S02-C01B7 [1983]

Thermal effects

Engine, IC, intake, heat

S02-C01B7A [1997]

Device per se

(S02-C01B7)

S02-C01B7C [1997]

Circuitry

(S02-C01B7)

S02-C01F [1992]

Mass flow meters

(S02-C01X)

Includes Coriolis flow meters.

S02-C01F1 [1997]

Air mass flow sensors

(S02-C01F)

S02-C01X

Other flow meters

Includes using camera to image fluid to determine flowrate.

S02-C02

Discontinuous volume flow meters, water and gas meters

Chamber, piston

S02-C02A [1997]

Water meter

(S02-C02)

Includes water meters using continuous flow measurement techniques.

S02-C02A1 [1997]

**Protection against tampering** 

(S02-C02)

S02-C02C [1997]

Gas meter

(S02-C02)

Includes gas meters using continuous flow measurement techniques.

[1997]

S02-C02C1

**Protection against tampering** 

(S02-C02)

S02-C03

Other vol. flow measurement (incl. compound meters, measuring relative flow)

Fuel, engine, IC

S02-C04

**Dispensers** 

Dose, pump, chamber, container, drink, supply

S02-C04A

With expanding or contracting measuring chambers

Piston, stroke

S02-C04B

With moving measuring chambers

S02-C04C

With stationary measuring chambers

Optic

S02-C04X

Other dispensers

S02-C05

Measuring volume, capacity; measuringvessels

Cup

S02-C06

**Level indicating** 

Tank, fuel, depth, gauge, height

S02-C06A

**Bv floats** 

Switch, magnet, reed

S02-C06A1 [1992]

Operating electrical switch or transducer

S02-C06A1A [1992]

**Operating switch** 

S02-C06A1B [1992]

#### **Operating transducer**

Covers arrangements with proportional output, e.g. resistance wiper blade.

S02-C06A5 [1992]

Non-electric system

S02-C06B

By measuring weight or pressure

S02-C06C

# By measuring variation of electrical properties of sensor

This code and its subdivisions are used for cases in which the substance being monitored directly modifies the electrical property concerned. See S02-C06A codes for float-operated systems.

Probe, electrode, resonance, oscillator

S02-C06C1 [1992]

**Resistive system** 

S02-C06C1A [1992]

**Combined with heater** 

S02-C06C3 [1992]

**Capacitive system** 

S02-C06C9 [1992]

Other sensor properties (e.g. inductive)

Inductance

S02-C06D

**Using wave propagation effects** 

Refraction, reflection, diffraction, interference

S02-C06D1 [1992]

Using optical frequencies (em)

Light, IR

S02-C06D3 [1992]

Using sonic or ultrasonic radiation

Echo

S02-C06D5 [1992]

Using radio frequencies (em)

For radar-type systems search with W06-A04H8. *Microwave, RF* 

S02-C06D9 [1992]

Other wave propagation level sensing

S02-C06X

### Other level indicating

Includes dip-sticks and observable marks or scales on transparent vessel. Also includes level indicating using measurement of temperature.

#### S02-C07

Testing, calibrating and compensation aspects of S02-C equipment

S02-D

Weighing

Scale, load, platform

S02-D01

Weighing apparatus

S02-D01A

**Balances** 

Beam, pan

S02-D01B

Using elastic materials

Strain, gauge, spring, extension

S02-D01X

Other weighing appts. details

Includes magnetic, electrostatic or fluid action balancing.

Liquid, hydraulic

S02-D02

Weighing appts. for special purposes

S02-D02A

Weighing continuous stream of material

Includes measurement of weight of material e.g. on conveyer belt.

Flow, grain, granular, powder, fluid

S02-D02B

Weighing batches

Check, automatic discharge

S02-D02C

Weighing sheets, wires, fluids, livestock, vehicles (e.g. aircraft), weighing during motion

Platform, weighbridge

# S02-D02D

### **Price-indicating balance**

Includes weighing at point-of-sale (see also T05-L01 codes).

[1992]

#### S02-D02X

# Other weighing appts. for special purposes.

Includes appts. for incorporation in vehicles and appts. for weighing people.

#### S02-D03

# Indicating/recording weight

Display, calculate, label, printer

#### S02-D07

[2014]

# Calibration, compensation and testing of weighing equipment

(S02-D09)

Includes monitoring details.

#### S02-D09

# Other weighing aspects

Includes details of weighing apparatus, e.g. bearings, beams. Since 201401, calibration, compensation and testing details of weighing equipment are coded under S02-D07 only.

# S02-E

# Measurement of mechanical vibrations

Includes measurement of sound intensity.

#### S02-E01

# Vibration measurement methods

Includes measuring reverberation time, propagation velocity, resonant frequency or sound impedance.

Acoustic, sound, transducer, speed

#### S02-E02

# Vibration detectors

Includes detectors in fluids, radiation-sensitive detectors; detecting capacitance or reluctance change

Piezoelectric, magnetostrictive, optical, fiber-optic

#### S02-E09

# Other measurement of mechanical vibrations

#### S02-F

Measuring force, torque, work, mechanical power or efficiency, fluid pressure or vacuum

# S02-F01

### **Measuring force**

Load, thrust

#### S02-F01A

Hydraulically/pneumatically; by deformation of gauges; by counter-balancing

#### S02-F01B

Using variations in vibration freq., magnetic properties, capacitance or inductance

Magnetostrictive, resonance, oscillator

#### S02-F01C

# Using electrical resistance strain gauges

Includes piezo-resistive devices. Load cell

# S02-F01E [1997]

#### Piezoelectric

(S02-F01X)

#### S02-F01G [1997]

#### **Optical**

(S02-F01X)

# S02-F01X

Other force measurement (including stress measurement)

#### S02-F02

# Measuring torque, work, mechanical power or efficiency

Motor, engine, brake, dynamometer, generator

#### S02-F03

# Applications and methods of measuring force

# S02-F03A

#### Linear force, tension

Includes e.g. muscular force, ski binding release force, tension in ropes, belts etc.

#### S02-F03B

### Torque, mechanical power, work

Includes, e.g. axial thrust in shaft, vehicle power, several components of force, torque on nut, testing brakes, force applied to control members, e.g. brake pedal, steering input etc.

Torque wrench, robot, manipulator, brake pedal force, steering input

#### S02-F03X

Testing, compensation and calibration; other

#### S02-F04

# Measuring fluid pressure or vacuum

Gas, air, liquid

#### S02-F04A

Measuring pressure mechanically (using)

#### S02-F04A1

Flexible tube- or bellows type gauges

Bourdon

#### S02-F04A2

# Flexible diaphragm- or capsule type gauges

Membrane, plate

# S02-F04A9

Other mechanical fluid pressure measurement (incl. piston or liquid-column gauges)

Manometer

### S02-F04B

Measuring pressure electrically or magnetically (incl. electrical or magnetic indication of mechanical sensor displacements) (using)

Transducer

### S02-F04B1

Potentiometers, strain gauges, piezoresistances

Resistor, extension

#### S02-F04B2

Piezoelectric devices; variations in inductance, capacitance, magnetic properties; movement of magnets; electrokinetic cells

Electrode, resonance, plate

#### S02-F04B3

[1992]

#### Semiconductor transducer

See also U12-B03E.

#### S02-F04C

# Measuring pressure differences, several pressures, inflation pressures

Includes measurement of tyre pressure. See S02-F04E for remote indication and X22-E02 for onboard electric systems.

Differential, vehicle, remote

# S02-F04C1

[1997]

#### Pressure differences

(S02-F04C)

#### S02-F04C1A

[1997]

# Inflation pressures

(S02-F04C)

# S02-F04C2

[2005]

# **Blood pressure**

(S02-F04C)

# S02-F04C3

[1997]

# **Several pressures**

(S02-F04C)

# S02-F04C3A

[1997]

#### **Partial pressures**

(S02-F04C)

See also S03-E03 if achieved electrochemically.

#### S02-F04D

Vacuum gauges; measuring rapid changes in pressure; engine energy or work indicators

# S02-F04D1

[1997]

### Vacuum gauges

(S02-F04D)

See also V05-K03 for ionisation pressure gauges, e.g. Penning gauges.

Pirani, Penning

#### S02-F04D3

[1997]

# Measuring rapid changes in pressure

(S02-F04D)

# S02-F04D3A [1997]

#### **Knock detection**

(S02-F04D)

See also S02-J01A for IC engine testing and X22-A05A for IC engine pre-ignition detector. Includes knock detection by means other than using pressure measurement.

Misfire

#### S02-F04E

# Protection against overload or environment; temperature compensation

#### S02-F04F\*

[1980-2013]

# Testing, calibration and compensation

\*This code is now discontinued and transferred to S02-F07 from 201401, but remains searchable and valid for records prior to 2014. Does not include temperature compensation, see S02-F04E.

#### S02-F04J

[1992]

# **Optical techniques**

Optical fiber, polarisation, birefringent

#### S02-F04X

#### Other pressure measurement

#### S02-F07

[2014]

# Calibration, compensation and testing

(S02-F04F)

This code can be used together with other S02-F codes to highlight the type of equipment used, e.g. for measuring blood pressure (S02-F04C2). Details of temperature compensation of equipment measuring fluid pressure or vacuum are coded under S02-F04E only.

Monitoring

#### S02-G

# Measuring speed, acceleration or shock

### S02-G01

#### Linear or angular velocity

Rotating, wheel, vehicle, shaft, speedometer

#### S02-G01A

### Optically

Includes angular velocity measurement using optical gyroscope.

Laser, light, gyro, beam, ring

# S02-G01B

# **Electrically or magnetically**

Generator, tacho, pulse, frequency

#### S02-G01B1

### Measuring angular velocity

Does **not** include measurement of angular velocity using electric gyroscope; see S02-G01X.

#### S02-G01B1A\*

[1992-2004]

#### With fixed sensor

\*This code is now discontinued, but remains searchable and valid for records from 1992 to 2004.

#### S02-G01B1B\*

[1992-2004]

#### With moving sensor

\*This code is now discontinued, but remains searchable and valid for records from 1992 to 2004.

#### S02-G01B2

[2005]

# Measuring linear velocity

# S02-G01B9

# Other electrical or magnetic velocity measurement

#### S02-G01D

[1997]

# **Doppler effect methods**

(S02-G01)

See also W06-A04A2 (RF radar), W06-A05 (sonic/ultrasonic techniques) and W06-A06 (optical techniques). S02-G02X covers Doppler methods for measuring speed of fluids.

# S02-G01X

#### Other (incl. mechanically)

Includes determination of time to travel fixed distance and measurement of angular velocity using electric gyroscope.

Gyroscope, vibration, Coriolis

### S02-G02

# Speed of fluids, or bodies relative to fluids (by)

Flow, gas, wind, anemometer, liquid

#### S02-G02A

# Measuring electric or thermal variable affected by the flow

Heat, bridge, cooling, hot-wire

# S02-G02B

# Measuring fluid force or pressure differences

Pitot tube

#### S02-G02X

Other measurement of speed of fluids, or bodies relative to fluids (incl. swirl flowmeter)

Ultrasonic, Doppler, vortex, acoustic

#### S02-G03

#### **Acceleration or shock**

Inertia, force, accelerometer

S02-G07 [1992]

Calibration, compensation and testing

(S02-G09)

S02-G07A [1992]

**Calibration** 

S02-G07C [1992]

**Compensation aspects** 

S02-G07E [1992]

Testing and monitoring

#### S02-G09

# Apparatus details and other speed-related measurement aspects

Includes constructional details of measuring devices.

#### S02-H

# Indicating/recording movement or direction of movement

Includes analysis of trajectories.

Range, motion analysis, golf swing

# S02-J

#### Testing machines, structures or appts.

Model, simulate, performance testing, testing during production

### S02-J01

**Engines** 

S02-J01A [1983]

# **IC** engines

Fuel-consumption, cylinder, pressure, injection, Diesel, valve, speed, knock

S02-J01A1 [1997]

# For aircraft

(S02-J01A)

Includes piston engines.

S02-J01C [1992]

Gas turbine engines

S02-J01C1 [1997]

# For aircraft

(S02-J01C)

Includes turbo-prop engines and ram jets. See W06-B01B5 for onboard testing of aircraft engines. Bypass ratio, turbofan, compressor, afterburn

S02-J01E [1992]

#### Steam turbines

See X11-A01X for steam turbine testing where steam turbine is specifically for electricity generation.

S02-J01F [2005]

Rocket motors and ion propulsion

(S02-J01X)

S02-J01X [1992]

Other engine types

#### S02-J02

#### **Vehicles**

Includes all vehicle types: aerospace, automotive and locomotive, etc.

Wheel, track, roll, balance, transmission

#### S02-J02A

# Tyre performance, suspension, steering, wheels

Surface, road, tread, hold, grip, angle, toe-in, shock absorber

S02-J02B [1992]

Braking

S02-J02E [1992]

#### **Electrical system**

See also S01-G01 for electrical test appts. See X22 codes for tests on vehicle electrical systems.

S02-J02F [1992]

**Crash/impact testing** 

S02-J02F1 [1992]

# Crash dummy

Anthropomorphic

#### S02-J02X

# Other vehicle tests (includes testing vehicle transmission)

Alignment, body, clutch, gearbox

#### S02-J03

# **Machine parts**

Friction, drag

S02-J03A [1983]

# Gearing, transmission, bearings

Shaft, tooth, torque, differential, ball race

S02-J03X [1992]
Other testing of machine parts

#### S02-J04

# Optical appts. (also optical testing)

Beam, image, reflect, pattern, scan, objective, focallength, mirror

S02-J04A [1992]

**Testing of optical apparatus** 

S02-J04A1 [1992]

Testing optical fiber and other guide structures

S02-J04A1A [1997]

# **Testing optical fiber**

(S02-J04A1)

See V07-J also.

S02-J04A1C [1997]

# **Testing optical amplifiers**

(S02-J04A1)

Includes optical fiber amplifiers. See also S01-D08B3 and V07-K01C.

S02-J04A1X [1997]

**Testing other guide structures** 

(S02-J04A1)

S02-J04A3 [1997]

# **Testing liquid crystals**

(S02-J04A9)

See also U14-K01A8.

Nematic, cholesteric

# S02-J04A3A [1997]

# **Testing LCDs**

(S02-J04A9)

See also U11-F01F and/or U11-F01D and U14-K01A8.

S02-J04A5 [1992]

Testing and measuring lenses and lens systems

S02-J04A9 [1992]

Testing other optical appts.

Prism, grating

S02-J04B [1992]

**Testing of specific optical apparatus** 

S02-J04B1 [1992]

Microscope

S02-J04B3 [1992]

# Fiberscopes and endoscopes

See also V07 codes for novel fiber-optic aspects. See also S05-D04 codes for medical applications, V07-N02 for optical fiber details and S06-B09 for photographic attachments. See W04-M01 for video camera equipment.

S02-J04B3A [1997]

**Fiberscope** 

(S02-J04B3)

S02-J04B3C [1997]

Endoscope

(S02-J04B3)

S02-J04B9 [1992]

Other optical appts.

# S02-J05

# Investigating static or dynamic balance

Rotor, rotating, motor, weight, bearing, moment of inertia and dynamic balance/unbalance sensor

#### S02-J06

# **Investigating fluid-tightness**

Leak, pipe, seal, pressure, air-tight, gas, hermetic, vacuum

#### S02-J06A

# By detecting leakage fluid

S02-J06A1 [1992]

**Electrically** 

S02-J06A3 [1992]

**Acoustic or ultrasonic detection** 

S02-J06A5 [1992]

**Using tracer substance** 

Radioactive, dye, fluorescent

S02-J06A7 [2006]

**Optical detection** 

Includes using camera, spectrometer. Prior to 2007, covered by S02-J06A9.

S02-J06A9 [1992]

Other leakage fluid detection methods

Liquid, bubble, submerged, immersion testing

S02-J06B

By measuring fluid loss/gain rate

Flow rate, pressure drop

S02-J06X

Other fluid tightness investigation

S02-J07

Aerodynamic or hydrodynamic testing

Electrical aspects of aircraft and ship testing are also coded in W06-B05 and W06-C05 respectively.

Flow, pressure, wind tunnel, aircraft, ship, tank, wave generator

S02-J08

Vibration or shock testing of structures

Impact, dynamic, oscillating

S02-J09

Other testing of machines, structures or

appts.

Includes testing during production, performance testing, and model-based simulation testing. See also T01-J15H for simulation of non-electronic systems.

S02-J10

[1992]

**Investigating elasticity of structures** 

(S02-J09)

Extension, strain, stress, Young's modulus

S02-K

Indicating or recording - general

S02-K01

Appts. indicating/recording function of variable, e.g. r.m.s., mean

Integrate, meter, data analysis, plotting best straight line, form factor, statistical methods, standard deviation, median, average, mean, least squares, regression

S02-K02

Appts. with compensating correcting/protection features

S02-K02A [1992]

Compensation/correction for transducer characteristics

Includes linearizing. *Linearity, law* 

S02-K02B [1992]

Compensation/correction for ambient variations

Includes compensation for variation of temperature. *Pressure* 

S02-K02B1 [1997]

**Temperature compensation** 

(S02-K02B)

S02-K02B3 [1997]

Pressure compensation

(S02-K02B)

S02-K02B9 [1997]

Other environmental compensations

(S02-K02B)

S02-K02C [1992]

Protection

Includes protection from overload, excess signal level etc.

S02-K02D [1992]

**Noise reduction** 

S02-K02X [1992]

Other aspects of compensation, correcting and protection

#### S02-K03

# Transferring or converting sensor output

Transducer, encode, analogue-digital, A-D

#### S02-K03A

**Electrically or magnetically** 

#### S02-K03A1

Influencing current/voltage capacitively or electrodynamically

S02-K03A1A [1992]

Electrodynamically

Tacho-dynamo

S02-K03A1C [1992]

Capacitively

S02-K03A2

Influencing current/voltage resistively or inductively

S02-K03A2A [1992]

Resistively

Potentiometer

S02-K03A2C [1992]

Inductively

LVDT, coil, movable armature

S02-K03A5 [1992]

Using magnetic effects

(S02-K03A9)

S02-K03A5A [1992]

Magnetoresistance

S02-K03A5C [1992]

Magnetostriction

S02-K03A5E [1992]

**Hall effect** 

S02-K03A5F [1997]

Magneto-optical

(S02-K03A, S02-K03B)

S02-K03A5X [1992]

Other magnetic effects

#### S02-K03A9

Other electrical or magnetic transfer

#### S02-K03B

# Optically

Light, fiber, fiber-optic, reflect, beam, intensity, interferometer, laser

S02-K03B1 [1992]

**Using fiber optics** 

See also V07-K10 codes.

S02-K03B9 [1992]

Other optical transference or conversion

#### S02-K03X

# Other (incl. using fluid or mechanically)

Covers use of piezoelectric transducer.

Pressure

#### S02-K04

# **Indicating measured values**

Alarm

S02-K04A [1992]

**Audible indication** 

S02-K04C [1992]

Visible indication

Display, LED, LCD

S02-K04G [1992]

Indicating threshold value

S02-K04D [2006]

# **Haptic indication**

Prior to 2007, covered by S02-K04X. See W05-A01A1 for general haptic annunciators and alarms.

Tactile feedback, vibrating indicator

S02-K04X [1992]

Other measured value indication

#### S02-K05

# **Recording measured values**

Includes memory details, pen recorders, line printers etc. See S06 codes for line printer details. Plot, position, writing, print, mark, paper, platen, X-Y, graphical

#### S02-K06

# Component parts of recording/indicating appts.

Line printers are only included when specifically for printing measured values. See S06 codes for line printer details.

#### S02-K06A

# Scales, dials, pointers

Instrument, display, indicia, markings

#### S02-K06B

# **Recording elements**

Print, ink, paper, mark

#### S02-K06B1

# Electric, magnetic, heated, optical, perforating elements

Electrode, beam, dot matrix, electrocardiogram

#### S02-K06B2

# Ink transfer recording elements

#### S02-K06X

# Other component parts of recording/indicating appts.

Includes vehicle dashboard instrumentation; see also X22-E codes.

[1992]

#### S02-K07

# Testing, calibration and monitoring

(S02-K09)

S02-K07 codes are only applied when the instrument used is unclear. Otherwise, specific calibration/testing codes from the relevant S02-A to S02-G sections should be applied instead, such as S02-B10 for testing and calibration of surveying and navigation equipment.

# S02-K07A [2005]

# **Testing and monitoring**

(S02-K07, S02-K09)

# S02-K07B [2005]

#### **Calibration**

(S02-K07)

# S02-K08 [1992]

#### Remote reading; tariff metering

(S02-K09)

# S02-K08A [1992]

#### Remote reading

See also S02-K08B for remote reading of e.g. gas, water (S02-C02 codes also), or electricity meters (S01-B01 also), and W05-D codes, e.g. W05-D04A5 for radio link or W05-D07G if for vehicles, which cover telemetry in general.

#### S02-K08B

[1992]

Tariff metering appts.

### S02-K09

# Other indicating or recording

From 201401, monitoring details are coded under S02-K07A. This code remains searchable and valid for monitoring details for records prior to 2014.

#### S03: Scientific Instrumentation

#### S03-A

# Measuring optical radiation (IR, visible and UV)

See also S03-E04 for appts. having provision for investigating material sample. Measurement performed on laser beam is also coded in V08-A06. Includes black body radiation source.

#### S03-A01

# **Photometry**

#### S03-A01A

# Photometry by comparison with reference light or electric value

#### S03-A01B

# Photometry using electric radiation detectors

Includes meters/sensors for measuring and/or detecting a light source, e.g. infrared detectors. See also U12-A02 codes.

Laser power meter

#### S03-A01B1

[1997]

# Photometry using photovoltaic detectors

(S03-A01B)

See also U12-A02A2 and X15-A02A codes. Photodiode, bandgap, depletion region, space charge, solar cell

#### S03-A01B3

[1997]

# Photometry using capacitive detectors

(S03-A01B)

Includes ferroelectric devices. For discrete ferroelectric devices, see V01-B02B9. For integrated ferroelectric devices, see also U12 codes, e.g. U12-C02F for capacitor and U12-D02A7 for transistor.

# S03-A01B5

[1997]

# Photometry using photoresistive detectors

(S03-A01B)

See also U12-A02B1.

Photoconductive

### S03-A01B7

[1997]

# Photometry using array of detectors

(S03-A01B)

See U13-A01X for focal plane array and W04-M01B5 for producing video image with optical radiation, and W04-M01E1A for producing video image with infrared radiation.

Mosaic

# S03-A01B9

[1997]

#### Other electric radiation detectors

(S03-A01B)

PMT, photomultiplier

#### S03-A01X

#### Other photometry aspects

Includes measuring e.g. visually, chemically etc., also general details.

### S03-A02

#### Spectrometry; colorimetry; polarimeters

See S03-E04 codes for more details. Spectroscope

#### S03-A02A

# Generating spectrum e.g. by prism or diffraction grating; measuring line intensity

Wavelength

#### S03-A02A1

[1997]

# Monochromators

(S03-A02A)

#### S03-A02B

# Absorption, double-beam, flicker or Raman spectrometry

#### S03-A02C

# Colorimetry; polarimeters

See also S03-E04B5.

Colour, filter, polarise, Nessler tube, polarisation, birefringence, refractive index

#### S03-A02F

[1997]

# Interferometric spectrometers

(S03-A02X)

Includes Fourier Transform spectrometers, e.g. FTIR spectrometer. For novel aspects of the interferometer, see S02-A03A. See T01-J04B1 for novel computing aspects of the Fourier Transform. *Golay detector* 

# S03-A02X

### Other spectral measurements

Includes atomic emission spectrometers (See also S03-E04D3) and spectroradiometers.

# S03-A03

# Pyrometry and IR temperature measurement

Infrared, temperature, pyrometer, pyroelectric, heatsensing, remote, bolometer, actinometer

#### S03-A04 [1997]

# Cooling arrangements for optical instruments

(S01-J02)

Covers all devices within the context of S03-A and S03-E04. Covers cooling arrangements for IR detectors. See S01-J02 for cooling arrangements for other measuring instruments.

Dewar

### S03-A05 [1992]

# Calibration/testing of optical instruments and compensation aspects

(S02-K02, S02-K09)

S03-A05A [1992]

**Testing of optical instruments** 

S03-A05C [1992]

**Calibration of optical instruments** 

S03-A05E [1992]

Compensation aspects of optical instruments

#### S03-A09

#### Other optical measurements

Measuring optical phase difference, degree of coherence, optical wavelength, velocity of light. *Interferometer, phase* 

### S03-B

## Thermometers and calorimeters

Covers temperature and heat quantity measurements.

### S03-B01

# **Thermometers**

Medical thermometers with electrical content are also coded in S05-D01E.

Fuse, catalyst

# S03-B01A

# **Thermoelectric**

Thermocouple, junction, Seebeck

#### S03-B01B

# Linear resistance e.g. platinum resistance thermometer

Resistor, film, wire

#### S03-B01C

# Other electric/magnetic type

Includes e.g. using semiconductor p-n junction, crystal resonator frequency, thermal noise of resistance or conductor. Also includes measurement by unspecified electric transducer. Thermo-electromotive

#### ..........

# Integrating or differentiating expansion or contraction e.g. mercury thermometer

Bimetal, alcohol, maximum-minimum

#### S03-B01E

S03-B01D

# Adaptations and novel measurements for specific purposes

Includes novel measurement of temperature where sensor is of unspecified type or unimportant.

S03-B01E1 [1992]

For aggressive environments

S03-B01E9 [1992]

Other adaptations of thermometers for specific purposes

S03-B01F [1983]

#### **Thermistors**

Thermistors per se are also coded in V01-A02A. Resistor, PTC, NTC, positive, negative, temperature coefficient

# S03-B01G [1992]

#### **Optical**

(S03-B01X)

Covers aspects where there is modification of some optical property, e.g. polarisation state or refractive index. Thermometers using colour changes, e.g. of liquid crystals or chemical indicators, are covered by S03-B01X. Pyrometry is covered by S03-A03.

Fiber-optic

# S03-B01H [1992]

**Testing, calibrating and compensation** (S03-B01X)

S03-B01H1 [1992]

**Testing of thermometers** 

S03-B01H3 [1992]

Calibration of thermometers

#### S03-B01H5 [1992]

### **Compensation aspects of thermometers**

# S03-B01K [1992]

# **Display of temperature**

(S02-K04, S03-B01)

Includes recording of temperature. See also S02-K04 and S03-B01.

Display, LED, LCD, record

#### S03-B01X

#### Other thermometers

Includes e.g. casings, measuring temp. using acoustic effect or colour change of liquid crystal/chemical indicator.

Ultrasonic, thermochromic

#### S03-B02

#### **Calorimeters**

Heat quantity measurement. Includes electrical measurement for domestic heating system, see also X27-E01A. Also includes calibration, testing and compensation of calorimeters. Calorimetry for investigation of sample properties is coded in S03-E01C.

Flow, thermal flux

#### S03-C

# Geophysics

Includes non-geophysical applications such as detecting presence of objects, e.g. using light barrier (S03-C08). (See also S03-C06). Well logging apparatus with electrical content is also coded in X25-E02.

#### S03-C01

# Seismology, seismic/acoustic prospecting

Seismic, exploration, log, prospecting, reflect, surveying, oil, gas

# S03-C01A

#### **Generating seismic waves**

Vibration, piston, generator, hydraulic, shear, explosive charge, pneumatic cannon

#### S03-C01B

# Detecting, transmission, or recording of seismic signals

Also includes transmitting seismic signals to recording apparatus (see also W05-D codes, e.g. mud pulse telemetry W05-D06M1). Towed hydrophone arrays are covered by S03-C01C1. *Geophone* 

#### S03-C01C

For water-covered areas; for well logging

# S03-C01C1 [1983]

#### For water-covered areas

Marine, streamer, tow, hydrophone

#### S03-C01C5

[1983]

# For well-logging

Borehole, formation, downhole

#### S03-C01X

Other seismology, seismic/acoustic prospecting (incl. processing seismic data)

#### S03-C02

# Electric, magnetic, em prospecting, measuring earth's magnetic field

Well-logging appts. is coded under respective prospecting type.

#### S03-C02A [1983]

#### With electric current

Electrode, probe, resistor

# S03-C02B [1983]

#### With magnetic/electric field

Includes measuring Earth's magnetic field and proximity sensors. For weapon detection at airports, see also \$03-C06 and W06-B02A1.

Coil, resonance, oscillator, pipe-finder, metal detector, magnetotelluric, terrestrial

# S03-C02F [1997]

# Using quantised spin properties

(S03-C02X)

# S03-C02F1 [1997]

#### **NMR**

(S03-C02X)

For NMR details per se, see S01-E02A1 and S03-E07C.

#### S03-C02F3 [1997]

#### MRI

(S03-C02X)

For MRI per se, see S01-E02A2 and S03-E07A.

# S03-C02F5

[1997]

#### **Nuclear Quadrupole Resonance**

(S03-C02X)

NQR

# S03-C02F9 [1997]

# Using other quantised spin properties phenomena

(S03-C02X) ESR. EPR

# S03-C02M [2022]

# **Geophysical muon imaging**

Includes use of cosmic ray muon radiography to investigate density distribution inside geological structures for mapping/imaging.

Muography, muon mapping, attenuation, flux, trajectory

#### S03-C02X [1983]

# Other electric, magnetic, em prospecting (incl. electromagnetic prospecting methods)

Antenna, borehole, RF, microwave

#### S03-C03

#### Prospecting using nuclear radiation

Gamma, neutron, X-ray

#### S03-C04

# Gravimetric or other prospecting; measuring gravitational field/waves

Gravity

#### S03-C04A [1997]

# **Optical prospecting**

(S03-C04)

Includes thermal prospecting. Does **NOT** include light barriers (see S03-C08 codes).

Thermal

#### S03-C05 [1992]

# Geophysical natural disaster prediction and detection

(S03-C09)

Includes e.g. earthquake, volcano and landslide prediction and detection techniques. See also S03-C01 codes for seismic detection apparatus per se. See W05-B08 codes for natural disaster alarm systems.

# S03-C06 [1997]

# Detecting presence of person or object

This code is used to differentiate between prospecting and presence detection and is technology non-specific. It will thus almost always be combined with another (usually S03-C) code: e.g. detecting presence of contraband using Nuclear Magnetic Resonance would be coded as S03-C02F1 and S03-C06. Includes also baggage inspection at airport (See also W06-B02A5) and pipeline detection (see also X25-Y02). See W05-B and W05-C for alarms in general.

Drugs, Narcotics, Explosives

# S03-C07 [2005]

# For non-seismic well-logging or open water prospecting

These codes are used to differentiate between well-logging, open water prospecting or presence detection and are technology non-specific. Thus, they will almost always be combined with other (usually S03-C) codes. For seismic well-logging or open water prospecting, see S03-C01C codes.

# S03-C07A [2005]

Non-seismic well-logging

S03-C07B [2005]

Non-seismic open water prospecting

# S03-C08 [1992]

# **Light barriers**

(S03-C09)

Packaged semiconductor light transmitting and receiving devices for light barriers are coded in U12-A02C2. Optical intruder detection is covered by W05-B01C2 codes.

Machine-operator protection

S03-C08A [1992]

**Construction details** 

S03-C08C [1992]

Circuitry

#### S03-C09

### Other geophysics

Includes mechanical well diameter measurement.

#### S03-C10 [1997]

# Testing, calibrating and compensation aspects of geophysics devices

(S03-C09)

Includes testing of geophones. For geophones per se, see S03-C01B codes.

#### S03-D

#### Meteorology

Includes weather houses, sunshine duration measurement, rainfall or precipitation gauges, windspeed.

Atmosphere, pollution, pressure, precipitation, rain, satellite, balloon, probe, ionospheric sounding

#### S03-D01

[1992]

# Wind speed and direction gauges

See also S02-G02 for anemometer details.

#### S03-D02

[1992]

# Detection of precipitation; Air humidity measurements

#### S03-D02A

[1992]

# Measuring rainfall

Precipitation, gauge

#### S03-D02B

[1992]

# Detecting presence of rain, snow, ice or fog

Smog measurements are coded under \$03-D06 only.

# S03-D02B1

[1992]

# For non-meteorological application

Includes detection for automatic actuation of vehicle windscreen wipers (See also X22-J01).

# S03-D02C

[2016]

# Air humidity measurements

See also S03-F09A.

#### S03-D03

[1992]

# **Atmospheric pressure measurements**

Fluid pressure measurements are covered by S02-F04 codes.

Barometers

# S03-D04

[1992]

# Air temperature measurements

Thermometers are covered by S03-B01 codes.

# S03-D05

[1992]

# Weather prediction systems, weather forecasting

Includes weather satellite and weather radar systems. Includes prediction of cyclones, thunderstorms, hurricanes, etc. See W06-A04H2 for weather radar, S02-B04 for satellite surveying of the earth. See also W05-B08 section for adverse weather alarms.

# S03-D06 [1992]

#### Pollution, fall-out measurements

Includes all environmental pollution measurement, e.g. marine, fresh water, air, soil, etc. For air quality per se, see S03-E14N codes.

Smog

# S03-D09 [1992]

# Other meteorology

Includes detection of atmospheric measurements for non-meteorological applications, and meteorological data processing. Also includes lightning strike detectors.

#### S03-E

# Investigating physical or chemicals properties of materials: methods and appts.

Electrical apparatus for medical purposes is also coded in S05-C if in-vitro, or S05-D01G/S05-D01L if in-vivo. Electrical exhaust sensors for internal combustion engines are also coded in X22-A05B.

#### S03-E01

# Thermal (by investigating)

#### S03-E01A

# Changes of state or phase; sintering; coefficient of expansion: thermal conductivity

Using melting or boiling points, distillation, sublimation, expansion, thermal conductivity.

#### S03-E01B

# Moisture content; flash-point, explosibility; presence of flaws

Includes e.g. psychrometry, dew point, humidity, hygrometry

### S03-E01B1 [1997]

# Thermal cycling

(S03-E01B)

Includes thermal test chambers for PCBs and integrated circuits. See also V04-R06 codes for PCB testing and U11-F01G for burn-in testing of integrated circuits. Includes thermal cycling of test pieces, such as might be carried out in a metallurgy laboratory. If the material under test is subjected, additionally, to a load, see also S03-F02B for time varying load and S03-F02C for fixed load.

Temperature excursion, PCB, semiconductor device, integrated circuit, coupon

# S03-E01B3 [1997]

### Flaw detection

(S03-E01B)

Includes detection of flaws using infra-red radiation. For flaw detection using visible or ultraviolet radiation, see S03-E04F2. Includes thermal imaging. *Defect* 

#### S03-E01C

#### **Calorimetry**

Includes e.g. combustion. Calorimeters per se are in S03-B02.

#### S03-E01E

#### [1992]

# **Emissivity determination and differential** thermal analysis

Includes acoustic thermography. For detecting flaws, see also S03-E01B3.

#### S03-E01X

### Other thermal investigation

#### S03-E02

# **Electrical (by investigation)**

Moist, liquid, flow, humidity

#### S03-E02A

# Resistance of solid absorbing or reacting with fluid

Includes e.g. semiconductor gas sensor.

Oxide, metal, film, moist, humidity, resistor, bridge, oxygen, semiconductor

#### S03-E02B

# Resistance of liquid or electrically heated body in material

Catalyst

#### S03-E02C

# Capacitance

Dielectric

#### S03-E02C1 [1997]

#### Moisture detection

(S03-E02C)

# S03-E02C3 [1997]

# Flaw or contamination detection

(S03-E02C)

# S03-E02C5 [1997]

# **Capacitance spectroscopy**

(S03-E02C)

Includes Deep Level Transient Spectroscopy, TSCAP and Admittance Spectroscopy. For measurements on semiconductor materials, see U11-F01A codes. For measurements on devices, see U11-F01C codes.

DLTS, deep level, impurity, trap, lifetime

S03-E02D [1992]

**Impedance** 

S03-E02F [1992]

# Using tunnel current and analogous effects

(S03-E02X)

Includes all scanning probe microscope types and all adaptations for measurement, e.g. measurement of electric or magnetic fields, photon excitation, capacitance and ionic conductance, in addition to other relevant instrumentation codes.

See also V05-F for novel microscope and manufacturing details and S02-A codes for novel cantilever displacement measurement.

For optical scanning tunnelling or near-field optical microscopes with tunnel current type probes, see additionally S02-J04B1 and S03-E04R.

Does NOT include use of scanning probe technology for patterning techniques or recording see V05-F05D and relevant T03-C and U11 codes. SPM, magnetic force, MFM, SNOM, shear-force microscopy

# S03-E02F1 [1997]

# Scanning tunnelling microscopes

(S03-E02F) STM

S03-E02F3 [1997]

# **Atomic force microscopes**

(S03-E02F) *AFM* 

#### S03-E02X

#### Other electrical investigation

Includes e.g. measuring Q-factor change on oscillating piezoelectric crystal resonator caused by deposition (see also S03-E12), investigating breakdown voltage (see also S01-G03), electrostatics.

## S03-E03

#### **Electrochemical**

For ion sensor FET see U12-D02A also. *Chemical* 

# S03-E03A

# Measuring deposition or liberation from electrolyte e.g. coulometric titration

Electrolytic, coulometer, titration, Karl Fischer

### S03-E03B

#### Measuring currents/voltages in voltaic cells

#### S03-E03B1

# Due to effects at electrodes; e.g. potentiometric titration

Includes vehicle lambda probes. Fuel, air, engine, exhaust

#### S03-E03B2

# Due to effects in the electrolyte; concentration cells

Includes electrochemical pH sensors. See also S03-F10. For non-electrochemical pH detection, see relevant S03-E04 and E09 codes, as well as S03-F10.

pH sensor

#### S03-E03B9

# Other measuring currents/voltages in voltaic cells

#### S03-E03C

# Containers, electrodes, membranes, partitions

Includes CHEMFETS, ISFETs and integrated circuits using these transducers (also coded in U12-D02A and U12-B03E for discrete devices, and U13-D02 for integrated circuit structure). Also includes electrolyte.

# S03-E03C1 [1997]

#### **Biosensors**

(S03-E03C) See also S03-E14H codes. *Membrane* 

# S03-E03E [1992]

# **Electrophoresis**

(S03-E03X)

Includes isoelectronic focussing. For detectors to identify substances separated by electrophoresis, see \$03-E09C7 codes.

Separation, gel, macromolecular, protein

### S03-E03X

# Other electrochemical investigation

Prior to 2005, included non-electrochemical pH measurement. After 2005, see S03-F10 only.

### S03-E04

#### Optical (by investigating)

See also S03-A02 codes.

Photometer, light, centrifuge

#### S03-E04A

#### **Colour; spectral properties**

Spectroscope, colour

#### S03-E04A1

# **Using photoelectric detection**

# S03-E04A4 [1992]

# Measurement using radiation at two wavelengths

Includes measurement of blood oxygen content using catheter (S05-D01G).

#### S03-E04A5 [1992]

# Wavelength dependent absorption

(S03-E04A9)

Includes atomic absorption spectrometers. See also S03-A02 codes.

# S03-E04A5A [1992]

# With light modulation

Includes photoacoustic absorption spectroscopy. *PAS* 

# S03-E04A5B [1997]

# Infrared spectroscopy

(S03-E04A5)

# S03-E04A5E [1997]

#### Visible/ultraviolet spectroscopy

(S03-E04A5)

UV, electronic transition, Hund's rules

#### S03-E04A5G [1997]

# **Gaseous phase**

(S03-E04A5)

"Gaseous phase" refers to the phase to which the radiation is applied. Includes, therefore, atomic absorption spectrometers. This code will nearly always be combined with at least one other S03-E04A5 code.

#### S03-E04A5L [1997]

# Liquid phase

(S03-E04A5)

"Liquid phase" refers to the phase to which the radiation is applied. This code will nearly always be combined with at least one other \$03-E04A5 code.

# S03-E04A5S [1997]

# Solid phase

(S03-E04A5)

"Solid phase" refers to the phase to which the radiation is applied. Includes Attenuated Total Reflectance Spectroscopy. This code will nearly always be combined with at least one other S03-E04A5 code.

ATR

#### S03-E04A9

#### Other spectral properties

#### S03-E04B

Reflection, refraction, transmission; dichroism; phase- or polarisation affecting properties

#### S03-E04B1

#### Transmission; specular reflectivity

# S03-E04B1A [1992]

#### **Transmission**

Includes non-dispersive gas analysis. Includes measurement by splitting light source into two paths, one for reference/control, one for test sample, and measuring relative absorption.

Turbidity, densitometer

#### S03-E04B1B [1992]

#### Specular reflectivity

Reflectance

# S03-E04B5 [1983]

# Refraction; phase; interference; dichroism; polarisation; diffraction

Polarise, refractometer, interferometer, ellipsometer, measuring refractive index

#### S03-E04B5A [2005]

#### Surface plasmon resonance

(S03-E04B5)

# S03-E04C

#### Scattering, diffuse reflection

Includes Rayleigh and Tyndall scattering. Also includes Optical Time Domain Reflectrometry (from 1992; previously coded in S03-E04B1).

OTDR

#### S03-E04C1

# In moving fluid; e.g. smoke detection

See W05-B02A1 also for smoke detecting fire alarm using scattering effects.

Suspension, particle, fire alarm, turbidity

#### S03-E04C2

In material in container

S03-E04C3 [1997]

# **Optical computerised tomography**

OCT, optical coherence tomography

#### S03-E04D

# Optical, electrical, mechanical or thermal excitation

Fluorescent, atomise, plasma, flame, photothermal, phosphorescence

S03-E04D1 [1992]

Raman scattering

S03-E04D3 [1997]

**Atomic emission spectrometer** 

(S03-E04D)

S03-E04D3A [1997]

**Inductively coupled** 

(S03-E04D)

#### S03-E04E

# Chemiluminescence; bioluminescence; observing effect on chemical indicator

React, luminescent, reagent

# S03-E04F

#### Jewels; Detecting flaws or contamination

See T04-D for automated visual inspection techniques. For systems using IR detection of thermal images S03-E01B takes precedence.

Inspect, reflect, semiconductor, mask, pcb, printed circuit board, recognition, visual, comparison

S03-E04F1 [1992]

**Detecting contamination or impurities** 

S03-E04F2 [1992]

Flaw detection

S03-E04F3 [1992]

**Optical examination of jewels** 

Gem, cut, facet

#### S03-E04G

#### Moving sheets

Paper, newspaper

#### S03-E04H

#### Moving fluids or granular solids

### S03-E04J [1997]

#### On-line measurements

Covers arrangements for use in a production line/manufacturing environment (see also X25 codes). S03-E04J will nearly always be combined with at least one other S03-E04 code.

#### S03-E04P [1992]

# Calibration/compensation/testing of optical measurement system

(S02-K02, S02-K09)

#### S03-E04R [1992]

# Optical microscopy

(S03-E04X)

See also S02-J04B1 for microscope appts.

# S03-E04R1 [2006]

#### **Confocal Microscopy**

Includes laser scanning microscopy. See also S03-E04D/E04E if used with fluorescent staining methods.

# S03-E04T [1997]

# **Using Fourier Analysis**

Includes use of Fast Fourier Transform (see also T01-J04B). This code will nearly always be combined with at least one other S03-E04 code. *FFT* 

#### S03-E04X

# Cuvettes; Imaging and other optical investigation

Includes automatic optical analysis apparatus (with S03-E15 codes), forming picture using TV camera.

#### S03-E05

# Using microwaves and other radio frequency waves

This code covers methods and apparatus for investigating physical or chemical properties of materials by means of microwaves and other radio waves, including microwave spectrometry and general terahertz radiation investigation. (TeraHertz imaging is covered by S03-E05E). For investigation using electromagnetic waves other than radio waves see S03-E04 codes (optical) and S03-E06 codes (X-rays, neutrons, electrons, etc.).

Investigating properties using electric and magnetic fields are covered by S03-E02 codes and S03-E11 codes respectively, and use of spin effects by S03-E07 codes.

Dipole moment, loss factor, moment of inertia, gas phase, radio frequency, RF, waveguide

S03-E05A [1997]

**Moisture detection** 

(S03-E05)

S03-E05C [1997]

Flaw detection

(S03-E05) Defect

S03-E05E [2005]

Terahertz radiation imaging

(S03-E05)

# S03-E06

# Using e.g. X-rays, neutrons, electrons

Includes use of ionizing or particle radiation for determining properties of a sample, e.g. patient x-ray diagnosis or scanning electron microscopy. For measurement of ionizing radiation intensity per se (x-ray, gamma ray, alpha, beta etc.), particle behaviour or electron beam current density, see S03-G codes.

Medical apparatus is also coded in S05-D codes. For luggage check see also S03-C03, S03-C06 and W06-B02A. Measurement of radioactive emission from sample injected into human body, e.g. scintography is not included (see S03-G02B3). Control of X-ray equipment in general is covered by V05-E02 codes. Includes use of gamma rays.

Tube, beam, radiate, radioactive

### S03-E06A

Measuring absorption

S03-E06A1 [1992]

Flaw detection

S03-E06A3 [1997]

**Moisture detection** 

(S03-E06)

# S03-E06B

#### Forming picture

Scan, tomography, scintillation, display, phosphor, stimulable sheet

# S03-E06B1 [1992]

#### Microscopes

See also V05-F codes for electron, ion and X-ray microscopes. Prior to 2005, included tunnelling microscopes - now only coded in S03-E02F codes. SEM. TEM. STEM

# S03-E06B3 [1992]

#### **Electronic imaging**

Includes use of e.g. video camera systems responsive to radiation, and stimulable-sheet phosphor imaging (see also S05-D02A5C for medical X-ray stimulable-sheet system and S06-K codes for aspects analogous to facsimile, especially S06-K99G).

S03-E06B3A [2005]

Computer tomography

S03-E06B5 [1992]

Photographic recording

S03-E06B9 [1992]

Other image-forming methods

#### S03-E06C

# Diffracting, reflecting, scattering e.g. backscattering radiation

Crystal structure, Compton

S03-E06C1 [1992]

Flaw detection

# S03-E06D

# By measuring secondary emission, e.g. X-ray fluorescence

Does not include fluoroscopy.

Auger electrons, photoelectric effect, X-ray spectrometer

S03-E06D1 [2005]

Flaw detection

S03-E06H [1992]

**Details of apparatus** 

S03-E06H1 [1992]

#### Radiation source

Includes control, e.g. source intensity control, dosage etc. For source positioning see S03-E06H4.

S03-E06H2 [2006]

#### **Detector positioning**

See S03-E06H5 codes for novel detection system per se.

S03-E06H3 [1992]

Specimen positioning

S03-E06H4 [2005]

Source positioning

S03-E06H5 [1992]

**Detection system** 

Includes e.g. cassettes.

S03-E06H5A [2005]

#### **Semiconductor detectors**

For measurement of ionizing radiation intensity using semiconductor detectors, see S03-G02B2G.

S03-E06H5B [2005]

#### **Scintillation detectors**

For measurement of ionizing radiation intensity using scintillation detectors see S03-G02B1.

S03-E06H5C [2005]

# Stimulable sheet phosphors

For novel stimulable sheet phosphors per se, see V05-M01C1. For novel stimulable phosphor readout systems, see S06-K99G and other S06-K codes as appropriate.

S03-E06H5D [2005]

#### Video systems

For novel X-ray video systems per se, see W04-M codes.

S03-E06H7 [1992]

Shielding, protection

S03-E06H9 [1992]

Other appts. details

S03-E06X

#### Other uses of X-rays, neutrons, electrons

Includes contrast agents for X-rays.

Contrast media

#### S03-E07

#### NMR, EPR or other spin effects

See S01-E02A codes. S03-C02F is used when the purpose is prospecting, together with S03-C06 if for contraband or intruder detection. For static and gradient field coils, see also X12-C and V02-F01G respectively and for coils in general see S01-E02A8A. For medical apparatus, see also S05-D02B codes.

Spin echo, tomography, axis

S03-E07A [1992]

MRI

See also S01-E02A2 codes. Contrast agents are coded in S03-E09X also.

S03-E07C [1997]

**NMR** 

(S03-E07)

Includes NMR spectroscopy. See also S01-E02A1 codes.

Nuclear Magnetic Resonance

S03-E07E [1997]

**ESR/EPR** 

(S03-E07)

See also S01-E02A4.

Electron spin resonance, paramagnetic, klystron

S03-E07G [1997]

# **Nuclear Quadrupole Resonance**

(S03-E07)

See also S01-E02A3. For contraband detection, see also S03-C02F5, and S03-C06 codes.  $\label{eq:contrabation}$ 

NQR

S03-E07X [1997]

### Other quantised spin measurements

(S03-E07)

See also S01-E02A9.

Cyclotron resonance

#### S03-E08

# Using sonic or ultrasonic vibrations

Includes vibrations which may be induced acoustically, thermally, optically, magnetically etc., but detected using acoustic apparatus. For photoacoustic spectroscopy where optical radiation is detected, see S03-E04A5A. For ultrasound generating transducers, see V06-V01N. For ultrasound "measurement" transducers, see V06-V04G codes. See S02-A05B codes for acoustic dimension measurement. For medical imaging see also S05-D03 codes and V06-V04K for transducers for specifically medical use.

Transducer, piezoelectric

#### S03-E08A

#### Flaw detection

Includes acoustic emission techniques, e.g. where a material is subjected to a mechanical stress and the acoustic output detected by a microphone. See S03-F02B and S03-F02C for tensile testing per se.

Crack, inspect, material, pipe, weld, non-destructive testing

# S03-E08C [1992]

#### **Specific property**

Covers investigation of a specific physical property by measurement of sonic or ultrasonic vibration. Includes e.g. analysing fluids; measuring attenuation, speed, density, frequency spectrum to characterise medium.

# S03-E08E [1997]

# **Imaging**

(S03-E08, S03-E08A)

E.g. using visualisation of interior, using Barkhausen effect.

# S03-E08G [1992]

# **Acoustic microscopes**

Covers acoustic microscopes per se.

#### S03-E08X

#### Other sonic or ultrasonic measurements

Includes construction details of ultrasonic equipment, e.g. probes and arrangements for orientation - see also V06. Measuring deposition on crystal resonator using variation in Q-factor or impedance is not included - see S03-E02X. Includes contrast agents.

Contrast media, UCA

#### S03-E09

#### Chemical methods

#### S03-E09A

Precipitation; Absorption; Adsorption

#### S03-E09B

**Ion-exchange; Catalysis; Combustion** *Catalyst* 

#### S03-E09C

# By chromatography e.g. column, plate

Gel, injection, flow, needle, capillary, vaporise

[1983]

#### S03-E09C1

**Gas chromatography** 

S03-E09C3 [1992]

Thin layer chromatography

### S03-E09C5 [1983]

Liquid and ion exchange chromatography

#### S03-E09C7 [1997]

# Chromatography and electrophoresis detectors

(S03-E09C)

From 2006, this code covers detectors to identify substances separated by electrophoresis. Electrophoresis per se is covered in S03-E03E.

#### S03-E09C7A [1997]

# Optical

(S03-E09C)

See also S03-A01B codes.

# S03-E09C7B [1997]

#### **Mass spectrometric**

(S03-E09C, S03-E10A)

For mass spectrometers, see S03-E10A and V05-J01 codes.

**GCMS** 

# S03-E09C7C [1997]

#### Thermal conductivity

(S03-E01A, S03-E09C)

For thermal conductivity measurements per se, see \$03-E01A.

Katharometer

#### S03-E09C7D [1997]

#### Ionisation

(S03-E09C)

Includes flame ionisation and photo-ionisation detectors.

S03-E09C7E [1997]

**Electron capture** 

(S03-E09C, S03-E03)

S03-E09C7F [1997]

**Electrochemical** 

(S03-E09C)

For electrochemical sensors generally see S03-E03 codes.

S03-E09C7X [1997]

Other chromatography detectors

(S03-E09C)

S03-E09D

Titration, micro-analysis

Karl Fischer, sample, end-point

S03-E09E

Chemical indicators

Reagent, strip, colour, chart, compare

S03-E09F [2005]

Immunoassay techniques and biological indicators

Includes all novel reagents and techniques. See also S03-E04D and S03-E04E for fluorescence detection and observation techniques. For radiopharmaceutical immunoassav indicators, see also S03-G02B9. For microarray and biochip techniques, see also S03-H01 codes. Prior to 2005 coded in S03-E14H4. From 2022, see also B11-C08N codes to highlight different biological testing methodologies. See also B11-C08E3, B11-C08N, C11-C08E3, C11-C08N and D05-H18B codes.

Antibody, assay, antigen, binding, ligand, fluorophore, monoclonal, conjugate, PCR testing, polymerase chain reaction testing, drug screening

S03-E09X

Other chemical investigation methods

Includes contrast agents for MRI (see S03-E07A also).

S03-E10

Investigating ionisation of gases or electric discharges

S03-E10A [1992]

For mass spectrometer or spectrograph

See also V05-J01 codes.

Ionise, smoke detector

S03-E10A1 [1997]

**Using magnetic sectors** 

(S03-E01A)

S03-E10A1A [1997]

**Double focussing mass spectrometers** 

(S03-E10A)

Nier-Johnson, Mattauch-Herzog

S03-E10A2 [1997]

**Tandem mass spectrometers** 

(S03-E10A) MS/MS, GCMS

S03-E10A3 [1997]

**Time-of-flight mass spectrometers** 

(S03-E10A)

Includes e.g. ion mobility spectrometers. Also includes Coaxial Impact Collision Ion Scattering Spectrometer.

TOF, GCMS, CAICISS

S03-E10A4 [1997]

**Secondary Ion Mass Spectrometers** 

(S03-E10A)

Includes spark source mass spectrometry and ion scattering spectrometry. For ESCA, Auger spectroscopy, electron microprobe see S03-E06D; for low energy electron diffraction, see S03-E06C. SIMS, duo-plasmatron, SSMS, ISS

S03-E10A5 [1997]

**Quadrupole mass analysers** 

(S03-E10A)

Includes ion trap mass spectrometers. **GCMS** 

S03-E10A6 [1997]

**Inductively coupled mass spectrometers** 

(S03-E10A) IC.P

S03-E10A7

[1997]

**Ion Cyclotron Resonance Mass Spectrometers** 

(S03-E10A)

Includes Fourier Transform Mass Spectrometers. ICR, FTMS

### S03-E10A8 [2002]

# **MALDI/SELDI** mass spectrometers

(S03-E10A)

For mass spectrometers with matrix assisted laser desorption ionisation source. See V05-J01E for novel ionising arrangements.

Matrix assisted laser desorption ionisation, surface enhanced laser desorption ionisation

# S03-E10B [2005]

**Energy spectrometers** 

# S03-E10C [1992]

# Investigating discharges per se

Includes, e.g. plasma processing endpoint detection through plasma colour change.

#### S03-E11

#### **Investigating magnetic variables**

Flux, Hall, diamagnetic, paramagnetic

#### S03-E11A [1983]

# Flaw detection (incl. eddy current)

Surface, inspect, fault, crack, weld, non-destructive testing

#### S03-E11C [1992]

### **Specific property**

Covers measurement of a specific physical property using investigation of magnetic variables, e.g. using saturation of remanence to investigate mechanical hardness (mechanical testing of hardness in general is covered by S03-F02A).

# S03-E11C1 [1997]

# **Contamination detection**

Debris

# S03-E11X [1992]

#### Other magnetic variable investigation

#### S03-E12

# Analysing by weighing; by measuring pressure/volume of gas

Balance, vapour pressure, gas sorption, adsorption, absorption

#### S03-E12A [1992]

# By analysing weight/ by weighing

Includes gravimetric analysis.

# S03-E12B [1992]

### Specific weight determination

# S03-E12C [2005]

# By measuring pressure/volume of gas

(S03-E12)

#### S03-E13

#### Sampling; specimen preparation

#### S03-E13A

#### Sampling solids

Microtome, cut, slide

#### S03-E13B

# Sampling liquid or fluent material

Also includes sampling of granular solids, e.g. sand, flour, salt etc.

Flow, water, liquid, powder

#### S03-E13B1

# Dippers, dredgers, suction or ejector devices

Pipette

#### S03-E13B2

# Intake at several levels; splitting samples; flowing or falling material sampling

### S03-E13B9

#### Other sampling liquid or fluent material

Includes sampling of suspensions from liquids, gases or other fluent materials, e.g. exhaust gas particulate sampling.

Aerosol

#### S03-E13C

# Sampling gases

### S03-E13D

# Preparing specimens for investigation

Centrifuge, filter, separate, freeze

# S03-E13D1 [1992]

#### For automatic analysers

See S03-E15 codes also. Includes preparation of many samples from one original which will be subjected to different test procedures.

#### S03-E13F [2006]

#### Sample holders, carriers or storage systems

Includes e.g. microscope slides, sample refrigerators, cuvettes, novel instrumentation-type glassware, e.g. test tube, petri dish. Note that general laboratory glassware is not included.

#### S03-E14

#### Investigation methods (for)

Codes in this section are used when testing methods or appts. are specifically intended for investigation of the material or substance concerned. Depending on the scope of the invention, codes for a specific testing method may also be assigned.

#### S03-E14A

# **Food, Pharmaceuticals and Cosmetics**

#### S03-E14A1 [1992]

# Drugs, medicines, pharmaceuticals

Electrical aspects of pharmaceuticals manufacture are covered by X25-P02. See also S05-C05. Capsule, tablet

# S03-E14A2 [2005]

#### Food and drink

Milk, meat, tobacco, alcohol

# S03-E14A3 [2005]

#### Cosmetics

#### S03-E14B

#### Water

See X25-H03 for electrical aspects of water and sewage treatment.

Sea, waste, effluent, pollution, process

#### S03-E14C

#### Metals

Electrical aspects of metallurgy are covered by X25-Q codes, and of working metals by X25-A codes, e.g. X25-A01 (casting).

Melt, cast, metallurgy, phase, assay

# S03-E14C1 [1992]

#### **Testing metallic electrodes**

For electrodes per se, see S03-E03.

# S03-E14C3 [1997]

# **Alloys**

(S03-E14C)

#### S03-E14C3A [1997]

#### Steel

(S03-E14C)

See X25-Q01 for electrical aspects of steel manufacture.

# S03-E14C3X [1997]

# Other alloys

(S03-E14C)

Brass, solder, bronze

#### S03-E14D

# Concrete, glass, ceramics, refractories, resins, plastics, rubber, leather, wood

Asphalt, chalcogenide

# S03-E14D1 [1983]

#### Concrete

Cement, strength, setting

# S03-E14D4 [1983]

#### Glass, ceramics, refractories

Electrical aspects of glass working are covered by X25-A05.

# S03-E14D7 [1983]

#### Resins, plastics, rubber, leather, wood

Electrical aspects of plastics working are covered by X25-A06, of rubber working by X25-A07.

#### S03-E14E

Fuels; Explosives; Soil

# S03-E14E1 [1992]

#### Fuels

Includes crude oil and oil-derived fuels, as well as coal, natural gas etc. Oils for lubrication are covered by S03-E14F.

Gas, liquid, hydrocarbon, crude, refine, LNG, LPG

### S03-E14E3 [1992]

#### **Explosives**

Blasting, detonate, pressure

# S03-E14E7 [1992]

# Soil

Rock, core, sample, groundwater recharge, minerals

#### S03-E14F

# Oils; Viscous liquids; Paints; Inks

Includes lubricating oils. Fuel oils are covered by S03-E14E1.

Lubricate, flow, cleaning products

#### S03-E14G

# Paper; textiles

See X25-T codes for electrical aspects of paper and textile manufacture.

Sheet, fabric, web, yarn, fiber, pulp

#### S03-E14H

# **Biological material**

For electrical aspects of biological material investigation see S05-C codes also where medical application stated.

Medical, clinical, forensic, diagnose

#### S03-E14H1

#### Blood

Coagulate, plasma, platelet, cell count

### S03-E14H2 [2005]

#### **Biological fluids**

(S03-E14H9)

Includes urine, semen, saliva, phlegm etc.

### S03-E14H3 [2005]

#### **Nucleic acids**

(S03-E14H)

Includes general DNA/RNA sequencing and tests for specific gene sequences, where there are no specific details. Where novel reagents are claimed, see also S03-E09F.

For microarray or biochip technology see also S03-H01A codes.

# S03-E14H4\* [1983-2004]

#### **Immunoassay**

\*This code is now discontinued and transferred to S03-E09F, but remains searchable and valid for records from 1983-2004.

Antibody, assay, antigen, monoclonal, conjugate, bonding, HIV, AIDS, hepatitis

#### S03-E14H5 [1992]

### **Enzymes, proteins and amino acids**

(S03-E14H9)

# S03-E14H6 [1992]

#### **Tissue samples**

(S03-E14H9)

# S03-E14H9

# Other biological material

Breath

# S03-E14J [1992]

#### **Plants**

Includes seeds, crops.

# S03-E14L [1992]

# Chemical and biological warfare agents

Includes detection. See S03-E09 for chemical detection techniques, S03-C06 for luggage or mail inspection methods or S03-H01 for lab-on-chip or biochip technology.

For electrical aspects of chemical or biological warfare detection see W07-F01 also.

#### S03-E14M [1992]

Herbicides; Pesticides

# S03-E14N [1992]

#### Air quality

Covers air quality, e.g. in workplace, hospitals and home. See S03-D06 also for pollution monitoring. Details of gas analysis and gas sensors are also coded under S03-E14P.

Breathable, pollution, contaminant

# S03-E14N1 [1997]

# In buildings

(S03-E14N)

#### S03-E14N3 [1997]

#### Clean room

(S03-E14N)

See U11-C15B for clean room used in semiconductor manufacture and T03-A02B9 for clean room used in magnetic record carrier manufacture.

Semiconductor, impurity

# S03-E14N9 [1997]

#### Other air quality measurements

(S03-E14N)

# S03-E14P [1997]

# Gas sensor; Gas analysis

Includes determining the components of a gas. See also S03-E02A and S03-E03 for electrical and electrochemical gas sensors, respectively. Details of air quality analysis (pollution) are coded under S03-E14N and S03-D06.

Gas detection

#### S03-E14P1 [1997]

### For combustion products

Carbon monoxide, sulphur dioxide, nitrogen dioxide

S03-E14P3

[1997]

For chemical reaction products

S03-E14P9

[1997]

# Gas sensor for other products

Livestock, poultry, SF6

S03-E14R

[2006]

#### Flame/combustion detector

Includes methods/apparatus for detection of flames or combustion, e.g. for fire alarm (see also W05), or industrial/domestic combustion equipment (see also X25-X13/ X27-G02). For pyrometric detection, see also S03-A03; for optical detection, e.g. UV, see S03-E04 codes.

#### S03-E14W

[2016]

#### **General industrial waste**

#### S03-E14X

#### Other

Dust

#### S03-E15

[1992]

# Automatic analysis equipment

Codes in this section are used with other S03-E codes depending on the specific nature of the equipment. For example use S03-E15 and S03-E14H codes for automatic biological material analysis apparatus.

### S03-E15A

[1992]

### **Control**

For computer control aspects see e.g. T01-J08A.

#### S03-F

# Investigation of physical or chemical properties of materials: specific properties

#### S03-F01

#### Density

Densimeter

# S03-F01A

# Investigation of density by immersion in fluid; from transmission of radiation; pressure difference

Includes measurement of density by cosmic ray muon tomography / radiography. From 2022, see S03-C02M for geophysical muon imaging. *Displacement, ultrasonic* 

#### S03-F01X

# Other density measurement

#### S03-F02

#### **Mechanical strength**

#### S03-F02A

#### **Hardness**

Load, indent, ball, bearing, Vickers, Rockwell, Mohs

#### S03-F02B

# Resistance to wear or heat; Machinability; Cutting ability

Includes applying time varying (cyclic) loading. If the sample is also subjected to temperature excursions, the code S03-E01B1 is additionally applied.

Abrasion, tool, bearing, erosion

#### S03-F02C

#### By applying steady tension or compression

If, in addition to steady tension or compression, the sample is subjected to temperature excursions, the code S03-E01B1 is also applied.

Tensile, stress, strain, fatigue

# S03-F02D

### By steady bending, twisting or shearing

Torque, shaft, flexure, axis

### S03-F02E

#### By applying impulsive forces

Impact, shock, frequency

#### S03-F02X

# Other mechanical strength measurement (incl. ductility, twisting and coiling properties)

### S03-F03

#### Flow properties

Includes viscometers.

Fluid, liquid, viscosity, thixotropic, Poiseuille's formula, Stokes' law, Ostwald, Newtonian fluid

#### S03-F03A

# By moving body in material

E.g. rising or falling speed, rotary bodies, rotational, damping effect.

Vibratory viscometer

# S03-F03X

### Other flow properties

Includes measuring flow of material e.g. through capillary tube.

Rheometer

#### S03-F04

# Diffusion effects; Surface or boundary effects

Includes e.g. measurement of wettability.

Surface tension, Ficks law, solder wettability

#### S03-F05

# Particle size; Sedimentation of suspensions

For blood, see S03-E14H1 also, and S05-C01 if electrical appts. is involved.

S03-F05A [1992]

**Sedimentation** 

S03-F05C [1992]

Particle size

Includes cytometry.

#### S03-F06

Concentration of suspensions; permeability, pore-volume or surface area of porous materials

S03-F06A [1983]

# Concentration of suspensions

Aerosol, Colloid, Emulsions, Slurry

S03-F06B [1983]

# Permeability, pore-volume or surface area of porous materials

Pressure, osmosis, porosity, filter, gas-mask, respirator

S03-F06C [1992]

#### **Particle counters**

Includes cytometry.

#### S03-F07

Weather-, light- and corrosion resistance

#### S03-F08

# **Coefficient of friction: Adhesion**

Surface, adhesives

# S03-F09

Moisture content (incl. hydrometers); detecting flaws or contamination

# S03-F09A [2005]

# General moisture detection / humidity measurements

Includes measurement of moisture e.g. mechanically, but not measurement using capacitance, microwaves or radiation absorption; for these cases see S03-E02C1, S03-E05A, S03-E06A3 respectively. Air humidity measurement used in meteorology is coded under S03-D02C. *Hyarometer* 

S03-F09B [2005]

**General flaw detection** 

S03-F09C [2006]

#### General contamination detection

Prior to 2007, covered by S03-F09B.

# S03-F10 [2005]

#### pH measurement

(S03-E03X)

See also S03-E03B2 for electrochemical methods, and S03-E09E and S03-E04E for chemical indicators. Prior to 200501, non-electrochemical pH measurement was coded in S03-E03X.

# S03-F11 [2014]

#### Non-destructive testing

This code is used to highlight the non-destructive aspect of the testing or analysis. This code can be applied with other S03-F codes to highlight the type of analysis/test done.

#### S03-F20

# Other physical or chemical properties

For sampling devices see S03-E13 codes. Growth measurement

#### S03-G

#### Measurement of nuclear or X-radiation

Codes in this section are concerned with novel methods and equipment for measuring radiation per se. For measurement on materials using radiation see S03-E06 codes, and for object detection/prospecting see S03-C codes, e.g. S03-C03.

Beta, gamma, particle, radioactive

#### S03-G01

# Recording/ processing movements of particles, measuring neutron radiation

Includes processing or analysis of tracks. Neutron dosimetry is also in S03-G02A.

Track

S03-G01A [1992]

# Recording/ processing movements of particles

Wilson cloud chamber, bubble, scintillation, track

S03-G01C [1992]

Measuring neutron radiation

S03-G01X [1992]

Other recording/ processing movements of particles, measuring neutron radiation

S03-G02

Measuring nuclear or X-radiation

S03-G02A

#### **Dosimeters; Integrating detectors**

Includes e.g. chemical, photographic, luminescent dosimetry, and arrangements integrating the output of an electrical detector.

Thermoluminescent, expose, film badge, TLD

#### S03-G02B

### Measuring intensity

Codes in this section are used for particular radiation detection arrangements.

Count, camera, discriminate

S03-G02B1

**Scintillation detectors** 

S03-G02B2

Counting-tubes, ionisation chambers; Cerenkov, semiconductor, resistance or secondary emission detectors

For tube type detectors see V05-H also.

S03-G02B2A [1992]

Counting tube (e.g. Geiger-Muller)

S03-G02B2C [1992]

Ionisation chamber

S03-G02B2E [1992]

Secondary emission detector

S03-G02B2G [1992]

Semiconductor detector

See U12-A03 also.

#### S03-G02B3 [1997]

# **Nuclear imaging**

(S03-G02B)

Covers all cases where a radiopharmaceutical is injected into the patient, e.g. in Positron Emission Tomography or Single Photon Emission Computed Tomography. See also S05-D02C. See U22-D02C for coincidence circuit for PET apparatus.

See S03-E06B codes for imaging using externally applied radiation, e.g. X-ray tomography.

SPECT, PET, Gamma camera, Anger camera, Compton camera

#### S03-G02B9

# Other nuclear radiation intensity measurement

Includes radioactive immunoassay techniques - see also S03-E09F.

Image, phosphor, scan, sheet

#### S03-G02C

Beam position/section; spatial/spectral distribution; polarisation, absorption cross section; half-life

# S03-G02C1 [1992]

#### **Beam measurements**

Covers position or section measurements. Faraday cup

S03-G02C1A [1992]

Beam polarisation

S03-G02C1C [1992]

#### Cross section

Beam area, absorption, barn

# S03-G02C3 [1992]

# **Radiation spectrometers**

Includes, e.g. X-ray or Mössbauer spectrometers. Note: This code is reserved for analysing nuclear radiation for the purest of reasons, e.g. at a nuclear power station or a nuclear research institute.

Using nuclear radiation (X-rays, neutrons, gamma rays etc.) to analyse material properties is covered by S03-E06 codes, e.g. S03-E06D.

# S03-G02C5 [1992]

# Half life measurements

Decay

S03-G05 [1992]

Calibration, testing and compensation aspects

# S03-H [2005]

# General scientific instrumentation technology details

These codes can be used with S01 and S02 instrumentation types, except for the S03-H03 codes. For testing, calibration or compensation, see relevant sections in S01 and S02.

# S03-H01 [2005]

# Lab on Chip and Microarray technology

These codes are used in combination with other S03 codes to denote specific technology types. For general automatic analysis equipment, see S03-E15. See also U13-D04 codes for semiconductor based technology. For instrumentation using electrochemical techniques, see S03-E03 codes. LOC, Lab-on-chip

# S03-H01A [2005]

# **Microarrays and Biochips**

(S03-E15)

See relevant S03 codes for detection type. See S03-E09F for Immunoassay techniques. Prior to 2005, see S03-E15.

DNA Chip, Protein Chip, GeneChip™

# S03-H01B [2005]

### Microfluidic instrumentation

#### S03-H02 [2005]

#### Micro/nanometre scale instrumentation

See also V06 codes for micro and nano-scale actuators/motors/sensors and U12-B03F codes for MEMS/NEMS technology in general.

#### S03-H02A [2005]

# Micrometre scale instrumentation

In general, covers instrumentation technology involving manipulation or manufacture at a scale of greater than 0.1 microns.

# S03-H02B [2005]

### Nanometre scale instrumentation

In general, covers instrumentation technology involving manipulation or manufacture beneath 0.1 microns, or 100 nanometres.

# S03-H03 [2005]

#### Testing, compensation and calibration

These codes are used to indicate general testing, calibration or compensation for S03 equipment. Note that some areas of S03 already have testing, calibration and compensation codes. Where these codes already exist, they take precedence over S03-H03, e.g. S03-A05 codes, S03-C10 and S03-E04P. Prior to 2005, see S02-K and S01-J02.

S03-H03A [2005]

**Testing** 

S03-H03B [2005]

Compensation

S03-H03C [2005]

Calibration

#### **S04: Clocks and Timers**

All aspects of clocks and watches are included, whether electrical or not.

#### S04-A

# Mechanical aspects of clocks and watches

# S04-A01

# Drive, geartrains, escapements, balances etc.

Includes clutch mechanisms, weights, chains, mainsprings etc.

Gear, wheel, pendulum, movement, pivot, adjust

#### S04-A02

#### **Time indication**

Hour, rotating, analogue, face, indicia, minute

#### S04-A02A

### Hands, dials, drums

Sundials are in S04-A09 only.

Face, disc, display, timepiece, concentric, ring

#### S04-A02B

# Day, date, tide or local time indicators

Calendar, display, zone, disc, window, world, month, ring, year

#### S04-A02X

#### Other (time indication)

Includes illumination, striking, alarms, ringing, etc. *Bell, chime, light* 

#### S04-A03

#### Winding; setting

Including clutch wheel and locking bar mechanisms.

Adjust, hand, spring, compress, pushbutton

#### S04-A04

#### Cases, glasses

Display, window

# S04-A04A

### Constructions

Includes watch straps and clock stands. Details of watch straps are also coded under P23-C02. Ring, seal, mount, housing, plastics, body, face, frame

### S04-A04A1 [1992]

#### **Anti-magnetic shielding**

#### S04-A04A2

#### Water-proofing

#### S04-A04B

#### Materials and manufacture

Glass, metal, titanium, alloy, nitride, aluminium, carbide, coating, deposit, film, jewel, bind

[1992]

#### S04-A05

### Frameworks, bearings, calipers

Plate, metal, plastics, rotor, spring, wheel

#### S04-A09

#### Other (mechanical aspects)

Includes combination of timepieces with other measuring instruments. Metronomes, sundials, hourglasses and other gravitational timepieces. *Dial, display, compass, magnetic* 

#### S04-B

# **Electrical aspects of clocks and watches**

Smartwatch devices are primarily classed as wearable computers (T01-M06A1D). See also S05-D01 codes for physiological measurements, and W04-X01A1 for performance-related measurements during sports or fitness training.

# S04-B01 [1983]

# Power supplies; electrical winding; motor driven time indication

Inverter, voltage, capacitor, control

#### S04-B01A [1983]

#### Power supplies; electrical winding

For batteries see X16, for solar cells see X15-A02, U12-A02A codes.

#### S04-B01B [1983]

#### Motor driven time indication

For stepper motors see also V06-M05. For motor control see also V06-N codes, e.g. V06-N01. Rotor, drive, stator, pulse, synchronous, pole, circuit, current, analogue, switch, gear, magnetic

#### S04-B02

# **Oscillators**

#### S04-B02A

#### Balances, pendulums, tuning forks

Drive, movement, spring

#### S04-B02B

#### Quartz

Crystal, piezoelectric, resonance, trimmer

#### S04-B02X

#### Other (oscillators)

Includes laser and maser oscillators (see also V08-A01A and V08-B) and atomic clocks. Atomic oscillators are covered by U23-A06 from 2016 (pre-2016 by U23-D02). Time and frequency standards are also coded in S04-C09.

Beam

#### S04-B03

# Timing chains; setting

Includes drive blocking and radio transmission aspects.

Display, counter, divider, memory, digital, microprocessor

#### S04-B04

### **Electronic displays**

# S04-B04A [1992]

# **Electro-optic displays**

Includes lamps, LEDs, LCDs etc.

Digital, liquid, indicate, segment, analogue,

# S04-B05

calendar, date

# Acoustical time indication; alarms

For combined radio/alarm appts. see also W03-G03A. Piezoelectric devices, buzzers etc. are in V06 also.

Signal, sound, frequency, tone

### S04-B05A [1992]

#### Musical animation

Nursery

#### S04-B06

# Master slave clocks and radio controlled setting

Radio and line transmission details of timing signals, drive mechanisms, pulse transmission systems etc. Signal, control, circuit, receive, adjust, phase, reference, standard time signal, MSF, WWV, DCF-77

S04-B07 [1992]

**Braille clock** 

Blind

S04-B08 [1992]

Motion clock, e.g. cuckoo or movable drum

# S04-B09 [1980]

#### Other (electrical aspects)

Includes casings and manufacture for electronic timepieces. Clocks/watches integral with gaming, cooking, medical etc. devices. All aspects of circuitry specifically for timepieces.

Memory, radio, dial, smartwatch

#### S04-C

#### **Timers**

Circuit, control, automatic, program

#### S04-C01

#### Time switches

If switch details are claimed, then see V03-C08 also. For cooking appliances see X27-C. For washing/drying appliances see X27-D.

Cam, set, circuit, domestic, drive, mechanism, contact, rotating, washing, cycle

#### S04-C02

#### Timer clocks

For cooking appliances see also X27-C. For audio/video appts. see also T03, W03, W04. Switch, set, interval, select

#### S04-C02A [1992]

#### Including time indicator or alarm

# S04-C02X [1992]

Other (timer clocks)

#### S04-C03

# Measuring unknown time intervals

For sports equipment see W04-X. Includes stopwatches.

Counter, period, start-stop, elapsed, oscillator, hand, second

# S04-C03A [1992]

### Measuring methods and equipment per se

S04-C03C [1992]

**Applications** 

#### S04-C03C1 [1992]

# Measuring electronic signals and pulse duration

See also S01-D06.

# S04-C03C2

[1992]

# Measuring duration of activities, operations, and events

See T05-G for specific monitoring of vehicles, machines, etc.

S04-C03X

[1992]

Other (time interval measurements)

S04-C07

[1992]

Colour change time indication, e.g. for perishable goods

#### S04-C09

# Other (timer aspects)

Includes time and frequency standards (see also S04-B02X) and also electronic metronomes and hour-glass type timers. For clocks using gravitational effects see S04-A09 also.

Frequency, standard, atomic, resonance, select, interval, program, pulse, stabilised, adjust, microprocessor, molecular, oscillator, count, delay

# S04-D

# Watchmakers' tools

Includes tweezers, eyepieces, measuring and calibrating appts., and relevant electronic test gear.

# S04-E

[1992]

# Time recording

Includes e.g. time clock for employees.

# **S05: Electrical Medical Equipment**

Electrical aspects only are included, except for documents with A61N IPC, which guarantees inclusion whether electrical or not.

#### S05-A

# **Therapy**

For treatment of abnormal cells/tissues etc. using non- or minimally invasive equipment, e.g. electrotherapy, magnetotherapy, radiation therapy, ultrasound therapy etc. See S05-B codes for corresponding surgical equipment, and S05-D codes for measurement of bioelectric currents.

Condition, treat, beauty, patient

#### S05-A01

# Heart pacemakers and defibrillators

Includes all aspects of electrical cardiovascular stimulation.

Cardiac, sense, implant, lead, pulse, atrium, control, tissue, ventricle, physiological, time

#### S05-A01A [1992]

#### **Pacemakers**

Includes general heart stimulation arrangements.

# S05-A01A1 [1992]

# **Demand pacemakers**

Includes pacemakers controlled by physiological parameter e.g. heart biopotential.

#### S05-A01A5 [1992]

# **Programming and control aspects**

Includes programmed control of pacemakers, e.g. using stored program. See T01-J06A for data processing in medical applications.

# S05-A01A5A [1997]

# Remote programming and control

(S05-A01A5)

Includes arrangements for programming and controlling operation from external source, e.g. for modifying version of control program.

# S05-A01B [1997]

### **Defibrillators**

(S05-A01)

Can be used for both internal and external defibrillators.

# S05-A01C [1997]

#### Power supplies and storage

(S05-A01)

Includes power supplies and storage for all implanted heart therapy equipment, and charge storage arrangements for defibrillators. See U24 codes for power supplies in general, and X16 codes for power storage aspects.

#### S05-A02

### **Electrodes and connecting leads**

Includes any apparatus attached to or through skin for purpose of applying electric field or current. If current application is also claimed then see also S05-A04.

Contact, lead, connect, conducting, implant, stimulating, flexible

# S05-A02A [1997]

#### For stimulation of heart

(S05-A02)

Covers electrodes used in conjunction with pacemaker or defibrillator.

# S05-A02B [1997]

#### For stimulation of nervous system

(S05-A02)

Covers electrodes used to apply current to muscles or nervous system for e.g. pain relief, i.e. TENS.

# S05-A03

# Radiation/Ultrasonic therapy (including magnetic fields)

Including optical, magnetic, X-ray irradiation, and protection from undesirable radiation.

Frequency, hyperthermia, beam, electromagnet, isotope

#### S05-A03A [1983]

# Optical radiation (including IR, UV and Laser)

Laser apparatus is in V08 also. For UV and sun-ray lamp apparatus see X27-A02A2 also. Lamps per se are also in X26. Radiation therapy using visible light is in S05-A03A9 only.

Ultraviolet, tan, lamp, cooling, lens, sun, beam

#### S05-A03A1 [1997]

#### Infrared

(S05-A03A)

Includes application of heat from Infrared source. See also S05-A05B for heat therapy in general.

#### S05-A03A2 [1997]

#### Laser

(S05-A03A)

Includes laser for cosmetic use, e.g. laser hair and tattoo removal.

#### S05-A03A3 [1997]

# **Ultraviolet**

(S05-A03A)

#### S05-A03A9 [1997]

# Other light, including visible light spectrum

(S05-A03)

#### S05-A03B [1997]

# **Electric fields therapy**

(S05-A03)

Includes application of static electricity and electric fields. From 2016, all RF-based therapy inventions are coded in S05-A03D. Prior to 2016, RF-based therapy inventions were coded in S05-A03B or S05-A03X depending on novel aspect.

# S05-A03C

### Sonic or ultrasonic therapy

(S05-A03)

See S05-B02 for ultrasonic surgical equipment e.g. lithotripsy, and S05-A05 for massage using ultrasound. Infra-sonic can also be coded here. For music therapy see S05-A09.

#### S05-A03D [1997]

# Microwave and other radio-frequency (RF) therapy

(S05-A03)

From 2016 includes all RF-based therapy. Prior to 2016, inventions were coded in S05-A03B or S05-A03X depending on novel aspect. See X25 for microwave heating.

#### S05-A03E [1997]

### **Magnetic fields**

(S05-A03)

Includes all aspects of magnetotherapy e.g. using magnetic fields produced by coils or permanent magnets, applied externally, or internally using implanted elements.

#### S05-A03E1 [2002]

### Magnetotherapy

(S05-A03)

Includes use of permanent magnets, e.g. traditional Chinese medicine.

#### S05-A03E2 [2002]

#### **Electromagnetic therapy**

#### S05-A03F [1997]

# **Using X-Rays**

(S05-A03)

See S05-D02 codes for X-Ray diagnostic equipment.

#### S05-A03X [1997]

#### Other radiation

(S05-A03)

Includes Gamma-ray therapy and particle irradiation therapy.

Brachytherapy

#### S05-A04 [1983]

# **Applying currents**

(S05-A09)

Electrodes per se are also in S05-A02. Includes all aspects of nerve, muscle and skin stimulation for e.g. pain relief, i.e. transcutaneous electrical nerve stimulation, and also depilation.

Pulse, frequency, implant, HF, muscle, regulate, ECT, TENS, depilation

#### S05-A04A [1992]

### **Iontophoresis**

See also S05-J02 for administering drugs through the skin.

#### S05-A05 [1983]

# Physical therapy, massage, acupuncture

(S05-A09, S05-X)

Not steam baths, saunas, etc. These are coded under S05-A09 and X27-E03A1 only. Includes massagers using ultrasound. See W04-X01A for sports training equipment. See X27-A02A2 for massage/vibrators.

Exercise, cycle, treadmill, vibration, heat, limb, movement, mechanical

#### S05-A05A [1997]

# Artificial respiration and cardiac assistance

(S05-A05)

For cardiac assistance and respiratory aids using e.g. heart massage, pumping and applied pressure etc. Applying electric currents for heart stimulation is coded in S05-A01. Respiratory aids using e.g. gas or air are coded in S05-G02E.

Pump, squeeze, pressure, cardiac wrap/harness

# S05-A05B [2002]

### Heat and cooling therapy

Therapy using direct application of heat. Also includes therapy using cooling techniques.

# S05-A05C [2005]

# Massage

Massage details for domestic items, such as beds, chairs, beauty treatment, etc. are also coded under X27-A02A2.

S05-A05D [2005]

**Acupuncture** 

S05-A05E [2007]

**Physical therapy** 

S05-A07 [1992]

# Eye exercise, strengthening defective eye muscles

Optical

#### S05-A09

# Other (e.g. speech therapy, relaxation therapy)

Includes electrical aspects of e.g. aromatherapy and homeopathy, steam baths, saunas etc., audio relaxation, deaf/dumb speech therapy, insomnia curing apparatus, air cleaners and filters.

#### S05-A10 [2006]

### Patient positioning for therapy

Used for cases where the novelty is in the positioning of a patient rather than in the therapeutic device itself.

#### S05-B

# Surgery

Surgical instruments, devices and equipment. See S05-A codes for therapeutic equipment. Anaesthesia apparatus is in S05-L. Diagnostic endoscopes are in S05-D04.

Instrument, shock, wave, tissue, pressure, coagulate, incision, cut, cauterisation

# S05-B01 [1992]

#### Using laser, IR, or UV

Includes all aspects of laser surgery. Light, optical, beam, focus

# S05-B02 [1992]

#### Using sonic or ultrasonic equipment

Includes extracorporeal shock-wave lithotripsy e.g. using ultrasonic waves. See V06 for details of ultrasonic transducers.

Lithotripsy, stone, concretion

# S05-B03 [1992]

# Using mechanical or electrical equipment

Includes electrosurgical apparatus and electrosurgical cauterisation instruments.

### S05-B04 [1992]

#### Monitoring during surgery

From 2006, S05-B04 codes cover monitoring during the complete surgery, including the patient (S05-B04B), the surgical instruments (S05-B04A1) and the surgical procedure per se (S05-B04A).

#### S05-B04A [1997]

# Monitoring of surgical apparatus/procedure

For monitoring status of surgical equipment during surgery, e.g. temperature of cauterisation appts., power used by ablation appts. etc. From 2006, also includes monitoring progress of surgical procedure itself, e.g. amount of tissue removed, status of tissue surrounding operation site etc. Also includes intraoperative imaging appts/methods.

#### S05-B04A1 [2006]

### Monitoring location of surgical instruments

(S05-B09)

Includes equipment for tracking the location of surgical instruments inserted into patient, and monitoring location of instruments in the operating theatre, e.g. instrument tags, swab counters etc. Prior to 2006 coded in S05-B04A.

Tagging, swab

#### S05-B04B [2006]

#### Monitoring patient during surgery

For monitoring vital signs, etc. of patient during surgery. Prior to 2006 coded in S05-B04.

#### S05-B05 [1997]

#### **Endoscopic surgery**

(S05-B09)

Includes apparatus for keyhole surgery. See S05-D04 for diagnostic endoscopes.

#### S05-B06 [2002]

#### Cryosurgery

Cryogenics

# S05-B07 [2005]

# Remote control and automated/robotic surgical systems

All aspects of automated / robotic systems used in surgical procedures including 5G wireless networkenabled telesurgery devices.

#### S05-B09

[1992]

#### Other (Surgical equipment)

Irrigation

#### S05-C

# Medical analysis of biological materials

S05-C codes cover electrical aspects only. See S03-E13 codes for sampling, S03-E14H codes for specific sample types and other relevant S03 codes for specific testing techniques. Includes polymerase chain reaction (PCR) testing for medical applications. See also B11-C08E3, B11-C08N, C11-C08E3, C11-C08N and D05-H18B codes.

Sample, cell, liquid, microscope, measure

#### S05-C01

#### **Blood**

See also S03-E14H1. Breathalysers are in S05-C09. Covers in-vitro testing.

Flow, fluid, monitor, test, coagulate, corpuscle

#### S05-C02 [1997]

#### **Biological fluids**

(S05-C09)

For medical analysis of biological fluids such as urine, semen, saliva, phlegm. See also S03-E14H9. *Urine* 

# S05-C03 [1997]

# **Biological tissues**

(S05-C09)

In-vitro analysis of tissue samples for detection of abnormal cells from e.g. biopsy. See also S03-E14H6.

Biopsy, culture, cell

# S05-C05 [1992]

# For testing medicine, drugs

See also S03-E14A1.

#### S05-C09

# Other (analysis of biological materials)

Includes breathalysers (see also S03-E14H9) and electrical DNA analysis (see also S03-E14H3).

Measure, chamber, fluid, test, assay, electrophoresis, DNA, ultrasonic

#### S05-D

#### **Electrical diagnosis**

#### S05-D01

#### Measuring and recording systems

For indicating and recording in general see also S02-K. For details of wearable computing / fitness sports training devices see also T01-M06A1D and W04-X01A1.

Electrode, data, display, monitor, physiological, process, image, probe, transducer

#### S05-D01A

#### For bioelectric currents

Including measuring neurological and nerve stimulation, electrodes, physiological testing and encephalographic apparatus.

Conducting, potential, brain, EEG, physiological

#### S05-D01A1

[1983]

# **Electrocardiographs**

ECG, EKG, signal, cardiac, heart, lead, tachycardia, bradycardia, fibrillation, QRS complex

# S05-D01A1A [1997]

#### **Electrodes**

(S05-D01A1)

Includes electrodes adapted for ECG measurements e.g. scalp, chest etc. Scalp, foetal monitoring, cardiography

#### S05-D01A2 [1997]

# **Neurological currents and signals**

(S05-D01A)

Includes measurement of neurological bioelectric currents and signals e.g. electroencephalography, electromyography, magnetoencephalography etc. *EMG*, *EEG*, *MEG*, *squid* 

# S05-D01A2A [1997]

#### **Electrodes**

(S05-D01A)

Electrodes for detecting bioelectric signals other than ECG, i.e. EEG, EMG e.g. needle electrodes.

# S05-D01B

#### For heart rate, blood pressure

Pressure measuring devices are also in S02-F04 codes for flow measuring see also S02-C. Includes vein and artery wall thickness and blockage measurement.

Catheter, pulse, ultrasonic

# S05-D01B1 [1983]

#### **Blood pressure or flow**

Sphygmomanometer, Korotkoff, cuff, Doppler, fluid, electro-arteriograph

### S05-D01B1A [1997]

# **Blood pressure**

(S05-D01B1)

# S05-D01B1B [1997]

#### **Blood flow**

(S05-D01B1)

Includes measurements of blood flow velocity and cardiac output.

Tracer, thermo-dilution, catheter

# S05-D01B5 [1983]

#### Heart rate, pulse

Measuring or recording pulse. See S05-A05 for exercise.

Cardiac, frequency, stethoscope

#### S05-D01C

### For lungs, body shape, or movement

# S05-D01C1 [1983]

### Lungs and respiration

Includes all aspects of breathing, exhaled air gas content and volume measurement.

See S05-C09 for breathalysing for e.g. alcohol or drug content.

Pressure, expire, inhale

# S05-D01C5 [1983]

#### **Body shape or movement**

Detecting, measuring or recording systems for testing shape, size and movement of body parts; e.g. bone and muscle strength and dimension measurements.

Position, limb, gait, posture

### S05-D01C5A [1992]

# Measurements for non-medical purposes

Includes fingerprint identification, driver alertness sensors and determining eye movements for use in controlling aircraft, etc.

Gaze

# S05-D01C7 [2020]

#### Sleep monitoring

For monitoring sleep patterns and other sleep parameters. Used in conjunction with other S05 codes depending on specific monitoring and measurement technologies.

#### S05-D01D

# Using electric currents or magnetic fields

Includes all aspects of electrical current, voltage, and frequency measurement not covered elsewhere in S05-D01. NMR diagnosis is in S05-D02B only. From 2006, audiometering is coded under S05-D01D2 only.

Electrode, sense, frequency, tone, ear, generator, skin, polygraph

[1997]

#### S05-D01D1

# **Body impedance measurements**

(S05-D01D)

# S05-D01D2 [2006]

### **Audiometering**

Hearing test

# S05-D01E [1992]

### For body temperature measurement

Thermometer

### S05-D01F [1992]

# For reflex and reaction measurement

#### S05-D01G [1992]

### In-vivo blood composition measurement

Includes in-vivo measurements of blood characteristics e.g. blood gas concentration, pH value, glucose monitoring.

Oximeter

### S05-D01H [1992]

# Stethoscopes

Instruments for auscultation. See V06 for acoustic transducers.

# S05-D01J [1997]

# Tissue, bone content and properties measurement

(S05-D01C5)

Includes measurement of bone density, bone mineral content, water, fat content and properties such as tissue elasticity etc. See S05-D01G for invivo blood composition measurement.

Bone marrow, bone mineral

# S05-D01K [2005]

# **Internal Pressure Measurement**

Blood pressure measurement is coded in S05-D01B1A only, and Intraocular pressure measurement is coded in S05-D05 only.

Cystometer

# S05-D01L [2006]

#### In-vivo fluid measurement

This code is for in-vivo measurement of bodily fluids other than blood. Includes spinal fluid, stomach acid, urine, sperm etc. For in-vivo blood measurement, see S05-D01G only.

Spinal fluid, stomach acid, urine, sperm

#### S05-D01X

#### Other (Psychotechnics)

Includes pain threshold sensing. *Psychotechnics, mental state* 

#### S05-D02

# **Radiation diagnosis**

See S03-E06 codes for analysis by radiation in general. See S05-A codes for therapeutic equipment using radiation e.g. X-Rays. For nuclear or X-radiation measurement see also S03-G02 codes. Video cameras/signal generation - see also W04-M01F.

Image, phosphor, stimulable sheet, light, radiographic, read-out, tomography, scintillation

#### S05-D02A

# **Using X-rays**

Radiographic, support, dental, image, source

# S05-D02A1 [1983]

### **Tomography**

Computer, source, beam, CAT, CT, project

#### S05-D02A3 [1983]

## Generating X-rays; protection

Includes equipment for protection from radiation and safety aspects. See V05-E codes for X-ray tubes and control in general.

Voltage, beam, source, anode, radiographic, cathode

# S05-D02A5 [1983]

# Recording; analysing

Film, light, video, intensify, radiate, radiographic, display, ray, cassette

# S05-D02A5A [1992]

#### **Photographic**

Electrical aspects of film cartridge and developing apparatus are also coded in S06.

# S05-D02A5B [1992]

#### Video

For X-ray TV system see also W04-M01F, and V05-D for tube aspects.

Fluoroscopy, feature

#### S05-D02A5C [1992]

#### Stimulable sheet phosphor

See also S06-K99G and S03-E06B3. See also V05-M01C codes for image storage screens.

#### S05-D02A5D [2002]

#### Other detectors

Includes, for example, photon detectors.

# S05-D02A5E [1992]

### **Processing of recorded image**

Includes all aspects of processing recorded X-ray image for e.g. storage, enhancement, analysis, enlargement, rotation etc. See T01-J10 codes for image processing using digital computers, and T01-J06A for data processing systems for medical applications.

### S05-D02A6 [1992]

X-ray table, positioning

#### S05-D02A6A [1997]

Positioning X-ray source

#### S05-D02A6B [1997]

**Positioning X-ray detector** 

### S05-D02A7 [2006]

#### X-ray contrast media

See also S03-E09X for contrast agents.

# S05-D02B [1992]

#### **NMR** diagnosis

(S05-D02X)

# S05-D02B1 [1992]

# NMR equipment, magnet, RF pulse generator

See also S01-E02A and S03-E07 codes for MRI/NMR measurements in general.

[1992]

#### S05-D02B2

#### Image processing, analysing

Includes processing of recorded image for e.g. enhancement, enlargement, analysis etc. See T01-J10 codes for image processing, and T01-J06A for medical data processing systems.

# S05-D02B3 [1992]

#### MRI contrast media

See also S03-E09X for contrast agents.

#### S05-D02B4 [2006]

### Adaptations for MRI compatibility

Adaptations to electrical medical appts. for use in MRI environment or for mitigating unwanted effects due to MRI procedures, e.g. shielding for implanted devices.

# S05-D02C [1992]

# **Using nuclear radiation**

Covers cases in which radiopharmaceutical is injected into patient. Includes gamma camera, SPECT and PET. See also S03-G02B3.

#### S05-D02E [1992]

# Patient table, patient positioning

Operating tables specifically for scanning are in S05-D02E only, not S05-G.

#### S05-D02X

# Other (radiation diagnosis, e.g. optical)

Includes use of radiation e.g. thermal, optical, microwave radiation for investigating physical or chemical properties. Includes lamp, laser, UV, Infrared equipment.

Resonance, radiate, spin, echo, frequency phase, IR, UV, light

#### S05-D03

### Ultrasonic diagnosis

See S03-E08 codes for sonic and ultrasonic testing in general.

Ultrasound, image, linear scan, sector scan, echo, frequency, probe, acoustic, tissue, blood

# S05-D03A [1992]

#### **Transducers**

Includes general transducer aspects. See also V06. *Piezoelectric* 

# S05-D03A1 [1992]

# **Device details**

Acoustic, ultrasonic diagnostic transducers, magnetostrictive, electrostrictive, crystal, ceramic

# S05-D03A2 [1992]

# **Arrangements of transducers**

Includes transducer arrangements for transmission and reception of ultrasonic waves, e.g. array.

Ultrasonic transducer array

# S05-D03B [1992]

### **Equipment other than transducers**

# S05-D03C [2006]

#### Ultrasound contrast media

See also S03-E09X for contrast agents.

#### S05-D03E [1992]

## Image processing and analysing

For processing recorded image for e.g. enhancement, storage and analysis. See T01-J10 for image processing in general, and T01-J06A for medical data processing systems.

# S05-D04 [1983]

# **Endoscopes**

(S05-D09)

For endoscopic surgical equipment see S05-B05. See also S02-J04B3C and V07-N02 for optical fiber details.

Light, optical fiber, image, illuminate, reflect, laser, arthroscope, laparoscope, colonoscope

#### S05-D04A [1997]

#### Control aspects

(S05-D04)

Covers arrangements for controlling movement and positioning of endoscopes within body.

Endoscope positioning, endoscope control

# S05-D04B [1997]

#### **Imaging aspects**

(S05-D04)

Includes equipment for capturing image of internal organs/cavities, e.g. video camera, CCD, ultrasound etc. See W04-M01 codes for video camera equipment.

#### S05-D05 [1992]

# Eye testing, examination

(S05-D09)

Includes all arrangements for examining the eye for diagnostic purposes; e.g. determining cornea shape, examining eye fundus, measuring cornea curvature, intraocular pressure measurement, testing astigmatism, glaucoma etc. Detecting eye movements for controlling e.g. photographic camera, aircraft etc. is coded in S05-D01C5A.

Intraocular pressure, cornea, astigmatism, ophthalmoscope, ophthalmic, eye photography, gonioscope, glaucoma, patient chair

# S05-D06 [1997]

### **Diagnostic information systems**

Includes computer systems designed to aid in patient diagnosis e.g. expert systems and diagnostic databases. See T01-J16A for expert systems in general, and T01-J06A1 for medical information systems.

Information system, medical diagnostic database, medical expert system

#### S05-D06A [2005]

# **Telediagnosis**

Includes systems for patient diagnosis where patient and medical expert are in different geographical locations e.g. where patient's image, measurements etc. are transferred via internet, wireless telephone. N.B. Used for initial diagnosis of the patient only. For everyday monitoring of patients from remote locations, see S05-G02B2A.

### S05-D07 [1997]

# **Diagnostic displays and monitors**

Includes equipment for displaying diagnostic information, e.g. radiation images. See T04-H for visual display units, W05-E codes for general display arrangements, and W03 for television displays.

Terminal, monitoring, diagnostic display

#### S05-D08

[2005]

### **General diagnostic processing**

#### S05-D08A

[2005]

#### **General image processing**

Can be applied either when type of image isn't mentioned or when it isn't important.

#### S05-D08B

[2005]

# **General data processing**

Can be applied either when type of data isn't mentioned or when it isn't important.

#### S05-D09

#### Other electrical diagnosis

Including aspects of diagnosis associated with pregnancy e.g. conception, sex and ovulation determination. Includes measurements associated with nutritional management systems, e.g. diet planners, calorie counters.

Foetus, ovulation, gender, conception

#### S05-E

#### **Dentistry**

Electric toothbrushes are covered by X27-A02A3A only. For sterilising apparatus see also S05-G. Anaesthesia is also in S05-L.

Optical, motor, handpiece, tooth, grip, X-ray

#### S05-E01

[1992]

# **Dental surgery and treatment apparatus**

Includes apparatus for dental surgery and general dental treatment.

#### S05-E02

[1992]

# Peripherals, e.g. lamp or chair

Light

#### S05-E03

[1997]

# Diagnostic equipment and measurement e.g. X-rays

(S05-E)

Includes all electrical equipment for dental diagnosis and measurement. Includes initial electrical measurements for dental prosthetics design. See S05-D02 for radiation diagnosis in general.

#### S05-F

[1983]

#### **Prostheses**

Implant, artificial, larynx, nerve, stimulating, tactile

#### S05-F01

[1992]

#### Hearing aids

Includes only implanted hearing aids.(See W04-Y codes for all aspects of implanted and non-implanted hearing aids).

Ear, cochlea, deaf, sound

#### S05-F02

[1992]

#### Internal incontinence devices

#### S05-F03

[1992]

#### Arm or leg prostheses

Limb

#### S05-F04

[1992]

# **Artificial heart pumps**

Includes permanent artificial hearts only. Blood pumping and treatment circuits for use during surgery, and therapy e.g. dialysis, are coded in S05-H. Heart pacemakers are coded in S05-A01A codes only. Heart pump motors are also coded in X25-L03A.

### S05-F05 [1997]

#### Artificial aids for eyesight

Corneal implant, artificial eyes, contact lens

S05-F09 [1992]

### Other (prostheses)

Includes medical splints and face masks.

# S05-F10 [2024]

#### **Design of prosthetic devices**

Includes details for designing a prosthesis tailored to the patient's physical needs and lifestyle. See also T01-J15X for computer/software-based design, and T01-J06A for medical applications. This code is to be used with other S05-F codes to specify the type of prostheses designed, e.g. S05-F03 for arm/leg prostheses. Manufacturing details of prostheses are coded under P32-M.

Custom prosthetics

### S05-G [1983]

# Medical and Digital Health systems, hospital equipment, sterilization equipment

(S05-X)

For dentistry equipment see S05-E also.

#### S05-G01 [1992]

#### Sterilising

Includes electrical equipment for sterilising or disinfecting medical equipment only. For sterilization of medical waste before disposal see S05-W. For non-medical sterilisation or disinfection see X27.

#### S05-G01A [1992]

#### Using mechanical cleaning, or chemicals

Includes ultrasonic vibrations and disinfectant.

# S05-G01B [1992]

#### Using heat, radiation, or electricity

Sterilisation using hot gases, plasma or microwave radiation etc.

Ultraviolet, microwave, hot gas, steam

#### S05-G02 [1992]

# Medical and Digital Health systems, hospital equipment

Includes medical and healthcare IT systems. Also includes patient monitoring and life support systems, and equipment for use in operating theatres, doctor and dentist surgeries and ambulances.

Incubators, patient transport

### S05-G02A [1992]

#### For moving patients (includes wheelchairs)

Electric wheelchairs may also be coded as electric vehicles in X21, depending on claimed content.

Stretcher, trolley

# S05-G02B [1992]

#### Beds, nursing equipment

Monitor

#### S05-G02B1 [1997]

# Patient beds

(S05-G02B)

Includes beds configured for medical use; e.g. with adjustable frame, patient lifting apparatus, tiltable axes etc.

### S05-G02B2 [1997]

#### **Patient monitoring**

(S05-G02B)

Includes monitoring equipment for use by nurses for observation and long-term monitoring of e.g. unconscious patients in intensive care unit, ward etc. to determine change in condition, e.g. heart attack.

ITU, patient monitor

#### S05-G02B2A [1997]

# Monitoring patients from remote location

(S05-G02B)

Includes equipment for monitoring patients who are at home or other location remote from the hospital.

#### S05-G02B2B [1997]

#### Portable hospital equipment

Includes monitoring equipment for use in e.g. ambulance and equipment which may be carried easily by a person.

Ambulance equipment, portable patient monitor

#### S05-G02B3 [1997]

Life support systems

### S05-G02B3A [2002]

**Incubators for infants** 

# S05-G02C [1992]

#### Operating theatre equipment

Operating tables specifically for radiation diagnosis go in S05-D02E only.

# S05-G02D [1992]

#### **Nurse call systems**

See also W05-A, and W01-C04 codes for intercoms.

# S05-G02E [1997]

### Respiratory aids using gas

(S05-G02)

Includes devices for assisting respiratory system using gas, e.g. ventilators, inhalators etc., and monitoring mixture of supplied gas. See S05-A05A for assistance of respiration by e.g. mechanical/electrical means. See S05-D01C1 for aspects of breathing, exhaled air gas content and volume measurement.

Ventilator, breathing aid, inhalator

#### S05-G02F [2006]

#### Tissue and fluid extraction equipment

Electrical novelty in equipment used to withdraw fluids and tissue, e.g. for testing, therapy.

#### S05-G02G [1992]

#### **Medical IT systems**

See also relevant T01 codes for computing aspects. Hospital asset management, inventory

# S05-G02G1 [1997]

#### Patient's medical records

(S05-G02G)

For patient record storage and administration in e.g. hospital. See T01-J05B for database aspects. *Electronic patient record, EPR* 

#### S05-G02G2 [1997]

#### **Health care administration**

(S05-G02G)

Includes health administration and insurance processing systems. See T01-J05A2 for administration using computers in general. Health care scheduling, health insurance, health cover

#### S05-G02G3 [2005]

# Data transfer/storage methods and apparatus

(S05-G02G)

Includes all aspects of data transfer between medical equipment, from equipment to central database or from remote location to medical centre. Includes encryption, image compression, access control, network or database details, etc.

# S05-G02G4 [2006]

#### **Treatment planning systems**

This code is used for systems such as radiotherapy planning systems, wherein for example the size, shape and location of a tumour are used to calculate the most effective positioning and intensity of X-ray generators. Can be used with S05-A or S05-B codes if system is integral with therapeutic or surgical apparatus.

# S05-G02G5 [2020]

#### Pharmacovigilance systems

Control, analysis and management of systems for recording and analyzing data associated with pharmacovigilance, clinical trials, drug screening etc.

#### S05-G02G9 [2005]

# Other medical IT systems methods/apparatus

(S05-G02G)

Includes medical surveys, population screening etc.

### S05-G02H [2021]

#### Nursing trolleys, carts

Electrical details of trolleys and similar equipment used in hospitals.

# S05-G02X [2012]

### Other hospital equipment

Includes special equipment used in hospital bathrooms, such as baths for patients with lower body bone fractures or whole body bone fractures. Includes equipment used outside hospitals e.g. at doctor surgeries etc. (equipment used in dental surgeries is coded under S05-E02 only) and electrical aspects of wearable devices, hospital clothing and household medical equipment. Gynaecological lamp, RFID belts

# S05-H [1983]

#### Dialysis; pumping

(S05-X)

Permanent artificial hearts are coded in S05-F04 only, even if pumping aspects are claimed. Includes all aspects of filtering. Electrical aspects of pumps are also coded in X25-L03A.

Blood, flow, fluid, valve, piston, chamber, hemodialysis, liquid, monitor, kidney

### S05-H01 [1997]

#### Dialysis and blood treatment circuits

(S05-H)

Covers all aspects of blood treatment; blood oxygenators, filtering, artificial kidneys, dialysis systems etc.

Haemofiltration, diafiltration, oxygenator, blood treatment, peritoneal

# S05-H02 [1997]

# **Blood pumping systems**

(S05-H)

Transfusion, blood pump, circulatory assistance

# S05-J [1983]

#### Infusion

Includes all electrical aspects of syringes and intravenous fluid administering and control apparatus. For anaesthetic administration control see S05-L also.

Pump, reservoir, drug, valve, volume, deliver, meter, chamber, implant, membrane

S05-J01 [1992]

Fluids

Liquid, flow

S05-J01A [1992]

### Monitoring of intravenous fluid delivery

# S05-J02 [1992]

# **Drugs through skin**

Delivery of drugs for anaesthesia is coded in S05-L02. See also S05-A04A for iontophoresis.

S05-K [1992]

# Aids for handicapped people (e.g. Braille devices)

(S05-X)

Blind, obstacle detection

S05-K01 [1997]

#### **Mobility aids**

Invalid vehicle, vehicle access, invalid mobility

# S05-L [1992]

# Anaesthesia

(S05-X)

### S05-L01 [1997]

# **Gas delivery systems**

(S05-L)

#### S05-L02 [1997]

# Intravenous or intramuscular delivery systems

(S05-L)

Local anaesthesia, relaxation, analgesia

# S05-M [1992]

#### Electrical drug storage and dosing

(S05-X)

Manufacturing details of medicines, tablets, etc. are not coded under S05-M, but under X25-P02 (electrical details only).

#### S05-M01 [1997]

#### **Drug delivery systems**

(S05-M)

Drug dosing, drug delivery, dispenser

# S05-M02 [1997]

### Monitoring medication compliance

(S05-M

Arrangements for indicating time for taking medicine, programmed dispensers, monitoring medicines taken etc.

Regime, pill counter, timer

# S05-M03 [1997]

# **Drug storage systems**

(S05-M)

Includes storage facilities for drugs, etc. in hospitals, doctors' surgeries.

#### S05-M04 [1997]

# Ventilator systems with medication

(S05-M)

See S05-G02E for respiratory aids e.g. ventilators.  ${\it Inhaler}$ 

#### S05-M05 [2019]

# Pharmaceutical dispensing and delivery systems

Includes dispensing and delivery of medical prescriptions within hospitals and other pharmacies. *Pharmacy, Dispensary* 

# S05-P [1997]

#### **Medical simulation systems**

For medical education using training and simulation aids, i.e. for training in medical procedures e.g. surgical, therapeutic, analysis, nursing etc. See W04-W07 for simulator systems, training and demonstration, T01-J15H for simulation of non-electronic systems, and T01-J06A for data processing in medicine. See also P85-A codes, in particular P85-A01G, for non-electrical aspects. *Medical education, medical simulation, medical training* 

# S05-V [2006]

#### Veterinary

This code is to highlight veterinary application and can be used in conjunction with other S05 codes which highlight novelty. See also X25-N02 codes. Prior to Jan 2007 these were coded in S05-X. *Veterinary* 

# S05-W [2015]

#### Medical waste management

Sterilization of medical waste before disposal. For sterilising or disinfecting medical equipment only see S05-G01. Includes recycling aspects. See also X25-W01 and X27-D.

### S05-X

### Miscellaneous

From 2007, veterinary applications are coded under S05-V only. Includes teaching, transplanting, atomising and enuresis detection. For teaching involving training and simulations aids, see also S05-P

Air, respiration, valve, flow, patient, infant, pressure, gas

### S05-Y [2005]

#### Additional medical device details

# S05-Y01 [2005]

# Testing and monitoring of medical equipment and systems

Includes methods and apparatus for alerting an operator when an abnormality occurs in an electrical medical apparatus.

S05-Y02 [2005]

Nano/micro scale medical devices

S05-Y03 [2005]
Implantable medical devices

S05-Y04 [20 Ingestible medical devices

# S05-Y05 [2006]

# Control, monitoring and communication of internal devices

[2005]

Includes e.g. magnetic control of ingestible devices, remote monitoring of implanted devices etc. Can be used in conjunction with specific device codes. See also W05-D codes for remote control, communication and monitoring apparatus per se.

# S05-Y07 [2019]

# Manufacture of medical equipment

Includes manufacturing of diagnostic and surgical equipment.

#### **S06: Printing and Photography**

### S06-A\*

[1980-2009]

# Electrography, electrophotography, magnetography

\*This code is now discontinued, see S06-D to K. Includes electrical and non-electrical aspects. Copier, copy, image, photocopier

#### S06-A01\*

[1980-2009]

### **Recording members**

\*This code is now discontinued, see S06-E01.

Layer, charge, conducting, image, surface, acceptor, compound, donor, dope

#### S06-A01A\*

[1980-2009]

# **Photoconductive layers**

\*This code is now discontinued, see S06-E01A. Includes all types of charge-generating layers and photosensitive paper.

Hydrazone, photoreceiver, accept

#### S06-A01A1\*

[1980-2009]

#### **Organic photoconductive layers**

\*This code is now discontinued, see S06-E01A1. *Cyclic, polycyclic, heterocyclic, quinone* 

#### S06-A01A2\*

[1980-2009]

# Inorganic photoconductive layers

\*This code is now discontinued, see S06-E01A2. Amorphous, silicon, selenium, carry, dope, surface, oxide, polycrystalline

#### S06-A01A3\*

[1980-2009]

#### Sensitisers; binding materials

\*This code is now discontinued, see S06-E01A3. Dye, composition, photosensitiser, organic, oxidative potential

#### S06-A01A4\*

[2007-2009]

#### **Treatment of recording members**

\*This code is now discontinued, see S06-E01A4. Includes application of a lubricant to the surface of the drum, etc.

#### S06-A01A9\*

[1980-2009]

### Other (photoconductive layer aspects)

\*This code is now discontinued, see S06-E01A9. Includes aspects of photoconductive belt/drum not covered by other S06 codes.

#### S06-A01B\*

[1980-2009]

#### Carriers; intermediate or cover layers

\*This code is now discontinued, see S06-E01B. Sensitive, image, amorphorous, coating, drum, base layer, protective layer.

#### S06-A01D\*

[1997-2009]

# Manufacture of recording members for magneto-, electro(photo)-graphy

\*This code is now discontinued, see S06-E01C. Includes deposition of layers on drum. Depositing

#### S06-A01D1\*

[1997-2009]

# Apparatus used for manufacturing of recording members for magneto-, electro(photo)-graphy

\*This code is now discontinued, see S06-E01C1.

#### S06-A01F\*

[1997-2009]

#### **Temperature control**

\*This code is now discontinued, see S06-E01D. For warming up photoconductor layers on drum or belt up to normal working operation temperature.

Heater

# S06-A01X\*

[1980-2009]

#### Other (Recording members)

\*This code is now discontinued, see S06-E01X. Includes thermoplastic and photoelectric layers, paper treatment and manufacture, see S06-C02 codes for lithographic plate manufacture. Image, electrostatic, surface, copy, substrate, polymer

#### S06-A02\*

[1980-2009]

#### Sensitising

\*This code is now discontinued, see S06-E02. *Electrode, surface, electrostatic* 

#### S06-A02A\*

[1997-2009]

#### Corona charger

\*This code is now discontinued, see S06-E02A. Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04. Discharge, electrode, grid, scorotron, corotron, dicorotron

#### S06-A02B\*

[1997-2009]

#### Contact charger

\*This code is now discontinued, see S06-E02B. *Roller, brush* 

#### S06-A03\*

#### **Exposing**

\*This code is now discontinued, see S06-D/E03. Includes aspects of platen movement, copying station or unit holding original document, lens/mirror systems and drum and belt drive details.

#### S06-A03A\*

[1983-2009]

[1980-2009]

#### Frame scanning

\*This code is now discontinued, see S06-D01A. Includes slit and full frame scanning.

#### S06-A03B\*

[1983-2009]

#### Line (i.e. raster) scanning

\*This code is now discontinued, see S06-D01B. Raster output scanner Laser, modulate, polygonal, mirror

#### S06-A03C\*

[1983-2009]

# Synchronisation; changing magnification

\*This code is now discontinued, see S06-D10A. Includes all aspects of magnification/reduction lens systems.

Size, variable, enlarge, ratio, paper, select, adjust

#### S06-A03D\*

[1992-2009]

#### Optical elements, e.g. lenses

\*This code is now discontinued, see S06-D03/E03B Mirror

#### S06-A03E\*

[1992-2009]

# Light source driver (e.g. biassing)

\*This code is now discontinued, see S06-D02A/E03A1.

Illuminate, biassing

#### S06-A03E1\*

[1997-2009]

# Light source per-se

\*This code is now discontinued, see S06-D02/E03A. Includes lamps (see also X26) and e.g. laser (see also U12/V08).

Lamp, LED

#### S06-A03F\*

[1992-2009]

#### **Driving system and construction**

\*This code is now discontinued, see S06-D04/E03C. Includes mountings for optical system *Glass, feed, position* 

#### S06-A03F1\*

[1997-2009]

# **Document feeder**

\*This code is now discontinued, see S06-D04B. Original, sheet, page, contact glass

#### S06-A03G\*

[1992-2009]

#### Image reading appt.

\*This code is now discontinued, see S06-D. Includes electronic image acquisition scanner, raster input scanner.

Read

#### S06-A03G1\*

[1997-2009]

#### Image sensor

\*This code is now discontinued, see S06-D05. Electronic image CCD pick-up element of line type and of matrix type.

CCD

#### S06-A03G3\*

[1997-2009]

# **Determining details of original document**

\*This code is now discontinued, see S06-D06. Density and size measurement, color, page width/length, see also S02-A03B2 for length/width/thickness measurements.

#### S06-A03H\*

[1992-2009]

# Magnetographic and non-light exposure

\*This code is now discontinued, see S06-D09.

#### S06-A03X\*

[1992-2009]

#### Other (Exposing)

\*This code is now discontinued, see S06-D09. Includes thermal and X-ray (electroradiography) exposure.

Electroradiography, X-ray

#### S06-A04\*

[1980-2009]

#### **Developing**

\*This code is now discontinued, see S06-E04. Includes copy density and darkness control and brush or magnetic applicator details

Bias, contrast, replenishment

# S06-A04A\*

[1980-2009]

#### **Using solid developer**

\*This code is now discontinued, see S06-E04A. *Powder particles* 

#### S06-A04A1\*

[1992-2009]

# Dry toner supply and storage e.g. reservoir

\*This code is now discontinued, see S06-E04C. Toner supply from container, tank, hopper to developer chamber

#### S06-A04A1A\*

[1992-2009]

#### **Toner level detector**

\*This code is now discontinued, see S06-K07B1.

### S06-A04A1B\* [2002-2009]

#### **Toner density detector**

\*This code is now discontinued, see S06-K07B2. *Refill* 

# S06-A04A2\* [1992-2009]

# **Toner application**

\*This code is now discontinued, see S06-E04C. Includes application by magnetic brush arrangement, scavangeless.

#### S06-A04A9\* [1992-2009]

### Other (using solid developer)

\*This code is now discontinued, see S06-E04.

# S06-A04B\* [1980-2009]

# Using liquid developer

\*This code is now discontinued, see S06-E04B. Flow, fluid, suspension

#### S06-A04C\* [1980-2009]

### **Developer materials**

\*This code is now discontinued, see S06-E04. Codes in this section cover materials per se and their manufacture only. Includes toner details for electrophotographic facsimile and laser printer.

Compound, particle, cellulose, composition, copolymer, disperse, dry, magnetic

# S06-A04C1\* [1980-2009]

#### **Powder**

\*This code is now discontinued, see S06-E04A1. Charge, resin, binder, component, polymer, coating

#### S06-A04C2\* [1980-2009]

#### Liauid

\*This code is now discontinued, see S06-E04B1. Suspension, polymer, resin, solvent, acid, aqueous, dispersion

#### S06-A04C5\* [1997-2009]

#### Manufacture and manufacturing appt.

\*This code is now discontinued, see S06-E04D.

# \$06-A04C9\* [1997-2009]

#### Other (developer materials)

\*This code is now discontinued, see S06-E04X. *Cyan, ester, solution, aerosol* 

# S06-A04X\* [1997-2009]

# Other (developing)

\*This code is now discontinued, see S06-E04X. Storing waste toner for disposal.

# S06-A05\* [1980-2009]

#### **Transferring images**

\*This code is now discontinued, see \$06-E05. Includes removal of recording sheet from drum after transfer.

Surface, receive, separate, contact, dielectric

# S06-A05A\* [1997-2009]

#### Corona charger

\*This code is now discontinued, see S06-E05A. Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04. *Discharge* 

#### S06-A05A1\* [2002-2009]

# Corona charger transfer of toner

\*This code is now discontinued, see S06-E05A1. Discharge

# S06-A05A2\* [2002-2009]

# Corona charger separation of paper

\*This code is now discontinued, see S06-E05A2. *Discharge* 

# S06-A05B\* [1997-2009]

# Contact type charger

\*This code is now discontinued, see S06-E05B. *Transfer roller, blade, belt* 

# S06-A05B1\* [2002-2009]

#### Transfer roller or belt, toner transfer details

\*This code is now discontinued, see S06-E05B1.

#### S06-A05B2\* [2002-2009]

# Transfer roller or belt, paper separation details

\*This code is now discontinued, see S06-E05B2.

#### S06-A05C\* [1997-2009]

#### Intermediate belt/drum

\*This code is now discontinued, see S06-E05C.

# S06-A05D\* [2008-2009]

#### Care of transfer appts.

\*This code is now discontinued, see S06-E05D. For lubrication of transfer roller, belt, intermediate roller or belt.

Lubricant

# S06-A06\* [1980-2009]

#### **Fixing**

\*This code is now discontinued, see S06-E06. Flash

# S06-A06A\* [1992-2009]

# Heat and pressure application

\*This code is now discontinued, see S06-E06A. If heater aspects are claimed see X25-B codes also. *Fuse* 

# S06-A06B\* [1992-2009]

#### Roll and roll driving

\*This code is now discontinued, see S06-E06B1. Includes clearing jams in fixing system.

Roller

#### S06-A06B1\*

[1997-2009]

#### Belt and belt driving

\*This code is now discontinued, see S06-E06B2.

#### S06-A06C\*

[1992-2009]

#### **Fuser oil composition and application**

\*This code is now discontinued, see S06-E06C.

#### S06-A06C1\*

[1992-2009]

### **Fuser oil composition**

\*This code is now discontinued, see S06-E06C1.

#### S06-A06D\*

[1997-2009]

#### Lustre control

\*This code is now discontinued, see S06-E06D. *Heating, gloss, pre-heating* 

# S06-A06P\*

[2008-2009]

#### **Pre-fixing**

\*This code is now discontinued, see S06-E06P. E.g. for reducing the moisture content of the transfer material to increase its rigidity.

#### S06-A06X\*

[1992-2009]

#### Other (fixing)

\*This code is now discontinued, see S06-E06X. Cooling

#### S06-A07\*

[1980-2009]

# **Multi-processing stations**

\*This code is now discontinued, see S06-E. This code is used when the system or process as a whole is claimed rather than any specific aspect.

Processor cartridge

#### S06-A07A\*

[1997-2009]

# **Drive system for several imaging stations**

\*This code is now discontinued, see S06-E. Driving linked colour stations

# S06-A08\* [1980-2009]

# Using magnetic patterns or thermoplastic layers

\*This code is now discontinued, see S06-E07. Includes all aspects of magnetography. Magnetic printer head details may also have T03-A03 codes assigned, depending on content.

Latent, heat, permeable, field, deformation

#### S06-A09\*

[1980-2009]

#### **Electrography not using charge patterns**

\*This code is now discontinued, see \$06-E08. Includes electrophoresis.

Polymer, deform, electrostatic, field, impact, magnetic, paper

#### S06-A10\*

[1980-2009]

# Cleaning, residual charge elimination etc.

\*This code is now discontinued, see S06-K06. Includes corona discharge, scrapers, ozone gas removal and charge-unifying drum exposure. Develop, light, residue, dust, roll, collect, filter

#### S06-A10A\*

[1992-2009]

#### Toner removal

\*This code is now discontinued, see S06-K06C. Involves removal of toner.

Surface, brush, lube block

### S06-A10A1\*

[1992-2009]

#### Using blade

\*This code is now discontinued, see S06-K06C1. Scraper

### S06-A10B\*

[1992-2009]

#### Charge removal and ozone removal

\*This code is now discontinued, see S06-K06B. Drum, discharge

#### S06-A10C\*

[1997-2009]

# Returning toner for re-use

\*This code is now discontinued, see S06-K06C2. *Recycle* 

#### S06-A10D\*

[2007-2009]

# Transfer of toner to collection or waste container

\*This code is now discontinued, see S06-K06C3. Covers mechanism for transferring toner to the collection or waste container for later removal and recycling outside the copier.

# S06-A10E\* [2007-2009]

#### Removal of other material, e.g. dust

\*This code is now discontinued, see S06-K06D. Includes details of air cleaning systems. If cleaned air is expelled outside the copier, see also X27-E01B2 (electrical aspects only).

#### S06-A11\* [1980-2009]

#### **Multicolour systems**

\*This code is now discontinued, see S06-K01. Used for any aspect of colour system, with other codes as appropriate.

Dye, pigment, tint

# S06-A11A\* [1992-2009]

#### **Full colour**

\*This code is now discontinued, see S06-K01A. Four colour, magenta, cyan, yellow, black

# S06-A11B\* [1992-2009]

# Two colour, highlighting

\*This code is now discontinued, see S06-K01B. *Red* 

# S06-A12\* [1983-2009]

#### Sheet handling/feeding

\*This code is now discontinued, see S06-K02. Includes all mechanisms for transporting sheet through copier, collators and sorters.

Paper, document, roller, guide, position, side, belt, detect, platen, path

#### S06-A12A\* [1983-2009]

#### Multicopies; duplex

\*This code is now discontinued, see S06-K02A. *Reverse, double, invert* 

# S06-A12B\* [1983-2009]

#### For different paper sizes

\*This code is now discontinued, see S06-K02B. For feeding paper of different lengths and thickness.

# S06-A12C\* [1992-2009]

#### **Collators and sorters**

\*This code is now discontinued, see S06-K02C. Includes feeding paper containing classified info to a locked tray. Includes paper stores. Stack, tray

# S06-A12D\* [2002-2009]

# Paper skew detection, skew correction, clearing jams

\*This code is now discontinued, see S06-K02D.

# S06-A12E\* [1997-2009]

#### Sheet decurling

\*This code is now discontinued, see \$06-K02E.

#### S06-A12F\*

[2008-2009]

# **Duplex sheet feed**

\*This code is now discontinued.

# S06-A14\* [1987-2009]

Control, monitoring, warning devices

\*This code is now discontinued, see S06-K07. Includes operating status display (for display control circuitry see T04-H codes), mode selection devices,

microprocessor details (see also T01-J codes, e.g. T01-J08A), and recording inhibiting devices.

# S06-A14A\* [1992-2009]

#### User input and display

\*This code is now discontinued, see S06-K07A1. Includes mode selection keys, etc. *Indicate* 

# S06-A14B\* [1992-2009]

# Monitoring and error detection

\*This code is now discontinued, see S06-K07B. Fault, reset

#### S06-A14C\* [1992-2009]

#### Control of copier operation

\*This code is now discontinued, see S06-K07A. Covers general details of control system.

#### S06-A14D\* [1997-2009]

#### **Power supply control**

\*This code is now discontinued, see S06-K07A2.

#### S06-A14E\* [1997-2009]

#### Remote monitoring and control

\*This code is now discontinued, see S06-K07C1. *Billing* 

# S06-A14F\* [2005-2009]

# Management of confidential/secure documents, e.g. prevention of illegal copying

\*This code is now discontinued, see S06-K07A3. Preventing illegal copying of banknotes, securities and private documents, recognising copy prevention marks on documents, output to authorised operator. See also T01/T04 for image processing aspects and T05-J for testing of securities, banknotes, etc.

# S06-A15\* [2002-2009]

#### **Electrophotographic copier rollers**

\*This code is now discontinued, see S06-K03H. General constructional details of rollers.

#### S06-A16\*

[1987-2009]

# **Electronic copier**

\*This code is now discontinued, see S06-K07.

#### S06-A16A\*

[1992-2009]

# Digital copier, editing copier

\*This code is now discontinued, see S06-K07A4. Includes picture processing and modification aspects of otherwise conventional appt.

#### S06-A16B\*

[1992-2009]

# Systems with non-electrophotographic input or output arrangements

\*This code is now discontinued, see S06-K99B a together with S06-F/G/H/J codes. Includes systems with CCD sensor input, and thermal output.

#### S06-A16C\*

[1997-2009]

# Systems with electrophotographic and non-electrophotographic output

\*This code is now discontinued, see S06-K99B a together with S06-F/G/H/J codes.

#### S06-A17\*

[1997-2009]

#### **Recycling Systems**

\*This code is now discontinued, see S06-K04. From 2005 covers all aspects of recycling. See also X25-W04 for electrical aspects of recycling systems in general.

# S06-A17A\*

[2005-2009]

# **Paper Recycling**

\*This code is now discontinued, see S06-K04A. For removing toner from recording paper to enable reuse of paper.

Paper

#### S06-A17B\*

[2005-2009]

### **Toner Recycling**

\*This code is now discontinued, see S06-K04B together with appropriate S06-E04 codes.

# S06-A17C\*

[2005-2009]

# **Component Recycling**

\*This code is now discontinued, see S06-K04C. See also V04/X12 for recycling electrical components.

#### S06-A18\*

[1992-2009]

#### Finishing apparatus

\*This code is now discontinued, see \$06-K05.

#### S06-A18A\*

[1997-2009]

# Stapling, binding, paper cutting, paper punching, paper folding

\*This code is now discontinued, see S06-K05A. Includes bookbinding/stapling/cutting/punching devices situated inside the copier or separate bookbinding/stapling/cutting/punching machines attached to the copier.

#### S06-A18B\*

[2006-2009]

#### Laminating

\*This code is now discontinued, see S06-K05B. Laminating, protective layer

#### S06-A18C\*

[2008-2009]

#### **Shredding**

\*This code is now discontinued, see S06-K05C. Includes immediate shredding directly after scanning.

# S06-A18D\*

[2008-2009]

# Attachment or printing of copy prevention marks to document to prevent forgery

\*This code is now discontinued, see S06-K05D. Includes applying a magnetic wire, RFID tag, etc., as part of the printing process. If attaching a RFID tag, see also T04-K codes. Details on watermarking also coded under T01.

# S06-A19\*

[1992-2009]

#### Construction

\*This code is now discontinued, see S06-K03. Includes details of machine casing, framework, etc., and also internal mounting arrangements of components and modules

# S06-A19A\*

[1997-2009]

#### Paper holders

\*This code is now discontinued, see S06-K03B. *Container, storage* 

#### S06-A19A1\*

[1997-2009]

#### Cassettes

\*This code is now discontinued, see S06-K03B1. For holding paper sheets before being fed for copying onto.

Container

# S06-A19A2\* [1997-2009]

#### Trays, bins

\*This code is now discontinued, see S06-K03B2. For receiving documents or copy paper sheets after copying operation, duplex intermediate tray.

#### S06-A19B\* [1997-2009]

#### Ventilation and humidifying mechanisms

\*This code is now discontinued, see S06-K03C.

#### S06-A19C\* [1997-2009]

#### Frames, casings, bearings

\*This code is now discontinued, see S06-K03D.

#### S06-A19D\* [2007-2009]

# Manufacture and manufacturing apparatus

\*This code is now discontinued, see S06-K03E. Covers manufacturing method and apparatus for the manufacture of copier elements.

### S06-A19E\* [2008-2009]

# Packaging for electrography, electrophotography and magnetography

\*This code is now discontinued, see V04-X together with S06-K99 codes.

#### S06-A20\* [1980-2009]

# Other (electrography, electrophotography, magnetography)

\*This code is now discontinued, see S06-E09. Includes forming electrostatic latent image as initial stage in data acquisition for e.g. audio and video systems, e.g. still picture camera with electrostatic latent image production (see also T03 and W04). Includes electrophotographic displays (see W05-E codes also), recycling other than paper and ink, non-copy-able documents, etc.

Display, light

### S06-B

#### **Photography**

Electrical aspects only are included. Video and electronic still-picture cameras are covered by W04-M01 codes.

Image, optical, instant-picture, SLR, disc, roll, cartridge, film

#### S06-B01

#### Focussing; indicating

Lens, automatic, adjust, reflect, drive, intensity, light, display

#### S06-B01A [1983]

#### Focus detection; rangefinders

Rangefinders combined with surveying navigating appt. are coded in S02-B01. (See W06-A codes for radar and analogous systems.)

Position, distance, beam, drive, element, IR, infrared, ultrasonic, UV, ultraviolet

#### S06-B01B [1983]

### Lens positioning; indicating

Includes all aspects of positioning motors (see also V06), viewfinder display details and film data marking appt.

Focal, alarm

#### S06-B01B1 [1992]

#### Lens positioning, driving

Length, barrel, zoom, correcting focus

#### S06-B01B2 [1992]

#### Film data marking

Information, record, print, time, date

#### S06-B01B2A [1997]

### **Optically**

LED

#### S06-B01B2B [1997]

#### Magnetically

Magnetic marking see also T03 codes Magnetic head

# S06-B01C [1997]

#### Viewfinder display

LCD

#### S06-B01E [1997]

# Eye gaze direction detection

Detects pupil of eye for controlling direction of line for auto-focussing or line of view. See S05-D01C5A for eye ball position detection.

#### S06-B02

#### Camera exposure control

Automatic, lens, manual, speed

#### S06-B02A

# **Light metering**

See also S03-A01 codes.

Intensity, compensate, bright, photometry

#### S06-B02B

# Exposure time and aperture evaluation and setting

Includes evaluation using film speed/sensitivity information.

# S06-B02B1 [1997]

# Reading data from film/film cartridge

Using pre-set data on film or cartridge to automatically set camera. Reading magnetic marking see T04 and T03 codes also. *DX code* 

#### S06-B02B2 [1997]

#### Aperture/shutter speed setting

Includes manual input for pre-setting aperture size or shutter speed.

#### S06-B02C

#### Shutter and aperture control

Includes remote actuation.

Electromagnet, magnet, motor, drive, blade, diaphragm, mechanism, open, time

#### S06-B02C1 [1992]

#### Remote actuation

See W05-D04 codes for optical or radio controlled system.

#### S06-B02C5 [1992]

#### **Actuation using timer delay**

See also S04-C01.

#### S06-B02E [1997]

#### Camera shake detection/correction

For sensing movement due to user of camera in order to perform compensation e.g. optically using lens or to warn user of excessive movement or to prevent photo-taking operation.

Movement sensing

#### S06-B03

#### Flash units

Part of camera, lamps, tubes, reflectors, fittings, and operating circuits are coded in X26 also.

Illuminate, pulse, strobe, gun, trigger, charge, built-in

#### S06-B03A [1983]

### **Electronic**

Covers discharge tube flash units, xenon discharge tube, capacitor discharge circuit.

Capacitor discharge, xenon lamp

### S06-B03A1 [2002]

# **Pre-light emission**

Pre-light emission before discharge of flash to prevent red eye. See only W04-M01H codes if for digital camera.

#### S06-B03B [1983]

#### Non-electronic

Covers incandescent lamp flash units.

### S06-B04 [1983]

#### Film processing

Electrical aspects of developing exposed film, exposing photographic paper, scanning negative, developing exposed film and paper. Includes electrical aspects of X-ray film processing. Does not include electrical aspects of film manufacture or details of film material.

Image, colour, print, expose, negative, positive, copy, dark-room

#### S06-B04A [1983]

#### Photographic printing appts.

Electrical aspects of printer for wet developing of photographic film or paper to produce photographic print. Control and monitoring of process. For positive or negative scanning to provide digital image to computer and computer output appt. see S06-B06B. For printing from digital camera see also W04 esp. W04-D10, for non-wet printing see S06-E to S06-K codes.

Frame, original, scan filter, magnify, reduce, colour output on microfilm

# S06-B04A1 [1992]

### Copiers using microcapsule sheets

Cylith, cycolour

### S06-B04A2 [2005]

#### Processing exposed film

Electrical aspects of developing, fixing, washing and drying negative.

#### S06-B04A3 [2005]

#### **Processing developed negatives**

Electrical aspects of processing developed negative to produce photographic prints.

Enlarging, exposing, rinsing, fixing, washing, drying

#### S06-B04A5\* [1992-2004]

### Control and monitoring of printing station

\*This code is now discontinued and transferred to S06-B04A2 for film/slide processing, including control and monitoring details and S06-B04A3 for print/slide making, as well as control and monitoring details and modification of exposure based on e.g. negative characteristics.

Correct, auto-exposure, contrast measurement, density

#### S06-B04B [1983]

# Photographic film manufacture

Includes electrical aspects of photographic film manufacture only. See S06-B04A2 for developing exposed film and electrical aspects of chemical, thermal development and S06-B04A3 for developing photographic paper and electrical aspects of chemical, thermal development.

Develop, electrolytic, solution, emulsion, heat, dry, flow, fluid, liquid, mix, roll, silver, agitate, recovery, halide

# S06-B04C [1997]

#### Film order processing

Mini-lab, direct plate exposure

#### S06-B04E [1997]

# Photographic film or paper feeding (not in camera)

Convey, feed

#### S06-B05

# Cinematography

Includes cinema equipment and projectors. for motion picture film, telecine machine. Magnetic and video recording are covered by T03 and W04.

Cine, picture, motion, sound, track, record, tape, frame, television, telecine, reel, synchronising, screen

#### S06-B06 [1983]

# Projectors, viewers (incl. microform)

Video projectors are covered by W04-Q01 codes and only coded in S06-B06 if they are either a permanent part of a photographic projector, or intended for use as an overhead projector transparency. For projector synchronisation with audio/video recording appts. see W04-K01 also. *Transparency, cassette, frame* 

#### S06-B06A [1992]

#### **Projectors**

Display, slide, screen, reel

### S06-B06B [1992]

#### Film scanners and viewers

Scanning positive or negative to provide digital image to computer, printer, self service kiosk etc.

#### S06-B06C [1992]

#### Microfilm apparatus

Read, fiche, microfiche

# S06-B08 [1983]

#### Other camera electrics

Includes e.g. motorised control for instant-picture camera, eyepiece lamps, microprocessor control of camera and/or lens etc, mode selection control. Remote control is covered by \$06-B02C1.

Control, drive, data, transmission

#### S06-B08A [1992]

#### Film winding in camera

Reel, perforation detection

# S06-B08B [1997]

# Film loading detection

For determining correct cartridge loading and film feed.

# S06-B08C [1997]

#### **Power source details**

Includes storage compartments for battery and detection of battery voltage level. See also X16 for battery details, if measuring battery level see X16 and S01. See U24 for power supply details. *Battery* 

### S06-B09

#### Other (photography)

Includes electrical aspects of X-ray photography (processing is also coded in S06-B04 codes).

Radiate, beam, colour, cassette, medical, tomography, photobooth, separate flash units and lighting units, photothermography

#### S06-C

#### **Printing**

Includes electrical aspects of presses, rotary machines etc. but **not** character and line printers, printers as computer peripherals, which are covered by S06-D to K codes. For textile printing see also X25-T.

Colour, image, scan, picture

#### S06-C01

# Photoelectronic composing; controlling composing machines

Pre-press proofing, colour proofing. Character, select, text, space, graphic, laser, font, phototypeset, typeset

#### S06-C02

#### Plate production; colour separations

Imagesetter, platesetter, computer to plate, electrophotographic plates per se are coded in S06-A01X.

Tone, beam, half, night, pixel, reproduce, lithography, flat-bed scanner, drum, gravure

#### S06-C02A [1992]

Plate production

# S06-C02A1 [2006]

# Computer to plate manufacture

Covers all aspects of direct plate manufacture and production from computer original without intermediate stages. See also T01 for computer design aspects.

CTP, computer-to-plate

# S06-C02B [1992]

#### **Colour separation**

#### S06-C03

#### Printing, press control

Control of flexographic, offset lithographic, screen printing, gravure, printing processes, etc.

Machine, plate, rotating, cylinder, sheet, roll, ink, offset, lithography, stencil printer

# S06-C03A [1992]

#### **Control**

Control system for plate loading, sheet feeding, wash-up, damping, inking and registering, etc.

# S06-C04 [2008]

#### Media conveying details

Includes electrical details of media, e.g. paper or web, conveying in printer, e.g. offset printer.

# S06-C05 [2002]

# **Print finishing equipment**

Novel electrical aspects of sheet/batch collators, folders, booklet makers, binders, perforator, scorer, numberer

Staple, sheet separation, stack, bind, feed

#### S06-C09

#### Other (printing)

For textile printing see also X25-T.

#### S06-D

### [2010]

#### Scanning Systems

Previously coded as S06-A03, W02-J01, W02-J02A. Includes aspects of platen movement, copying station or unit holding original document, lens/mirror systems, drum and belt drive details and scanning drive (See also V07-K05). See also U14-H01B for thin film image sensor, U13-A01 and U13-A02 for circuitry and CCD. Details of scanners that are not part of an image forming device (e.g. flat bed scanners) are coded in T04-M only.

#### S06-D01 [2010]

**Scanning Type** 

#### S06-D01A [2010]

#### Frame Scanning

Previously coded as S06-A03A. Includes slit and full frame scanning.

#### S06-D01B [2010]

# Raster/Line Scanning

Previously coded as S06-A03B. Raster output scanner

Laser, modulate, polygonal, mirror

# S06-D02 [2010]

#### **Light Source**

Previously coded as S06-A03E1. Lamps (see also X26) and e.g. laser (see also U12/V08). Lamp, LED

#### S06-D02A [2010]

# **Light Source Driving**

Previously coded as S06-A03E. *Illuminate, biassing* 

### S06-D03 [2010]

#### **Optical Elements**

Previously coded as S06-A03D, W02-J01A. See also S06-D01 if specific to type of exposure.

Polygonal

### S06-D04 [2010]

### **Drive System and Construction**

Previously coded as S06-A03F, W02-J01B. Includes mountings for optical system. See also V06 codes for motor details.

Glass, feed, position

# S06-D04A [2010]

### Position detection and adjustment

Previously coded as W02-J01C. Includes control and error compensation of scanning velocity and position.

#### S06-D04B [2010]

#### **Document feeder in scanning system**

Previously coded as S06-A03F1. Feeding of paper through the copier other than through the scanning arrangements are coded under S06-K02

Original, sheet, page, contact glass

#### S06-D05 [2010]

#### Sensors

Previously coded as S06-A03G1, W02-J02A1. Electronic image CCD pick-up element of line type and of matrix type.

CCD, photoelectric detector, thin film image sensor, multi-element array

### S06-D05A [2010]

### Integral reading circuitry

Previously coded as W02-J02A1A.

# S06-D06 [2010]

#### **Determining details of original document**

Previously coded as S06-A03G3. Density and size measurement, color, page width/length, see also S02-A10B for length/width/thickness measurements.

# S06-D09 [2010]

#### Non-light exposure

Previously coded as S06-A03H, S06-A03X. Includes thermal and X-ray (electroradiography) exposure. *Electroradiography, X-ray* 

#### S06-D10 [2010]

# **Combined scanning and printing arrangements**

# S06-D10A [2010]

#### Synchronising, changing magnification

Previously coded as S06-A03C. If synchronisation with sheet feeding is involved, then S06-K02 codes are also assigned. Includes all aspects of magnification/reduction lens systems.

Size, variable, enlarge, ratio, paper, select, adjust

#### S06-E [2010]

### **Electrophotographic Image Production**

Previously coded as S06-A, T04-G04, W02-J02B2.

# S06-E01 [2010]

#### **Recording members**

Previously coded as S06-A01, T04-G04C. Drum driving aspects are coded in S06-E03 codes only. Includes photosenstive paper, photoconductive belt, drum, etc. Toner is coded under S06-E04 only. Constructional details are also coded under S06-K03.

Layer, charge, conducting, image, surface, acceptor, compound, donor, dope, photoconductor, belt

# S06-E01A [2010]

#### **Photoconductive layers**

Previously coded as S06-A01A. Includes all types of charge-generating layers and photosensitive paper. Also cross reference with T04-G04C for photosensitive materials for optical printer.

Hydrazone, photoreceiver, accept

#### S06-E01A1 [2010]

#### Organic

Previously coded as S06-A01A1.

Cyclic, polycyclic, heterocyclic, quinone

#### S06-E01A2 [2010]

#### Inorganic

Previously coded as S06-A01A2.

Amorphous, silicon, selenium, carry, dope, surface, oxide, polycrystalline

#### S06-E01A3 [2010]

#### Sensitiser; binding materials

Previously coded as S06-A01A3.

Dye, composition, photosensitiser, organic, oxidative potential

### S06-E01A4 [2010]

#### **Treatment of recording members**

Previously coded as S06-A01A4. Includes application of a lubricant to the surface of the drum, etc.

#### S06-E01A9 [2010]

# Other (photoconductive layer aspects)

Previously coded as S06-A01A9. Includes aspects of photoconductive belt/drum not covered by other S06-E01A codes.

# S06-E01B [2010]

#### Carriers; intermediate or cover layers

Previously coded as S06-A01B.

Sensitive, image, amorphorous, coating, drum, base layer, protective layer.

#### S06-E01C [2010]

#### Manufacture

Previously coded as S06-A01D. Includes deposition of layers on drum.

Depositing

#### S06-E01C1 [2010]

#### Manufacturing apparatus

Previously coded as S06-A01D1.

#### S06-E01D [2010]

#### **Temperature control**

Previously coded as S06-A01F. For warming up photoconductor layers on drum or belt up to normal working operation temperature. The control aspect is also coded by S06-K07A1. See also X25-B codes for details of electric heating.

Heater

# S06-E01X [2010]

#### Other (recording members)

Previously coded as S06-A01X. Includes thermoplastic and photoelectric layers, paper treatment and manufacture, see S06-C02 codes for lithographic plate manufacture. Electric details of paper manufacture is also coded under X25-T09A. Image, electrostatic, surface, copy, substrate, polymer

#### S06-E02 [2010]

#### Sensitising

Previously coded as S06-A02. Desensitisers for removing residual charge are coded in S06-K06. *Electrode, surface, electrostatic* 

# S06-E02A [2010]

#### Corona charger

Previously coded as S06-A02A. Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04.

Discharge, electrode, grid, scorotron, corotron, dicorotron

#### S06-E02B [2010]

#### Contact charger

Previously coded as S06-A02B. *Roller, brush* 

#### S06-E03 [2010]

#### **Exposure**

Previously coded as S06-A03. See also S06-D for combined scanning and printing arrangements.

#### S06-E03A [2010]

#### **Light Source (for exposure)**

Previously coded as S06-A03E1, T04-G04B. See X26 for lamp details, for LED heads see also U12-A01A3 or U12-A01A6.

Lamp, LED

### S06-E03A1 [2010]

#### **Light Source Driving (for exposure)**

Previously coded as S06-A03E. *Illuminate, biassing* 

### S06-E03A2 [2010]

# Light source type - LED

Previously coded as W02-J02B2A.

#### S06-E03A3 [2010]

# **Light source type - Laser**

Previously coded as W02-J02B2B.

#### S06-E03B [2010]

#### **Optical Elements**

Previously coded as S06-A03D, T04-G04A1. *Polygonal, galvanometer* 

#### S06-E03C [2010]

#### **Drive System and Construction**

Previously coded as S06-A03F, T04-G04A2. Includes mountings for optical system. Details of sheet feeding are coded under S06-K02 codes. See also V06 codes for motor details.

Scan

### S06-E03C1 [2010]

# Position detection and adjustment

# S06-E04 [2010]

### Developing

Previously coded as S06-A04. Includes copy density and darkness control and brush or magnetic applicator details. For removal of developer from drum see S06-K06. For colour developer, see also S06-K01 codes. See also S06-K07B1A and S06-K07B1B for level detection and density detection of developing agent respectively. Inkjet inks and thermal ink ribbons are not coded here, but are coded by S06-G04 and S06-H02 respectively.

Bias, contrast, replenishment

### S06-E04A [2010]

#### Using solid developer

Previously coded as S06-A04A. *Powder particles* 

### S06-E04A1 [2010]

#### **Composition of solid developer**

Previously coded as S06-A04C1.

Charge, resin, binder, component, polymer

#### S06-E04B [2010]

#### Using liquid developer

Previously coded as S06-A04B. *Flow, fluid, suspension* 

#### S06-E04B1 [2010]

# **Composition of liquid developer**

Previously coded as S06-A04C2.

Suspension, polymer, resin, solvent, acid, aqueous, dispersion

# S06-E04C [2010]

# **Developer application**

Previously coded as S06-A04A2. Includes application by magnetic brush arrangement, scavangeless.

#### S06-E04D [2010]

### Manufacture of developer agent

Previously coded as S06-A04C5.

### S06-E04E [2010]

# Toner supply and storage

Previously coded as S06-A04A1. Toner supply from container, tank, hopper to developer.

#### S06-E04X [2010]

#### Other developing and developer materials

Previously coded as S06-A04C9, S06-A04X.

#### S06-E05 [2010]

#### Transferring images

Previously coded as S05-A05. Includes removal of recording sheet from drum after transfer.

Surface, receive, separate, contact, dielectric

### S06-E05A [2010]

#### Corona charger

Previously coded as S06-A05A. Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04.

Discharge

#### S06-E05A1 [2010]

#### Corona charger - transfer of developer

Previously coded as S06-A05A1.

#### S06-E05A2 [2010]

#### Corona charger - separation of paper

Previously coded as S06-A05A2.

#### S06-E05B [2010]

### Contact type charger

Previously coded as S05-A05B. Transfer roller, blade, belt

# S06-E05B1 [2010]

# Contact type charger - transfer of developer

Previously coded as S06-A05B1.

## S06-E05B2 [2010]

# Contact type charger - separation of paper

Previously coded as S06-A05B2.

#### S06-E05C [2010]

#### Intermediate belt/drum

Previously coded as S06-A05C.

### S06-E05D [2010]

#### Care of transfer apparatus

Previously coded as S06-A05D. For lubrication of transfer roller, belt, intermediate roller or belt. Lubricant

#### S06-E06 [2010]

# **Fixing**

Previously coded as S06-A06. *Flash* 

# S06-E06A [2010]

#### Heat and pressure application

Previously coded as S06-A06A. If heater aspects are claimed see X25-B codes also.

#### S06-E06B [2010]

#### Fuser mechanism and driving

# S06-E06B1 [2010]

# **Fuser roller**

Previously coded as S06-A06B. See also S06-K03H for constructional details of rollers.

Roller

S06-E06B2 [2010]

**Fuser belt** 

Previously coded as S06-A06B1.

S06-E06C [2010]

**Fuser oil** 

Previously coded as S06-A06C.

S06-E06C1 [2010]

**Fuser oil composition** 

Previously coded as S06-A06C1.

S06-E06D [2010]

**Lustre control** 

Previously coded as S06-A06D. *Heating, gloss, pre-heating* 

S06-E06P [2010]

**Pre-fixing** 

Previously coded as S06-A06P. E.g. for reducing the moisture content of the transfer material to increase its rigidity.

S06-E06X [2010]

Other fixing details

Previously coded as S06-A06X. *Cooling* 

S06-E07 [2010]

# Using magnetic patterns or thermoplastic layers

Previously coded as S06-A08, T04-G09. Includes all aspects of magnetography. Magnetic printer head details may also have T03-A03 codes assigned, depending on content. Includes magnetic line printers used as computer peripherals.

Latent, heat, permeable, field, deformation

S06-E08 [2010]

#### **Electrography not using charge patterns**

Previously coded as S06-A09. Includes electrophoresis.

Polymer, deform, electrostatic, field, impact, magnetic, paper

S06-F [2010]

### **Impact Image Production**

Previously coded as T04-G01. Includes mechanical action. Electromagnet and solenoid drive aspects are coded in V02-E02A also.

Armature, coil

S06-F01 [2010]

**Dot Printer** 

Previously coded as T04-G01A. *Matrix, pin, wire, needle* 

S06-F02 [2010]

**Using Type** 

Previously coded as T04-G01B. Self contained typewriters are in S06-K99A.

Select, hammer, daisy-wheel, disc, step, font, typeface, golf-ball

S06-F03 [2010]

Ribbon

Previously coded as T04-G01C. Includes printer ribbon re-inking.

Ink, cassette

S06-G [2010]

**Ink-Jet Image Production** 

Previously coded as T04-G02, W02-J02B3. Liquid, dye, nozzle, resin, water, channel, drop, pressure, reservoir, eject, electrode, pulse

S06-G01 [2010]

**Drop-on-demand** 

Previously coded as T04-G02A.

Thermal ink-jet, bubble, piezoelectric, ultrasound

S06-G02 [2010]

Selective drop deflection

Previously coded as T04-G02B.

Charge, electrode, stream, gutter, continuous

S06-G03 [2010]

**Printhead details** 

Previously coded as T04-G02A1, T04-G02B1, W02-J02B5. Search together with S06-K03 for constructional and manufacturing details. See also S06-G01 or S06-G02 to highlight the type of inkjet system. See also S06-K06A for printhead cleaning. Details of piezoelectric elements for inkjet printheads are also coded under V06-M06D.

S06-G04 [2010]

Inkjet ink

Previously coded as T04-G02C.

#### S06-G05 [2010]

#### **Recording Media**

Previously coded as T04-G02E. Includes media composition and manufacture. Includes pre-print application of liquid (not ink) to paper/ pre-treatment of paper for ink jet printing. See also X25-T09A for electrical details of paper manufacture.

Paper, fabrics, OHP sheet, recording pattern of LCD screen

### S06-G06 [2010]

# Ink Chamber/Cartridge

Previously coded as T04-G02G. See also S06-K03 for chamber construction. Search together with S06-G03 for combined chamber and printhead details. See also S06-K07B1A and S06-K07B1B for level detection and density detection of inkjet ink respectively.

# S06-G06A [2010]

#### Refilling of ink cartridge

Previously coded as T04-G02F.

#### S06-G07 [2010]

# Post ink application processing

Previously coded as T04-G02H. Includes processes for treating ink after application using e.g. heat or UV light.

# \$06-G10 [2010]

### Applications of ink-jet printing technology

Previously coded as T04-G02J. Covers printing on non-paper-like media e.g. CD (see also T03). Includes textile printing (see also X25-T04D), Manufacturing LCD screens and filters (see also U14). 3D / 4D printing and other industrial applications using inkjet technology (see also X25-A08).

## S06-H [2010]

#### **Thermal Image Production**

Previously coded as T04-G03, W02-J02B1. Includes thermal ink compositions and heat sensitive paper and ribbons. For photo-thermography, see also S06-E04.

Transfer, thermosensitive, resistive elements, thermal transfer ink ribbon

# S06-H01 [2010]

# Using thermally sensitive paper

Previously coded as T04-G03A.

#### S06-H01A [2010]

#### Composition of heat-sensitive layer

Previously coded as T04-G03A1.

# S06-H02 [2010]

#### Using thermal ribbon

Previously coded as T04-G03B. Includes use of thermal transfer sheets.

Cartridge

#### S06-H02A [2010]

#### Thermal ink composition

Previously coded as T04-G03B1. Includes composition and manufacture of thermal ink. If colour ink, see also S06-K01. Ink for inkjet printer is only coded under S06-G02C.

Dye

#### S06-H03 [2010]

#### Printhead details for thermal printer

Previously coded as T04-G03C. See also S06-K06A for printhead cleaning. For thin-film resistor heads see also U14 codes, e.g. U14-H01B.

#### S06-J [2010]

# Electrode (e.g. electrosensitive/erosive) Image Production

Previously coded as T04-G05.

#### S06-K [2010]

#### **Image Production Units features**

Covers features common to all printer types such as paper feeding and control systems.

#### S06-K01 [2010]

#### Colour system

Previously coded as S06-A11, T04-G04, W02-J07. Used for any aspect of colour system, with other codes as appropriate.

Dye, pigment, tint

#### S06-K01A [2010]

#### **Full colour**

Previously coded as S06-A11A.

Colour, magenta, cyan, yellow, black, CMY, CMYB, RGB

#### S06-K01B [2010]

# Two colour, highlighting

Previously coded as S06-A11B.

#### S06-K02 [2010]

### Media feeding, e.g. sheet feeding

Previously coded as S06-A12, T04-G06A, W02-J05A. Includes all mechanisms for transporting sheet through copier, collators and sorters. For feeding of an original document through a scanner, see S06-D04B only. Constructional details of sheet feeding mechanisms are coded under S06-K03 codes.

Paper roll, paper tray, document holder

# S06-K02A [2010]

#### Multicopies; duplex

Previously coded as S06-A12A. *Reverse, double, invert* 

#### S06-K02B [2010]

# For different paper size, clearing jams, skew correction

Previously coded as S06-A12B. For feeding paper of different lengths and thickness. Paper skew detection is coded by S06-K02D.

### S06-K02C [2010]

#### Collators and sorters

Previously coded as S06-A12C. Feeding paper containing classified info to a locked tray. See T04-J codes for feeding outside printing unit.

#### S06-K02D [2010]

# Paper skew detection

Previously coded as S06-A12D. Paper skew correction is coded by S06-K02B. For clearing jams in fixing system see also S06-E06.

#### S06-K02E [2010]

#### **Sheet decurling**

Previously coded as S06-A12E.

#### S06-K03 [2010]

#### Construction

Previously coded as S06-A19, T04-G11, W02-J05, W02-J06. Includes details of machine casing, framework, etc., and also internal mounting arrangements of components and modules.

#### S06-K03A [2010]

#### Carriage/Motor aspects

Previously coded as T04-G06. Includes all carriage systems not coded elsewhere. Constructional details of motors are covered by V06 codes.

#### S06-K03B [2010]

#### **Paper Holders**

Previously coded as S06-A19A. *Container, storage* 

#### S06-K03B1 [2010]

#### Cassettes

Previously coded as S06-A19A1. For holding paper sheets before being fed for copying onto.

#### S06-K03B2 [2010]

#### Trays, bins

Previously coded as S06-A19A2. For receiving documents or copy paper sheets after copying operation, duplex intermediate tray

#### S06-K03C [2010]

# Cooling, ventilation & humidifying mechanisms

Previously coded as S06-A19B. Fan

### S06-K03D [2010]

### Frames, cases, bearing

Previously coded as S06-A19C.

#### S06-K03E [2010]

#### Manufacture and manufacturing apparatus

Previously coded as S06-A19D. Covers manufacturing method and apparatus for the manufacture of elements.

#### S06-K03F [2010]

### **Connectors, circuitry**

Previously coded as W02-J05C.

#### S06-K03G [2010]

#### **Power supply**

Previously coded as W02-J06. Includes mains and battery supplies for all types of units including portable systems. Control aspect of power supplies are coded by S06-K07A2 only. Also includes protection circuits. See U24-D, U24-E, U24-F and U24-X codes.

Surge, overload, back-up

#### S06-K03H [2010]

#### Rollers

Previously coded as S06-A15. General constructional details of rollers. See also S06-E05B for transfer roller or S06-E06B1 for fuser roller.

#### S06-K04 [2010]

#### Recycling

Previously coded as S06-A17, T04-G11B, W02-J05D. See also X25-W04 for electrical aspects of recycling systems in general.

#### S06-K04A [2010]

#### Paper recycling

Previously coded as A06-A17A. For removing toner from recording paper to enable re-use of paper.

#### S06-K04B [2010]

#### Recording agents recycling

Previously coded as S06-A17B.

### S06-K04C [2010]

#### Components recycling

Previously coded as S06-A17C. See also V04/X12 for recycling electrical components.

### S06-K05 [2010]

# **Finishing**

Previously coded as S06-A18, T04-G06B, W02-J05B. For collators and sorters see S06-K02C.

#### S06-K05A [2010]

# Stapling, binding, cutting, punching, folding

Previously coded as S06-A18A. Includes bookbinding/stapling/cutting/punching devices situated inside the copier or separate bookbinding/stapling/cutting/punching machines attached to the copier.

# S06-K05B [2010]

#### Laminating

Previously coded as S06-A18B. Laminating, protective layer

### S06-K05C [2010]

# Shredding

Previously coded as S06-A18C, T04-G06S. Includes immediate shredding directly after scanning/printing.

# S06-K05D [2010]

# Attachment of anti-copy mark

Previously coded as S06-A18D. Includes applying a magnetic wire, RFID tag, etc., as part of the printing process. If attaching a RFID tag, see also T04-K codes. Detection of copy prevention marks on documents are also coded under S06-K07A3. Details on watermarking also coded under T01.

#### S06-K06 [2010]

#### **Cleaning/Recording Agent Removal**

Previously coded as S06-A10, T04-G02D. Covers mechanism for transferring toner to the collection or waste container for later removal and recycling outside the copier. For details of toner or ink recycling, see S06-K04B.

### S06-K06A [2010]

#### **Printhead cleaning**

#### S06-K06B [2010]

#### Charge and ozone removal

Previously coded as S06-A10B. Drum, discharge

# S06-K06C [2010]

#### Removing excess developer agent

Previously coded as S06-A10A. Involves removal of toner

# S06-K06C1 [2010]

#### **Using blade**

Previously coded as S06-A10A1. *Scraper, doctor blade* 

#### S06-K06C2 [2010]

# Returning toner / ink for re-use

Previously coded as S06-A10C.

#### S06-K06C3 [2010]

# Transfer of developing agent to waste container

Previously coded as S06-A10D. Covers mechanism for transferring developing agent to the collection or waste container for later removal and recycling outside the printer/copier/facsimile. See S06-K06C2 when the toner is recycled within the copier for immediate re-use. See S06-K04B for details of recording agents recycling.

#### S06-K06D [2010]

#### Removing dust, etc. from components

Previously coded as S06-A10E. Includes details of air cleaning systems. If cleaned air is expelled outside the copier, see also X27-E01B2 (electrical aspects only). Constructional details of ventilation and humidifying mechanisms are also coded by S06-K03C.

#### S06-K07 [2010]

#### **Communication and Control**

Previously coded as S06-A14, S06-A16, T04-G10, W02-J03, W02-J08. Includes operating status display (for display control circuitry see T04-H codes), mode selection devices, microprocessor details (see also T01-J codes, e.g. T01-J08A), and recording inhibiting devices. Does not include motors and solenoids for carriage and platen movement.

#### S06-K07A [2010]

#### **General control systems**

Previously coded as S06-A14C, T04-G10A, W02-J03A7.

### S06-K07A1 [2010]

### User input and display

Previously coded as S06-A14A, T04-G10A1, W02-J03A4. Includes mode selection keys, etc Operator warning device, mode setting, touchscreen

#### S06-K07A2 [2010]

#### **Power supply control**

Previously coded as S06-A14D.

#### S06-K07A3 [2010]

# Management of confidential/secure documents

Previously coded as S06-A14F, T04-G10F, W02-J11. Preventing illegal copying of banknotes, securities and private documents, recognising copy prevention marks on documents, output to authorised operator. See also T01/T04 for image processing aspects and T05-J for testing of securities, banknotes, etc. Attachment of anti-copy mark, e.g. a RFID, is also coded under S06-K05D. Secrecy details during communication, such as transmission data encoding, password, data encryption, etc., are also coded by S06-K07C7.

#### S06-K07A4 [2010]

#### Image processing

Previously coded as S06-A16A, W02-J03A1, W02-J03A2. Includes details of digital copiers. See also

Picture signal amplifier, halftone screening, edge enhancement, noise or error suppression

#### S06-K07A4A [2010]

# **Compensation for acquisition aspects**

Previously coded as W02-J03A1A. Shading compensation

#### S06-K07A4B [2010]

# Changing magnification, composing and electronic layout control

Previously coded as W02-J03A2A, W02-J03A2B.

# S06-K07A4C [2010]

#### Image outputting

Previously coded as W02-J03A3. Includes systems for generating previews of image before sending (using e.g. a facsimile) or printing. Details of user display is also coded by S06-K07A1.

#### S06-K07A4D [2010]

# Compression/bandwidth reduction

Previously coded as W02-J03B. See U21-A05 codes for coding in general, W04-P01A codes for TV signal compression, and W02-G04A codes for bandwidth reduction in general.

# S06-K07A5 [2010]

#### Copy sheet counting

Previously coded as W02-J03A7A.

# S06-K07B [2010]

#### **Monitoring systems**

Previously coded as S06-A14B, T04-G10G, W02-J03A5. Covers monitoring systems of the device, monitoring of the communication system is S06-K07C6 only.

# S06-K07B1 [2010]

# Monitoring of recording agent Refill

#### S06-K07B1A [2010]

# **Recording agent level detection**

Previously coded as S06-A04A1A.

#### S06-K07B1B [2010]

# Recording agent density detection

Previously coded as S06-A04A1B.

#### S06-K07C [2010]

#### Communication

Previously coded as W02-J03C, W02-J08. Includes input-output arrangements, telephone interface and secrecy systems (with W02-L). Search W01-C05B1 and W01-C01H for telephone aspects also. For ISDN aspects see W01-C05B7. For LAN aspects see W01-A06 codes.

# S06-K07C1 [2010]

#### Remote control/monitoring

Previously coded as S06-A14E, T04-G10E. Search together with S06-K07A and S06-K07B codes as applicable.

#### S06-K07C1A [2010]

#### Print Job/Queue

Previously coded as T04-G10E1.

### S06-K07C2 [2010]

# Interfacing

Previously coded as T04-G10C.

# S06-K07C2A [2010]

#### Telephone interfacing

Previously coded as W02-J03C7. Includes combined facsimile-telephone. See W01-C01P4. Also W01-C05B3H.

### S06-K07C2B [2010]

# **Network interfacing**

Previously coded as W02-J08A. Includes aspects of printers with built in print server.

#### S06-K07C2C [2010]

#### ISDN interfacing

Previously coded as W02-J08C. Also W01-C05B7 codes for general aspects of ISDN.

#### S06-K07C2D [2010]

#### **Computer interfacing**

Previously coded as W02-J03C8. See also T01-C03B code.

# S06-K07C3 [2010]

#### Signal processing

Previously coded as W02-J03C1.

# S06-K07C4 [2010]

# **Determining and setting transmission**

Previously coded as W02-J03C2. Includes detecting type of receiving station (e.g. G3, G4).

Autodialler, modem

#### S06-K07C5 [2010]

#### **Reception details**

Previously coded as W02-J03C5.

Automatic answering

### S06-K07C6 [2010]

# Monitoring and error checking

Previously coded as W02-J03C3.

# S06-K07C7 [2010]

#### Secrecy/Authentication

Previously coded as W02-J03C6. Includes transmission data encoding, password, data encryption. Management of confidential/secure documents are also coded by S06-K07A3.

# S06-K99 [2010]

# **Machine Type**

The machine type codes cover the application of a patent for a particular function. Patents that describe multiple applications will not be covered (except MFP).

# S06-K99A [2010]

#### Self-contained printing machine

Self-contained typewriters, label printers, independent units, hand held printing devices.

S06-K99B [2010]
-----------------

Copier

S06-K99C [2010]

**Printer** 

Printer peripherals for use with a computer.

S06-K99D [2010]

Fax

S06-K99E [2011]

**Plotters** 

Previously coded as T04-H02.

# S06-K99F [2010]

#### Multifunctional peripheral

Includes patents describing the combination of two or more other machine types.

MFP

#### S06-K99F1 [2010]

# Multifunctional peripheral including fax application

Previously coded as W02-J07.

# S06-K99G [2010]

#### **Analogous systems**

Previously coded as W02-J10. For medical stimulable sheet phosphor systems see also S05-D02A5C. For electronic blackboard (previously coded in W02-J09) see also W04-W05.

# S06-K99X [2010]

# Other (printer types)

Previously coded as T04-G09. Includes Braille printers, (see S05-K, T04-X for other Braille aspects), electronic pen recorders. Magnetic printers are coded under S06-E07 only.

# **Section T: Computing and Control**

T01: DIGITAL COMPUTERS	313
T02: Analogue and Hybrid Computers	346
T03: Data Recording	347
T04: Computer Peripheral Equipment	385
T05: Counting, Checking, Vending, ATM and POS Systems	397
T06: Process and Machine Control	403
T07: Traffic Control Systems	410

### **T01: Digital Computers**

#### T01-A

#### **Mechanical digital computers**

Align, calculate, register, interlock

#### T01-B

#### Fluid-pressure digital computers

Pneumatic, hydraulic, valve

#### T01-C

#### Input/output arrangements

Covers specific input arrangements for transferring data to be processed into a form which is capable of being handled by a computer. See T01-H for information transfer. Peripheral devices per se are in T04. See U21 for electronic switching.

Port

#### T01-C01

# For record carriers (e.g. magnetic tape)

Includes buffering. See T01-C07C1 for smart card interface.

Card, disc, drive, reader, SCSI (small computer system interface), PCAT, SASD

### T01-C01A [1997]

#### To/from DASD

Includes details of all defined standards, e.g. ATA, SATA, SCSI, iSCSI, IDE.

Floppy disc, hard disc, CD-ROM

#### T01-C01C [1997]

#### To/from semiconductor memory

See also U14-A codes. Flash memory

#### T01-C02

#### For manual input device

Mechanical switches are coded in V03, and electronic switch details in U21.

Coordinate, enter, key, touch, matrix

# T01-C02A [1987]

# **Keyboard interface**

Alphanumeric code generation, key stroke detector

### T01-C02A1 [1992]

#### In co-operation with display

Includes keys used in conjunction with icons or instructions displayed on the screen such as help keys, cursor control keys and function select keys. Details of icons used for program management are coded in T01-J12D.

#### T01-C02A9

[1992]

#### Other (optoelectronic keyboard)

Opto-electronic keyboard

#### T01-C02B

[1987]

#### Position-digital value converters

Digitiser, co-ordinate

#### T01-C02B1

# In cooperation with display

See also T01-J12 for GUI/HCI, and T01-J12B for GUI windows.

#### T01-C02B1A\*

[1992-2001]

#### For mouse

\*This code is now discontinued, see T04-F02B1 from 2002. Includes use of mouse to 'pull down' icon functions and windows. See also T01-J12B for windows in general.

# T01-C02B1B\*

[1992-2001]

#### For joystick

\*This code is now discontinued, see T04-F02B3 from 2002. Includes interfaces and code translators for joysticks. See T01-P02 and W04-X02 codes also, if used for computer/arcade games.

# T01-C02B1C\*

[1992-1996]

# For light pen

\*This code is now discontinued. See T01-C02B1H from 1997-2001 and T04-F02A1 from 2002.

# T01-C02B1D\*

[1992-2001]

# Virtual keyboards and touch screens

\*This code is now discontinued, see T04-F02A2 from 2002. Includes interfaces and 'key' / position code translation. Also includes finger-operated mouse.

#### T01-C02B1E\*

[1997-2001]

# Three-dimensional space signal input/output

\*This code is now discontinued, see T04-F02B from 2002. Includes virtual reality handsets/sensor, gloves (see W04-V07E codes also).

### T01-C02B1G\* [1997-2001]

#### **Tracker ball**

\*This code is now discontinued, see T04-F02B5 from 2002.

# T01-C02B1H\* [1997-2001]

#### Pen input

\*This code is now discontinued, see T04-F02A1 from 2002. Includes input by inductive or capacitive pen, light pen and touch pen. For pen sensing details, see T04 and U21.

#### T01-C02B1J\*

[1997-2001]

#### Finger-shaped or hand input

\*This code is now discontinued, see T04-F02B from 2002. Devices which use relative movement of finger or hand as input to processor.

Thimble

#### T01-C02B9\*

[1992-2001]

#### Other (position-digital value converters)

\*This code is now discontinued, see T04-F02B from 2002.

#### T01-C03

#### Data exchange with distant stations

Bus, transmit, receive, terminal, link, line receiver

# T01-C03A [1992]

# Arrangements for interfacing with networks

Transmitting information between computers via communication medium. Including LAN and WAN interfacing details of computer networks. See T01-H07 for inter-computer communication and T01-M02 for multiprocessing structure. For bus arbitration and cycling arrangements see T01-H05B. Also includes computer peripheral network connections, but see also appropriate code for specific peripheral e.g. T01-C05A1.

ARPANET (advanced research project agency network), binding

# T01-C03B

[1992]

#### **Data communication**

Includes telephone interfaces and modems. RS-232 (Recommended Standard 232), RS-485, RS-422, RS-423

### T01-C03C [1997]

#### Wireless link

Connection between/to devices, for connection to peripheral (e.g. printer) see T01-C07C3 instead. Includes, satellite, radio, infra-red, etc. interfaces for accessing a network. See also W01-A06C3 and W01-A06C4.

#### T01-C03C1

[1997]

## Broadcast radio/television signal input

TV card

#### T01-C04

#### **Output to displays**

Video, colour, graphics, character, monitor, colour/intensity

#### T01-C04A

#### For CRTs

Monitor, VDU

#### T01-C04B

### For display panels

Flexible display monitors are coded under T04-H03N. Details of general foldable/bendable displays are coded under W05-E05F.

Matrix, LCD, gas discharge, plasma, hologram, flexible panel, foldable panel

### T01-C04C

[1997]

# **LED display**

(T01-C04)

# T01-C04D

[1997]

#### Display processing

(T01-C04)

Graphics card

#### T01-C04X

#### Other

Update, Bitmap

#### T01-C05

# Output to printers (incl. plotters, typewriters)

Character, font, format, graphic, line, text, ink-jet, impact, thermal, X-Y, chart

# T01-C05A To printer

[1992]

For '3D/4D printing' technology such as Fused Deposition Modelling (FDM) see T01-J07B3.

Ink-jet, impact, thermal, laser

T01-C05A1 [1997]

To/from networked/shared printers

T01-C05B [1992]

To plotter

X-Y, chart

T01-C06 [1992]

#### Scanning

(T01-C09)

Bar code reading and character recognition, such as OCR, are covered by T04-A03B1 and T04-D04 codes respectively. Hand scanners for computer input are coded in T04-M02. This code is used for computer interfacing details only.

OCR, bar codes

T01-C06A [2012]

#### To/from networked/shared scanner

Covers the scanners that share with the network Remote scanner

T01-C07 [1992]

#### Interconnections (subsystems)

Includes general aspects not specific to interfaced devices such as input/output and data communications. See T01-H05A for I/O controllers and processors, and T01-L09 for physical structures.

T01-C07A [1992]

#### Asynchronous/Synchronous operation

Covers interfaces characterised by communication mode. See T01-H07B for bus protocol details. USART (sync/async receiver/transmitter), start-stop bit, flip-flop

T01-C07B [1992]

#### Fiber optics

Also coded in V07.

T01-C07C [1992]

#### **Interfaces**

Includes backplanes, cables, chip carriers and plugboard/card/overlay motherboards. See also T01-L02 and V04 for hardware details, and T01-L09 for wiring and connectors.

Current loop, EIA, interrupt, DMA/program controlled, slave, adaptor card, latch-chip, SCSI

T01-C07C1 [1992]

Smart card reader interface

T01-C07C2 [1992]

#### **Buffers**

Includes structure e.g. shift registers, re-circulating, and buffer/interface function such as rate control.

T01-C07C3 [1997]

# Non-wired connection between peripheral and computer

Includes radio and optical signal transfer between computer and peripheral. Remote control of computer.

Free space, wireless, infrared

T01-C07C4 [1997]

# Serial ports, parallel ports, serial-parallel conversion

Centronics (RTM), USB

T01-C07C4A [2005]

#### Serial interface with additional features

Additional features such as power supply. See also T01-H07, T01-H05B for bus transfer and T01-L01/3 for connector details. See also V04 codes.

USB, universal serial bus interface, hot swap, plug and play, firewire, IEEE 1394, i-link®

T01-C07C5 [1997]

# Using standard interfaces or expansion cards

See T01-C11 for PCMCIA cards per se. *PCI. PCI-X*.

T01-C07D [1992]

### Topology

Covers wiring arrangements and connections to interface including power arrangements. Includes interface buses and point-to-point connection. See T01-H07A for bus structures.

T01-C08 [1992]

# Digital input/output using sampling of analog signals

Analog to digital converter

T01-C08A [1992]

# Speech recognition/synthesis input/output

(T01-C09)

See also W04-V codes for sound wave analysis/synthesis, speech to text, text to speech and T01-J18 for speech/audio processing.

Telephone, output, sound

T01-C08B [1997]

#### Measurement signal input

See also T01-J07A for data acquisition applications.

T01-C09

Other

T01-C10 [1997]

#### Non-manual human input

(T01-C09)

Includes eye input, foot input and neurological input to computer.

T01-C11 [1997]

#### **PCMCIA** cards

See also T04 and U11.

#### T01-D

#### **Data conversion**

See U21-A for coding and code conversion in general.

#### T01-D01 [1992]

### **Data encryption and Decryption**

Includes private and public key encryption. See W01-A05 codes for data communications aspects. DES. RSA

T01-D01A [2002]

#### **Encryption algorithm**

For encoding a plain text message using number of division using ki dimensional vector on a finite field. *Polynomial, primary number* 

#### T01-D02 [1992]

#### Coding and information theory

Includes data compaction/compression, formal communication models, and non-secret encoding systems. Image compression prior to 1997 - see also T01-J10A1. T01-J10B, now indexed in T01-J10D

Lempel-Ziv, sliding window, Huffman, holotropic, fractal coding

#### T01-D02A [2005]

#### Watermarking

See also T01-J10D for image watermarking and W04 for audio/visual watermarking.

Stenanography

T01-D03 [1992]

# Shifting

Includes justifying, scaling and normalising.

T01-D04 [2005]

#### **Data flow speed conversion**

Pre 2005 see T01-D09.

T01-D09 [1992]

#### Other

From 2005 see T01-D04 for data flow speed conversion.

#### T01-E

#### **Data processing**

Instruction, masking, bit manipulation

#### T01-E01

# Sorting, selecting, merging or comparing data

Algorithm, key, routine, sequence generator, word, bit stream manufacture

# T01-E01A [1992]

#### Sorting

Includes grouping data records, rearranging, and re-recording.

Software Boolean logic operation

#### T01-E01B [1992]

#### **Selectina**

Includes special character detection.

#### T01-E01C [1992]

#### Comparing

Includes merging.

### T01-E02

# Computation using only denominational number representation

Digital processing using binary, ternary etc. number systems.

Arithmetic, binary, decimal, exponent, floatingpoint, integer, logic, mantissa, operand, fixed point, coded decimal

### T01-E02A

#### Adding, subtracting

Addend, carry, even, subtrahend, sum

#### T01-E02B

#### Multiplying, dividing

Multiplication, multiplier, product

#### T01-E02C [1997]

# **Logic processing**

See U21-C for logic circuits.

T01-E02D [1997]

**ALU** 

#### T01-E02X

#### Other (incl. evaluating functions)

Approximation, interpolation, complex numbers, logarithm, root, square

#### T01-E03

# Computation using digital nondenominational representation

Integration, differentiation, increment, pulse, proportional, multiplier, divider, P-modulo arithmetic

#### T01-E04

# Comparing digital values; random number generators

See also T01-J15 for chaos modelling. Pseudo random binary sequence (PRBS), comparator, hashing

T01-E05 [1992]

# Novel data processing technology

(T01-E09)

T01-E05A [1992]

#### **Optical/Electro-optical**

See also T01-M06D and T02-A03 for analogue optical computing and T02-B for hybrid arrangements. Pure optical, electro-optical components are found in V07-K06.

SLM (spatial light modulators), SLR (spatial light rebroadcasters)

### T01-E05B [1992]

### **Neuronal configurations**

Neural networks in general are covered by T01-J16C1. See T02-A04A5 for analog neural networks.

#### T01-E05C [1992]

#### **Superconducting elements**

Superconducting computing systems are covered by T01-M06E. See also U14-F02B.

T01-E05D [1992]

Biocomputer

T01-E05Q [2005]

#### **Quantum Computing**

Using quantum theory for processing. Prior to 2005 see T01-E05X. For Quantum processor architecture see T01-M06Q.

T01-E05X [1992]

Other novel data processing technology

T01-E09

Other

#### T01-F

# **Program control**

Software

#### T01-F01

#### Microprogramming

T01-F01A [1987]

#### **Enhancement of operating speed**

Includes use of several micro-control devices operating in parallel.

Score boarding

T01-F01B [1992]

Loading

T01-F01B1 [1997]

# Firmware microprogramming

See T01-S01A for disclosure of firmware code.

# T01-F01C [1992]

#### **Address formation**

Includes address formation of next microinstruction selection.

#### T01-F02

# Interrupt, multi-programming, multitasking, software interrupts

Covers supporting and keeping track of operations of multiplicity of users who are running numerous concurrent processes.

Access, multi-port, multi-task, request, poll, queuing control

# T01-F02A [1992]

#### Task transfer initiation

Covers multiple task sequencing and selection. Initiating and controlling task operations and use of system resources.

T01-F02A1 [1997]

Interrupt handling/processing

T01-F02B [1992]

#### Saving or restoring of program or task

Covers program control blocks and multiple register set usage.

T01-F02C [1992]

#### **Task interaction**

Includes multiprocessor transaction management protocol and allocation of resources to processes, load balancing and scheduling.

Lock-out avoidance, IPC

T01-F02C1 [1997]

**Synchronisation** 

Multimedia

T01-F02C2 [1997]

**Resource allocation** 

T01-F02C3 [2006]

**Multi-thread** 

The ability of an operating system to execute different parts of a program simultaneously.

T01-F02C4 [2007]

**Data transfer between applications** 

T01-F03

**Execution of machine instructions** 

Fetch, instruction, nodes, pipeline, pre-fetch

T01-F03A [1987]

Address formation of next instruction, branching, access of instruction operand

T01-F03B [1987]

Concurrent instruction execution, pipeline, look-ahead

Low level parallel mechanisms, RISC

T01-F03B1 [1997]

**Pipelining** 

T01-F03C [1997]

Instruction decoding

T01-F04 [1987]

Subprogram execution

(T01-F09)

T01-F05 [1987]

Arrangements for executing specific programs and system management software

(T01-F09)

Includes operating systems, supervisors, executives and monitors.

Debug, edit, execute, state-machine

T01-F05A [1992]

# High level language and language processors

Binary Compilers and Assemblers for e.g. operating system compilation. Use of Application Programming Interface (API), Dynamic Link Libraries (DLLs) during program execution. From 2007, for use of API during software development see T01-J20B1, and for Compilers and Assemblers used in software development, see T01-J20B1.

Cobol, Fortran, Pascal, Lisp, C, C++, Java®

T01-F05B

[1992]

# Booting/initialisation and recovery

(T01-G05A)

Includes reconfiguration, retry, checkpointing and restoring.

Start-up

T01-F05B1

[1997]

Resetting

T01-F05B2 [1997]

#### Configuring

Boot-up and program loading. Hot configuration. Version management of software e.g. BIOS firmware. For version management of software code see T01-F05F or T01-J20B2 during development. For Installation and/or updating of software involving transmission over network see T01-N02B1E. For network security software updates see T01-N02B3.

Plug and play

T01-F05B3

[1997]

# Sleeping and waking, power-up/down, halting

Includes Power Management

T01-F05C

[1992]

#### Interactive support programs

Includes time share control.

T01-F05D

[1992]

Job entry system programs

T01-F05E

[1992]

# Data handling programs and storage management

Includes allocation/deallocation strategies, distributed memories, segmentation, storage hierarchies and swapping. See also T01-E01 and T01-J05B.

BIOS, Kernel, utilities, file management, up/down loading, share seize mechanisms

T01-F05E1 [2008]

Middleware

T01-F05F [2007]

**Software version management** 

T01-F05G [1997]

# **Operating systems and virtual systems**

Machine emulation including network operating systems.

MS-DOS, Unix, OS/2, Novell NetWare, Windows NT, LINIX

T01-F05G3 [1997]

#### Virtual systems

Includes shells and interfaces created by OS and emulation of terminal types by OS software.

Bourne-shell, utilities

### T01-F05G5 [1997]

#### **System management**

Includes user privilege set-up; security - see T01-J12C, usage monitoring see - T01-G05C, T01-G11; file management - see T01-F05E.

T01-F05G5A [2006]

Screen savers

T01-F05G7 [2006]

### Real time clock

Covers updating and management of real time system clock.

T01-F06 [1992]

#### **Program control arrangements**

(T01-F09)

Covers program arrangements were instructions are pre-programmed before processing is carried out. See T01-M05 for architecture. Non-numerical controllers per se are covered by T06-A04B. For disclosure of firmware see T01-S01A. See also U21 for logic devices.

PLD, PLC, EEPROM

T01-F07 [1992]

#### **Object based systems**

Links, AKO, ISA, object-oriented programming (OOP), object-oriented database (OODB)

T01-F09

Other

#### T01-G

#### Error detection/correction; monitoring

Software debug systems are covered by T01-J20.

#### T01-G01

#### Using redundancy in data representation

See also U21-A06 for error correction/ detection circuitry, and W01-A01 codes for data transmission aspects.

#### T01-G01A [1992]

#### Using checking codes

Error correction words (ECW), Error correction codes (ECC), Hamming distance

#### T01-G01A1 [1992]

**Using parity** 

#### T01-G02

#### Testing hardware during idle time

Includes integrated circuits with on-chip testing circuitry. See also S01-G01A, U11-F01D2, U13-C07, U14-D.

Diagnose, check-bit, routine, sub-routine, program, signature analysis

#### T01-G02A [1987]

### **Defective hardware location subsystems**

#### T01-G02A1 [1987]

#### On integrated circuit

Includes LSSD (level sensitive scan design). See also U13-C07.

# T01-G02A2 [1992]

#### System/field testing

Includes Computer Aided Test (CAT) system comprising of microcomputer/computer to aid testing of processor/CPU based systems or appts. See also T01-J07B for quality control

# T01-G02A2A [1992]

### **Automatic Testing Equipment (ATE)**

See also T01-J08F for system test other than processor systems.

### T01-G02A2B [1992]

#### **Built in testing**

Includes scanpath, signature and boundary analysis. *Built in block operation (BILBO)* 

# T01-G02A2C [1992]

#### By comparison

Includes comparing with known 'good' cards or appts.; redundancy in registers and comparing results in both; and signature analysis.

Goldcard, Signature analysis

#### T01-G02A2D [1992]

#### Test programs and algorithms

Includes software for generating test patterns and/or collecting results and analysing faults. Also software controlling test procedures or appts.

#### T01-G02B [1992]

### **Marginal testing**

Includes preventative maintenance and safety margins.

#### T01-G03

# Using redundancy in operation or hardware

Redundant processors - see T01-G05B from 1997. Passive fault masking, active fault masking, backward error recovery, single event upset (SEU) prevention, RAID

#### T01-G04 [2014]

#### **Computer vibrating testing**

Includes testing computer assemblies for resistance to the effects of mechanical vibration and shock. See also S02-E (Measurement of mechanical vibrations).

#### T01-G05 [1987]

#### Fail-safe and monitoring systems

(T01-G09)

Includes appts. for error recovery and monitoring during operation of processor or processing system for reliable operation of hardware or software. See T06-A08 also for control system applications and T01-J20 for software debug and test.

Fail, fail-safe, fault-tolerant

#### T01-G05A [1987]

# Watchdog monitoring / Ensuring proper program flow

Includes halting of operation of all processing within computing system upon detection of error. See also T01-F05B for booting/initialisation and recovery from 1992.

Rollback, halting operation, freeze

### T01-G05B [1987]

#### **Using additional processors**

Includes redundant processor techniques (see T01-G03 for non-processor redundancy).

#### T01-G05C

[1992]

# Monitoring

(T01-G09)

Includes patterns, pulse trains and error processing.

#### T01-G05C1

[1992]

# Recording or statistical evaluation of computer activity

(T01-G09)

# T01-G06 [1992]

#### Logic simulation

(T01-G09)

Includes simulation machine/processor executing logic simulation, and logic models; and several simulation processors working in parallel. See also T01-J15A3 for electrical/electronic circuit emulation in CAD systems; T01-F05G3 for machine emulation. Event driven, levelized

#### T01-G06A

[1992]

#### Compiled code

LCC (levelized compiled code)

#### T01-G06B

[1992]

# Table driven

Using look-up tables to model logic functions.

#### T01-G06C

[1992]

### Hardware accelerators

(T01-G09)

Includes use of hardware for certain functions of simulation in cooperation with software to reduce load on processor to speed up process.

#### T01-G07

[1992]

#### **Fault simulation**

(T01-G09)

Includes introduction of known faults and monitoring/analysing effect such as stuck-at-one and stuck-at-zero techniques.

#### T01-G07A

[1992]

#### **Test sequence generation**

Includes test vector compression.

# T01-G07X

[1992]

# Other

### T01-G08 [1992]

#### **Computer Diagnostics**

(T01-G09)

Includes fault location, file/diagnostic dictionary software, remote diagnostic (see also T01-N codes), fault masking and fault documentation. See T01-J08F for diagnostic of non-computer equipment.

# T01-G08A [1997]

### **Systems support**

Includes systems support repository, help system. For AI based expert system support, see also T01-I16A

#### T01-G09

#### Other

From 1992 see T01-J20C for software debug systems; T01-G05C for monitoring of computer systems; T01-G06 for logic simulation systems; T01-G07 for fault simulation systems; and T01-G08 for diagnostic systems.

#### T01-G11 [1997]

# Measurement of non-processing parameters of computer systems

(T01-G05C, T01-G09)

Includes smoke or fire detection (see W05-B02 codes also), alarm generation, power/spike failure in computer systems. See also T01-G05C for processor related monitoring. See T01-J08F for computer testing and monitoring of non-computer equipment.

# T01-G11A [1997]

#### **Power supply**

Includes measurement and control of external power supply to computer. See T01-L01 for computer power supplies and T01-G05A.

#### T01-G11B [1997]

#### Temperature measurement and control

Includes measuring temperature/humidity of computer surroundings to maintain optimum operating conditions. See also T01-G05A.

#### T01-G11C [1997]

# User monitoring, e.g. tiredness

Includes measuring muscle tiredness, time of continuous use (see also T01-G05C), harmful screen emissions.

RSI

### T01-G11F [2012]

#### Fan speed measurement and control

Covers measuring the speed of the fan and controlling the speed depends on the CPU usage

#### T01-G11X [2005]

# Other measurement of non-processor parameters

#### T01-H

# Data storage and memory, interconnection, data transfer

See U14-A for semiconductor memories per se, and T03 for data storage and recording by relative movement between head and record carrier.

#### T01-H01

# Interconnections to random access memory, addressing and memory allocation, memory systems and architectures

Harvard architecture

#### T01-H01A

### **Module Addressing Technique**

Shadowing, memory allocation table, look ahead addressing

[1987]

### T01-H01B [1987]

# Memory storage components, hardware, or use of

Includes data layers, data logging memory cards and cassettes. See T04-K for smart cards per se. See also T01-H01C for unauthorised copying or memory protection (e.g. for disk or ROM). For physical construction of record carriers, see U14 for semiconductor memories and T03 for disks and tapes etc.

#### T01-H01B1\* [1992-2004]

# Dynamic recording by relative movement between recording head and storage medium (disk, drum, tape etc.)

\*This code is now discontinued. See T01-H01B4, T01-H01B5 and T01-H01B6 from 2005. File server, disk, drum, tape

# T01-H01B1A\*

[1997-2004]

#### Storage Arrays

\*This code is now discontinued. See T01-H01B7 from 2005.

RAID

# T01-H01B2\* [1992-2004]

# Optical, magneto-optical computer memory

\*This code is now discontinued. See T01-H01B4/5/6 from 2005

Hologram, CD-ROM, DVD

#### T01-H01B3 [1992]

#### Semiconductor / solid state memory

Includes semiconductor, bubble, capacitor, card, core, and RAM. See also U14-A codes.

RAM, ROM, DRAM, EPROM, EEPROM, flash memory

### T01-H01B3A [1992]

### **Memory card**

Search together with other T01-H01B3 codes for type, see also T04-K. for removable memory. MMC, SD, CF, Memory Stick

#### T01-H01B3B [2005]

#### **Static Magnetic Memories**

Covers solid state magnetic memories. MRAM

#### T01-H01B3C [2005]

#### **Static Optical Memories**

Covers solid state optical memories.

#### T01-H01B3D [2006]

# Non-volatile electronic semiconductors memories

Flash memories, see also T01-H01B3A flash memory cards.

#### T01-H01B4 [2005]

#### **Dynamic Magnetic**

Includes Hard Disks, floppy disks.

# T01-H01B5 [2005]

#### **Dynamic Magneto-Optical**

Mini-disc

### T01-H01B6 [2005]

### **Dynamic Optical**

For CD, CD-ROM, DVD.

# T01-H01B6A [2005]

### Volume Read e.g. Holographic

For use of media that is read by passing a light beam through (not off) the material such as holographic storage.

### T01-H01B7 [2005]

#### **Storage Arrays**

Also code under memory type, see also T01-G03 for redundant storage areas, e.g. RAID. See T01-H01B1A prior to 2005.

#### T01-H01B9 [2005]

# Others (including all non-semiconductor static memories)

#### T01-H01C [1987]

# Memory/Storage Protection Arrangement/method

For data back-up/protection see T01-G and T01-F05E.

# T01-H01C1\* [1992-2005]

# **Smart card fraud protection**

\*This code is now discontinued. See T04-K04 from 2006.

#### T01-H01C2 [1992]

Illegal memory access prevention

#### T01-H01C3 [1992]

# For prevention of memory loss including refresh

See also U14-A03B4A. Prevention of memory loss due to defective memory.

#### T01-H01C4 [1992]

Other

# T01-H01D [1987]

# Stacks and Registers

Covers fast-access temporary storage locations within CPU. Dual port memory is covered by T01-H03D from 1992.

### T01-H01X [1987]

#### Other

Includes high performance storage units (HPSU). BICPU (bimemory independent CPU)

# T01-H02\* [1987-1991]

#### Virtual memory, cache stores

\*This code is now discontinued. See T01-H03A from 1992.

### T01-H03 [1992]

# **Memory type**

(T01-H02, T01-H09)

# T01-H03A [1992]

# Cache memory, virtual memory and hierarchical memory

Includes use of small, high speed buffer, virtual and hierarchical memories. Includes address translation (see also T01-H01A). Prior to 1992 covered by T01-H02, now discontinued. Network Caching is covered by T01-N01D4 from 2005.

Ageing

# T01-H03B [1992]

## **Associative memory**

Includes content addressable and parallel searching.

### T01-H03C [1992]

# Interleaved memory and mass storage

Includes secondary memory. Expanded memory unit

# T01-H03D [1992]

## Sequential access and shared memories

(T01-H09)

Includes common shared bus, multiport, crossbar switching memories (Dual port memory was coded in T01-H01D prior to 1992).

Dual port memory, video RAM

# T01-H03X [1992]

Other

Primary

#### T01-H05 [1987]

# Computer peripheral control / General request handling/ Bus Accessing

## T01-H05A [1987]

#### **Program control for computer peripherals**

See also T03 for data storage controllers for dynamic recording, e.g. T03-A10 codes (magnetic), T03-B08 (optical) and T03-D01E5 (magneto-optical).

Channel processor

# T01-H05B [1987]

# **Handling requests**

For interconnection or data transfer. See also W01-A03A for general data communication access systems.

Access

# T01-H05B1 [1992]

#### For access to memory bus

Includes priority.

# T01-H05B2 [1992]

### For access to input/output bus

Includes polling, interrupt, burst mode, DMA, cycle steal.

# T01-H05B3 [1992]

#### For access to common bus or bus system

Includes centralised access control, request, token, time dependant, slot and contention.

# T01-H05B4 [1997]

#### Local bus systems

(T01-H05B, T01-H05B2, T01-H05B3) *PCI, VL-bus* 

### T01-H07 [1987]

# Information transfer / Bus structures

(T01-H09)

Search T01-C03 also for data exchange interfacing with distant stations, and W01-A for digital transmission in general.

# T01-H07A [1987]

#### **Bus structures**

See also T01-C07D for bus interface.

# T01-H07A1 [1992]

### **Type**

Includes common/parallel, plural and variable width/speed buses.

#### T01-H07A2 [1992]

### Control

Includes centralised, decentralised control.

#### T01-H07A9 [1992]

Other

# T01-H07B [1987]

#### **Bus transfer protocols**

See W01-A03A also for control of access to transmission path.

Handshaking, synchronous, asynchronous, conversion

# T01-H07C\* [1992-2001]

#### Information transfer

(T01-H09)

\*This code is now discontinued, see T01-N and W01-A from 2002. Includes computer network management, routing and communication control. See also T01-J08C and W01-A for communication in general. See also T01-C03B for computer interface for communication via modem.

Inter-operability, open systems, GroupWare, CSCW

# T01-H07C1\* [1992-2001]

#### **Electronic mail**

\*This code is now discontinued, see T01-N01C and W01-A06E1, W01-A06G2, W01-A06X from 2002. Voice mail in telephone system coded in W01-C02B7C. See also W01-A06E1, W01-A06G2, W01-A06X.

Computerised voice mail

# T01-H07C3\* [1997-2001]

# **Data / Media Transfer Applications**

\*This code is now discontinued, see T01-N01D from 2002. Includes downloading file from remote site (FTP).

# T01-H07C3A\* [1997-2001]

#### Audio, sound transfer

\*This code is now discontinued, see T01-N01D1A from 2002.

Internet radio

# T01-H07C3B\* [1997-2001]

# Computerised video and image file transfer

\*This code is now discontinued, see T01-N01D1B from 2002. Includes computerised video conferencing.

JPEG, MPEG

# T01-H07C3C\* [1997-2001]

## **Electronic document transfer**

\*This code is now discontinued, see T01-N01D2 from 2002. For intranet and internet documentation and web page transfer.

WWW, TCP/IP

# T01-H07C3D\* [1997-2001]

#### Multimedia transfer

(T01-J09)

\*This code is now discontinued, see T01-N01D1 from 2002. Combination of text, data, image, sound, or computer programs. Audio/video aspects of multimedia systems are also assigned W04-K10.

# T01-H07C3E\* [1997-2001]

# Running / executing software from remote site or server

\*This code is now discontinued, see T01-N01D3 from 2002.

Applet, Java

# T01-H07C5\* [1987-2001]

# Distributed and networked computer communication

\*This code is now discontinued, see T01-N02 from 2002.

## T01-H07C5A\* [1997-2001]

# Computer network control, monitoring and management

\*This code is now discontinued, see T01-N02 from 2002. See T01-J08C for communication controllers and W01-A06 for data transmission systems in general.

# T01-H07C5C\* [1997-2001]

# Data transfer over private network, intranet transfer

\*This code is now discontinued, see T01-N02A2A from 2002. Data and file transfer within single computer network.

# T01-H07C5E\* [1997-2001]

#### Over public network, internet transfer

\*This code is now discontinued, see T01-N02A2B from 2002. Data and file transfer between networks. Includes on-line systems.

PSTN, TCP/IP, gateway

#### T01-H07C5S\* [1997-2001]

#### Using server

\*This code is now discontinued, see T01-N02A2C. *Print server* 

# T01-H07C7 [1997]

### Local inter-processor data transfer

Inter-processor communication in multiprocessor computer.

# T01-H07C7C [1997]

### **Connections**

Non-bus interconnections.

Matrix, circuit-switched

#### T01-H07P\* [1997-2001]

# **Computer communication protocols**

(T01-H07C)

\*This code is now discontinued, see T01-N02A from 2002. See T01-H07C prior to 1997, T01-J12C for computer security and T01-D01 for encryption. Bus transfer protocols are found in T01-H07B.

# T01-H08 [1992]

# **Multiprocessor memory management**

(T01-H09)

See also T01-M02 for multiprocessor systems and details. See also T01-J05B4 (DBMS) for locking. Distributed system, parallel-processor, single instruction multiple data (SIMD)

#### T01-H09

Other

#### T01-J

#### **Data processing systems**

Routine

#### T01-J01

#### **Desk and pocket calculators**

See also T01-M06A1 where no processing details mentioned.

# T01-J02\* [1980-1991]

## **Multi-processor systems**

\*This code is now discontinued, see T01-M02 from 1992.

# T01-J02A\* [1987-1991]

#### Distributed

\*This code is now discontinued, see T01-M02A from 1992.

#### T01-J02B\* [1987-1991]

## Co-operating processor

\*This code is now discontinued, see T01-M02B from 1992.

# T01-J02C\* [1987-1991]

# Array/parallel

\*This code is now discontinued, see T01-M02C from 1992.

#### T01-J03

#### For evaluating statistical data

See also T01-J04B2 for correlation. *Histogram* 

#### T01-J04

# For function synthesis/ analysis or equation solving

#### T01-J04A [1983]

### For solving equations

Differential, polynomial, linear programming

#### T01-J04B [1983]

For correlation or transformation, e.g. Fourier, Walsh, etc.

# T01-J04B1 [1992]

#### Transformation function

Includes Walsh, Fourier and multi-dimensional transforms.

FT, FFT, S-transform

#### T01-J04B2 [1992]

#### **Correlation function**

Includes digital filtering, array and convolution. Digital filters in general are coded in T01-J08B and U22-G01 codes. See also T01-J03 for statistical analysis using correlation.

#### T01-J04C [1992]

#### Matrix or vector computation

Includes complex numbers.

# T01-J04D [1992]

# **Function evaluation by approximation**

# T01-J04E [2005]

# **Mathematical Modelling**

See also T01-J15H for simulation systems involving mathematical models.

Chaos theory

#### T01-J05

# For administration, commerce or information retrieval

#### T01-J05A [1987]

# Non-Specific Administration, business and commercial Tool

See T05-L codes also for EFT, point-of-sale and automatic teller machines. From 2002 see T01-N01A for on-line business systems.

Cash, cash-transaction, point-of-sale, meter, postage, management

# T01-J05A1 [1992]

## Financial/Monetary

Includes banking, billing, Point of Sale (POS), and metering.

#### T01-J05A2 [1992]

# **Administration and Management Tools**

Includes management, resource allocation, business, education, government, marketing and law. Also includes decision support, MIS, stock control, workflow control and project management.

#### T01-J05A2A [2002]

#### **Business Models**

Includes business to public administration relationship models, problem solving/identifying solutions, requirements, and end-to-end thread, see T01-N01A2 for Internet Business models and T01-J05A2 prior to 2002.

# T01-J05A2B [2002]

# **Workflow Management**

Includes execution and automation of a business process, see T01-J05A2 prior to 2002.

### T01-J05A2C [2002]

#### **Data Analysis**

Includes assessing the financial health of a company, processing of market data to predict the future demand of a product/service, surveying and polling in order to obtain data, cost model and TCO, see T01-J05A2 prior to 2002.

### T01-J05A2D [2002]

# **Inventory Monitoring/Management**

Includes cash register/terminal maintaining or updating a record of goods, see T01-J05A2 prior to 2002.

# T01-J05A2E [2002]

### **Insurance and Risk Analysis**

Includes processing and assessing insurance claims, evaluation of risk factors in a loan determination, see T01-J05A2 prior to 2002.

#### T01-J05A2F [2002]

# Investment portfolio selection, planning analysis and trading

This code covers evaluation of securities or other types of investments, and trading in commodities and securities, see T01-J05A prior to 2002.

# T01-J05A2G [2005]

# Intellectual Property and Copyright management

See T01-N01A2G for on-line systems. See also W04 for audio/video aspects.

#### T01-J05A2H [2005]

### **Personnel Management**

Includes internal business administration, health and safety, employment tribunal, organisation chart, people performance management, payroll, pensions, benefits, recruitment, career development, etc. See T01-N01A2H for online personnel management.

# Peoplesoft ™, OrgPlus ™

# T01-J05A2L [2007]

#### **Legal and Regulatory**

Includes legal services such as litigation and contracts as well as accountability and compliance with government regulations.

# T01-J05A2M [2011]

## **Marketing and Advertising**

Includes all off-line advertising and marketing aspects.

#### T01-J05A2N [2024]

# Business processes related to the Transportation industry

Includes vehicle sharing, ride hailing, etc. Details of vehicle rental, hiring and sharing systems are also coded under X22-U for motor vehicles and X21-U for electric vehicles.

# T01-J05A3 [2005]

#### **Tools for Government**

This code is intended for electronic public administration and management tools used by governmental bodies or agencies to implement government-to-citizen (G2C), government-to-business (G2B) and/or government-to-government (G2G) service(s). Includes commerce, voting/election, immigration, law enforcement, licensing, taxation, records management etc. See T01-N01A3 for on-line systems and T05-F for voting.

IRS, legislation, ID, social services, Citizenship

# T01-J05A4 [2024]

# Information processing for Agriculture, Fishing, Forestry and Mining

Includes information analysis or data storage related aspects of analysis on agriculture, fishing, forestry, mining.

# T01-J05B [1987]

## Data storage and retrieval, databases

Includes directory structures, filing, and storage, See T01-J10 also for image and pictorial data storage and accessing. For data recording see appropriate T03, W04 codes.

Database, file, directory, storage

#### T01-J05B1 [1992]

# **Content analysis and indexing**

Includes abstracting, linguistic processing, and thesauri.

T01-J05B2 [1992]

#### Storage

Includes directory, file organisation and record classification.

T01-J05B2A [1997]

Image filing/archiving

T01-J05B2B [1997]

# Data and directory structures

Includes hashing, tree structures.

T01-J05B2C [2007]

Metadata

T01-J05B3 [1992]

# Search and retrieval

Includes algorithms for reducing time required for searching large data bases e.g. clustering, query formulation, searching and selecting, Presentation of results. For on-line searching see T01-N03A2.

T01-J05B4 [1992]

#### **Database**

Includes current awareness, information networks, question-answering, fact retrieval, database.

T01-J05B4A [1997]

### Distributed databases, blockchains

Includes distributed ledger systems such as Blockchain.

T01-J05B4B [1997]

Relational database

T01-J05B4C [1997]

**Object-Oriented database** 

T01-J05B4D [1997]

**Deductive database** 

T01-J05B4F [1997]

Image and video databases

T01-J05B4M [1997]

#### **Database Management**

Includes database updating, version control, concurrency and access control.

T01-J05B4P [1997]

#### **Database Applications**

For database software applications or systems that use databases.

T01-J05B9 [1992]

Other

Data bank sharing, library automation

T01-J05C [1997]

Information analysis

T01-J06

Medical equipment and information systems

T01-J06A [1983]

#### Medical

See also S05 codes for electrical medical equipment in general. For initial diagnostic, S05-D06A. For continuous monitoring, S05-G02B2A. From 2005 see T01-N01E for on-line systems. For non-medical biological processing see T01-J13A only.

Diagnose, patient, biological, medical

# T01-J06A1 [1997]

#### **Medical information systems**

See also S05-G02G. For medical records, S05-G02G1. For administration including appointments, S05-G02G2. From 2005 see T01-N01E1 for on-line systems.

T01-J06B\* [1983-2001]

## For vehicle or missile guidance

\*This code is now discontinued, see T01-J07D from 2002, See X22-E06 for land vehicle on-board systems and W06-B01B1 and W06-C01B1 for aircraft and ship based systems. Navigation in general is covered by S02-B and W06-A codes.

Aircraft, flight, navigation, map, guide, course, track following, collision avoidance

# T01-J06B1\* [1997-2001]

## **Geographical Information Systems**

\*This code is now discontinued, see T01-J07D3A from 2002. For map generation see T01-J10C2A GPS

# T01-J07 [1983]

# For industrial process control

(T01-J09)

Manufacture, parameter, factory automation (FA)

# T01-J07A [1987]

#### Data collection/acquisition

See W05-D codes for measurement and control signal transmission systems.

Process variable, nuclear physics, meteorology

# T01-J07A1 [1997]

## Portable data input devices

See T01-M06A1 for portable computers.

# T01-J07A3 [1997]

# Multiple sensor data acquisition

# T01-J07B [1992]

# Computer control of manufacturing/industrial machines and Quality Control (QC)

Includes Computer-Aided Manufacture (CAM) and computerized robotics/mechatronics. See T01-J16 for Artificial Intelligence (AI), Fuzzy Logic, and Neural Network aspects. See also T06-A, T06-D and X25-A codes.

CAM, industrial robot, Industry 4.0

# T01-J07B1 [1997]

**Quality control** 

#### T01-J07B2 [2005]

#### Semiconductor manufacture control

This code covers aspects of semiconductor manufacture and cleaning processes. See also U11-C (especially U11-C15C).

# T01-J07B3 [2016]

# 3D / 4D printing / additive manufacturing

Includes control of machines used for 3D / 4D printing / additive manufacturing technologies such as Solid Freeform Fabrication (SFF), stereolithography, Laminated Object Manufacturing (LOM), and Fused Deposition Modelling (FDM). See also X25-A08 codes. For computer control and interfacing with printing devices such as inkjet or laser printers and plotters, see T01-C05.

# T01-J07C\* [1992-2001]

## Vehicle microprocessor systems

\*This code is now discontinued, see T01-J07D1 from 2002. Includes aerospace, shipping. See also T01-J06B and T06-B01 for vehicle guidance. See also X22 codes.

Heating system control

# T01-J07C1\* [1992-2001]

#### **Transmission**

\*This code is now discontinued, see T01-J07D1A from 2002. See also X22-G01 for vehicle transmission systems per se.

## T01-J07C2\* [1992-2001]

### **Multiplex control system**

\*This code is now discontinued, see T01-J07D1B from 2002. Vehicle multiplex systems per se are covered by X22-K, and signal transfer aspects in W05-D02 and W05-D07D.

#### T01-J07D [2002]

# Vehicle/Aircraft/Missile process control systems

(T01-J06B)

Includes microprocessor systems for aircraft, vehicles, and missiles. See X22 and W06 for aircraft and ship based systems. Navigation in general is covered by S02-B and W06-A codes.

Aircraft, flight

# T01-J07D1 [2002]

### Vehicle microprocessor systems

(T01-J07C)

Includes aerospace, shipping. See also T01-J06B (pre-2002), T01-J07D3 and T06-B01 for vehicle guidance. See also X22 codes and T01-J07C1 prior to 2002.

Heating system control

#### T01-J07D1A [2002]

#### **Transmission**

(T01-J07C1)

See also X22-G01 for vehicle transmission systems and T01-J07C2 prior 2002.

#### T01-J07D1B [2002]

# **Multiplex control systems**

(T01-J07C2)

Vehicle multiplex systems per se are covered by X22-K, and signal transfer aspects in W05-D02 and W05-D07D. See also T01-J07C2 prior 2002.

# T01-J07D3 [2002]

# For guidance

(T01-J06B)

See X22-E06 for land vehicle on-board systems and W06-B01B1 and W06-C01B1 for aircraft and ship based systems. Navigation in general is covered by S02-B and W06-A codes. Also see T01-J06B1 prior 2002

Aircraft, flight, navigation, map, guide, course, track following, collision avoidance

# T01-J07D3A [2002]

# **Geographical Information Systems**

(T01-J06B1)

For map generation see T01-J10C2A. *GPS* 

# T01-J08 [1983]

#### For electrical equipment

(T01-J09)

Computer-control, component, frequency, test, digital signal processors, DSP

#### T01-J08A [1992]

# **Equipment support processing**

This code is intended to highlight that a device uses a processing system when nothing is particularly novel about the processing system. Some applications have specific codes in T01 e.g. T01-J07D for vehicles or T01-J07B for industrial machinery, which should always be used in preference to this code. This does not apply to the sub-levels of this code (i.e. T01-J07D1 and T01-J08A2 could be used together to show a vehicle microprocessor system based around a DSP). *Microprocessor based system, ASIC* 

#### T01-J08A1 [1997]

Using external, general purpose computer e.g. Personal Computer

# T01-J08A2 [1997]

### **Using Digital Signal Processors**

Covers processor converting analogue signals to digital. See also U22-G codes.

DSP

# T01-J08A3 [2011]

#### For game machine

Includes all processing aspects of integrated game devices/machines. See also T05-H05E and W04-X02.

Pachinko machines, Arcade games, pinball game machines, etc

# T01-J08B [1992]

#### **Digital filters**

Corresponding math function in T01-J04B2. See also U22-G01 codes.

### T01-J08C [1992]

#### Communication controller

See T01-H07 for inter computer communication.

#### T01-J08F [1997]

# Testing or monitoring of equipment function and parameters

See T01-G for microprocessor and computer testing.

# T01-J08F1 [2006] Performance and data logging

T01-J08X [1992]

Other

T01-J09\* [1980-2011]

#### Other

\*This code is now discontinued. Includes multimedia up to 1996, see T01-J30 from 1997.

## T01-J10 [1987]

# For image processing

(T01-J09)

See also T04-D for image recognition and preprocessing, and under application in e.g. W04-P codes for video processing, respectively. Control of photographic film cameras is found in T01-J08A and S06-B.

## T01-J10A [1987]

**Image acquisition** 

T01-J10A1\* [1992-1996]

## **Data compression**

\*This code is now discontinued. See T01-J10D from 1997. Codes remain valid before 1997; see also T01-D02, T01-J10B for image compression prior to 1997.

# T01-J10A2 [1992]

#### Image memory management

Covers use of memory system for processing in conjunction with a data presentation/computer graphics system e.g. manipulating the address or contents of image or text information stored in memory. For display memory organisation and structure for storing an image and manipulating image data between the display memory and the display system see T01-C04. See also T01-J05B for information storage and retrieval.

#### T01-J10B [1987]

# **Image processing**

Covers digital image processing arrangements using a personal/mobile computer, e.g. image enhancement, analysis, objects processing, optical character recognition (OCR), edge detection, facsimile, and video. If processing is in peripheral or other device then see T04-D. T04-D07 can be applied to highlight applications. (T01-J10 and T04-D are only used together when the novelty does not describe how/when the processing is carried out). *Pel, pixel* 

## T01-J10B1 [1992]

### Image enhancement

Includes use of histogram, deblurring, noise filtering, edge detection, scratch removal and geometric correction.

#### T01-J10B2 [1992]

# **Image analysis**

Includes determination of characteristic parameters and scene analysis.

#### T01-J10B2A [2002]

#### For recognition

Includes character and image recognition, OCR, and object recognition.

Pattern recognition, mark recognition

T01-J10B3 [1992]

**Object processing** 

T01-J10B3A [1997]

Object enlargement, reduction and rotation

T01-J10B3B [1997]

Object colour processing and colour system conversion

T01-J10C [1987]

#### Image generation

Graphics, function generator, fractal image generation

T01-J10C1 [1992]

**Generating graphs** 

T01-J10C2 [1992]

Generating shapes, curves, lines

T01-J10C3 [1992]

#### In text

Includes form filling and format. Processing ideographic/pictographic languages and characters. Font generation and manipulation. *Graphic character representation* 

# T01-J10C4 [1992]

#### 3-dimensional

Includes solid modelling, mesh, surface determination, tessellation, voxel, and shading.

#### T01-J10C4A [1997]

### Virtual reality

Generating and displaying of virtual reality images.

T01-J10C4B [1997]

Computer tomography

T01-J10C5 [1992]

Stored modelling data, animation and graphic packages

Texture mapping

T01-J10C7 [1997]

# **Composite image formation**

Combining two or more objects or images.

T01-J10C9 [1992]

#### Other

'Painting systems'

#### T01-J10D [1997]

#### Image digitisation/coding/compression

See T01-J10A1 and T01-J10B prior to 1997. See also T01-D02.

# T01-J10E [1997]

#### **Image storage**

(T01-J05B, T01-J10A2)

Image filing and archiving. See T01-J10A2 for image memory management. See also T01-J05B2A for image filing, and T01-J05B4F for image and video databases. Also includes video storage.

# T01-J10G [1992]

# **Applications**

Includes film, TV, tomography, robotic eye, facsimile, automatic focussing image processing.

# T01-J10X [1992]

#### Other

See T01-H07C3B between 1997 and 2002. See T01-N01D1B post 2002.

#### T01-J11 [1992]

#### **Productivity Tools and Applications**

Includes WYSIWYG, typesetting and editing.

# T01-J11A [1992]

Word processing (WP)

#### T01-J11A1 [1997]

Spelling/dictionary, grammar-checking, parsing

#### T01-J11B [1992]

# Desk top publishing (DTP)

(T01-J09)

Ventura®, PageMaker®, QuarkXpress®

#### T01-J11C [1997]

#### **Electronic and intranet documentation**

See T01-N03B2 for on-line aspects.

# T01-J11C1 [1997]

# Using Mark-up languages and navigating documents using hypertext

Includes page description languages. HTML, SGML, XML

#### T01-J11C2 [1997]

**Help documentation** 

#### T01-J11C3 [2007]

# Parsing markup language documents

# T01-J11D [1997]

# **Document delivery system and office automation**

#### T01-J11E [2005]

#### **Presentation Software**

Presentation software, includes multimedia presentation software, see also T01-J30 and W04-W.

PowerPoint ®

# T01-J11F [2005]

# Organiser/scheduler

See also T01-J05A2B for business schedule organising. See T01-N03A3 for networked aspects. *Calendar* 

## T01-J11G [1997]

**Spreadsheets** 

#### T01-J12 [1992]

# Program management, GUI/WIMPS/HCI

Covers software and processing aspect of interactive operator interface windows applications security, and pull down menus.

### T01-J12A [1992]

**Prompting** 

#### T01-J12B [1992]

#### Window/split screen

Includes menu driven system where options are presented for selection by user. See also T01-C02 for means of selection.

Menu driven, front of screen

#### T01-J12B1 [1997]

# User interface management system

#### T01-J12C [1992]

#### Security

(T01-X)

Preventing unauthorised access to files and processing systems such as anti-hacking and copy protection; electronic security systems for computers. See also T01-H01C2 for illegal memory access prevention.

#### T01-J12C1 [2006]

#### **Authentication**

See also W04-V04A3 for voice authentication.

[2006]

# T01-J12C1A

## **Using Password**

Covers password systems for gaining access to computer system. See T01-N02B1B for network based password systems.

# T01-J12C1B [2006]

#### **Using Biometrics**

Covers biometric systems for gaining access to computer system. See T01-N02B1H for network based biometric systems. See also T04-D07F for biometric image recognition and S05-D01C5A for measuring systems.

# T01-J12C2 [2006] Security System Administration

# T01-J12D [1992]

## Icons, Widgets

Covers use of graphic object displayed as a symbolic reference for a process or file which may be selected by user. Includes cursor and pointer manipulation. See also T01-J10C.

## T01-J13 [2005]

# Scientific analysis

Processing systems used to support scientific analysis. See S03 for analysis acquisition systems.

# T01-J13A [2005]

# **Biological analysis**

Biological analysis includes DNA analysis and other biological systems. See also T01-J06A for medical applications.

# T01-J14 [1992]

## Language translation

See T01-J16C3 for intelligent natural language processing.

#### T01-J15 [1987]

# Computer-aided design (CAD) and simulation

Includes computer modeling and simulators. See also T01-J10C for image generation, and T01-E04 for random number generation. For Computeraided manufacturing (CAM) see T01-J07B.

Netlist, net library

#### T01-J15A [1987]

# Design and simulation of electrical circuits and hardware

See also U11 or V04. Includes CAD systems for mask design.

T01-J15A1 [1987]

Logic circuit, CPU design

T01-J15A2 [1987]

Wiring layout, PCB's, integrated circuits

# T01-J15A3 [1992]

# Computer simulation of electrical and electronic circuits

(T01-J15A1)

Includes use of graph models, petri net and analog modelling.

GPSS, SPICE, VHDL, Computer timing analysis

## T01-J15A4 [1992]

## **Network design**

Includes positioning and routing.

#### T01-J15B [1997]

#### **Design verification**

Includes fault finding techniques.

## T01-J15H [1997]

## Simulation of non-electronic systems

Includes simulation of e.g. thermodynamics and weather systems, and also includes electrical systems not covered by T01-J15A/B codes. See also T01-J04E for mathematical modeling.

# T01-J15X [1987]

# **CAD for non-electronic applications**

Computer-aided design (CAD) for all applications (including electrical systems) not covered by T01-J15A/B codes.

### T01-J16 [1992]

#### Artificial intelligence (AI)

(T01-J09)

Covers knowledge processing, inexact reasoning e.g. fuzzy logic.

Chatbot

# T01-J16A [1992]

# **Expert systems**

Comprising a system of an integrated collection of facts and relationships, including knowledge base and table searching, question and answering. Includes knowledge base, rule base and table searching.

Teiresias, rulebase

#### T01-J16B [1992]

#### **Fuzzy logic systems**

Includes circuits for performing logic with more than two levels e.g. non-binary or analog logic systems. See also T02-A04B6 for hardware details, and U21-C03B1B for logic circuits. For implementation details search appropriate codes, e.g. X22-A03K for vehicle engine control using fuzzy logic.

# T01-J16C [1992]

## **Knowledge processing**

Forward chaining

# T01-J16C1 [1992]

#### **Neural networks**

Includes the use of parallel distributed processing elements constructed in hardware or simulated in software. For implementation details search appropriate codes, e.g. T06-A05A for neural network based control systems. For analogue aspects and implementations see T02-A04A5. SPANN (sequence processing artificial neural network)

# T01-J16C2 [1992]

# Learning

Includes use of a specific method or system to adjust the rules, i.e. connection weights, e.g. concept learning algorithm.

#### T01-J16C3 [1992]

# Natural and pictorial language processing

Includes where presentation of data to the user includes non-verbal representations or symbol, or statements in standard English language syntax. Non intelligent language translation is covered by T01-J14.

Semantics, abstracting concepts, phrases

# T01-J16C4 [1992]

# **Genetic algorithms**

Includes creating new solutions by dividing and splicing the old and determining the fitness of the new. Also includes artificial life. Duplicating the laws of nature e.g. inheritance and evolution.

## T01-J16C6 [1997]

#### Intelligent searching

Includes heuristics, hill climbing, depth first and breadth first searching, simulated annealing, travelling salesman etc.

T01-J16C9 [1992]

Other Al

T01-J17 [1992]

#### **Digital function generators**

(T01-X)

Trigonometric, Look-up table

# T01-J18 [1997]

## Computer processing for speech/audio

(T01-C08A, T01-J08, T01-J09)

# T01-J20 [1987]

#### Software development

Covers only software programming techniques and production / compilation / debug aids. For software implementations search T01-J, T01-N codes e.g. T01-J12B for windowing software, T01-N03B for Internet constructional software. For program code patents see T01-S.

#### T01-J20A [1992]

### **Programming techniques**

Includes functional, automatic, computergenerated, concurrent, sequential, object-oriented, procedural and network programming. For Object-based systems see T01-F07. For Object-oriented database see T01-J05B4C.

Object orientated programming (OOP), architecture neutral/dependent distribution format (ANDF),(ADDF)

#### T01-J20B [1992]

# Software Development Tools, Systems Analysis

Languages, methodologies, Development environment, Systems analysis.

Structured, top-down, work bench SSADM

## T01-J20B1 [1997]

### Software Development Kit

Integrated Development Environment.
Programming Tools. API for software development only. For use of API in program execution see T01-F05A. Program Compilers and Assemblers.
Software source code libraries. For dynamic link libraries (DLLs) see T01-F05A.

# API, code libraries, code text editors T01-J20B2 [1997]

# **Systems Analysis, Documentation**

Systems Analysis and Design, Specifications, Source code development version management. From 2007, for version management of other software e.g. BIOS, embedded software, application package, network security software see T01-F05B2, T01-N02B1E, T01-N02B3 as appropriate.

# T01-J20B2A [1997]

## **Software registration and Anti-piracy**

For incorporation of Software registration and Anti-Piracy coding mechanisms at development stage of software. See T01-J20X before 1997. See T01-J05A2G, T01-N01A2G for Intellectual Property and Copyright management.

Software protection

# T01-J20C [1992]

# Software Test, Verification, Debug, Optimization

(T01-G09)

Software test, verification and debug within and without Integrated Development Environment. Test data generation. Quality Assurance. Optimization of source code. Software simulation.

Beta-testing, debug, test case simulation

### T01-J20D [1992]

# Anti-Virus and Security program development

Development of Anti-Virus, Anti-Spyware programs. Analysis of Virus signatures. From 2007, see T01-N02B3 for applications of Anti-Virus software.

Virus signature analysis

# T01-J20X [1992]

#### Other software details

For Software copyright protection see T01-J20B2 from 1997 - 2006, and T01-J20B2A from 2007.

# T01-J21 [2006]

# Non-vehicle navigation

For vehicle guidance see T01-J07D3, covers all other guidance systems. See also S02-B08.

# T01-J21A [2006]

# **Geographical information systems**

Includes updating or displaying geographical information.

# T01-J21B [2006]

#### **Position fixing**

Processing details used to fix position of user, see also W01/W02 for communication system position fixing and W06 for position fixing in general.

# T01-J21C [2006]

**Route planning** 

## T01-J30 [1997]

## **Multimedia computer systems**

For details of media systems see W03-G03C1. See T01-J09, T01-J10 prior to 1997.

# T01-J30A [2002]

#### **Educational aids**

Includes use of multimedia systems for education and training purposes, CAI, tuition support systems, and student. Educational equipment is also assigned W04-W codes, also see T01-P01 prior to 2002. From 2005 see T01-N01B codes for on-line systems.

# T01-J30B [2002]

#### For computer games

See W04-X02C for video games, and T01-J10C for image generation aspects, see T01-P02A prior to 2002.

# T01-J30B1 [2002]

# For toys and novelties

See T01-P02 prior to 2002.

# T01-J30C [2005]

### **Media Players**

Includes computer-based media players that are not browser based for playing CDs, DVD's (see also T01-H01B), videos and audio files. See also T01-N03A1B for on-line systems and W04 for media.

Windows® Media Player, iTunes®

#### T01-J30D [2005]

# Computer processing for sports and training equipment

Covers use of digital computing in sports and exercise equipment. See also W04.

# T01-J30E [2006]

E-book reader software

#### T01-J30F [2006]

### Image/Video/Audio editing software

See T01-J12 for GUI aspects and W04 for details of image/video/audio being edited.

#### T01-J31 [2011]

# Computer processing for physically handicapped persons

Includes processing equipment for blind, dumb etc.

# T01-J40 [1997]

# Virtual reality systems

(T01-J10C4, T01-J10C9)

#### T01-J40A [2002]

#### **Games**

(T01-J10C4, T01-J10C9, T01-J40) Search T01-J40 together with T01-P02A to prior to 2002.

# T01-J40B [2002]

## **Training/Sports Aids Equipment**

(T01-P02B, T01-J40)

See also W04-X01 codes for electrical aspects of sports equipment in general, search T01-J40 together with T01-P02B to prior to 2002.

# T01-J40C [2006]

## **Augmented reality systems**

Combining virtual reality displays with real world views allowing a user to see both at the same time. See also T01-J10C codes for image generation aspects. See also W04-W07E codes for virtual reality in general, as well other W04 codes for virtual reality and display aspects, e.g. W04-Q01K for head up displays.

# T01-J40D [2022]

## Mixed reality systems

This code covers details of devices or systems which are used for merging of real world and virtual world environments.

#### T01-J45 [2012]

# For evaluating software application or package

Covers evaluating the performance and load testing of a software application using a framework or by a CPLI

# T01-J50 [2012]

#### **Trial period software**

Includes software intended to be used for a defined period of time, search together other T01-J or T01-N codes for type of software

# T01-K [1983]

## Clock signal generation/distribution

(T01-X)

See also U22 codes for clock generators and distributors, e.g. U22-A04A2 and U22-D06 respectively.

Oscillator, synchronisation, timing

# T01-K01 [1997]

# Varying clock rate/frequency

(T01-K)

Clock generators with variable or programmable frequency, e.g. for slowing/increasing clock frequency.

Programmable frequency, variable clock rate

# T01-L [1987]

# Computer equipment details

(T01-X)

#### T01-L01 [1987]

#### Power supplies, stand-by arrangements

Mains supply are covered by U24-D and E and X12-H and J. See X16 for battery systems and X15 for solar power/renewable resources.

Back-up, automatic switching, regulator, stabiliser

### T01-L01A [2005]

#### **Primary power supply**

Note that for portable devices the battery is the primary power source and would be coded here (as well as T01-M06A1).

#### T01-L01B [2005]

### **Back-up power supply**

UPS, battery back up

# T01-L01C [2011]

# **Solar power supply**

See also X125 for details of solar power system.

#### T01-L01D [2021]

#### Wireless power charging

See also U24-H02 for general low power noncontact power distribution aspects and X12-H01E for higher power levels. Non-contact battery charging in general is covered by X16-G03.

# T01-L02 [1987]

# **Constructional details**

See V04-T for constructional details of electronic appts. in general.

Stand, support

# T01-L02A [1997]

## **Cooling and ventilation**

(T01-L02)

Includes electrical and mechanical cooling and ventilation systems for computer equipment, including data centre facilities. See also T01-G11B for temperature measurement and control aspects, and V04-T03 for electronic equipment cooling and heating arrangements in general.

## T01-L02B [1997]

# Housing

(T01-L02)

Includes peripheral installations in computer housings e.g. internal drives, trackballs etc. See also V04-S codes.

Housing, casing, cabinet

# T01-L02C [1997]

# **PCB** mounting

(T01-L02)

For mounting of PCBs in computer housing and devices being mounted on the PCB. See V04-T02 for PCB racking.

Racking, PCB, mounting

## T01-L02D [1997]

# **EM** shielding

(T01-L02)

See V04-U for EMI shielding.

# T01-L02E [2002]

#### **Prevention of theft**

Includes devices which prevent the theft of computer equipment.

# T01-L02F [2006]

# Computer system acoustic noise reduction

Includes noise reduction for forced cooling (e.g. fans and liquid cooling pumps etc).

#### T01-L02G [2011]

# **Shock-proof and absorption**

Includes proofing against earthquakes, etc. Search together with other T01-L codes as appropriate (e.g. T01-L02B for shock absorber in housing)

#### T01-L03 [2005]

#### Connectors, cables and wiring

Includes cables, wiring, etc. for computers. Prior to 2005 see T01-L09. See also V04 (particularly V04-M30E) and X12.

Connector, computer cable, wiring

# T01-L09 [1987]

#### Other

From 2005 see T01-L03 for connectors.

# T01-M [1992]

# Computer/processing architecture

These codes are used for novel architectures, and in conjunction with other T01 codes as additional descriptive detail or as a more general description. See T02 for analogue or hybrid systems. For computer systems using redundancy, see T01-G03 and T01-G05B codes.

## T01-M01 [1992]

## Single processor computer units

Covers processor arrangements where instructions are received from an external source. See T01-M05 for pre-programmed architectures.

Microprocessor, CPU

# T01-M02 [1992]

## **Multiprocessor systems**

(T01-J02)

Covers use of multiple processors to process logically- or functionally-divided jobs or tasks, and to execute programs or program segments concurrently, asynchronously or simultaneously. Multi-tasking is covered by T01-F02 codes.

Master-slave

#### T01-M02A [1992]

#### Distributed

(T01-J02A)

Covers use of separate computers that are linked through communications network to process task/job.

Plain, true, distributed

## T01-M02A1 [1992]

## Computer networks

Computer network interfacing is covered by T01-C03A. Inter-computer communication is covered by T01-H07C. See also W01-A06 codes for network details and networks in general.

LAN, WAN

## T01-M02A1A [1997]

#### **Network-only computers**

(T01-M02A1)

Includes computers designed to operate using software accessed via a network e.g. Internet. Internet, network computer, network terminal

# T01-M02A1B [1997]

#### **Client-server systems**

(T01-M02A)

Covers architecture details of Client-Server systems. Computer networks in general are covered by W01-A06 codes. Data communication within Client-Server Networks are covered by T01-N02A2C. Use of servers is coded in T01-N02A3C.

Client-server, back-end, front-end

#### T01-M02A1C [1997]

#### Internetworking

Covers architectural details of internetworking systems such as the Internet, 'Internet-of-Things', WANs and the associated interconnection details. See also W01-A06B7 for Internets, W01-A06G for interconnection details and T01-N02A2 for communication details.

Internet, intranet, WAN, LAN

# T01-M02B [1992]

# Cooperative

(T01-J02B)

# T01-M02C [1992]

## Parallel/array

(T01-J02C)

Computer architectures designed to carry out multiple arithmetic operations simultaneously or concurrently.

Systolic, hypercube

#### T01-M02C1 [1992]

# Characterised by instruction/data relationship

Architectures classified by the presence of single or multiple streams of instructions and data.

SIMD (single instruction multiple data), SISD (single instruction single data), MIMD (multiple instruction multiple data), MISD (multiple instruction single data)

### T01-M02C2 [1992]

#### Pipeline/vector computers

Instruction pipelining is covered by T01-F03B.

# T01-M02C3 [2005]

# **Superscalar computers**

For processors that execute multiple scalar operations in parallel. Includes Very Long Instruction Word processors. See T01-M02C prior to 2005

VLIW, 2nd Generation RISC, Trace Scheduling

# T01-M02D [1997]

# Master-slave systems

(T01-M02) Master-slave

# T01-M03 [1992]

#### Data/demand driven

Architectures for executing only executable code components required to provide requested data.

# T01-M04 [1992]

#### **Reduced instruction set computers**

See T01-F03B for pipelined execution of machine instructions.

RISC

## T01-M05 [1992]

## **General microcomputing architectures**

(T01-J)

Covers processor arrangements where instructions are pre-programmed or hardwired into the processor before processing is carried out. See also T01-F06 for program arrangements.

**ASIC** 

## T01-M06 [1992]

#### Characterised by type

#### T01-M06A [1992]

#### Mini/micro/PC

(T01-X)

Covers personal computers. For use as descriptive code with other T01 codes.

#### T01-M06A1 [1992]

#### **Portable**

Includes laptop, notebook, hand-held and calculator. For processing aspect of calculator see also T01-J01.

# T01-M06A1A [1997]

### Hand-held; Tablet computers

(T01-M06A1)

For mobile telephones with computer functionality see W01. Pre-1997, search T01-J01, T01-J05, T01-J09, T01-M06A1.

iPad™

# T01-M06A1B [1997]

## **Docking stations**

(T01-M06A)

# T01-M06A1C [2006]

#### E-book reader hardware

Hardware specifically for displaying E-books. Includes details of screens, controls and design intended to simulate a conventional paper book. See also T01-N01B5 for online aspects, U14 for novel display aspects T01-M06A1A, T01-L02B, V04 for novel casings.

E-book reader

# T01-M06A1D [2006]

# Wearable computers

Includes 'smartwatches' and other computer devices used for applications such as fitness tracking and health monitoring. For physiological measurements search with S05-D01 codes and for performance-related measurements during sports or fitness training search with W04-X01A1.

# T01-M06A3 [1997]

#### **Desktop/mini-tower**

(T01-M06A)

#### T01-M06A5 [2006]

#### Consoles

This code covers computer systems designed as one self-contained unit, e.g. video game console.

#### T01-M06A9 [1992]

# Other (personal computer types)

## T01-M06B [1992]

### **Mainframes**

(T01-X)

Covers systems handling large base of time-sharing terminal users.

### T01-M06C [1992]

#### **Supercomputers**

(T01-X)

# T01-M06D [1992]

# **Optical systems**

See also T01-E05A for digital optical processing elements, and T02-A03 for analogue and hybrid optical processing elements.

# T01-M06E [1992]

#### **Superconductor systems**

(T01-X)

See also T01-E05C for superconducting elements. See also U14-F02 codes.

# T01-M06Q [2005]

#### **Quantum Systems**

Using quantum devices for processing. Prior to 2005 see T01-M06C/X. See T01-E05Q for processing systems using quantum mechanics. *Quantum well gate* 

# T01-M06S [2005]

#### Servers

Covers architecture and construction of servers. Use of servers in computer networks is covered in T01-N02A3C, client-server systems communications in T01-N02A2C and architecture of client-server systems in T01-M02A1B. Constructional details are also coded in T01-L section.

# T01-M06X [1992]

Other (computer types)

# T01-M09 [1992]

#### Other (inc. virtual machines)

Virtual machines are also coded in T01-F05. See also T01-F05G3 for virtual systems, and T01-F02 for multiprogramming.

Emulation

#### T01-N [2002]

# Internet and information transfer

(T01-H07C)

# T01-N01 [2002]

### **Applications**

Documents describing specific applications of network communication and Internet systems.

# T01-N01A [2002]

#### Financial/Business

Includes Internet banking, billing, point of sale (POS) and metering, see T01-J05A1 and T01-H07C5E prior to 2002.

# T01-N01A1 [2002]

#### Financial technology systems

Includes 'FinTech', cryptocurrency, electronic payment systems e.g. Near-Field Communication (NFC), Internet banking, billing, point of sale (POS) and metering (T01-J05A1 and T01-H07C5E prior to 2002). See also T05-L for POS systems in general. FinTech, bitcoin, altcoin, Ethereum, electronic funds transfer (EFT), digital wallet

# T01-N01A2 [2002]

#### **Internet Business models**

Includes Business Models for the Internet, See T01-J05A and T01-H07C5E prior 2002, and T01-J05A2 for non-Internet related Business models.

#### T01-N01A2A [2002]

# E-shop, e-auction, e-mall, and e-services

Includes On-line ordering, transactions of goods and services, and virtual market place, See T01-J05A together with T01-H07C5E prior to 2002. *On-line shopping, auction, e-commerce* 

## T01-N01A2B [2002]

## **E-procurement**

Includes seeking suppliers, electronic tendering. See T01-J05A2 together with T01-H07C5E prior to 2002.

## T01-N01A2C [2002]

## **Advertising and Marketing**

Includes network based systems such as web marketing, common marketing, consumer buying habits, feedback and banner advertising. See also T01-N01A1 and T05-L02 if involving financial incentives (coupons) and W05-E03E for display aspects.

# T01-N01A2D [2002]

#### Social media / virtual communities

Includes social media discussion forums and message posting. See also T01-N03A1C for messaging applications. Prior to 2002 see T01-J05A and T01-H07C5E.

Facebook™, Twitter™

## T01-N01A2E [2002]

# Value chain service providers and Integrators

Includes logistics, production management, web based shipping support, web hosting and integrated on-line management.

# T01-N01A2F [2002]

# **Information Brokerage**

Includes financial advice, consultancy, stock/commodities/futures market monitoring/trading (see also T01-N01A1 and T05-L02 for trading). See T01-J05A2 with T01-H07C5E prior to 2002.

On-line broker

# T01-N01A2G [2005]

# On-line Intellectual Property (IP) and Copyright management

See T01-J05A2G for off-line systems including protecting copyright of downloaded files. See also W04 for audio/video aspects.

#### T01-N01A2H [2005]

#### **On-line Personnel Management**

Includes internal business administration, performance management, payroll, pensions, benefits, recruitment, career development, etc. See T01-J05A2H for offline personnel management.

#### T01-N01A2J [2005]

# On-line insurance and risk analysis

Includes on-line processing and assessing insurance claims, evaluation of risk factors in a loan determination.

### T01-N01A2L [2007]

# **Legal and Regulatory**

Includes legal services e.g. litigation, contracts, accountability and compliance with government regulations.

# T01-N01A2M [2010]

### Carbon trading

Covers emissions trading, pre-2010 see T01-N01A2F.

Cap and trade, Kyoto protocol

# T01-N01A3 [2005]

#### **E-Government**

For network-based electronic public administration and management tools used by governmental bodies or agencies to implement government-to-citizen (G2C), government-to-business (G2B) and/or government-to-government (G2G) service(s). Includes commerce, e-voting, immigration, law enforcement, licensing, taxation, records management, environmental, social and governance (ESG), sustainable development goals (SDG) etc. See T01-J05A3 for off-line systems and T05-F for voting.

E-Gov, G2C, G2B, G2G, ESG, SDG, E-voting

## T01-N01A4 [2007]

#### On-line non-profit organization

Includes charities.

#### T01-N01B [2002]

# Education, information and entertainment

From 2005 includes on-line educational systems. Prior to 2002 see T01-H07C together with T01-H07C5E.

# T01-N01B1 [2002]

#### Gaming

Includes network, on-line gaming, cloud gaming and on-line gambling (see also T01-N01A1, T01-N01D3, T05-L02 and W04). See T01-H07C3B, T01-H07C3D and T01-H07C5E prior to 2002. See T01-J30 for off-line systems.

Internet gaming, MUD, multi user dungeon, MMOG, MMORPG, massive multi-user on-line game

## T01-N01B2 [2002]

#### **Chat rooms**

See T01-H07C3D together with T01-H07C5E prior 2002.

# T01-N01B3 [2005]

#### **On-line Education**

Covers Educational systems using a computer network and use of computer networks in an educational environment. See T01-J30A together with T01-N01D prior to 2005. See also T01-N01A2D for virtual classrooms, etc.

## T01-N01B3A [2005]

## Remote examination/testing

# T01-N01B4 [2005]

#### **News systems**

Covers on-line systems for news updates including e-mail subscription services (together with T01-N01C).

#### T01-N01B5 [2006]

#### E-books

Documents describing E-book (electronic book) per say including file format aspects see also T01-N01A2G for copyright control aspects T01-J11C for electronic documents in general.

E-book. Electronic book

# T01-N01B9 [2002]

# Other internet education, information and entertainment

# T01-N01C [2002]

#### E-mail

Includes electronic mail for use by computer systems connected to a network. Facsimile services are covered by S06 codes, telex systems by W02 codes and message switched networks by W01-A codes. See also W01-A06E1, W01-A06G2, and W01-A06X.

Computerised voice mail

# T01-N01D [2002]

#### **Data Transfer**

Includes downloading file from remote site (FTP). See T01-H07C3 and T01-H07C5E prior to 2002.

### T01-N01D1 [2002]

#### Multimedia

(T01-J09, T01-H07C3D)

Combination of text, data, image, sound, or computer programs. Audio/video aspects of multimedia systems are also assigned W04-K10. See T01-H07C3D prior to 2002.

## T01-N01D1A [2002]

# Audio, sound transfer

See T01-H07C3A prior to 2002. *Internet radio* 

# T01-N01D1B [2002]

## Video and Image transfer

(T01-H07C3B)

Includes computerised video conferencing. See T01-H07C3B and T01-H07C5E prior to 2002. See also W01-A06E1A for data conferencing and broadcasting and W02-F01E3 interactive Internet broadcasting.

JPEG, MPEG

#### T01-N01D2 [2002]

#### File Transfer

(T01-H07C3C)

For transfer of files other than multimedia. Includes downloading non-internet executable programs, as well as web page transfer. Includes the transfer of Instant Message (IM) data between users in real time.

WWW, URL

#### T01-N01D3 [2002]

#### From remote site or server

(T01-H07C3E)

Includes networks where applications are run on server under the control of a client system. See T01-H07C3E prior to 2002.

Applet, Java, thin-client

# T01-N01D3A [2012]

# Cloud computing services

Includes network systems where applications are run using a virtual system from remote locations, such as Software as a Service (SaaS), Infrastructure as a Service (IaaS).

Cloud Computing, Citrix <sup>®</sup>, Virtualization, Virtual Desktop

# T01-N01D4 [2005]

#### **Network File Caching**

For storage of regularly accessed files such as web graphics. See also T01-N02A3C for server based caching, T01-N03A1 for browser based caching, see also T01-H03A before 2005.

# T01-N01D5 [2006]

Multicasting

# T01-N01E [2005]

#### **On-line Medicine**

See also S05 codes for electrical medical equipment in general. For initial diagnostic, S05-D06A. For continuing monitoring, S05-G02B2A. From 2005 see T01-N01E for on-line systems. For drug delivery/ordering systems see also T01-N01A2 codes.

#### T01-N01E1 [2005]

### **On-line Medical information systems**

See also S05-G02G. For medical records, S05-G02G1. For administration including appointments, S05-G02G2.

### T01-N01F [2017]

## **Internet of Things**

Interconnection / Internetworking of computers, devices and systems used in applications such as home automation (see also X27-V), smart grids. For cellular IoT technology such as 5G wireless network-based systems see W05-D06 codes.

# T01-N02 [2002]

# **Communications and Control**

(T01-H07C5A)

See T01-H07C3A prior to 2002.

See T01-J08C for communication controllers and W01-A06 for data transmission systems in general

# T01-N02A [2002]

## Communication

Includes computer communications within a network.

# T01-N02A1 [2002]

# **Communication Protocol**

(T01-H07P, T01-H07C)

Covers novel aspects of TCP/IP and novel uses of other protocol types for transfer over a network. See also W01-A06F for protocols in general and W01-A06F2 for network protocols. See T01-H07P prior to 2002, T01-H07C prior to 1997. Bus transfer protocols are found in T01-H07B.

# T01-N02A1A [2005]

#### Addressing

Covers network addressing as opposed to routing. For setting and determining destination of packets, not route that they will travel. Includes Domain Name System (DNS), network identification and Universal Resource Locators (URLs). See also W01-A06F2.

IP address

# T01-N02A1B [2005]

## Ad-hoc network systems

Includes setting up dynamic networks. See also under application, e.g. T01-N01B2 for chat rooms, T01-N01A2C for advertising. See also W01 for network codes, e.g. W01-A06C4A for Bluetooth network or W01-A07H2A for Bluetooth interface. ProximityMail<sup>TM</sup>, BluePing<sup>TM</sup>, 'on the fly' wireless network, relay area network, RAN, localised community messaging network.

# T01-N02A2 [2002]

#### **Network Communication**

(T01-H07C5A, T01-H07P)

For communications between computers in a network, see T01-H07C5A and T01-H07P prior to 2002.

### T01-N02A2A [2002]

#### LAN

(T01-H07C5C)

Includes computer communication over a private network i.e. interconnected distributed communities of computer based data terminals within a single building or a localised group of buildings. See T01-H07C5C prior to 2002, and also see W01.

Intranet, local area network

# T01-N02A2B [2002]

#### WAN

(T01-H07C5E)

Includes computer communication over a public network i.e. networks which link computers, data terminals or Local Area Networks which are physically located in different locations or establishments, also see T01-H07C5E prior to 2002 and see W01.

Internet, wide area network, Gateway, PSTN, TCP/IP

#### T01-N02A2C [2002]

# **Client/Server systems**

(T01-H07C5S)

Includes computer communication using a client/server relationship, see T01-H07C5S prior to 2002.

# T01-N02A2D [2005]

#### SAN

Code covers storage area networks. See also T01-H01B codes for storage media type, T01-N02B codes for access and W01-A06B5B for network aspects.

#### T01-N02A2E [2005]

#### Peer-to-peer networks

Covers network communication between stations without using a central server. See also W01-A06B8C and W01-A06E2B.

Viral network, p2p

## T01-N02A2X [2002]

### Other Network communication system

Includes other types of computer communications not already covered in T01-N02A2.

## T01-N02A3 [2002]

#### **Hardware**

Includes physical hardware such as computers and servers used for accessing a network, see T01-H07C5S prior to 2002.

#### T01-N02A3A [2002]

# Dedicated systems for accessing the Internet e.g. set top box

Includes systems designed specifically for accessing the Internet, also see W04.

## T01-N02A3B [2002]

### Computer based routing

(T01-H07C5A)

Includes routing and management of network traffic, also see W01 and see T01-H07C5A prior to 2002.

#### T01-N02A3C [2002]

#### Servers

Includes processing performed on the server and claimed server devices, see T01-M06S for architecture and construction (along with T01-L). See T01-H07C5S prior to 2002.

## T01-N02B [2002]

#### Control

Includes control of computer software.

# T01-N02B1 [2002]

#### **Access and Control**

Includes control of access to file and folders. *Permissions, access control list, ISP* 

# T01-N02B1A [2002]

## File management and access, databases

Includes watermarking (see also T01-D02A from 2005), hashing e.g. for blockchain / distributed ledger systems (see also T01-E04) and digital certificates for file authentication. See also T01-N01D (for file transfer) and T01-J05B (for data storage and retrieval, databases).

Hash values, digital certificates

## T01-N02B1B [2002]

# **User Privileges/Password systems**

Includes access file/folders and restricted areas using a password, see T01-J12C prior to 2002. Security, login, Permissions, access control list

# T01-N02B1C [2005]

# **Unsolicited Advertising Protection**

Includes spam and pop up protection, see also T01-N01C for e-mail.

Spyware, adware, browser hijack

# T01-N02B1D [2005]

#### **Firewalls**

Includes devices or software for controlling access to network data or resources from external network connections and for controlling access to external network resources or data by internal network clients.

Firewall, intrusion detection, port forwarding, port blocking, NAT, Stateful packet inspection

# T01-N02B1E [2006]

# **Network operating system management**

Management of network operating systems. Installation and/or updating of software involving transmission over network. For network security software updates see T01-N02B3.

Automatic software updates

T01-N02B1F [2006]

Internet portals

T01-N02B1G [2006]

Internet gateway

# T01-N02B1H [2006]

### **Biometric authentication**

Covers biometric authentication for computer networks. See T01-J12C1B for off-line systems. See also T04-D07F for biometric image recognition and S05-D01C5A for measurement systems.

# T01-N02B2 [2002]

## Monitoring

Includes monitoring computer/network communications and hardware. Prior to 2002 see T01-H07C5A.

#### T01-N02B2A [2002]

#### **User monitoring**

Includes monitoring user(s) activity on computers and networks.

Cookie

#### T01-N02B2B [2002]

#### System and Fault monitoring

Includes monitoring systems which are used to monitor computer hardware operation, log events, report failures also, on-line(internet-based) monitoring and on-line diagnosis of any electronic system, see T01-H07C5A prior to 2002. For monitoring of electrical appliances over the internet see T01-N01D and W05.

Event monitor, system log, event viewer

#### T01-N02B2C [2005]

## **Transmitted content analysis**

Monitoring contents of transmitted files, including emails

Packet sniffing, chat room monitoring

# T01-N02B3 [2006]

#### Network security, anti-malware

Anti-Virus, Anti-Spyware Software applications. Testing server security and setting updates for security programs. For security program update via network transmission see T01-N02B1E. Before 2007 see T01-J20D for Anti-Virus software applications.

Anti-Virus, Anti-Spyware, Trojan, Worm, Hacking

# T01-N02B5 [2006]

#### Web site management

Incorporation of multimedia content in websites. Changing content viewed by different visitors to site.

# T01-N03 [2002]

#### **Internet Software**

Search together with T01-S03.

# T01-N03A [2002]

#### **User Applications**

# T01-N03A1 [2002]

#### Browsers, apps

Includes browsers and other applications (apps) which enable users to interface with internet content. See T01-J12B prior to 2002. See T01-J12B1 for user interface management details.

Internet Explorer<sup>TM</sup>, Netscape<sup>TM</sup>, Safari<sup>®</sup>, Chrome<sup>®</sup>

### T01-N03A1A [2002]

# **Content management/Parental control**

Includes controlling the content viewed using a browser.

Net nanny

# T01-N03A1B [2002]

# Media players

Includes software which allows multimedia content/information to be viewed/played. Real player $^{\text{TM}}$ 

# T01-N03A1C [2002]

# Messaging/chat applications

Includes pop-up messaging/chat windows. See also T01-N01A2D for social media in general.

WhatsApp™, ICQ, emoji

#### T01-N03A2 [2002]

#### **Search Engines and Searching**

Pre-2002, search with T01-J05B3 and T01-H07C5E.

#### T01-N03A3 [2005]

# Meeting co-ordination and organiser/calendar applications

Covers applications to arrange meetings with groups of people through software. Covers a personal calendar application linked to an email program. See T01-J11E for off-line see also T01-N01C email.

Microsoft Outlook®, MS Teams®, Lotus Notes®

# T01-N03B [2002]

#### **Constructional Software**

Includes software used to design websites / webpages.

## T01-N03B1 [2002]

#### Internet executable programs

Includes executable programs e.g. applets, which enable viewing of content. Covers only novel aspects - see T01-N01D3 or T01-N03A1 for applications.

Applet, Flash™, Java bean

# T01-N03B2 [2002]

## Mark up languages

Includes page description language used in creating, editing, and navigating electronic documents, see T01-J11C1 prior to 2002.

Hypertext. HTML. XML

## T01-N03B2A [2002]

#### **Editors**

Includes editors used to edit mark-up language e.g. Microsoft® FrontPage.

# T01-N03B2B [2007]

# Parsing markup language documents

# T01-N03B3 [2005]

## **Scripting Languages**

Covers patents concerned with web based scripting languages which are neither compiled nor mark-up languages.

PHP, ASP, JavaScript, PERL, CGI

# T01-N03B4 [2005]

#### Format conversion

Covers conversion of media from one network standard to another one. Includes converting e-mail (T01-N01C) to e.g. Facsimile (S06) or SMS (W01), also includes converting web browser formats such as SGML, XML and HTML (T01-N03B2).

#### T01-P\*

[1992-2001]

# Computer educational aids and toys

(T01-X)

\*This code is now discontinued, see T01-J30 and T01-J40 from 2002.

# T01-P01\* [1992-2001]

#### **Educational**

\*This code is now discontinued, see T01-J30A from 2002. Includes use of computers for education and training purposes, question and answer systems, computer aided instruction, CAI, tuition support systems, student testing and computerised marking systems (see also T04 codes). Educational equipment is also assigned W04-W codes.

# T01-P02\* [1992-2001]

#### Toys, games and novelties

\*This code is now discontinued, see T01-J30B1 from 2002. Covers all computer games and computerised toys. See W04-X codes for electrical aspects of games and amusements.

# T01-P02A\* [1997-2001]

#### Computer video games

(T01-P02)

\*This code is now discontinued, see T01-J30B and T01-J40A from 2002. See W04-X02C for video games, and T01-J10C for image generation aspects.

# T01-P02B\* [1997-2001]

# **Sports equipment**

(T01-P02)

\*This code is now discontinued, see T01-J40B from 2002. See also W04-X01 codes for electrical aspects of sports equipment in general.

# T01-S [1997]

#### Software content

These codes are used to indicate documents that have a significant software content, and which contain either a program listing, or in which software is used. T01-S codes are used in conjunction with other T01 codes to indicate software aspects.

# T01-S01 [1997]

#### Software listings

Software in the form of a program listing.

# T01-S01A [1997]

# Machine-oriented low-level languages

(101-5

Documents containing listings written in e.g. binary, machine, assembler and firmware languages.

# T01-S01B [1997]

#### **High-level languages**

(T01-S)

Documents containing source code written in high level language, e.g. C, C++, Java, Visual Basic, Python, Swift etc.

## T01-S01C [1997]

#### **Pseudo-code and Algorithms**

(T01-S)

Documents in which algorithms, rather than software is disclosed.

# T01-S02 [1997]

# Software patents

Covers documents in which an invention is described and claimed in terms of software, but in which no program listing is included.

# T01-S03 [1997]

# **Claimed software products**

Claimed products based on software, and stored on e.g. CD-ROM, in which the use of a computer program or software components is stated in an independent claim.

# T01-X

# Miscellaneous

# **T02: Analogue and Hybrid Computers**

# T02-A

# **Analogue computers**

#### T02-A01

#### **Hand-manipulated**

Slide-rule, linear, circular

#### T02-A02

#### Mechanical or fluid-pressure computers

Pneumatic, hydraulic, gearing

#### T02-A03

# Using optical or electro-optical, elements

See also T02-B and T01-E05A. Optical components per se are found in V07.

Transform, correlation, acoustic-optical

# T02-A03A [1992]

# **Implementations**

Includes diffraction grating and Fourier analysis implemented using optical elements.

#### T02-A03B [1992]

#### **Optical computers**

Digital optical computers are coded in T01-M06D and digital components in T01-E05A.

#### T02-A04

# **Electric or magnetic computers**

# T02-A04A

#### **Applications**

Modelling, simulation

## T02-A04A1

# Economics, statistics, electric equipment, structures

### T02-A04A5 [1992]

#### Neuronal

(T02-A04A9)

Neural networks are also coded in T01-J16C1 and digital neural elements in T01-E05B.

# T02-A04A9

#### Other (applications)

#### T02-A04B

# **Processing**

Operational amplifier

#### T02-A04B1

# **Multiplication or division**

#### T02-A04B2

## Integration or differentiation

Integrator

## T02-A04B2A [1992]

#### Convolution

SAW convolver

#### T02-A04B3

# Evaluating polynomials, roots, exponentials, discontinuous functions

Square-root, exponent, logarithm, tangent, cotangent, sine, cosine, trigonometry

#### T02-A04B4

## **Arbitrary function generation**

#### T02-A04B5

# Interpolation, extrapolation, equation solving

#### T02-A04B6 [1992]

## **Fuzzy Logic**

(T02-A04B9)

See also T01-J16B and U21-C03B1B.

## T02-A04B9

# Other (incl. optimisation or addition)

Includes correlation transforms, (coded in T02-A04B1, T02-A04B2 prior to 8701).

# T02-A04X

## Other (incl. programming)

#### T02-B

#### Hybrid computing arrangements

See also T02-A03 and T01-E05A for use of optical components.

### T03: Data Recording

This class covers dynamic recording systems, i.e. those based on relative movement between record carrier and transducer. Record carriers themselves are included irrespective of application and are covered in T03 alone. Mechanical aspects of carrier driving and head positioning are also included in T03 for all applications, but W04 codes are assigned as well to indicate intended use for audio/video recording. All other aspects of audio and video recording, such as circuitry and signal processing, are covered in W04 only. Static stores themselves are coded in U14 and computer storage systems using them in T01-H codes. Abstract storage systems (e.g. software for controlling storage) that do not contain any details of physical recording equipment, such as methods for backing up computer data, are covered in T01 and are not coded in T03. Bar-coding is not covered in T03, being covered by T04-A03B1.

In class T03, recording technologies are split into 'group' (5 character) codes covering four main areas :

T03-A - magnetic recording, e.g. 'hard disk drives', but also including floppy disks, magnetic tapes, cards and tickets.

T03-B - optical recording, e.g. optical disks such as 'CD' and 'DVD', optical cards and tapes also being included.

T03-C - capacitive recording, electron beam recording and 'tunnel current' recording.

T03-D -'combination' recording, i.e. recording using two (or more) of the above methods, e.g. magneto-optical recording such as ''MiniDiscs ® but also including electro-optical recording and other technologies.

Apart from the above codes, the other code groups in T03 are independent of 'recording technology' and can be assigned alone - when inventions are broadly applicable - or in conjunction with the technology codes to convey more detail. For example, within the T03-F disk drive codes, T03-F02C1 represents a novel drive motor. In the T03-A codes specific to magnetic recording T03-A08A1C is assigned for any aspect of hard disk drives. Thus a novel disk drive motor for an HDD is coded as T03-A08A1C and T03-F02C1.

## T03-A

#### Magnetic recording/reproduction

'Combination' recording involving magnetic methods such as magneto-optical, is not included see T03-D01 codes.

#### T03-A01

#### **Record carriers**

Includes materials for cards with magnetic strip - see T04-C01 also. Magnetic record carriers per se are coded in T03 only, even if audio-video application is stated. For records prior to 2002 carriers with containers (e.g. tape cassettes) are also coded in W04 when application to audio or video recording is stated or implied.

#### T03-A01A

# **Magnetic layers**

Prior to 2007 all magnetic materials and films are also coded in V02-A01 and V02-B01 codes respectively. From 2007 V02-B01 has been discontinued while V02-A01 codes are only applied for magnetic materials of general application. Therefore V02 is no longer routinely assigned for magnetic recording media and heads with the exception of nanostructures, which are coded in V02-B04.

Particle, bind, ferromagnetic, film, coating, layer

# T03-A01A1

# [1987]

#### Magnetic materials

Includes composition and physical details of materials.

# T03-A01A1A

# [1992]

## Metal and alloy compositions

Prior to 2007 this topic was also coded in V02-A01A2. This topic is no longer coded V02. Chromium, cobalt, iron, nickel

# T03-A01A1C

#### [1992]

#### Non-metallic compositions

Includes ferrite materials. Prior to 2007 this topic was also coded in V02-A01B2.

Oxide, ferrous, ferric, gamma

# T03-A01A1E

#### [1992]

#### **Physical details**

Covers details such as e.g. size or shape of magnetic particles themselves - details of physical properties of magnetic layer as a whole are covered by T03-A01A8.

Acicular, diameter, needle

# T03-A01A3 [1987]

#### **Binder materials**

Includes composition, physical details and manufacture.

Resin, polyurethane, PVC, polymer, copolymer

#### T03-A01A5 [1992]

# Additional non-magnetic material in magnetic layer

Includes lubricant (see also T03-A01B5 codes).

#### T03-A01A6 [1992]

# **Multilayer magnetic coatings**

Layer arrangements of carrier as a whole are covered by T03-A01F.

# T03-A01A6A [2006]

# **Exchange coupling systems**

# T03-A01A7 [1992]

# Complete magnetic layer formula

See also T03-A01A which will continue to be used for cases where precise details cannot be identified. *Recipe, formulation, composition* 

## T03-A01A8 [1992]

### Physical details of magnetic layer

Details of magnetic materials per se are covered by T03-A01A1 codes.

#### T03-A01A8A [1997]

# Physical and chemical details of magnetic layer

Covers thickness, hardness, etc. and also inventions specifying low level of, or absence of, certain elements.

Hardness, HB, HR, HV, durability, roughness, film

#### T03-A01A8C [1997]

# Magnetic property details of magnetic layer

Covers details such as specific coercivity, Curie point etc.

#### T03-A01A9 [1992]

Other magnetic layer details

## T03-A01B

# Base layers; protective coatings

Film, surface, protect, substrate, lubricate, organic

#### T03-A01B1 [1987]

#### Base layers, substrates

# T03-A01B1A [1992]

#### **Substrates**

Polyester, polyethylene, terephthalate, resin, glass, aluminium, titanium, alloy

#### T03-A01B1B [1992]

## **Base layers**

Covers layers applied to substrate before magnetic layer is deposited.

Under-layer

#### T03-A01B1X [1992]

# Other layers below magnetic layers

Indicates layers between magnetic layers, normally used with T03-A01A6, which indicates multilayer magnetic coatings.

Intermediate

## T03-A01B3 [1987]

#### **Backing layers**

Covers layers on opposite side of substrate to magnetic film.

Back-coating layer, reverse

#### T03-A01B5 [1987]

## Protective coating and lubricating layers

T03-A01B5B takes precedence over T03-A01B5A if the position of the lubricating layer is not disclosed or determinable.

Film, anti-abrasion, slide, friction

# T03-A01B5A [1992]

# Lubricating layers part of magnetic layers See T03-A01A5 also.

#### T03-A01B5B [1992]

# Lubricating layer separate from magnetic layers

Covers layer subsequently applied to carrier surface.

Disk

#### T03-A01B5C [1992]

#### Protective coating layers

Antistatic layers are covered by T03-A01B5D. Anti-corrosion, nitride

#### T03-A01B5D [1992]

#### **Antistatic layers and materials**

For antistatic measures and materials in general see X25-S codes.

Charge, triboelectric, conductive dispersion, carbon black

# T03-A01B5X [1992]

# Other layers above magnetic layer

Includes 'parking area' e.g. for CSS operation of a hard disk (T03-A01C1A). See also T03-A01G.

Contact-start-stop, zone

# T03-A01B7 [2008]

## Heat transfer layers

This code covers heat transfer layers chiefly for thermo-assisted magnetic record carriers, for which T03-A01T is also assigned.

Thermal, laser, heating, spot

#### T03-A01C

## Characterised by form

Codes in this section are applied to indicate the type of carrier only and are used in conjunction with other T03-A01 codes as appropriate. To distinguish recording apparatus in general by carrier type, see T03-N codes.

T03-A01C1 [1987]

Disk

T03-A01C1A [1992]

Hard disk

Covers disk with rigid substrate. Stack, cylinder, bulk store

T03-A01C1C [1992]

Flexible disk

Covers floppy disks.

T03-A01C3 [1987]

**Tape** 

T03-A01C3A [1992]

For helical scan recording

T03-A01C5 [1992]

Card

(T03-M01)

See T04 also for card carriers of 'magnetic strip' type.

T03-A01C7 [1992]

Drum

T03-A01C8 [1992]

# Characterised by intended application

Codes in this section are only used if the carrier is specified (not necessarily claimed) to be primarily for a specific purpose.

T03-A01C8A [1992]

**Audio recording** 

T03-A01C8B [1992]

# Video recording

VTR, camera-recorder, camcorder, electronic still picture camera, Mavica

## T03-A01C8C [1992]

## Computer data recording

This code is **not** used for hard disks, the assumption being made that such carriers are chiefly intended for this purpose.

T03-A01C8X [1992]

Other recording applications

T03-A01C9 [1992]

## Other magnetic carriers

Includes work piece adapted to store limited amount of data e.g. for identification purposes. This code, when assigned with T03-M02 indicates photographic film with an integral magnetic carrier. (See also S06-B codes).

#### T03-A01D [1987]

## Vertical recording medium

This code is used with other T03-A01 codes as appropriate.

Perpendicular, thickness direction

## T03-A01E [1992]

#### Superconducting magnetic record carriers

This code is used with other T03-A01 codes as appropriate. See T03-A06K for other aspects of using superconductors in magnetic recording. General aspects of recording using superconductors (other than in magnetic recording) are covered by T03-C07. Superconductive devices and materials in general are covered by U14-F codes. (X12-D06 codes are assigned for high-power aspects of superconductors).

# T03-A01F [1992]

#### Layer arrangements

(T03-A01X)

This code deals with emphasis on sequence of layers without particular reference to any one layer. Multilayer magnetic coatings are covered by T03-A01A6.

# T03-A01G [1992]

# Additional recording area and physical recording format

(T03-A01X)

This code covers the physical arrangement of the record carrier into separate areas, either for dedicated (e.g. servo tracks) or general use. Recording formatting on a physically continuous recording surface is covered by T03-A06F1.

Hard sectoring, index, format, pre-format, reference

[1992]

## T03-A01G1

# Separate magnetic tracks

(T03-A01X)

# T03-A01G3 [2008]

# Carrier with discrete magnetic recording areas

Includes magnetic carrier with patterned magnetic layer, such as nano-imprinted type. For hard disk carriers search with T03-A01C1A and other T03-A01 codes as appropriate. Manufacture of such carriers is covered by T03-A02G3 and other T03-A02 codes as appropriate.

Pattern, depression, pit

# T03-A01G5 [1992]

# Using other recording method

(T03-A01X)

Covers the use of non-magnetic storage, e.g. a magnetic carrier with an optical or capacitive servo track.

# T03-A01H [1992]

## Leader

(T03-A01X)

Includes compositions, details of optical transparency, etc. See T03-E05A5 for leader-sensing mode control in tape drives.

Colour, light, transmission, autostop

## T03-A01R [2006]

# Recycling and destroying magnetic carrier

This code is used for recycling and destroying of **magnetic** record carriers only. Recycling and destroying of optical carriers is covered by T03-B01R and of magneto-optical carriers by T03-D01R. Where an invention is applicable to recycling or destruction of several types of carrier or the type is not disclosed the general code T03-H02R is assigned instead. For recycling of recording or playing equipment see V04-X01C.

# T03-A01T [2008]

# Thermo-assisted magnetic record carrier

Covers magnetic carriers which are locally heated to facilitate high-density recording. Equipment using this type of recording is assigned T03-A06N1 codes, (T03-A06M codes from 2007-2012), and other T03 codes as appropriate.

HAMR, heat assisted magnetic recording

#### T03-A01X

### Other magnetic carrier details

Marking, cinefilm magnetic soundtrack

#### T03-A02

#### **Record carrier manufacture**

For manufacture restricted to a specific type of carrier, search with T03-A02E codes.

## T03-A02A [1987]

## Applying magnetic film to substrate

Includes apparatus (with T03-A02D1) and methods for liquid deposition, sputtering, evaporation, and other techniques. Prior to 2007 see V02-H02 codes also for magnetic film application. Therefore V02 is no longer routinely assigned for manufacture of magnetic recording media with the exception of nanostructures, which are coded in V02-H02G. Manufacturing processes other than magnetic layer deposition are covered by T03-A02B codes. (See note for T03-A02B8).

Vapour deposition, vacuum deposition, plating, coating

#### T03-A02A1 [1992]

# Coating by liquid method, including plating

Prior to 2007 magnetic film deposition by plating was also coded in V02-H02C.

Electrolytic, electroless, spray, dip

#### T03-A02A3 [1992]

# Coating by sputtering, vapour deposition

Vacuum

# T03-A02A3A [1992]

#### Sputtering

Prior to 2007 this topic was coded in V02-H02B as well. Sputtering apparatus of general application is also coded in X25-A04 and V05-F codes.

#### T03-A02A3B [1992]

#### Vapour deposition

Heat, vessel, evaporate

# T03-A02A3X [1992]

#### Other

Includes techniques such as plasma spraying. Flame, jet

# T03-A02A5 [1992]

# **Treatment of deposited layer**

# T03-A02A5A [1992]

### **During deposition**

Includes e.g. magnetic orientation. *Field, orient, direction* 

#### T03-A02A5C [1992]

### After deposition

Includes e.g. heat treatment.

Drying

## T03-A02B [1992]

# Substrate and non-magnetic layer processing

Codes in this section are used to describe manufacturing processes (or equipment when used with T03-A02D codes) other than for magnetic layer deposition, which is covered by T03-A02A.

## T03-A02B1 [1992]

# Manufacture of substrate and base layers

# T03-A02B1A [1992]

#### Manufacture of substrate per se

Includes shaping, stamping etc. but **not** manufacture of substrate material, which is covered by T03-A01B1A. Prior to 1997, this code covered texturing and polishing of substrates (chiefly for hard disks, in which case T03-A02E1A is also assigned). From 1997 these topics are transferred to T03-A02B1C and T03-A02B1D. Both codes are assumed to relate to substrates, unless T03-A02B1B is also assigned to indicate base layer treatment. *Moulding, rolling, punching, extruding, stretching* 

# T03-A02B1B [1992]

#### Base layer application and treatment

Covers manufacture and deposition of base layers prior to magnetic layer deposition. Manufacture of base layer materials per se is covered by T03-A01B1B.

# T03-A02B1C [1997]

# **Polishing**

(T03-A02B1A)

It is assumed that this code relates to substrates unless T03-A02B1B is also assigned to indicate base-layer treatment.

# T03-A02B1D [1997]

#### **Texturing**

It is assumed that this code relates to substrates, unless T03-A02B1B is also assigned to indicate base-layer treatment.

CSS, flying height, slider, roughness

#### T03-A02B3

## **Backing layer manufacture**

Covers production of back-coat layers, but **not** materials manufacture which is covered by T03-A01B3.

[1992]

# T03-A02B5 [1992]

# Protective and lubricating layer manufacture

Covers deposition of layers only, for compositions see T03-A01B5 codes.

# T03-A02B7 [1992]

#### Additional manufacturing processes

Covers manufacturing steps carried out after basic carrier manufacture, e.g. cleaning, tape slitting (previously coded in T03-A02 and T03-M02), etc., but not loading into carrier case which is covered by T03-H01 codes. Equipment performing these processes is coded in T03-A02D3.

Post-treatment

# T03-A02B8 [1992]

## Multistep manufacturing processes

This code is used for inventions covering a number of manufacturing steps without apparent emphasis on any one, and therefore takes precedence over T03-A02A codes if magnetic layer deposition is mentioned as only one of several process steps.

#### T03-A02B8A [1992]

# Multistep manufacturing process for whole carrier

This code is used for inventions describing the complete manufacturing process only.

#### T03-A02B9 [1992]

#### Other manufacturing processes

Includes packing and shipping of manufactured carrier. Also includes writing of servo tracks during manufacture.

#### T03-A02C [1992]

# Quality control, testing (methods and equipment)

QC, evaluate, inspect

T03-A02C1 [1992]

# **Checking manufacturing process**

Monitoring, control, instrumentation

T03-A02C5 [1992]

# Checking finished or partially finished carrier

Flaw, inspection, testing, still-picture, contact-stopstart. CSS. lifetime

#### T03-A02C5A [1992]

# Using optical or other inspection

See also appropriate code in S03, e.g. S03-E04F2, which covers optical flaw detection.

Chemical, corrosion, humidity, heat, wear, exfoliation, abrasion, durability, asperity

T03-A02C5B [1992]

# By test recording

Error, bit error rate, BER, check

T03-A02D [1992]

Manufacturing equipment

T03-A02D1 [1992]

#### For manufacture of carrier per se

This code is used with other T03-A02 codes as appropriate, to indicate specific purpose. For example, use T03-A02A codes with T03-A02D1 for equipment used to apply magnetic layer to the carrier substrate; for general aspects of equipment for magnetic disk manufacture use T03-A02D1 with T03-A02E1.

# T03-A02D3 [1992]

## For subsequent processing

Includes equipment for treatment carried out after manufacture of carrier per se, e.g. slitting of tape (previously coded in T03-A02 and T03-M02), and general handling aspects.

Stack, wind, conveyor, feed

T03-A02D5 [1992]

For bulk storage, e.g. pancake

Reel, drum

T03-A02E [1992]

#### Characterised by type of carrier

Codes in this section are used (with other manufacturing codes as appropriate) to indicate the type of carrier being manufactured only. Prior to 1992 use T03-N codes.

T03-A02E1	[1992]
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Disk

T03-A02E1A [1992]

Hard disk

T03-A02E1C [1992]

Flexible disk

T03-A02E3 [1992]

Tape

T03-A02E5 [1992]

Card

T03-A02E7 [1992]

Drum

T03-A02E9 [1992]

Other magnetic carrier

T03-A02G [2008]

# Manufacture of carrier with separate recording areas

Includes manufacture of magnetic carrier not having magnetic recording film over the whole area.

# T03-A02G1 [2008]

# Manufacture of carrier with separate magnetic recording tracks

Includes manufacture of magnetic carrier with separate magnetic track regions. For hard disk carriers search with T03-A02E1A and other T03-A02 codes as appropriate.

#### T03-A02G3 [2008]

# Manufacture of carrier with discrete magnetic recording areas

Includes manufacture of magnetic carrier with patterned magnetic layer, such as nano-imprinted type.

Pattern, depression, pit, stamper

#### T03-A02G5 [2008]

# Manufacture of carrier including nonmagnetic recording areas

Includes manufacture of magnetic carrier with separate recording area using other technology, such as optical, for which T03-B codes are also assigned. Magneto-optical record carriers are not included here, being covered by T03-D01A8 codes.

#### T03-A03

#### Heads

Prior to 2007 see also V02-A02 codes for magnetic materials. Prior to 2002 if audio/video application is indicated see also W04-B02A. For erase heads search with T03-A06E1. From 2002 heads for audio/visual recording are no longer coded in W04-B02. Audio/visual applications are indicated by W04-B10, W04-B12, W04-B14 and W04-B16 codes. Field, transducer, coil, flux, bias, inductance, yoke,

#### T03-A03A

## Heads with multiple active gaps

core, ferromagnetic, pick-up, read, write

Multichannel, multitrack, film, glass, erase

T03-A03A1 [1992]

For operation on same track

T03-A03A5 [1992]

# For operation on different tracks

For array type heads T03-A03A7 takes precedence. *Stereophonic, DCC* 

T03-A03A7 [1992]

#### Array-type multiple head

Matrix

#### T03-A03B

# Other inductive head structures

This code is used for inductive head structures not catered for by other T03-A03 codes which take precedence, or when precise detail cannot be determined.

#### T03-A03C

#### Flux-sensitive heads

Includes magneto-resistive aspects (covered in T03-A03C3).

Read-only

T03-A03C1 [1992]

#### Combined with write head

Composite, disk drive

## T03-A03C3 [1992]

#### Using magnetoresistive material

All heads with thin film construction are additionally coded in T03-A03E. For biasing arrangements see T03-A03J9 also. Magnetoresistive elements used in non-head devices such as MRAM are coded in U12-B01B. Prior to 2007 thin film heads were also coded in V02-B03 but this code is now discontinued.

# T03-A03C3A [1997]

# Using giant magnetoresistance (GMR) effect

GMR, spin valve, Barkhausen

#### T03-A03C3C [2005]

# **Tunnel junction magnetoresistive head**

See also T03-A03C3A for tunnel junction giant magnetoresistive head.

T03-A03C3G [2006]

**Ballistic magnetoresistive head** 

T03-A03C3X [2006]

Other magnetoresistive head types

Colossal

T03-A03C5 [1992]

Using semiconductor-type device

See also U12-B01 codes.

Hall effect

T03-A03C9 [2005]

Flux sensitive head details

T03-A03C9A [2005]

**Magnetic layers** 

Pinned layer, free layer

T03-A03C9C [2005]

#### Spacer layer

Includes conductive non-magnetic layer between magnetic layers.

T03-A03C9E [2005]

# **Tunnel barrier layer**

Includes insulating non-magnetic layer between magnetic layers.

T03-A03C9G [2005]

Exchange layer

Anti-ferromagnetic

T03-A03C9J [2005]

#### Shielding layer

Used for internal shielding layers of magnetoresistive heads only. For other shielding aspects see T03-A03J7A.

T03-A03C9L [2005]

#### Layer arrangements

Covers emphasis on sequence of layers without particular reference to any one layer.

# T03-A03C9N [2005]

#### **Biasing arrangements**

Circuitry for biasing magnetic heads is covered in T03-A06G.

T03-A03C9X [2005]

Other

T03-A03D [1987]

## **Vertical recording heads**

This code is used with other T03-A03 codes as appropriate.

Perpendicular

# T03-A03E [1987]

#### Thin film heads

Assumed to be for inductive type head structures unless applied in conjunction with T03-A03C codes. This code is intended for magnetic heads wholly of film-circuit type construction, i.e. including thin film coil windings (for details of which search with T03-A03J5). Magnetic heads in which only the core and related magnetic circuit components are of thin film construction are not included. Cores for such heads are covered by T03-A03J1C, and for thin film circuit type heads by T03-A03J1E. Metal-in-gap heads are covered by T03-A03F codes. Prior to 2007 magnetic film details of 'thin film' heads of both types were also coded in V02-B03, which has now been discontinued. For film circuits in general, see U14-H codes, which are not assigned for thin film magnetic heads.

## T03-A03E1 [2006]

#### **Lead layers**

Covers layer arrangements for internal head connections. External head connections are covered in T03-A05C8.

T03-A03F [1992]

#### Metal-in-gap heads

MIG

T03-A03F1 [1992]

# **Gap-filling material**

Details of gap materials and structure for magnetic heads in general are covered by T03-A03J3C.

### T03-A03J [1992]

#### **General magnetic head details**

Covers details of inductive type heads. For details of magnetoresistive heads see T03-A03C9 codes. Codes in this section are used alone or in conjunction with other T03-A03 codes as appropriate.

# T03-A03J1 [1992]

#### **Head cores**

Carrier-contacting surfaces, including pole-pieces, are covered by T03-A03J3.

#### T03-A03J1A [1997]

#### **Magnetic material composition**

Prior to 2007 see also V02-A02 codes for further details of materials.

#### T03-A03J1C [1997]

## Thin film cores (for non-film head)

This code relates to magnetic heads with film-type cores, other parts of the head, such as windings, being of conventional construction. Prior to 2007 see also V02-B codes, especially V02-B03. From 2007 these codes are discontinued. Heads which are entirely of film circuit construction are covered by T03-A03E, their cores being covered by T03-A03J1E. Metal-in-gap heads are covered by T03-A03F codes.

# T03-A03J1E [1997]

#### Thin film head cores

This code is intended for core details of magnetic heads which are entirely of film circuit type construction, also coded in T03-A03E. See T03-A03J1C for magnetic film cores for otherwise conventional heads. (Prior to 2007 V02-B03 is also assigned for all aspects of thin magnetic films used for heads).

# T03-A03J3 [1992]

# **Carrier-interfacing surface**

Covers mechanical aspects and magnetic details such as pole pieces, but **not** cores, which are covered by T03-A03J1.

### T03-A03J3A [1992]

#### Pole pieces

Includes flux guides. Details of cores are covered in T03-A03J1.

# T03-A03J3C [1992]

#### Gap details

Metal-in-gap head details are covered by T03-A03F codes.

# T03-A03J3E [1992]

# **Head face**

Covers mechanical aspects of carrier-contacting surface surrounding active part of head, such as shape, friction-reduction, etc.

Hardness, roughness, smooth, projection, asperity

# T03-A03J3J [2007]

# **Heating device**

(T03-A03J9)

Covers arrangements for hearing carrier-interfacing surface of head to control fly height. Also coded in T03-A05C1. Arrangements for thermo-assisted magnetic recording (where portion of carrier is heated as part of the recording process) are not coded here, being covered in T03-A06M instead.

#### T03-A03J5 [1992]

# Windings

HF coils in general are covered by V02-F01 codes. Prior to 2007 HF coils for magnetic heads were also coded in V02-F05, which has now been discontinued.

## T03-A03J7 [1992]

### Casing, shielding, substrates

From 1997 codes in this section include substrates, previously covered in T03-A03J9.

#### T03-A03J7A [1997]

Casing and external shielding

### T03-A03J7C [1997]

#### Internal shielding layers

Includes shielding layers within film-type heads (see T03-A03E). For shielding layers within magnetoresistive heads see T03-A03C9J.

## T03-A03J7E [1997]

### **Substrate**

(T03-A03J9)

# T03-A03J8 [2006]

# **Internal head connections**

See T03-A03E1 for internal head connections for thin-film heads (e.g. magnetoresistive or inductive heads). External head connections are covered in T03-A05C8.

# T03-A03J9 [1992]

#### Other general head details

Prior to 1997 this code included head substrates, now covered by T03-A03J7E and prior to 2005 also included biasing arrangements for magnetoresistive heads which are now covered in T03-A03C9N. Circuitry for biasing magnetic heads is covered in T03-A06G.

#### T03-A04

# Head manufacture, testing, demagnetisation, cleaning

# T03-A04A [1987]

#### Manufacture, testing

Prior to 2007 see also V02-H codes and V02-H05. From 2007 manufacture and testing of magnetic heads is covered in T03 only.

T03-A04A1 [1992]

**Head manufacture** 

T03-A04A1A [1992]

**Assembly** 

T03-A04A1B [1992]

Film deposition

T03-A04A1C [1992]

**Coil winding** 

T03-A04A1D [1992]

## **Casing manufacture**

Includes manufacture of shield and mounting arrangements.

# T03-A04A1E [1992]

# **Mechanical or chemical treatment**

Includes e.g. burnishing, etching etc.

### T03-A04A5 [1992]

## **Head testing**

Includes test recording and non-electrical testing and inspection methods (also coded in e.g. \$03).

### T03-A04B [1987]

# Demagnetisation, cleaning

See V02-D for demagnetisation in general. *Abrasion* 

#### T03-A04B1 [1992]

#### **Demagnetising magnetic heads**

Degaussing, coil, solenoid, decay

# T03-A04B3 [1992]

# Cleaning magnetic heads

Cleaning of record carriers and of recording equipment in general is covered by T03-H02B and T03-H02C respectively.

Aerosol, cartridge

# T03-A04B3A [1992]

#### Cleaning compositions

Solvent

#### T03-A04B3B [1992]

#### **Dummy carrier for cleaning**

Includes cleaning cassettes, floppy disks adapted for cleaning, etc.

Cleaning tape

### T03-A04B3C [1992]

**Brush** 

#### T03-A05

### Head mounting and positioning

For records prior to 2002 audio/video head mounting and positioning is also coded in W04-B03. From 2002 W04-B03 is no longer used, audio/visual applications being indicated by W04-B10, W04-B12, W04-B14 and W04-B16 codes.

Drive, motor, stepper, track, control, rotating, read, write, slide, carriage

#### T03-A05A

# Azimuth correction, track centering, alignment maintenance

Error detection, angle, pitch

#### T03-A05A1 [1987]

# Dynamic adjustment, i.e. dependent on recorded signals.

Includes use of piezoelectric elements for head deflection.

Control, pilot

# T03-A05A1A [1992]

### **Head adjusting element**

See also V06-M06D for piezoelectric actuator. Includes shape memory alloy elements with self heating or auxiliary heater.

SMA, bimorph

#### T03-A05A1B [1997]

# Head position adjustment based on maximum read signal level

Covers dynamic arrangements positioning head for optimum output, without necessarily using dedicated servo information for track following (covered by T03-A05A1C).

Peak, maximise

# T03-A05A1C [1992]

# Track-following system, servo

For combined track accessing and following servo system see T03-A05B1A which is used as the default 'servo' code for magnetic recording and takes precedence over this code. For track following servos in general see T03-G02C1. For layout of servo tracks on magnetic carriers see T03-A06F codes. Details of physically separate servo tracks (magnetic and non-magnetic) created during formation of magnetic layer on carrier are covered in T03-A01G.

# T03-A05A1D [1992]

## Speed control for moving head

Covers rotary-head speed control. See T03-E03A7 for helical scan tape speed control.

### T03-A05A1E [2008]

## Head positioning for dual actuator systems

Includes control of a secondary actuator, e.g. on the main head arm of a disk drive, for fine positioning. For details of head adjusting elements per se see T03-A05A1A.

Piezoelectric

# T03-A05A1G [2005]

#### Using non-magnetic servo information

Includes use of optical servo tracks.

# T03-A05A1X [1992]

## Other dynamic adjustment

#### T03-A05A3 [1992]

# Adjustment not dependent on recorded signal alignment, setting up

Includes temp. compensation and manual adjustment of e.g. azimuth. See T03-K07 codes for testing also.

Screw, spring, pitch

# T03-A05B [1992]

### **Track selection**

(T03-A05X)

Covers arrangements to position head over desired track.

### T03-A05B1 [1992]

# By recorded signal

(T03-A05X)

Includes track accessing servo. See T03-G02B1 for track accessing servos in general.

Index, count, track crossing

# T03-A05B1A [1992]

#### Switching to track following servo action

This code is used as the default 'servo' code for magnetic recording. Inventions specific to track following servos only for magnetic recording are covered by T03-A05A1C.

# T03-A05C [1992]

## **Head support structure**

(T03-A05X)

Includes details of head to medium interface such as air bearing, contouring, gimbal, suspension and load arm. Use with T03-A05F codes for disks.

## T03-A05C1 [1992]

# For head-to-carrier spacing adjustment

(T03-A05X) Raise, lift, lower

# T03-A05C1A [1992]

Slider

(T03-A05X)

#### T03-A05C3 [1992]

### **Head support arm**

(T03-A05X)

Covers details of arm per se such as shape, mounting etc.

Swage

#### T03-A05C3A [2007]

# **Dual actuator systems**

(T03-A05X)

Covers arrangements for mounting a secondary actuator on main head arm for fine positioning. For details of head adjusting elements per se and positioning methods see T03-A05A1A codes.

# T03-A05C5 [1992]

#### **Motor drive**

(T03-A05X)

Includes motors per se - see V06-M codes also. See T03-A05D7 for helical-scan head motor drive. Bearings

T03-A05C5A [1992]

**Rotary drive** 

T03-A05C5C [1992]

Linear drive

# T03-A05C8 [2005]

#### Connections to read/write head

Includes wiring formed on head support arm. Prior to 2005 this was covered by T03-A05C3 and T03-A06C.

#### T03-A05D [1992]

# Specific head positioning details for helical-scan tape

(T03-A05X)

T03-A05D1 [1992]

Layout of heads, i.e. disposition

(T03-A05X)

# T03-A05D3 [1992]

## Signal coupling arrangements

(T03-A05X)

Codes in this section are concerned with signal transfer between the rotating heads and stationary part of equipment.

# T03-A05D3A [1992]

## Inductive, e.g. transformer

(T03-A05X)

See V02-F02 codes also.

### T03-A05D3C [1992]

Optical

(T03-A05X)

# T03-A05D3E [1992]

# **Radio frequency**

(T03-A05X)

## T03-A05D3G [1992]

Brushes

(T03-A05X)

See V04-L01 codes also.

# T03-A05D3X [1992]

#### Other rotary signal coupling

(T03-A05X)

# T03-A05D5 [1992]

# Rotary head drum

(T03-A05X)

Covers details of head drum per se, such as shape, materials, etc.

# T03-A05D7 [1992]

## Rotary head motor drive

(T03-A05X)

Includes motor per se. Motor-driven positioning for non-rotary heads in general is covered by T03-A05C5 codes.

#### T03-A05E [1992]

# Head positioning for longitudinallyscanned tape

#### T03-A05F [1992]

#### Head positioning for disk

Codes in this section are used either alone or with other T03-A05 codes, if the use of T03-A05F codes conveys additional information. See also T03-A08 codes, now assigned for all aspects of magnetic recording equipment. Prior to 1997, T03-A05F codes may be used to discriminate equipment type when head positioning is involved.

#### T03-A05F1 [1992]

# Non-contacting during operation

Hard disk, stack, CSS

# T03-A05F5 [1992]

## **Contacting during operation**

Floppy, flexible, diskette

# T03-A05G [2005]

#### Parking, latching arrangements

Includes load-unload ramps in hard disk drives, for which T03-A08A1C is also assigned. Prior to 2005 this topic was covered by T03-A05X. *LUL* 

# T03-A05X

# Other head positioning aspects

#### T03-A06

# Recording, reproducing or erasing methods/circuits

See T03-P codes for signal processing for recording in general, and W04-F and W04-G01 codes for video and audio recording signal processing in general.

# T03-A06A

# Direct, FM, PM or boundary displacement analogue recording

Frequency, phase, modulate, pulse

#### T03-A06B

# Other analogue recording

#### T03-A06C

#### **Digital recording**

Code, decode, pulse, bit, mark, space

#### T03-A06C1

[1992]

## Recording/write circuitry

## T03-A06C3 [1992]

## **Read circuitry**

Sense, threshold, peak

# T03-A06D [1992]

# Equalisation

(T03-A06X)

#### T03-A06E [1992]

# **Erasing**

(T03-A06X) Coil, magnet

## T03-A06E1 [1992]

# In equipment

(T03-A06X) Oscillator, head

# T03-A06E3 [1992]

#### Bulk

(T03-A06X)

See V02-D for demagnetising in general. Prior to 1992 T03-H02 was used for bulk erasure.

### T03-A06F [1992]

#### **Format**

(T03-A06X)

Covers signals recorded as magnetic information on carrier only. See T03-A01G codes for physical aspects of record carrier formatting, e.g. hard sectoring. See W04-B01A codes for formatting aspects relevant to audio/video recording.

#### T03-A06F1 [1992]

## Track layout

(T03-A06X)

# T03-A06G [1992]

#### Biasing

(T03-A06X)

Arrangements for biasing magneto-resistive heads are covered in T03-A03C9N (prior to 2005 this was covered in T03-A03J9).

## T03-A06H [1992]

### Skew correction, timebase correction

(T03-A06X)

See W04-F02B and W04-G01 codes for video and audio recording aspects.

#### T03-A06K [1992]

#### Superconductive magnetic recording

See T03-A01E for superconductive magnetic record carriers per se.

#### T03-A06M\* [2005-2012]

## Thermo-assisted magnetic recording

\*This code is now discontinued. Prior to 2013 it was used to indicate localised heating, usually by a laser, of an area on a magnetic record carrier to be written on. From 2013 this technology is transferred to T03-A06N1 within the category of energy-assisted magnetic recording.

#### T03-A06M1\* [2007-2012]

## Thermo-assisted magnetic recording methods

\*This code is now discontinued. Prior to 2013 it was used to indicate recording methods using heat assistance. From 2013 this technology is transferred to T03-A06N1A within the category of energy-assisted magnetic recording.

## T03-A06M3\* [2007-2012]

## **Heat source**

\*This code is now discontinued. Prior to 2013 it was used to indicate novel aspects of the heat source for heat-assisted recording. (Also covered in V08 for novel details of lasers and U12 for semiconductor lasers). From 2013 this technology is transferred to T03-A06N1C within the category of energy-assisted magnetic recording.

## T03-A06M5\* [2007-2012]

#### **Optical system**

\*This code is now discontinued. Prior to 2013 it was used to indicate novel aspects of the optical system for heat-assisted magnetic recording. From 2013 this technology is transferred to T03-A06N1E within the category of energy-assisted magnetic recording.

#### T03-A06N [2013]

## **Energy-assisted magnetic recording**

This code and its subdivisions cover the use of a separate energy source to enable writing to a magnetic record carrier using a lower magnetic field strength, i.e. to lower the coercivity of a storage bit while it is being written. The technology is assumed to apply to vertical/perpendicular recording and the general code for that topic, T03-A06V, is **not** normally assigned for energy-assisted magnetic recording. For application to hard disk drives search with T03-A08A1C. Note that magneto-optical recording is **not** included and is covered by T03-D01 codes.

### T03-A06N1 [2013]

## Thermo-assisted magnetic recording

Covers thermo-assisted ('heat-assisted') magnetic recording. Between 2005 and 2012 this topic was covered by T03-A06M codes.

HAMR

## T03-A06N1A [2013]

## Thermo-assisted magnetic recording methods

Covers thermo-assisted ('heat-assisted') magnetic recording methods. Between 2005 and 2012 this topic was covered by T03-A06M1 codes.

#### T03-A06N1C [2013]

## Heat source for thermo-assisted magnetic recording

This code covers novel aspects of the heat source for heat-assisted recording, e.g. a laser. (Also covered in V08 for novel details of lasers and U12 for semiconductor lasers). Prior to 2013 this technology was covered by T03-A06M3.

#### T03-A06N1E [2013]

## Optical system for thermo-assisted magnetic recording

This code covers novel aspects of the optical system for heat-assisted recording. Prior to 2013 this topic was covered by T03-A06M5.

Lens, near-field optics, solid immersion

#### T03-A06N3 [2013]

## Microwave-assisted magnetic recording

Search with T03-A03 codes for magnetic head details, e.g. T03-A03C3A for heads based on giant magnetoresistance effect or T03-A03C3C for tunnel junction magnetoresistive heads. From 2014 oscillators based on spin transport electronics effects are also assigned U23-A05.

GMR, MAMR, oscillating field, spin torque oscillator, STO, TMR

#### T03-A06N3A [2013]

## Microwave-assisted magnetic recording methods

#### T03-A06N9 [2013]

## Other energy-assisted magnetic recording

Covers the use of a separate energy source, other than heat or microwave energy, to lower storage bit coercivity during writing.

#### T03-A06V [2007]

#### **Vertical recording**

This code is used for highlighting the relevance of vertical recording methods where neither a novel vertical recording medium or novel vertical recording head is involved. Novel vertical recording media and heads are not routinely coded here, being covered by T03-A01D and T03-A03D respectively. Note that energy-assisted magnetic recording (as covered from 2013 by T03-A06N codes) is assumed to involve use of vertical/perpendicular magnetic recording and so T03-A06V is **not** routinely assigned for that topic.

#### T03-A06X

#### Other recording circuitry and methods

## T03-A07 [1987]

### Re-recording

(T03-A09)

Prior to 2006 this section included write/erase protection. From 2006 hardware aspects of write/erase protection for all types of recording are transferred to T03-H07 while signal format and signal processing methods are covered solely in T03-P07. T03-A codes are now used in addition to T03-H07 or T03-P07 codes to indicate applicability to magnetic recording.

Copy, master, duplicate

## T03-A07A\* [1992-2005]

### Preventing overwriting, erasure or copying

\*This code is now discontinued. See T01-H01C and T01-J12C for computing aspects.

## T03-A07A1\* [1992-2005]

#### Preventing accidental loss of data

\*This code is now discontinued.

### T03-A07A1A\* [1992-2005]

## By hardware detail, e.g. erase tab etc.

\*This code is now discontinued. Prior to 2006 the code was used with T03-N03 for tape cassette systems and with T03-N01 for disks.

#### T03-A07A1B\* [1992-2005]

### By signal format, by recorded data

\*This code is now discontinued. See T03-P07 for general non-magnetic recording signal processing aspects of data erasure or copying prevention. Pilot, inhibit

## T03-A07A3\* [1992-2005]

## Preventing unauthorised deliberate access or copying

\*This code is now discontinued.

## T03-A07A3A\* [1992-2005]

## By hardware detail, e.g. disk drive lock

\*This code is now discontinued.

## T03-A07A3B\* [1992-2005]

## By signal format

\*This code is now discontinued.

#### T03-A07B [1992]

#### Copying; re-recording

Covers authorised copying of magnetic recordings.

## T03-A07B1 [1992]

## Duplication of pre-recorded information at post mfg. stage, e.g. time code carrier

Includes servo track writing post manufacture, e.g. in hard disk drive. Duplication of whole carrier information is covered by T03-A07B3 codes.

Pre-formatting, servo, index, SMPTE

### T03-A07B3 [1992]

**Duplication from one carrier to another** 

## T03-A07B3A [1992]

Making many copies from one master

#### T03-A07B9 [1992]

Other copying, re-recording

## T03-A08 [1992]

#### **Magnetic drive**

Codes in this section are used with either T03-E or T03-F codes as appropriate to indicate carrier positioning aspects. Portable standalone drives are also coded in T04-P. Prior to 1997, these codes were used to indicate these aspects only, but are now widened in scope to be applied for any novel aspect of magnetic drives which would be included in T03. To further discriminate the type of equipment concerned, codes from the T03-N section should be used where T03-A08 codes are not sufficiently specific.

T03-A08A [1992]

#### Disk drive

See T03-F codes also.

T03-A08A1 [1992]

#### Single disk drive module

From 2012 T03-A08A1G is introduced for portable hard disk drives that are used for external storage. Hard disk drives of normal form factor for use within computers, servers, etc., are covered by T03-A08A1C and card-type or similar small form factor drives are covered by T03-A08A1E. In 2002 the title of T03-A08A1 was amended to better reflect its intended coverage of single units which may drive one or more magnetic disks. Storage systems based on multiple magnetic disk drive modules used together are covered by T03-A08A5 codes.

T03-A08A1A [1992]

Floppy disk drive

T03-A08A1C [1992]

## Hard disk drive

This code is used as the default reference for a 'hard disk drive'. Card type, or similar small form factor magnetic disk drives used within equipment are covered by T03-A08A1E and external hard disk drives by T03-A08A1G (from 2012), both of which are assigned instead of T03-A08A1C. Please note that since T03 codes cover dynamic recording systems only, SSDs and similar solid-state replacements for hard disk drives are not assigned this code and are instead covered by T01-H01B3 codes.

## T03-A08A1E [1997]

## Card type, small form factor magnetic disk drive

This code covers compact and/or thin drives, assumed to be of hard disk type unless other codes indicate otherwise, that are mounted inside the equipment using the stored data. Portable hard disk drives that are external to the computer or other equipment with which they are used are covered by T03-A08A1G.

**PCMIA** 

## T03-A08A1G [2012]

#### Portable hard disk drive

This code covers hard disk drives that are self-contained and used as external drives, e.g. for connection to a PC via a USB or similar interface. T04-P is also assigned for external computer storage disk drives. Standard hard disk drives and compact drives of e.g. card-type that are mounted inside equipment are covered by T03-A08A1C and T03-A08A1E respectively.

Back-up, desk-top, external storage

## T03-A08A5 [1992]

#### Multiple disk drive modules

From 2002 the title of this code has been amended to better reflect its intended coverage of multiple disk drive units (assumed to be for hard disks unless T03-A08A1A also assigned).

Stack

## T03-A08A5A [1997]

#### RAID system

Redundant array inexpensive disks

#### T03-A08C [1992]

#### Card drive

See T03-F and T04-A03A/T04-J codes also.

## T03-A08E [1992]

#### **Tape drive**

See also T03-E codes. This code is intended solely for drives intended for computer storage applications, e.g. tape streamers. It is **not** applied for details of audio or video tape recorders.

## T03-A08M [2007]

## Multiple head actuator type drive

Drives with multiple heads mounted in a fixed relationship with respect to each other are not routinely coded here.

T03-A09

Other

T03-A10 [1992]

Interfacing with magnetic recorder

T03-A10A [1997]

Interfacing hardware

Includes plugs, sockets, cables etc.

T03-A10C [1997]

Interface circuitry

T03-A10E [1997]

**Control aspects** 

See T01-C01 and T01-H01 codes also. Use with T03-A08A5A for RAID aspects.

T03-A10E1 [1997]

**Data transfer aspects** 

T03-A10E3 [1997]

**Control of storage** 

Includes file allocation, etc.

FAT

#### T03-B

## **Optical recording/reproduction**

For records prior to 2002 audio/video applications are assigned W04-C codes also. From 2002 carriers and head/record carrier driving aspects of audio/video optical recording are **no longer** coded in W04. For audio/video applications of optical recording drives see W04-C10 codes. Hard formatting aspects specific to audio/video recording are also covered in W04-C01F while signal formatting aspects are covered in W04-C05. Optical reading/writing circuitry is coded in W04-C06.

These codes are **not** used for cinematography per se (S06-B05), but optical soundtrack systems are included. 'Combination' optical recording, e.g. magneto-optical (T03-D01 codes), is **not** assigned T03-B codes unless stated to be applicable to optical recording also.

Disk, storage, compact, laser, beam, light

#### T03-B01

#### Record carriers and their manufacture

For records prior to 2002 all aspects of record carriers per se are assigned W04-C01 codes also, irrespective of stated application. From 2002 W04-C01 codes are no longer used. Codes for carrier type (T03-B01D section) are assigned when possible, to indicate this aspect only. (Prior to 1992 use T03-N codes). From 2002 T03-B01D codes can be used to indicate audio/video carrier applications. From 1997, T03-B01H is used for layer arrangements without particular reference to any one (previously assigned the general T03-B01 code).

T03-B01A [1987]

**Substrates** 

Mould, transparent

T03-B01A1 [1992]

Compositions

Includes glues, resins used for bonding multiple substrates.

PMMA, polycarbonate, resin

T03-B01A5 [1992]

Structure; shape

T03-B01A5A [1992]

**Double substrate** 

Double-sided, dual-substrate

T03-B01B [1987]

Light sensitive layers

Photo-sensitive, photochromic, contrast, reflection, pit

T03-B01B1 [1992]

Light sensitive materials

Spiropyran

T03-B01B1A [1992]

Light absorbing materials

Includes IR-absorbing compounds.

T03-B01B5 [1992]

## Characterised by recording process

Codes in this section are only assigned when some aspect of the light sensitive layer is novel, **not** to routinely indicate carrier type, which is catered for by T03-B01D codes.

## T03-B01B5A [1992]

#### **Ablation**

Covers methods involving depletion of material, such as hole burning.

Ablative, evaporation, metal film, surface tension

## T03-B01B5C [1992]

#### **Deformation**

Includes formation of bubbles.

Polymer, metal, bi-layer, gas, scatter

## T03-B01B5E [1992]

#### Interaction

Includes alloying or segregation of material. Exothermic, chemical reaction, alloy, separate, crystallisation, bi-layer

## T03--B01B5G [1992]

#### **Phase transition**

Includes change between crystalline and amorphous states.

Phase-change, liquid crystal

#### T03-B01B5J [1992]

#### **Combination of methods**

Includes use of more than one recording mechanism for multilevel recording of data. From 1997, multiple light sensitive layer arrangements and (single) layers sensitive to more than one wavelength, previously coded here, are respectively transferred to T03-B01B5N and T03-B01B5P.

High density, tri-level

#### T03-B01B5L [1992]

#### **Reversible process**

See T03-B01D8 for rewritable optical carrier in general.

Erasable, rewritable, photochromic

## T03-B01B5N [1997]

#### Multiple light-sensitive layer

(T03-B01B5J)

## T03-B01B5P [1997]

## Layer sensitive to different light wavelengths

(T03-B01B5J)

#### T03-B01B5X [1992]

## Other recording processes

## T03-B01C [1987]

#### Protective layers, (anti-) reflective layers

Coating, film

#### T03-B01C1 [1992]

#### Internal reflective or antireflective layers

This code takes precedence over T03-B01C3 and is used for indeterminate cases.

## T03-B01C3 [1992]

#### **External reflective or antireflective layers**

#### T03-B01C5 [1992]

#### Protective (ext.) layers

Anti-abrasion, scratch-resistant, antistatic

## T03-B01C7 [1992]

## Protection subsequently applied to carrier

Includes plastic air-occlusion film applied to surface of compact disk.

## T03-B01C8 [2007]

## **Labelling layers**

(T03-B01C9)

Includes optical and thermo sensitive layers for recording human readable information as well as layers suitable for printing e.g. by ink jet (see S06-G codes). Layers for recording data are covered in T03-B01B and are not coded here.

#### T03-B01C9 [1992]

Other

## T03-B01D [1992]

#### Record carrier type

Codes in this section are used in conjunction with either those for features of carriers per se, or those for manufacture, to indicate the type of the carrier only.

#### T03-B01D1 [1992]

Disk

#### T03-B01D1A [2002]

#### For audio/video storage

(W04-C01)

## T03-B01D3 [1992]

## Card

Includes cards with circular tracks and centre-hole to allow recording/playback in optical disk recorder.

## T03-B01D3A [2002]

## For audio/video storage

(W04-C01)

## T03-B01D4 [2006]

#### **Super resolution carrier**

Includes layer arrangements on carrier, e.g. mask layers, to increase resolution beyond wavelength of read/write laser. Super resolution arrangements involving optical components of head are covered in T03-B02B6 and are not coded here.

Super RENS, Super Resolution Near Field Structure

T03-B01D5 [1992]

**Tape** 

T03-B01D5A [2002]

For audio/video storage

(W04-C01)

## T03-B01D6 [1997]

#### **Multilayer carriers**

Includes double-substrate arrangements (also assigned T03-B01A5A) and carriers with multiple light sensitive layers on one substrate (see also T03-B01B5N).

## T03-B01D7 [1992]

## Non-erasable carrier

This code is only used when this aspect of the carrier is stated, and not merely instead of T03-B01D8. Search in conjunction with T03-B01D8 for hybrid carrier arrangements with erasable and nonerasable areas.

Direct read after write, DRAW, write once read many times, WORM, compact disk, CD

T03-B01D7A [1997]

Read only

Includes CD-ROM.

T03-B01D7C [1997]

**WORM** 

Covers carrier enabling writing, but not erasing. *Archive* 

T03-B01D8 [1992]

#### **Erasable and rewritable carrier**

For details of recording layers see T03-B01B5L. Search in conjunction with T03-B01D7 for hybrid carrier arrangements with erasable and nonerasable areas.

## T03-B01E [1992]

#### Manufacture

Use with T03-B01D codes to indicate manufacture of a particular type of carrier.

T03-B01E1 [1992]

**Equipment** 

T03-B01E1A [1992]

#### Stamper

From 1997, this code will be used to cover stampers per se only -see note for T03-B01E3E.

Press, punch, form, substrate, roll, sheet

## T03-B01E1B [1992]

#### **Coating equipment**

Covers equipment for applying any type of layer to substrate.

Evaporate, coat, deposit, spray, sputter, vacuum, vapor

## T03-B01E1M [2006]

## **Mastering equipment**

Includes equipment for writing to glass master and performing other mastering processes. See V05 codes for novel aspects of electron beam writing equipment.

Electron beam writer

## T03-B01E3 [1997]

### Characterised by process

Codes in this section are used with other T03-B01E codes as appropriate to provide additional information on the processes involved in an invention.

#### T03-B01E3A [1997]

## Fabrication and recording of master

Includes production of master from raw material and also process of recording data on it which carriers will finally store.

Glass, cut, tape master, hard disk, subcode

## T03-B01E3C [1997]

## Production of intermediate copies

Includes production of 'metal master' and 'metal mother'.

Plating, sputtering, coating

#### T03-B01E3E

### Production of stamper per se

Stampers per se, and materials for them, are coded in T03-B01E1A. From 1997, their manufacture will be described by use of T03-B01E3E together with T03-B01E1 or T03-B01E5 as appropriate. (Prior to 1997, T03-B01E1A itself was used with either 'apparatus' or 'method' codes).

## T03-B01E3G [1997]

#### **Pressing**

Includes bonding of multiple substrates and setting resins as well as sheet stamping methods. See T03-B01E3X for punching hole in substrate after pressing.

Injection moulding

### T03-B01E3J [1997]

## **Applying coatings after pressing**

Includes labelling where label is part of carrier (also coded in T03-H02A1A and X25-F08 when there are significant electrical details). Chiefly covers application of reflective and protective films after pressing process. T03-B01E1B will continue to be assigned (in addition to T03-B01E3J) where novel coating equipment is involved.

## T03-B01E3L [2011]

#### Polishing and cleaning

This code covers polishing and cleaning of an optical recording medium or a stamper or similar (e.g. with T03-B01E3E) **as part of a manufacturing process**. Polishing, cleaning or reconditioning of already-manufactured optical carriers by a user is **not** included and is covered by T03-H02B with T03-B01D codes assigned also as appropriate to denote the form of the carrier, e.g. T03-B01D1 for disk cleaning or scratch repair.

#### T03-B01E3P [1997]

### **Packing and shipment**

Includes placing CDs in 'jewel boxes' ('jewel boxes' per se and their manufacture are covered by T03-L01A1), labelling, etc. Electrical details of packing and labelling of carrier containers are also assigned X25-F codes.

#### T03-B01E3S [2002]

#### Multistep manufacturing process

This code is used for inventions covering a number of manufacturing steps without apparent emphasis on any one.

#### T03-B01E3X [1997]

## Other optical carrier manufacturing processes

T03-B01E5 [1992]

**Methods** 

T03-B01E7 [1992]

Testing, monitoring

T03-B01E7A [1992]

## Of manufacturing process

Instrumentation, check, measure

T03-B01E7B [1992]

Of carrier during manufacture

T03-B01E7C [1992]

#### Of complete carrier

Includes test recording and inspection by e.g. optical testing methods.

## T03-B01F [1992]

## **Recording format**

Covers physical aspects only such as groove/land structure and other aspects fixed at time of disk manufacture, as well as geometry of recordable and non-recordable pits. See T03-B05 for signal aspects of recording formats, including spatial arrangement of data on carrier and between carrier layers.

Sector, servo, index

#### T03-B01F1 [1992]

#### To increase storage density

Capacity, data

## T03-B01F1A [2007]

#### Multivalue data formats

Includes recording marks that are able to contain several pieces of information by using variations in length, width or depth, to store data values with base greater than two.

T03-B01F5 [1997]

Details of grooves, pits, etc.

T03-B01F5A [1997]

#### Relating to tracking

Track following and accessing is covered in T03-B02A3 codes, also assigned where appropriate.

## T03-B01H [1997]

#### Layer arrangements

Covers details of sequence layers making up record carrier without specific reference to any one layer.

## T03-B01R [2006]

## Recycling and destroying optical carrier

This code is used for recycling and destroying of **optical** record carriers only. Recycling and destroying of magnetic carriers is covered by T03-A01R and of magneto-optical carriers by T03-D01R. Where an invention is applicable to recycling or destruction of several types of carrier or the type is not disclosed the general code T03-H02R is assigned instead. For recycling of recording or playing equipment see V04-X01C.

#### T03-B02

## Heads and head/light source positioning

## T03-B02A [1987]

## Positioning, focusing

Codes in this section cover both lens positioning for focusing, and positioning of the head as a whole for track selection and alignment.

#### T03-B02A1 [1992]

## Lens positioning for focusing

Positioning of the head moving across the carrier is covered by T03-B02A3 codes.

#### T03-B02A1A [1992]

#### Drive element per se

Includes voice coil motor. (See V06-M04 also). *VCM* 

### T03-B02A1C [1992]

#### Focus detection and control

Includes focus servo arrangements. Feedback, error, lens, position

## T03-B02A3 [1992]

## **Head positioning**

Covers positioning of head as a whole, for track selection or following, **not** focusing, which is covered by T03-B02A1 codes.

## T03-B02A3A [1992]

#### Drive element per se

Includes linear motor. (See V06-M06B also). *Coil, pulse, step* 

#### T03-B02A3B [1992]

### Movable mounting structures

Includes rail assembly allowing head movement. *Guide, slide* 

## T03-B02A3C [1992]

#### Track selection and access

Includes track-accessing servo arrangements. (For track access servo in general, see T03-G02B1 codes).

Index, seek, kick pulse, step, initialise

#### T03-B02A3D [1992]

#### Track following

Includes track-following servo arrangements. (For track-following servos in general see T03-G02C1).

Alignment, feedback, off-track, shift, compensate, tilt

## T03-B02A3E [1992]

#### Interchangeable servo system

Includes track accessing servo switching to track following mode. This code takes precedence over T03-B02A3C and T03-B02A3D.

#### T03-B02A4 [2005]

#### **Tilt correction**

Covers arrangements involving movement of lens or using other optical systems e.g. liquid crystal element. Search in conjunction with T03-B06 codes for compensation by signal processing.

#### T03-B02A5 [1992]

#### **Compensation system**

Includes arrangements compensating for temperature change or vibration, in either focus or track access/following system.

Shift, disturbance, distortion, jitter

## T03-B02A7 [1992]

#### Light source control

Includes control of bias circuit for semiconductor laser (see also U12-A01B4 and corresponding codes in V08).

Monitor, current, feedback, LED, photodiode, APD sensor

#### T03-B02A8 [1997]

## Using multiple heads, head positioning for double-sided disk

From 2007 this code has been expanded to include multiple head systems not exclusively used for double-sided disks. Previously this code covered only head positioning for double-sided disks.

## T03-B02A8A [2007]

## Head positioning for double-sided disk

All general aspects of multiple head drives are also covered in T03-B10M. Includes dual-head systems and arrangements for single head to move to other side of disk. Search using T03-B02A8 for all records prior to 2007.

T03-B02A8C [2007]

Reading multiple formats

T03-B02A8E [2007]

Increasing access speed

T03-B02A8G [2007]

Simultaneous reading of multiple tracks

T03-B02B [1992]

Head

The codes in this group cover constructional aspects of optical heads per se. Head positioning is covered by T03-B02A codes.

T03-B02B1 [1992]

#### **Light source**

This code covers novel light sources themselves, such as laser diodes, specific details of which are covered by U12-A01B codes and also codes in V08. It does not refer to assemblies including the light source and associated optical elements external to it which are covered by T03-B02B if no specific detail is given, or by other T03-B02B subdivisions as appropriate. Light sources are normally assigned T03-B02B1 only but in cases of specific application to reading or writing, subdivision codes are assigned instead. Frequency doubling or other multiplying optical arrangements are covered by T03-B02B7E (coded as T03-B02B1 and T03-B02B7 prior to 1997). Light source control aspects are coded in T03-B02A7.

LED, laser, solid, gas

T03-B02B1A [1992]

For recording

Writing, erasing, overwrite

T03-B02B1B [1992]

For reading

T03-B02B3 [1992]

Photodetector for focus and read

Photodiode, diode, APD, quadrant, sensor

T03-B02B5 [1992]

Lenses

T03-B02B6 [1997]

#### 'Super-resolution' optical aspects

Aperture, Rayleigh, wavelength, refraction

T03-B02B7

[1992]

## **Optical systems, optical elements**

Includes other optical elements e.g. lightguides for transferring reading or writing light, (see V07-F01 codes for novel aspects). Lenses are covered by T03-B02B5. 'Super-resolution' optical aspects are indicated by assignment of T03-B02B6 with T03-B02B5 or T03-B02B7 codes as appropriate.

T03-B02B7A

[1997]

Beam splitter

Prism

T03-B02B7C

[1997]

**Polarising arrangements** 

T03-B02B7E

[1997]

## **Harmonic generators**

(T03-B02B1, T03-B02B7)

Covers arrangements effectively reducing wavelength of recording or reading light.

T03-B02B7G

[2005]

[1992]

**Diffraction gratings** 

T03-B02B7M [2006]

#### Multiple optical path

Includes systems for reading different types of optical disk.

#### T03-B02B8

## Optical recording head cleaning, head manufacture, head testing

From 2012 the scope of this code has been expanded to include manufacture and testing of optical heads, respectively covered by subdivisions T03-B02B8C and T03-B02B8E, in addition to optical head cleaning, for which T03-B02B8A is now the main code. Note that T03-B02B8 codes refer to the optical head itself, as defined by T03-B02B codes, and not head positioning aspects as covered by T03-B02A codes. Prior to 2012 T03-B02B8 covered only arrangements for cleaning sources, detectors, and optical system with cleaning of e.g. an optical disk player lens by a dummy carrier being covered by T03-B02B8A. From 2012 T03-B02B8A is used as a general reference for head cleaning. Cleaning of recording equipment in general is covered by T03-H02C.

## T03-B02B8A [1992]

## Optical recording head cleaning, including use of dummy carriers

From 2012 the scope of this code has been expanded to cover general arrangements for cleaning optical recording and playback heads, such as lens cleaners, in addition to its previous coverage of dummy carriers for cleaning. Prior to 2012, T03-B02B8A was used for cleaning using dummy carriers such as cleaning disks and T03-B02B8 served as a general 'optical head cleaning' code. (Prior to 1992 T03-B02 and T03-H02 were assigned for optical head cleaning).

Wipe, pad, brush, solvent, lens

## T03-B02B8C [2012]

## Optical recording head manufacture

Between 2006 and 2011 search T03-B02B codes with T03-M08 (general manufacturing code) for optical recording head manufacture. From 2012 T03-M08 is no longer assigned for this topic.

## T03-B02B8E [2012]

## **Optical recording head testing**

Between 1992 and 2011 search T03-B02B codes with T03-K07 codes (general testing code) for optical recording head testing. From 2012 T03-K07 codes are no longer assigned for this topic. When optical testing is involved codes in e.g. S02-J04 or S03-E04 subgroups are also assigned as appropriate.

#### T03-B02C [1992]

## Static carrier reading and writing system

Covers arrangements for reading or writing where relative movement of light source/sensor with respect to recording medium does not involve physical movement of either record carrier or a head apparatus. Instead relative movement takes place, for instance, by optical beam scanning with electro-optical or electromechanical scanning, or use of an switched optical array. Does not cover optical static stores, which are covered by U14-A02 codes.

## T03-B03\* [1992-2004]

## **Record carrier positioning**

\*This code is now discontinued and from 2005 novel aspects of optical record carrier positioning are assigned the appropriate T03-B10 code in conjunction with T03-F or T03-E codes.

#### T03-B03A\* [1992-2004]

#### For disks

\*This code is now discontinued. Prior to 2005 T03-N01 was also assigned and T03-F codes were applied for specific details.

## T03-B03C\* [1992-2004]

#### For cards

\*This code is now discontinued Prior to 2005 T03-N05 was also assigned and also T03-F codes for specific details. Codes in T04, e.g. T04-A03B and T04-J are assigned for this topic.

### T03-B03E\* [1992-2004]

#### For tape

\*This code is now discontinued Prior to 2005 T03-N02 and/or T03-N03 or T03-N04 were also assigned along with T03-E codes, which are still assigned for specific tape drive details.

#### T03-B05 [1992]

## Signal recording format and methods

## T03-B05A [2005]

## **Recording methods**

Includes arrangements for recording label information using data recording equipment on visible light sensitive layer. For this topic see also T03-H02A.

### T03-B05A1 [2005]

#### **Optimisation methods**

Includes use of test recording area. Use with appropriate code, e.g. T03-B02A7 for controlling light source power.

## T03-B05F [2005]

#### **Format**

Covers arrangement of data only, physical aspects such as hard sectoring of data, are covered by T03-B01F. Index signal recording and related aspects are also in T03-J01 codes.

Constant, angular, linear, velocity, CAV, CLV

#### T03-B05F1 [2007]

## Data arrangement within recording layers

Covers two dimensional data layout.

## T03-B05F5 [2007]

## Data arrangement between recording layers

Covers arrangement of different data types between different layers, e.g. layer used for interactive data such as Java info in Blu-Ray disks.

#### T03-B05F9 [2007]

#### Other data arrangements

## T03-B05K [2005]

## Determining format or type of carrier inserted

E.g. distinguishing between CD and DVD or between CD-R and CD-RW in drive capable of handling multiple formats.

#### T03-B06 [1992]

## Reading/writing circuitry

This code is used with T03-P codes when signal processing aspects are involved.

Laser, diode

T03-B06A [1992]

Writing

T03-B06C [1992]

Reading

T03-B07 [2007]

#### Re-recording, duplication

(T03-B01E3X, T03-B05A)

Includes equipment and methods for duplicating optical carriers by recording on writable media. Production of optical carriers by pressing is covered in T03-B01E and is not coded here.

#### T03-B08 [1992]

## Interfacing with optical recording equipment

#### T03-B09

## Other optical recording/reproduction aspects

Includes editing/recording techniques esp. for optical recording, track flaw detection, noise elimination etc., when not relevant to other T03-B codes.

## T03-B10 [2005]

### **Optical drive**

Portable standalone drives are also coded in T04-P. From 2005 optical drives are coded in this section in accordance with carrier type and are no longer assigned a corresponding T03-N code. Prior to 2002 optical drives are coded in T03-N as appropriate and W04-C10. From 2002 W04-C10 codes are applied only for audio/video recording applications and therefore between 2002 and 2005 optical drives with no audio/video aspect were assigned a T03-N code in conjunction with the appropriate T03-B codes to denote novel aspects.

## T03-B10A [2005]

#### Disk drive

CD, CD-ROM, CD-R, CD-RW, DVD, DVD-ROM, DVD-R, DVD-RW, DVD-RAM, DVD+R, DVD+RW, HD-DVD, BD-ROM, BD-R, BD-RE, BluRay, UMD

#### T03-B10A1 [2005]

#### Multilayer disk

From 2002 to 2005 drives for optical disk with multiple recording layers, e.g. DVD-9, DVD-10 and DVD-18 formats, are assigned W04-C10A2 where the invention has significant audio/video recording aspects. From 2005 W04-C10A2 is no longer used and all multi-layer aspects of drives are coded here. Optical disk drives for audio/video recording which are also used for recording other data formats are coded in W04-C10A3A.

T03-B10C [2005]

**Card drive** 

T03-B10E [2005]

**Tape drive** 

T03-B10M [2007]

Multiple head type drive

### T03-B12 [2005]

## Holographic recording

This code is applied in conjunction with other T03-B codes to denote the relevant aspect. Prior to 2005 holographic recording was assigned T03-C09 as well as in T03-B codes.

#### T03-C

## Other dynamic recording/reproducing methods

Audio/video applications are coded in W04-D codes also. For records prior to 2002, where application to audio/video recording is **not** stated, only capacitive record carriers and recording equipment are routinely assigned W04 codes also (in W04-D section). From 2002 W04-D codes are only applied where audio/video applications are specifically mentioned. For static stores see U14-A codes.

### T03-C01 [1992]

#### Capacitive

Includes ferro-electric probe storage.

PVC, carbon, conductive, lubricant, stylus, diamond, shank, antistatic

## T03-C03 [1992]

## Using electron beam

See also V05-F08C3 and other V05-F codes for equipment aspects, as appropriate.

## T03-C05 [1992]

## **Using tunnelling effects**

See also V05-F08C3 and V05-F01A5, and other V05-F codes for equipment aspects, as appropriate.

#### T03-C05A [1997]

## Record carriers and their manufacture

## T03-C07 [1992]

## Using superconductive element

See T03-A01E for superconducting magnetic record carriers, and T03-A06K for superconductive magnetic recording systems. Superconductive materials and devices in general are coded in U14-F codes, (X12-D06 codes are assigned for high-power electrical aspects of superconductors).

## T03-C09 [1992]

#### Other recording methods

#### T03-D

## Recording/reproducing using combination of methods

Audio/video applications are assigned in W04-D codes also.

## T03-D01 [1987]

### Magneto-optical recording

T03-D01 codes cover recording intended to be read as changes in reflected light due to the Kerr effect and not recording based on temporary lowering of coercivity by a heat source that is read magnetically, as in heat-assisted magnetic recording (covered by T03-A06N1). Prior to 2002 all aspects of magneto-optical recording were assigned W04-D codes. From 2002 carriers and mechanical aspects of magneto-optical recording are no longer coded in W04. Carriers intended specifically for audio/video recording are coded in T03-D01A1K. Audio/video applications of magnetic-optical recording drives are assigned W04-D20 codes. Inventions are assigned T03-D01 codes when specific reference is made to magnetooptical recording. However, it should be noted that T03-B should be considered also for general aspects, such as optical systems, which may also be relevant to magneto-optical recording, and to allow for cases where the magneto-optical aspect cannot be ascertained.

Photomagnetic, Kerr effect, disk, substrate, film, rare earth, amorphous, optomagnetic

## T03-D01A [1992]

#### **Record carriers**

Prior to 1997, this code included disclosures dealing with a sequence of layers without emphasis on any specific one. This subject matter is now transferred to T03-D01A4.

### T03-D01A1 [1992]

#### **Carrier type**

Codes in this section are used to indicate carrier type for both novel carrier details and novel manufacturing aspects. For these aspects, T03-N codes are **not** assigned from 1992.

T03-D01A1A	[	1992]

Disk

T03-D01A1C [1992]

Card

T03-D01A1E [1992]

Tape

T03-D01A1K [2002]

For audio/video recording

T03-D01A2 [1992]

**Substrate** 

T03-D01A3 [1992]

## Reflective, antireflective, and dielectric layers

The title of this code has been expanded to reflect the previous inclusion of dielectric layers, now covered by T03-D01A3E.

T03-D01A3A [1992]

**Antireflective layer** 

T03-D01A3C [1992]

**Reflective layer** 

T03-D01A3E [1997]

#### **Dielectric lavers**

This code is mainly intended for layers internal to the carrier. Spacing layers between two magnetic layers are covered by T03-D01A5G. External protective layers are covered by T03-D01A7 codes.

## T03-D01A4 [1997]

### Layer arrangements in general

This code is used for inventions where structures involving several layers are claimed, without particular emphasis on any one. See other T03-D01A codes for novel details of specific layers.

T03-D01A5 [1992]

#### **Magnetic layers**

See V02-A01 codes for magnetic compositions also, and V02-B01 for magnetic film in general.

T03-D01A5A [1992]

**Recording layers** 

T03-D01A5C [1992]

Reference layers

T03-D01A5E [1997]

#### **Exchange coupling system**

(T03-D01A5A, T03-D01A5C)

T03-D01A5G [1997]

#### Spacing layers

Covers layers consisting of metallic or non-metallic material separating two magnetic layers. Dielectric layers in general are covered by T03-D01A3E.

#### T03-D01A5J [2005]

## **Domain wall displacement system**

Covers systems which transfer high density recorded marks from memory/recording layer to displacement/reproduction layer via switching layer through exchange coupling force, then causing exchange coupling force to disappear through heating and shifting domain wall in reproduction layer to increase size of mark so as to allow reading by standard wavelength laser.

Memory layer, switching layer, displacement layer, control layer, reading layer, magnetically amplifying magneto optical system (MAMOS)

T03-D01A7 [1992]

Overcoat layer

T03-D01A7A [1992]

Lubrication aspects of overcoat layer

T03-D01A8 [1992]

#### Record carrier manufacture and testing

Prior to 2002 this aspect was also coded in W04-D01A1, irrespective of application. From 2002 W04-D01A1 is no longer used. Use T03-D01A1 codes to discriminate carrier type (T03-N codes not assigned from 1992).

T03-D01A8A [1992]

Substrate manufacture

T03-D01A8C [1992]

Reflective layer deposition

## T03-D01A8E [1992]

#### **Magnetic layer deposition**

Also coded in V02-H02 codes for novel aspects of equipment or process. Magnetic layer deposition for purely magnetic record carriers is covered by T03-A02A codes.

T03-D01A8G [1997]

Overcoat and lubricating layer deposition

T03-D01A8J [1992]

#### **Carrier testing**

For non-recording testing aspects see S02/S03 codes, e.g. S03-E04F2 for optical flaw testing.

## T03-D01A9 [2005]

#### **Recording format**

Covers physical aspects only, e.g. details of grooves and pits. See T03-D01E7 for signal aspects of recording format.

#### T03-D01B\* [1992-2004]

#### **Record carrier positioning**

\*This code is now discontinued. From 2005 novel aspects of magneto-optical record carrier positioning are assigned T03-F or T03-E codes in conjunction with the appropriate T03-D01K code.

#### T03-D01B1\* [1992-2004]

#### For disks

\*This code is now discontinued. Prior to 2005 T03-N01 was also assigned along with T03-F codes for specific details.

#### T03-D01B5\* [1992-2004]

## For tape

\*This code is now discontinued. Prior to 2005 T03-N02 and/or T03-N03 or T03-N04 were also assigned. See T03-E codes for tape drive details.

T03-D01C [1992]

**Optical head details** 

T03-D01C1 [1992]

## **Optical elements**

Includes light guides (see V07-F01 codes also).

T03-D01C1A [1992]

Lenses

T03-D01C1C [1992]

Beam splitter, polarizer

T03-D01C1E [1997]

'Super-resolution' optics

Numerical aperture, NA, Rayleigh, refraction

T03-D01C1G [1997]

**Harmonic generator** 

Covers arrangements effectively reducing wavelength of recording or reading light.

T03-D01C3 [1992]

**Light source** 

See U12 and V08 codes as appropriate for details of lasers and their control.

T03-D01C3A [1992]

**Light source control** 

T03-D01C5 [1997]

**Photodetector** 

See U12-A02B codes for semiconductor device respects.

Photodiode, diode, APD, quadrant, sensor

T03-D01D [1992]

**Optical head positioning** 

T03-D01D1 [1992]

**Focusing** 

T03-D01D1A [1992]

**Focus servo** 

T03-D01D1C [1992]

**Motor drive** 

Includes voice-coil motors and their control. See also V06-M04 and V06-N codes.

T03-D01D3 [1992]

Track selection and accessing

Includes motor drive for head positioning. See also V06-M and V06-N codes as appropriate.

T03-D01D3A [1992]

Track accessing servo

Track access servo systems in general are covered by T03-G02B1.

T03-D01D3C [1992]

Switching to track following servo action

T03-D01D5 [1992]

**Track following** 

T03-D01D5A [1992]

Track following servo

Track following servo systems in general are covered by T03-G02C1.

T03-D01D7 [1992]

Motor drive for track selection and following

Includes motor per se and also drive circuitry not specifically part of track access or track following servo systems, these being covered by T03-D01D3A and T03-D01D5A respectively.

T03-D01E [1992]

Erasing, rewriting, writing, interfacing methods and circuits

The title of this code has been expanded to reflect its wider use since 1992 to include reading and writing circuitry (now covered by T03-D01E3 codes) and interfacing aspects (T03-D01E5 codes).

T03-D01E1 [1992]

**Erasing/rewriting methods** 

Includes methods intended to reduce access time.

T03-D01E1A [1992]

Reducing unnecessary erasure

Includes monitoring of unrecorded areas to allocate data accordingly.

T03-D01E3 [1997]

Writing and reading circuitry

See also T03-P codes where broader signal processing aspects are involved.

T03-D01E3A [1997]

Writing

T03-D01E3C [1997]

Reading

T03-D01E5 [1997]

Interfacing aspects

Includes actual interfacing circuits and also storage control aspects, e.g. file allocation, etc. See also T01-H codes for computer storage systems. *FAT* 

T03-D01E7 [2005]

Signal recording format, methods

T03-D01E9 [1997]

Other magneto-optical recorder aspects

T03-D01F [1992]

**Magnetic system** 

T03-D01F1 [1992]

## **Magnetic head**

Includes manufacture of head (see V02-H05 also). Magnetic heads for purely magnetic recording are covered by T03-A03 codes.

## T03-D01F1A [1992]

#### **Head movement**

Covers spacing/movement of head relative to disk surface. Optical head positioning is covered by T03-D01D codes.

#### T03-D01F3 [1992]

#### Bias magnet, initialisation system

Novel permanent magnets are also coded in V02-E01, electromagnets in V02-E02 codes.

## T03-D01F3A [1992]

#### Position adjustment

Includes movement towards disk surface.

#### T03-D01H [1992]

## **Recording method**

Codes indicating recording method are assigned to indicate equipment type, and thus may be used with any other T03-D01 code provided the type of recording is disclosed.

## T03-D01H1 [1992]

#### **Magnetic field modulation**

Covers systems with constant intensity (unmodulated) light beam.

## T03-D01H5 [1992]

#### **Light beam modulation**

Covers systems with constant (unmodulated) magnetic field.

## T03-D01K [2005]

#### Magneto-optical drive

Portable standalone drives are also coded in T04-P. From 2005 magneto-optical drives are coded in this section in accordance with carrier type and are no longer assigned a corresponding T03-N code. Prior to 2002 magneto-optical drives are coded in T03-N as appropriate and W04-D20. From 2002 W04-D10 codes are applied only for audio/video recording applications and therefore between 2002 and 2005 optical drives with no audio/video aspect were assigned a T03-N code in conjunction with the appropriate T03-D01 codes to denote novel aspects.

T03-D01K1 [2005]

Disk drive

T03-D01K3 [2005]

**Card drive** 

T03-D01K5 [2005]

Tape drive

T03-D01R [2006]

## Recycling and destroying magneto-optical carrier

This code is used for recycling and destroying of magneto-optical record carriers only. Recycling and destroying of magnetic carriers is covered by T03-A01R and of optical carriers by T03-B01R. Where an invention is applicable to recycling or destruction of several types of carrier or the type is not disclosed the general code T03-H02R is assigned instead. For recycling of recording or playing equipment see V04-X01C.

#### T03-D03 [1992]

### **Electro-optical recording**

Includes photorefractive ferroelectric carrier system with e.g. static electric field and modulated light beam. For details of head and carrier positioning see T03-E, T03-F, and T03-G codes, as appropriate.

#### T03-D03A [1992]

#### Record carriers and their manufacture

Prior to 2002 W04-D01A codes were also applied. From 2002 W04-D01A codes are no longer used.

#### T03-D09 [1992]

## Other combination recording methods

## T03-E

#### **Tape (filament) transport**

For records prior to 2002 tape transport for audio/video recording was also coded in W04-B04B or W04-E02B. From 2002 tape transport aspects are no longer covered in these equivalent codes in W04, but are assigned W04-B10A or W04-B12A as appropriate if specific to video or audio tape recorders respectively. T03-N codes are assigned as appropriate to indicate equipment type.

Motor, rotor, drive, belt, gear, tape deck

#### T03-E01

## Spools; cassette changing; loading; threading

Spools within cassette housings are coded in T03-H01B, or T03-H01C only. Winding tape onto spools during manufacture is covered by T03-H codes only. Includes retention of cassette/spool in position during recording/playback.

Engage, guide, cam, gear, eject

T03-E01A [1992]

**Spools** 

Hub, reel, flange, leader

T03-E01B [1992]

Cassette changing

Load, eject, slot, slide, carriage

T03-E01B1 [1992]

Changing/ejecting mechanism within apparatus

T03-E01B1A [1992]

**Cassette door** 

Flap, damping, spring

T03-E01B5 [1992]

### **External feeding apparatus**

From 2006 external tape feeding for library systems is no longer included here, being covered by T03-Q01 and T03-Q07A. Prior to 2006 search with T03-E01B5 and T03-Q01 for external feeding arrangements for tape libraries.

#### T03-E01B7 [1992]

#### Handling different sized cassettes

Cassette adaptors per se (e.g. for enabling insertion of small cassette into standard machine) are covered by T03-H01B6.

T03-E01C [1992]

Looping, threading

T03-E01C1 [1992]

#### For helical scan tape

Includes arrangement to withdraw loop of tape from cassettes. Also coded in T03-N02 and T03-N03. Prior to 2002 audio/video applications of this technology were also assigned W04-B04B7A which is discontinued from 2002 and thus no longer assigned.

#### T03-E02

#### Other tape guidance

Includes capstan and rotary head guides, vacuum arrangements and pressure pads.

#### T03-E03

## Controlling, regulating or indicating speed

T03-E03A [1992]

**Speed control** 

Servo, feedback

T03-E03A1 [1992]

By measurement of carrier speed

Tachometer, pulse counting

T03-E03A5 [1992]

By recorded data

T03-E03A7 [1992]

#### In conjunction with helical-scan head

See also T03-A05A1D for helical scan head speed control, also coded in T03-N02.

#### T03-E04

## Tape tension control; speed changing; reversing

Fast forward, rewind, selector, motor

#### T03-E05

#### Control of operating mode

For records prior to 2002 audio/video applications are coded in W04-B04B5 codes. From 2002 these codes are no longer assigned.

Select, switch, function, play, rewind, fast forward, display, pause, cue, autostop, solenoid

T03-E05A [1992]

Based on sensed carrier features e.g. autostop

T03-E05A1 [1992]

Sensing recorded data

T03-E05A3 [1992]

Sensing tape tension

T03-E05A5 [1992]

## Sensing non-magnetic feature on tape e.g.

Includes optical detection. (Leader per se is covered by T03-A01H and T03-A01C3).

Light transmission, transparent

## T03-E05A7 [1992]

## Sensing speed of carrier

Includes detection of drop in speed, e.g. at end of tape, to halt operation.

## T03-E05A9 [1992]

## Other control based on sensed carrier features

### T03-E05B [1992]

#### Manual control

Includes operating controls, keys, switches, etc. *Pushbutton* 

#### T03-E05C [1992]

#### Remote control

See W04-E04A for remote control specific to audio or video recording.

Optical, IR, ultrasonic, radio, wire

#### T03-E06

## **Driving spools**

Includes motor, gearing and pulley systems, torque adjustment.

Reel, belt, tension, friction

#### T03-E06A [1992]

#### Motor

This code is used as a general code for tape drive system motors.

#### T03-E07

## **Driving tape**

Includes capstan/pinch roller systems.

### T03-E08

#### Other driving arrangements

Includes braking arrangements. Spool rotation preventing devices within cassettes are covered by T03-H01B7A

Clutch, reel, torque

## T03-F

#### Disk, drum, etc. drive and positioning

This section deals mainly with disk drive arrangements (general), but also covers analogous systems for card, drum, or other carriers. (For convenience the term 'disk' is used below). Search with T03-N codes to discriminate type of equipment, and with specific codes from other sections, e.g. T03-A08, T03-B03, etc.

Motor, floppy, hard, card, drum, cylinder

#### T03-F01

#### Automatic disk changing

Includes all types of loading/ejection mechanism where disk is not placed in final recording/reproducing. Position by hand. Load. arm. cartridge. eiect. feed

[1992]

#### T03-F01A

## Loading mechanism and drive

Includes disk tray.

#### T03-F01A1 [1992]

## Disk shutter opener

Disk cartridge shutters per se are covered by T03-H01A5. Includes arrangements to extract disk from cartridge within drive for playback/reproduction.

Pin. tab. lever

## T03-F01A5 [1992]

#### **Ejection system**

This code covers arrangements peculiar to the ejection of carriers, and **not** merely part of the reciprocating system for loading/unloading, which is covered by T03-F01A.

## T03-F01A7 [1997]

## Handling different disk size or type

## T03-F01B [1992]

## Disk positioning and centering

Hub, locate

#### T03-F01C [1992]

### Disk changing control system

Monitor, controller, circuit

#### T03-F01D [1992]

#### Manual loading of carrier

## T03-F01E [1992]

## Loading from carousel container for several carriers

Covers arrangements enabling simultaneous loading of several carriers, which are then played or recorded on, sequentially or non-sequentially. 'Internal' jukebox arrangements are covered by T03-F01F1. Carousel container per se is covered by T03-H01A2.

## T03-F01F [1992]

## Automatic feeding of single carrier from e.g. stack

## T03-F01F1 [1992]

## Feeding from stack within recording apparatus

Includes jukebox systems. Feeding systems from external stack (apart from library systems) are covered by T03-F01F5. Library systems are covered by T03-Q codes.

#### T03-F01F5 [1992]

## Feeding from stack or system external to equipment per se

From 2006 library systems are no longer included here, being covered by T03-Q codes.

## T03-F01X [1992]

## Other feeding arrangements

#### T03-F02

## Driving; control of drive and operating function; other

Motor details are coded in V06.

## T03-F02A [1992]

#### **Drive control**

Covers circuitry supervising and monitoring operation. Aspects specific to disk changing are covered by T03-F01C. See V06-N codes for motor control circuits.

T03-F02A1 [1992]

Speed control

T03-F02A5 [2005]

**Motor tilt control** 

T03-F02C [1992]

#### **Drive components**

Covers only those mechanical or electromechanical elements concerned with driving carrier.

#### T03-F02C1 [1992]

#### **Drive motor**

See V06-M codes also for motor details. Spindle motor

## T03-F02C3 [1992]

#### Turntable, spindle, bearings, disk clamping

## T03-F02C3A [1997]

## **Disk clamping arrangements**

(T03-F01B, T03-F02C3)

Covers arrangements to clamp disk onto shaft. Clamp arrangements for drive braking are covered by T03-F02C5.

## T03-F02C3C [1997]

**Bearings** 

T03-F02C5 [1992]

#### **Braking arrangements**

Arrangements to fix disk(s) on driving shaft are covered by T03-F02C3.

## T03-F02E [1992]

#### Carrier pressure arrangements

Includes arrangement to press floppy disk against magnetic head.

#### T03-F02G [1992]

#### Ventilation, cooling, air filters

Includes fans, heatsinks, etc. Cooling of electronic equipment in general is covered by V04-T03 codes.

## T03-F02G1 [1992]

## Air filters and particle/contaminant trapping

Air filters of general application are covered by T03-H02C. Prior to 1992 see T03-F02 and T03-H02. Includes the use of coatings etc. inside a drive to adsorb contaminants e.g. in an HDD (with T03-A08A1C).

## T03-F02J [1992]

## **Multi-carrier type drives**

This code is used with other T03-F codes as appropriate and covers arrangements specific to driving several carriers simultaneously.

## T03-F02L\* [1992-2004]

## Casings, constructional details

\*This code is now discontinued and since 2005 codes in this section are no longer used. Constructional aspects of disk drives are now assigned T03-L05 codes in conjunction with T03-A08A, T03-B08A or T03-D01K1 as appropriate, or in conjunction with T03-N01 for general cases.

#### T03-F02L1\* [1997-2004]

#### Casings, housings

\*This code is now discontinued.

#### T03-F02L5\* [1997-2004]

#### Internal construction

\*This code is now discontinued.

## T03-F02X [1992]

#### Other disk drive details

Includes internal connectors, e.g. between drive assembly and PCB. Prior to 2005 this code included external interfacing connectors, which are now covered in T03-M07. Includes arrangements for lubricating carriers within disk drives. For lubricating arrangements for motor bearings see T03-F02C3C along with V06.

#### T03-G

#### **General head arrangements**

To be used where appts. is non-specific or common to several types of recording. For specific applications see the relevant code group, e.g. T03-A05 for magnetic, and T03-B02A for optical recording.

Disk, drive, arm, carriage, position, motor, mount, rotating, transducer, align, stepper, slide, pick-up

#### T03-G01

## For adjusting head/record carrier spacing

Air, bearing, lower, pressure, raise

#### T03-G02

## For track selecting/aligning

Covers mechanical and electromechanical arrangements.

T03-G02A [1992]

**Head position actuator** 

T03-G02A1 [1992]

**Drive motor** 

See V06-M codes for details of motor per se.

T03-G02A5 [1992]

Mounting, support

Includes support arms, bearings etc.

T03-G02B [1992]

**Track selection** 

T03-G02B1 [1992]

Track access servo

T03-G02B1A [1992]

Switching to track following action

T03-G02C [1992]

**Track alignment** 

T03-G02C1 [1992]

Automatic alignment, track following servo

## T03-G02C5 [1992]

#### Manual alignment; setting up

For testing aspects see T03-K07 codes also.

#### T03-G02E [1992]

## Preventing servo crosstalk or unwanted interaction

Includes arrangements to prevent crosstalk between e.g. track following servo and focus servo in optical or magneto-optical disk systems, (see T03-B and T03-D01 codes also as appropriate).

#### T03-G09

## Other head arrangements

Includes other head locking/positioning appts. and head/carrier pressure maintaining appts.

#### T03-H

#### Record carriers and accessories in general

#### T03-H01

#### **Containers**

Codes in this section relate to containers, casings, sleeves etc. in which record carrier is driven. Storage containers in which the carrier is removed for playing are covered by T03-L01 codes. Sleeve, cover, cartridge, housing material, fabric,

#### T03-H01A

fiber

#### For disks

Prior to 2002 disk containers for audio/visual recording applications were also coded in W04-E02A1. From 2002 these codes are no longer used and T03-H01A6K is applied for disk containers specifically intended for audio/visual recording. (G11B-023)

Floppy, hard, compact, envelope, jacket, fold, flexible

## T03-H01A1 [1992]

#### **Materials**

Covers composition of container.

## T03-H01A2 [1992]

### For multiple disk container

Includes carousel arrangement in which carriers can be driven for recording or reproduction. See T03-F01E also for carousel-changing aspects.

T03-H01A3 [1992]

Structure

T03-H01A4 [1997]

Liner for disk container

T03-H01A5 [1992]

#### Protective arrangement, e.g. shutter

Disk drive arrangements for opening shutters are coded in T03-F01A1.

T03-H01A6 [1992]

Disk type

T03-H01A6A [1992]

Magnetic

T03-H01A6B [1992]

**Optical** 

T03-H01A6C [1992]

**Capacitive** 

T03-H01A6D [1992]

**Magneto-optical** 

T03-H01A6K [2002]

For audio/video recording

(W04-E02A1)

T03-H01A6X [1992]

Other disk type

T03-H01A7 [1992]

Disk hub

T03-H01A8 [1992]

### Manufacture and assembly

Covers manufacture of component parts of container and mounting carrier inside it.

T03-H01A9 [1992]

Other disk container details

#### T03-H01B

#### Cassettes for end-to-end webs/filaments

Prior to 2002 this topic was also coded in W04-B04B1 and W04-E02B1. From 2002 these codes are no longer used and audio/visual applications are indicated using T03-H01B4. Cassettes are assumed to be for magnetic tape unless other codes indicate otherwise.

Tape, guide, insert, reel, spool, end, leader

T03-H01B1 [1992]

**Materials** 

Polycarbonate, plastics

T03-H01B3 [1992]

#### Construction

Covers shape, internal arrangement of component parts, etc.

T03-H01B4 [2002]

## For audio/video recording

(W04-B04B1 and W04-E02B1)

T03-H01B5 [1992]

#### Protective arrangement e.g. tape cover

Search with T03-N02 for helical scan cassettes.

T03-H01B6 [1992]

### Cassette adaptor

Arrangements in a recorder to allow loading of different sized cassettes are covered by T03-E01B7.

T03-H01B7 [1992]

## Spools, spool locks

Spools not part of a cassette are covered by T03-E01A.

T03-H01B7A [1992]

#### **Spool locks**

Preventing spool rotation by tape drive components (e.g. brakes) is covered by T03-E08.

T03-H01B8 [1992]

## Loading with tape, manufacture of cassette per se

Includes manufacture and assembly of cassette.

T03-H01B8A [1992]

## Loading cassette with tape

Includes arrangements for cutting tape and attaching leader, gripper or buckle etc. For novel gripper or buckle arrangements per se, see T03-H01B9.

Pancake

T03-H01B8C [1992]

#### Manufacture of cassette per se

Includes moulding of cassette halves.

T03-H01B9 [1992]

#### Other end-to-end cassette details

Includes labels (with T03-H02A1A). Includes attachments to tape leader for gripping etc.

#### T03-H01C

#### Cassettes for endless webs/filaments

Loop, continuous, spool, message recorder, telephone answering, announcement

#### T03-H01X

#### Other container details

#### T03-H02

#### Record carriers, cleaning

Magnetic head cleaning is covered by T03-A04B codes only.

Disk, tape, cassette, head, compact, housing, cartridge, filter, fluid

#### T03-H02A [1992]

## General aspects of carriers, including labels

Prior to 2002 labels for audio/video recording carriers and cassettes were coded in W04-E03A. From 2002 this code is no longer used and audio/video applications of labels are coded in T03-H02A8. Includes labels applied to carrier itself and to housing, e.g. cassette case, jewel box, etc.

[1997]

#### T03-H02A1

#### Labels and authentication marks

#### T03-H02A1A [1997]

#### **Labels**

Includes labels applied to carrier itself and to housing, e.g. cassette case, jewel box. For labelling during manufacture of optical media see T03-B01E codes and X25-F08 (if there are significant electrical details).

## T03-H02A1C [1997]

#### **Authentication markings for record carrier**

Includes both human-readable and machine-readable markings, such as bar coding (see T04-A and T04-C codes also). Identification of counterfeit recordings by added signals is **not** included being covered in T03-P07C, and for audio and video recording in W04-G01L3 and W04-F01L3 respectively.

#### T03-H02A3 [2002]

## Integrated circuit storing carrier information

This code is intended for ICs incorporated in record carriers to act as e.g. 'electronic labels', with the possibility of reading contents information, or similar, either by recording equipment itself, or by an accessory system.

#### T03-H02A8

## For audio/video recording

(W04-E03A)

### T03-H02B [1992]

#### Cleaning of carriers

This code is used to highlight the cleaning or reconditioning of record carriers by an end user and **not** as a step in a manufacturing process. For cleaning, re-conditioning and similar processes as part of record carrier manufacture see codes for manufacture of the particular carrier type, e.g. T03-A02 codes for magnetic carriers, T03-B01E3L and other T03-B01E codes for optical carriers, or T03-D01A8 codes for magneto-optical carriers.

[2002]

#### T03-H02C [1992]

## Cleaning equipment, including air filters

Air filters specifically designed for disk drives are coded in T03-F02G1 only. Prior to 1992 search T03-F02 and T03-H02. Cleaning of magnetic and optical heads is not included and is respectively covered by T03-A04B3 codes and T03-B02B8 codes (from 1992).

### T03-H02R [2006]

## General carrier recycling and destroying arrangements

This code is used for recycling and destroying of record carriers in general, i.e. where the invention is applicable to several types of carrier or the type is not disclosed. It is **not** assigned when recycling or destroying of a **specific** type of carrier is involved, for which T03-A01R (magnetic carriers), T03-B01R (optical carriers) or T03-D01R (magneto-optical carriers) is assigned. For recycling of recording or playing equipment see V04-X01C.

## T03-H07 [2006]

#### Preventing overwriting, erasure or copying

Covers hardware-based methods of write/erase protection, e.g. erase tab, disk-drive lock. See T03-P07 for erasure/ copy prevention using signal formats/signal processing.

#### T03-H07A [2006]

Preventing accidental loss of data

### T03-H07C [2006]

Preventing unauthorised deliberate access or copying

#### T03-H09

## Other record carrier and accessory aspects

Including spool manufacture, tape winders/rewinders and disk-sleeve insertion appts.

#### T03-J

## Indexing; synchronising; measuring tape travel

This section includes codes for counters, gap inserting, cue recording, and carrier storage marking/indication. Labels for carriers are covered by T03-H02A1A. For audio/video applications see W04-H and W04-K codes also.

Pulse, code, position, track, time, counter, indicate, display

T03-J01 [1992]

Index signal recording and detection

T03-J01A [1992]

Time code

**SMPTE** 

T03-J01C [1997]

## Indexing information relating to carrier contents

Includes 'table of contents' information, recorded separately or interleaved with main recorded information, but usually by same recording process in either case. Labels providing such information in human-readable form are covered by T03-H02A1A. TOC

#### T03-J01C1 [1997]

## User-recordable contents index information

Includes 'user table of contents' information, and thus implies use of recordable, rather than 'read-only' carriers.

UTOC

T03-J01E [2006]

**Error management information** 

T03-J03 [1992]

**Synchronising** 

T03-J03A [1997]

## Synchronising data with carrier speed or head position

Codes in this section cover both control of carrier speed based on data rate, and modification of data rate based on head or carrier drive aspects. Details of clock circuits and systems are in T03-J03C.

CAV, CLV, angular, linear, wobble

## T03-J03A1 [1997]

## Controlling carrier speed based on recording data rate

See also T03-E03A5 and T03-F02A1 for tape and disk drive aspects respectively. Arrangements modifying data rate based on carrier speed or position of head on carrier, e.g. differing linear velocity along radius of a disk, are covered by T03-J03A3 and T03-J03A5 respectively.

#### T03-J03A3 [1997]

## Modifying data rate based on carrier speed

Covers arrangements to modify data rate based on measured speed of carrier.

## T03-J03A5 [1997]

## Modifying data rate based on head position

Includes arrangements to modify data rate based on change in linear velocity of tracks on a disk along its radius.

## T03-J03C [1997]

## **Clock system details**

See appropriate codes in e.g. U22 and U23 for actual oscillator and clock extraction circuits. *Phase, PLL* 

## T03-J03C1 [1997]

#### Clock generation and recording

Crystal, resonator, feedback, ring

#### T03-J03C5 [1997]

#### **Clock recovery**

This code is intended for read circuitry establishing a clock signal from recorded data itself.

## T03-J05 [1992]

## Measuring carrier travel

#### T03-J05A [1992]

## Measuring tape travel

Includes tape counters. Search with T03-E05A1 for arrangement for stopping e.g. in response to gaps in recorded information.

Automatic music search system, AMSS, display

### T03-K

#### Editing; monitoring

Includes dubbing, splicing, displays, disk speed monitoring, etc. For audio/video applications see W04-H and W04-J codes also. See T03-P01A for digital recording error correction.

Control, check, monitoring

T03-K01 [1992]

**Editing, splicing tape** 

Dubbing

T03-K01A [1992]

**Splicing** 

Tape, join, repair, bond

T03-K03 [1992]

**Operation displays** 

VU, volume unit, meter, mode, indicate

T03-K05 [1992]

Recording equipment control and circuits (general)

Includes control systems compensating for ageing effects, temperature change, etc.

T03-K05A [1992]

**Adaptive control systems** 

T03-K07 [1992]

**Recording equipment testing** 

Electronic circuitry testing in general is covered by S01-G01 codes.

T03-K07A [1992]

#### **Testing during manufacture**

From 2012 T03-K07 codes are no longer assigned for optical recording head testing. See T03-B02B8E. *Production line, evaluate, reject* 

T03-K07C [1992]

#### Complete equipment testing

Includes self-test facilities and performance testing of finished equipment.

Test tape, test disk, error check

T03-K07E [2006]

### **Detecting carrier defect**

Covers arrangements to protect drive from damage. For detection of defects using BER measurements search along with T03-P01A.

Arrangements to store information concerning the location of carrier errors, e.g. bad sectors, in order to speed up read and write processes are not coded here, being covered in T03-P01A and T03-J01E instead. Prior to 2006 this topic was covered in T03-P01A and T03-J01C.

T03-K09 [1992]

Other monitoring details

#### T03-L

#### **Recording housings**

Codes in this section relate to storage housings for record carriers, and also constructional details of recording equipment.

Disk, cassette, storage, magnetic, tape, floppy, cover, lock, support, case, compact, compartment, stack

### T03-L01 [1987]

## Cases and storage racks or boxes for record carriers

T03-L01 codes relate to casings and housings for record carriers, from which the carriers can be removed, and are not assigned for casings and housings of equipment, which are covered by T03-L05A. T03-L01 codes cover cassette boxes, racks, storage boxes for floppy disks, hard disks, tape reels etc. but not casings inserted into recording equipment in which the carrier is driven during recording/playing process (covered by T03-H01 codes). Prior to 2002, record carrier containers for optical recording carriers and other carriers specifically used for audio / video recording were also assigned W04-L01 codes. From 2002 these codes are no longer used and T03-L01K codes are used to indicate the type of carrier that the container is used for, and where appropriate, its application.

T03-L01A [1992]

## **Record carrier containers**

Includes packaging aspects, e.g. shipping containers.

T03-L01A1 [1992]

For disks

Compact, CD case, sleeve

T03-L01A3 [1992]

For tape

Search with T03-N03 for cassettes, and also T03-N02 for helical scan cassettes.

Video rental

T03-L01C [1992]

## Storage racks and cases

Includes arrangements for home or office use, mounting in car, etc., and also display stands for use in e.g. shop.

Retail, store

T03-L01C1 [1992]

For disks

Floppy, computer, data, file, box

T03-L01C3 [1992]

#### For tape

T03-N02, T03-N03 are also assigned as appropriate.

Spool, reel, cassette, drawer, rack, box

T03-L01K [2002]

**Carrier type** 

T03-L01K1 [2002]

Magnetic

T03-L01K3 [2002]

**Optical** 

T03-L01K5 [2002]

Magneto-optical

T03-L01K8 [2002]

For audio/video recording

(W04-L01)

T03-L01N [2007]

## Novelty housings, containers, combined with other article

Covers record carrier containers used for additional function. Includes record carrier cases and racks combined with other article, e.g. drinks can. Use in conjunction with other T03-L codes to indicate type of container.

T03-L05 [1987]

## For recording equipment; constructional details of recording equipment

T03-L05 codes relate to recording equipment per se and mounting details. T03-L01 codes are only assigned in addition when e.g. a storage rack is an integral part of an automatic feed system. (For library systems T03-Q codes are also assigned plus T03-E/T03-F as appropriate).

Housings/constructional details specific to audio/visual recording equipment is also coded in W04-L05.

Mount

T03-L05A [1987]

Cabinets, casings, stands

T03-L05B [1987]

#### Construction

Includes mounting of components, internal layout, cooling etc. See V04-T for constructional details of electronic appts. in general.

## T03-L05N [2005]

## Noise and vibration reduction using constructional techniques

This code covers constructional arrangements to reduce acoustic noise and vibration generated by the recording and reproducing equipment itself. Arrangements to reduce electrical noise in recorded or reproduced signals are covered by T03-P05.

## T03-L05S [2005]

## Shock absorbing and damping

This code covers constructional arrangements to reduce the effects of externally-applied shocks and vibration on the recording and reproducing equipment. Arrangements to reduce acoustic noise and vibration produced by the recording or reproducing equipment itself are covered by T03-L05N.

T03-M [1983]

General

#### T03-M01

#### For flat record carriers

This code was used to indicate card-type carrier systems prior to 1992. From 1992, T03-N05 will be assigned instead.

Card, strip

## T03-M02

#### For web and other record carriers

Prior to 1992, this code was chiefly used to indicate certain magnetic tape manufacturing processes (with T03-A02), such as slitting. From 1992 these are covered by T03-A02B7 and T03-A02E3, and T03-M02 is now mainly used for non-standard web carriers such as photographic film with e.g. magnetic recording aspects, (also assigned T03-A01C9).

Tape

T03-M05 [2005]

Power supply details

T03-M07 [2005]

#### Interfacing, connectors

Covers external interfacing and connectors e.g. between drive and other equipment, only. Interfacing for magnetic drives and optical drives is covered in T03-A10 and T03-B08 respectively, and is not coded here. See V04 codes also.

## T03-M08 [2006]

## General equipment manufacturing details

This code covers the manufacture of recording and playback equipment in general and is not assigned where more specific codes are available, such as T03-A04A1 codes for magnetic head manufacture and (from 2012) T03-B02B8C for optical head manufacture. T03-M08 is not assigned for manufacture of 'bought-in' components used in recording equipment, or for record carrier manufacture which is covered by specific codes in e.g. T03-A02 (magnetic carriers), T03-B01E (optical carriers), T03-C (capacitive and other carriers), T03-D01A8 (magneto-optical carriers), T03-D03A (electro-optical carriers) and T03-D09 (other 'combined method' carriers).

#### T03-M09

## Other general recording aspects

## T03-N [1983]

## **Recorder types**

Notes:

- (1) Codes in this section are applied to indicate equipment type only, and do not themselves indicate novel features;
- (2) It is not intended that the codes be used in isolation, but rather to restrict the scope of other T03 codes:
- (3) From 1992, T03-N codes have not been assigned to record carriers per se which can be assigned codes from the following sections: T03-A01C, T03-A02E, T03-B01D, T03-D01A1;
- (4) Prior to 2005 T03-N codes were assigned to all inventions involving a record carrier drive used for a given type of record carrier. From 2005 codes in this section will be only be applied where the recording method, e.g. magnetic. optical etc. is unknown or the invention is of a general nature. T03-A08, T03-B08 and T03-D01K codes are applied for inventions involving a particular method of recording;
- (5) Carriers in casings (e.g. cassettes, diskettes as covered by T03-H codes) are also assigned T03-N codes.

T03-N01

Disk

T03-N02

**Helical scan** 

T03-N03

Cassette

#### T03-N04

Reel-to-reel

T03-N05 [1992]

#### Card recorder

(T03-M01)

See also T04 and T05-H02 codes for card-freed systems.

T03-N06 [1997]

#### **Drum recorder**

Magnetic

T03-P [1987]

## Signal processing for recording (general)

Codes in this section may be used in conjunction with other T03 codes, or alone. For audio applications see W04-G01A also, and for video recording see W04-F codes.

T03-P01 [1987]

**Digital recording** 

T03-P01A [1987]

#### **Error detection**

See U21-A06 for error detection in coding systems in general.

Decode, code, block, interleave, Reed Solomon, cyclic, correct, memory

## T03-P01B [1992]

#### **Compression and decompression codes**

See T01-D02 for computer application of data compression and U21-A05A2 in general.

Compaction

## T03-P01D [2005]

## Equalisation, thresholding and digital signal processing

Covers signal processing circuitry for detection and reading of signals. Can be used in conjunction with T03-A06C3 and T03-B06C for specific application to magnetic and optical recording respectively. Prior to 2007 inventions specific to magnetic or optical read circuitry were assigned T03-A06C3 or T03-B06C only. See also U22-G codes for digital signal processing.

### T03-P01F [1997]

## **Formatting aspects**

Formatting aspects of magnetic record carriers, with emphasis on layout of tracks, are covered by T03-A06F codes.

T03-P02 [1987]

**Analogue** 

Demodulate, AM, FM, PM

T03-P05 [1992]

#### **Noise reduction**

This code covers arrangements to reduce electrical noise in recording or reproducing signals. Error detection and correction in digital recording is covered by T03-P01A. Reduction of acoustic noise (sound energy) generated by the equipment is not included and is covered by T03-L05N.

T03-P07 [1992]

## Signal processing to restrict or monitor access, writing, erasing or copying

W04-F01L and W04-G01L codes cover analogous arrangements specifically for audio and video recording and in these cases T03-P07 codes are not assigned. Prevention of overwriting, erasing or copying using hardware techniques, for all types of recording, is covered in T03-H07. Prior to 2006 T03-A07 codes covered anti-copying aspects specific to magnetic recording.

T03-P07A [1997]

Signal processing to prevent unauthorised access or copying

T03-P07C [1997]

Signal processing to identify occurrence of copying

T03-Q [1992]

#### **Library systems**

Covers systems for bulk storage of data, especially with automated retrieval.

T03-Q01 [1992]

#### Tape storage

Covers magnetic tape storage, unless additional codes indicate otherwise.

T03-Q05 [1992]

Disk storage

T03-Q05A [1992]

Magnetic disk library

T03-Q05C [1992]

**Optical disk library** 

T03-Q05E [1992]

**Magneto-optical disk library** 

T03-Q05X [1992]

Other disk library

T03-Q07 [2006]

## General aspects of recording media library

From 2006 this section covers all media library loading mechanisms and control systems. Previously this topic was covered in T03-E01B5 and T03-F01 for tape and disk systems respectively.

T03-Q07A [2006]

Loading mechanism and drive

T03-Q07B [2006]

Media changing control system

### T03-S [2005]

## Use of data recording apparatus for non-recording applications

Use in conjunction with T03-B01D1 for articles incorporating optical disks, e.g. clocks, drinks coasters. Also for using storage media for holding biological/chemical samples, testing/instrumentation aspects are also coded in S03.

## **T04: Computer Peripheral Equipment**

#### T04-A

#### Using digitally marked record carriers

Read, card, data, print, sense, code, document, mark, encode, bar codes

#### T04-A01

## Punched card or tape punches and readers

Optical, hole, punch hole, aperture

#### T04-A02

## Other digital marking (writing)

Includes credit or security card marking. Digitally marked cards per se are covered by T04-C codes. Writing to IC cards is covered by T04-K02. Includes erasure of markings.

[1992]

#### T04-A02A

## **Electrostatic or magnetic**

## T04-A02B [1992]

## Digital marking to be read using light (incl. IR.UV)

Includes bar code marking, two-dimensional bar code marking.

#### T04-A02X [1992]

#### Other writing

## T04-A03

## Other digital mark sensing (reading)

Reading of IC cards is covered by T04-K02. *Head, pick-up, sweep* 

#### T04-A03A

## By detecting electrostatic or magnetic field change

Strip

#### T04-A03B

#### Using light (incl. IR, UV)

Optical, beam, illuminate, laser, lens, reflect

## T04-A03B1 [1992]

#### Bar code reading

Search with T05-L01C for point of sale application, T01-C06 for computer interfacing and T04-M02 for hand-held bar-code scanner.

UPC, POS, two-dimensional code

#### T04-A03B9

## Other reading with light

Concealed data

#### T04-A03X

#### Other reading

Contact, key, electrode, acoustic, ultrasound

#### T04-A05

[2005]

[1992]

## **Card feeding apparatus**

Card feeding details for digitally marked record carrier. See T04-A03 for reading aspects.

#### T04-B

## Verifying correctness of digital marking

Covers checking and monitoring of marking e.g. for alignment, **not** routine reading to determine authorisation, etc. Includes error detection.

#### T04-C

## Digitally marked record carriers

Includes physical aspects, material, shape, etc. Covers only carriers with digital markings, digitally marked ID on items. 'Smart' cards are in T04-K01. Includes punched paper cards or tape (punches/readers are in T04-A01) see also T05-H02C5.

Identify, code

#### T04-C01 [1992]

#### Magnetic

Magnetic carriers are also assigned T03-A codes, or T03-A02 codes for manufacture, cross reference with T05-H02C5A.

Strip, card

## T04-C02 [1992]

### Using light (incl. IR, UV)

Cross reference to V07 hologram, T05-D card/badge access, T05-H cash payment, T05-C fare registering.

Optical, hologram, bar code

## T04-C09 [1992]

## Other record carriers

Includes electrostatic cards, inductive cards and remote sensing.

#### T04-D

## Character and signal pattern recognition

For data processing aspects of image acquisition and processing devices e.g. analysis, image detection, scanning, optical character recognition, camera, e.g. recognition for edge detection in peripheral. (T01-J10 and T04-D are only used together when the novelty does not describe how/when the processing is carried out). See also X25 codes, e.g. X25-A03E for robot manipulators. If novelty is in camera then see W04.

Image, detect, camera, digital, identify, scan, optical, video, facsimile, line, pixel, analysis

#### T04-D01

#### Using characters containing code marks

Used for system where character conveys additional information, e.g. in stroke width, or magnetic ink character recognition systems.

MICR

#### T04-D02

#### Image acquisition

Scanning, reader, image pick-up, TV camera, alignment, CCD camera

#### T04-D02A [1992]

## Mechanical and optical aspects of image acquisition

Lens, focus

## T04-D02B [1992]

#### Circuitry, processing of image acquisition

Processing within pick-up device, else coded in image processing see T01-J10 codes.

#### T04-D03

## Image pre-processing for image recognition

Image pre-processing before recognition processing, cross reference to T01-J10B2 for image processing/image analysis.

Filtering, quantising, compression, expansion, enhancement, contour, sensing

## T04-D03A [1992]

#### **Noise reduction**

Noise reduction done in peripheral unit.

## T04-D03B [1992]

## Edge recognition and determining orientation

Alignment

#### T04-D04

#### Recognition

Includes OCR (optical character recognition) and fingerprint identification, (see S05-D01C5A also). For speech recognition, see W04-V codes only. Scanner-computer interface details are coded in T01-C06.

Compare, reference, digital, memory, match

#### T04-D05

[1992]

#### Monitoring and error detection

(T04-D09)

Covers monitoring of parts of recognition system only. Using pattern recognition to detect errors in a pattern is in T04-D07A.

Fault detection

## T04-D07

## **Applications of recognition techniques**

See also under application. *Inspection* 

#### T04-D07A

[1992]

[1992]

## **Detecting defect in pattern**

Errors in the recognition system itself are covered by T04-D05. Flaw detection, also see S03-E. Includes comparison with original pattern e.g. PCB, workpieces, valuable papers etc. Cross reference to U11 for checking circuit/wiring layout, see also T01-J15A2.

#### T04-D07B

[1992]

#### Sorting objects by type

Includes quality pass-fail tests based on e.g. colour. See also T05-K and X25-F06 for sorting. Select

#### T04-D07B1

[1992]

## Using patterns specifically applied as identification marks

Label

## T04-D07C

[1992]

Identification of item

#### T04-D07D

[1992]

**Detecting movement or position** 

#### T04-D07D1

[1992]

#### **Detecting movement**

## T04-D07D3 [2011]

## **Detecting dimensions**

Covers uses of recognition system to determine dimensions of an object, e.g. height, length, etc. See also S02-A03. Details of 3D scanners are coded under T04-M05 only.

T04-D07D5 [1992]

Detecting position or orientation

T04-D07E [1992]

## Hand written character recognition

Cross reference to T04-F04 input of handwritten characters.

T04-D07F [2006]

#### **Biometrics**

For image recognition relating to fingerprint recognition. See T04-D04 only prior to 2006. See also T05-D01B for entry/exit registers based on human characteristics. See also S05-D01C5A where novel detection systems are included.

T04-D07F1 [2006]

**Facial recognition** 

T04-D07F1A [2007]

#### Eye detection

Includes iris recognition, for red eye detection see also W04.

T04-D07F2 [2006]

## **Fingerprint recognition**

Includes palm recognition.

T04-D07F9 [2007]

Other biometrics

T04-D07K [1992]

Using non-visible light images (e.g. IR, UV)

T04-D07X [1992]

Other recognition applications

T04-D08 [1992]

Colour systems

T04-D09

Other recognition aspects

#### T04-E

### **Graph reading**

Includes curve followers and devices for converting position of manually operated writing or tracing member into an electrical signal. Light pens, joysticks, etc. are covered by T04-F02 codes. See T01-C02 codes for computer interfacing of manual input interfacing systems and T01-C06 for scanner interfacing.

Position, tablet, coordinate, optical, digital, screen, matrix, point

#### T04-F

## Manual input arrangements for computers and computer controlled equipment

Only used if input devices details are given. Covers manual or other physical input arrangements. Covers input for computer controlled devices. Includes keyboards/keypads, trackpads and touchscreens for personal digital assistants (PDAs), handheld video games, handheld GPS systems, etc. See T01-C02 codes for interface to computer. Position, select, switch, contact, digital, touch, coordinate

## T04-F01 [1983]

#### Keyboards and keypads

For typewriter keyboards, see also S06-K. For switch and key actuation aspects, see V03-C01, cross reference T01-C02A for keyboard interface. Virtual keyboards are coded in T01-C02B1 only. Details of keypads for mobile phones are coded under W01-C01B8 only. If use of keypad/keyboard is not precise, no T04-F code is applied, but V03 codes instead.

Layout

T04-F01A [1992]

Control, circuitry

T04-F01A1 [1992]

#### **Key operation circuitry**

Including scanning. See also U21-B02C.

## T04-F01A5 [1992]

## **Key coding aspects**

See also U21-A05D codes for key coding aspects. Foreign, function key

## T04-F01B [1992]

## Construction

Cross reference to V03 for constructional details. Key, membrane, pushbutton, pressure, casing, housing

## T04-F02 [1983]

## **Analogue-based positional input devices**

This code includes computer input-type devices which operate on absolute or relative positional movement-based inputs.

Control, video game, indicate, matrix

## T04-F02A [1992]

## **Based on absolute position**

Devices which provide input based on the particular position pressed or touched by the device user. *X-Y. coordinate* 

## T04-F02A1 [1992]

## **Light pens**

Optical, light pointer, laser pointer

#### T04-F02A2 [1992]

#### **Touchscreens**

Details of touch sensors are coded under U21-B02C. Constructional details of the touchscreen are also coded under T04-F02C. Details of touchscreens for mobile phones are coded under W01-C01B8H only, details of touchscreens for digital cameras and camcorders are coded under W04-M01D3E instead, and details of touchscreens for printers and copiers are coded under S06-K07A1 only.

#### T04-F02A5 [1992]

#### Manual input pad and stylus

Includes details of digitiser tablet, graphic interface and touch pad.

Pen, matrix

#### T04-F02B [1992]

#### **Based on relative position**

Devices which provide input based on the relative position of the device with respect to a cursor or pointer on the display.

#### T04-F02B1 [1992]

## Mouse and other mouse-type input device

Mouse-type input devices including wired and wireless mice, click-and-point devices used in conjunction with presentation software, and combinations of the various device types. Details of laser pointers are also coded under T04-F02A1.

Wireless presenter, clicker, laser pointer

## T04-F02B1A [2005]

## Optical mouse or mouse-type input device

Mouse-type devices which use optical sensors instead of roller balls or wheels.

## T04-F02B2 [2005]

#### **Track Pads**

Touch pad used as mouse input e.g. on laptop computer.

#### T04-F02B3 [1992]

## Joysticks, gamepads

Includes input devices used for gaming machines, e.g. joypad, driving wheel, etc. that are used in place of joystick. Three-dimensional input devices, such as virtual reality gloves, are coded under T04-F02B7.

## T04-F02B3A\* [2002-2006]

## Force feedback for joystick

\*This code is now discontinued. From 2007 see T04-F03.

Pen. matrix

## T04-F02B5 [1992]

**Track balls** 

## T04-F02B7 [2002]

#### Three dimensional input

Includes power gloves, virtual reality gloves, 3-D input with strain gauges, virtual reality and acceleration measurements used as input e.g. tilt sensor used to scroll display on a PDA.

Glove, Wiimote®, Wii remote®, VR glove

#### T04-F02C [2005]

# Construction, manufacturing and testing details of analogue-based positional input devices

Includes mechanical details, manufacture and manufacturing apparatus. See also codes for type (e.g. T04-F02B1 for mouse, etc.). See T04-L01/L05 prior to 2005.

#### T04-F03 [2007]

#### Haptic feedback for manual input devices

Previous to 2007 see T04-F02B3A.

#### T04-F04 [1992]

#### Input of hand written characters

## T04-F05\* [1992-1996]

## Hand scanners for computer input

\*This code is now discontinued but remains searchable and valid for records from 1992 to 1996. From 1997 see T04-M02. See also S06 codes. Scanner computer interfacing details are covered by T01-C06 and image acquisition details are covered by T01-J10A codes.

## T04-F06 [2007]

#### Miscellaneous input devices

motor, head, record, word-processor

Includes buttons and foot pads for input. See also V03 or U21 for details of device.

#### T04-G\*

[1980-2009]

#### **Printers**

\*This code is now discontinued. See S06-D to K. Press/plate-type printers are in S06-C only. Includes all aspects of individual character and line printers. (Computer output interface details are in T01). Drive, feed, roll, copy, character, line, carriage,

## T04-G01\*

[1980-2009]

#### **Impact**

\*This code is now discontinued. See S06-F from 2010. Includes mechanical action. Electromagnet and solenoid drive aspects are coded in V02-E02A also.

Armature, coil

#### T04-G01A\*

[1983-2009]

#### **Dot printers**

\*This code is now discontinued. See S06-F01 from 2010

Matrix, pin, wire, needle

#### T04-G01B\*

[1983-2009]

#### **Using type**

\*This code is now discontinued. See S06-F02 from 2010.

Select, hammer, daisy-wheel, disc, step, font, typeface, golf-ball

## T04-G01C\*

[1992-2009]

#### Ribbon

\*This code is now discontinued. See S06-F03 from 2010.

Ink, cassette

#### T04-G02\*

[1980-2009]

#### Ink-jet

\*This code is now discontinued. See S06-G from 2010.

Liquid, dye, nozzle, resin, water, channel, drop, pressure, reservoir, eject, electrode, pulse

## T04-G02A\*

[1983-2009]

#### **Drop-on-demand**

\*This code is now discontinued. See S06-G01 from 2010.

Thermal ink-jet, bubble, piezoelectric, ultrasound

## T04-G02A1\* [2002-2009]

## Print head for ink jet drop-on-demand printer

\*This code is now discontinued. See S06-G03 from 2010.

Thermal ink-jet, bubble, piezoelectric, ultrasound

#### T04-G02B\*

[1983-2009]

#### Selective drop deflection

\*This code is now discontinued. See S06-G02 from 2010.

Charge, electrode, stream, gutter, continuous

## T04-G02B1\*

[2002-2009]

## Print head for selective drop deflection printer

\*This code is now discontinued. See S06-G03 from 2010.

Charge, electrode, stream, gutter, continuous

#### T04-G02C\*

[1992-2009]

#### Ink

\*This code is now discontinued. See S06-G04 from 2010.

#### T04-G02D\*

[2002-2009]

## Inkjet head cleaning and general maintenance of printhead

\*This code is now discontinued. See S06-K06 from 2010.

#### T04-G02E\*

[1997-2009]

## **Recording media**

\*This code is now discontinued. See S06-G05 from 2010. Includes pre-print application of liquid (not ink) to paper/ pre-treatment of paper for ink jet printing. See also X25-T09A for electrical details of paper manufacture.

Paper, fabrics, OHP sheet, recording pattern of LCD screen

#### T04-G02F\*

[2002-2009]

## Refilling of ink cartridge

\*This code is now discontinued. See S06-G06A from 2010.

#### T04-G02G\*

[2005-2009]

#### Ink Chamber

\*This code is now discontinued. See S06-G06 from 2010.

## T04-G02H\* [2005-2009]

## Post ink application processing

\*This code is now discontinued. See S06-G07 from 2010. Includes processes for treating ink after application using e.g. heat or UV light.

#### T04-G02J\* [2005-2009]

## Applications of ink-jet printing technology

\*This code is now discontinued. See S06-G10 from 2010. Covers printing on non-paper-like media, e.g. CD (see also T03). Includes textile printing (see also X25-T04D), 3-D printing and other industrial applications using inkjet technology. Manufacturing LCD screens and filters (see also U14).

#### T04-G03\*

[1983-2009]

#### **Thermal**

\*This code is now discontinued. See S06-H from 2010. Includes thermal ink compositions and heat sensitive paper and ribbons.

Transfer, thermosensitive

#### T04-G03A\*

[1992-2009]

#### Using thermally-sensitive paper

\*This code is now discontinued. See S06-H01 from 2010.

#### T04-G03A1\*

[1992-2009]

## Composition of heat-sensitive layer

\*This code is now discontinued. See S06-H01A from 2010.

## T04-G03B\*

[1992-2009]

#### Using thermal ribbon

\*This code is now discontinued. See S06-H02 from 2010. Includes use of thermal transfer sheets. Cartridge

## T04-G03B1\*

[1992-2009]

#### Thermal ink composition

\*This code is now discontinued. See S06-H02A from 2010. Includes composition and manufacture of thermal ink.

Dye

## T04-G03C\*

[1992-2009]

#### Printhead details for thermal printer

\*This code is now discontinued. See S06-H03 from 2010. For thin-film resistor heads see also U14 codes, e.g. U14-H01B.

Printhead

#### T04-G04\*

[1983-2009]

#### Optical (incl. laser)

\*This code is now discontinued. See S06-E from 2010. For line projection onto photosensitive medium which is then electrophotographically developed. If light deflection or modulation aspects are claimed, then see V07-K codes also.

Toner, laser

#### T04-G04A\*

[1992-2009]

#### Optical system, and driving system

\*This code is now discontinued. See S06-E03 from 2010.

#### T04-G04A1\*

[1992-2009]

## Optics (e.g. lenses and mirrors)

\*This code is now discontinued. See S06-E03B from 2010.

Polygonal, galvanometer

#### T04-G04A2\*

[1992-2009]

## Driving system

\*This code is now discontinued. See S06-E03C from 2010. See also V06 codes for motor details. Scan

#### T04-G04B\*

[1992-2009]

#### Printhead details, including light source

\*This code is now discontinued. See S06-E03A from 2010. For LED heads see also U12-A01A3 or U12-A01A6.

Array, LED, shutter

#### T04-G04C\*

[1992-2009]

#### Photosensitive materials

\*This code is now discontinued. See \$06-E01 from 2010. Includes photosenstive paper, photoconductive belt, drum, etc.

Photoconductor, belt, sheet

#### T04-G05\*

[1983-2009]

#### Electrode (e.g. electrosensitive/erosive)

\*This code is now discontinued. See S06-J from 2010. Electrostatic printing using any means other than light for charging. For electrographic details (e.g. developing), see also S06-A codes. If not specifically for printing, see also S02-K.

Electrostatic, dielectric, electrochromic, stylus

## T04-G06\* [1983-2009]

## Sheet breadth control, carriage drive for sheet control

\*This code is now discontinued. See S06-K03A from 2010. Includes solenoids and motors, but not control circuitry.

Position, step, margin, tabulate, space, nip

#### T04-G06A\*

[1992-2009]

## Media feeding

\*This code is now discontinued. See S06-K02 from 2010.

Line feed, paper

#### T04-G06B\*

[2005-2009]

## Finishing apparatus

\*This code is now discontinued. See S06-K05 from 2010.

Includes stapling, binding, laminating, etc. See also S06-C05 for industrial process. For devices independent of printer see T04-J02.

#### T04-G06C\*

[2006-2009]

### **Transferring image**

\*This code is now discontinued. See S06-K05 from 2010. E.g. in ink jet printer - jetting onto substrate and then transfer to final substrate.

## T04-G06S\*

[2008-2009]

#### **Shredding**

\*This code is now discontinued. See S06-K05C from 2010. Includes details of shredder integrated into printer, e.g. for automatically shredding confidential paper after paper jam.

#### T04-G07\*

[1992-2009]

## **Colour printing**

\*This code is now discontinued. See S06-K01 from 2010.

**CMYK** 

#### T04-G08\*

[1992-2009]

## Self-contained typewriters and printing devices

\*This code is now discontinued. See S06-K99A from 2010. Includes details of label printers, independent units, and hand held printing devices.

#### T04-G09\*

[1980-2009]

## Other printer types

\*This code is now discontinued. See S06-K from 2010. Includes magnetic and Braille printers (see S05-K, T04-X for other Braille aspects), electronic pen recorders.

#### T04-G10\*

[1992-2009]

### **Control systems for printers**

\*This code is now discontinued. See S06-K07 from 2010. Does not include motors and solenoids for carriage and platen.

#### T04-G10A\*

[1992-2009]

#### Internal control

\*This code is now discontinued. See S06-K07A from 2010. Includes control circuitry, power management.

#### T04-G10A1\*

[2005-2009]

### User input and display

\*This code is now discontinued. See S06-K07A1 from 2010. Includes mode selection keys, etc.

#### T04-G10C\*

[1992-2009]

#### Interface

\*This code is now discontinued. See S06-K07C2 from 2010. Also coded in T01-C05A. Serial, parallel, Centronics, RS232

#### T04-G10E\*

[1992-2009]

#### **Control from outside printer**

\*This code is now discontinued. See S06-K07C1 from 2010. See T01-C05A for output to printer, T01-H05A for print drivers and T01-J08F for diagnostic aspects of any peripheral equipment. Network printers will also require other T01 codes.

## T04-G10E1\*

[2005-2009]

## **Print Job/Queue**

Network printer, print driver

\*This code is now discontinued. See S06-K07C1A from 2010. See also T01-C05A/T01-C05A1 for output to printer and T01-H05A for print drivers.

## T04-G10F\*

[2006-2009]

# Management of confidential / secure documents, e.g. prevention of illegal copying

\*This code is now discontinued. See S06-K07A3 from 2010. Prevention of illegal printing of private documents, etc, recognizing or printing copy prevention mark on documents, output to authorised operator. See also T01 for image processing aspects, and T05-J for testing of securities, banknotes, etc.

## T04-G10G\*

[2007-2009]

### Monitoring of printing

\*This code is now discontinued. See S06-K07B from 2010.

## T04-G11\* [2005-2009]

#### **General Construction**

\*This code is now discontinued. See S06-K03 from 2010.

#### T04-G11A\* [2005-2009]

## Construction and manufacturing details of printer

\*This code is now discontinued. See S06-K03 from 2010. Includes mechanical details, manufacture and manufacturing apparatus. See T04-L01/L05 prior to 2005.

## T04-G11B\* [2005-2009]

## **Recycling Systems**

\*This code is now discontinued. See S06-K04 from 2010. See also X25-W04 for electrical aspects of recycling systems in general.

## T04-H

## Visual display units

Includes displays for computer related equipment such as for laptops and PDA's (personal digital assistants) and portable game consoles (e.g. Nintendo DSTM, Nintendo SwitchTM, Sony PSPTM). For signal processing aspects e.g. contrast control, white balance control etc, see also W03 codes. Screen, video, cursor, terminal, processor, VDU, graphic, line, monitor

#### T04-H01

#### **CRT control arrangements**

For CRT per se see V05-D codes. CRT TV display aspects are covered by W03-A08A codes. Image, deflect, raster, pixel

#### T04-H01A

#### For single beam tubes

## T04-H01A1 [1983]

#### Character and stroke generators

Pattern, vector

#### T04-H01B

## For storage, colour or other tubes

Beam index, beam penetration

## T04-H01B1 [1992]

#### Colour

## T04-H02 [1985-2010]

#### Plotters\*

\*This code is now discontinued. See S06-K99E from 2011. For computer interface per se see T01-C05B also.

Record, pen, drive, motor, X-Y, chart, curve, draw, mark

#### T04-H03

## **Arrangements for other visual indicators**

Includes LED, LCD element drive arrangements. Display arrangements in general are in W05-E codes also. Plasma displays per se are coded in V05-A codes also.

Gas discharge, optical, panel, number, alphanumeric, character, symbol

#### T04-H03A [1983]

## For single character

Seven segment, decoder, segment

## T04-H03B [1983]

## For several characters, e.g. matrix

From 2005 all display types (except LED) will not be coded in this section without novel details of the matrix array.

Row, column, driver, address

### T04-H03C [1992]

#### Characterised by type

#### T04-H03C1 [1992]

#### LED

See also U12-A01A.

## T04-H03C1A\* [1997-2010]

#### **Driver circuitry**

\*This code is now discontinued, see T04-H03F together with T04-H03C1 from 2010. See also U12-A01A5B for array or U12-A01A5A for single LED.

#### T04-H03C2 [1992]

#### LCD

See also U14-K01.

Liquid crystal, ferroelectric, anti-ferroelectric, deformed helical ferroelectric

#### T04-H03C2A\* [1997-2009]

#### **Driver circuitry**

\*This code is now discontinued. See T04-H03F together with T04-H03C2 from 2010. See also U14-K01A3.

## T04-H03C3 [1992]

#### **Electroluminescent**

See also U14-J03.

## T04-H03C3A\* [1997-2009]

#### **Driver circuitry**

\*This code is now discontinued. See T04-H03F together with T04-H03C3 from 2010. See also U14-J03.

## T04-H03C4 [1992]

## Plasma display panel

See also V05 codes.

## T04-H03C4A\* [1997-2009]

#### **Driver circuitry**

\*This code is now discontinued. See T04-H03F together with T04-H03C4 from 2010. See also V05-A01G.

## T04-H03C5 [2002]

Field emission display

## T04-H03C5A\* [2002-2009]

## Field emission display driver circuitry

\*This code is now discontinued. See T04-H03F together with T04-H03C5 from 2010. See also V05.

## T04-H03C6 [2002]

## **Digital micromirror display**

See also V07 for mirror control.

## T04-H03C6A\* [2002-2009]

## Digital micromirror display driver circuitry

\*This code is now discontinued. See T04-H03F together with T04-H03C6 from 2010.

## T04-H03C7 [2006]

## **Electrophoretic display**

Based on electrophoresis effect, microencapsulated EPD, partition-type EPD, charged particle display, electrochromatic display, electrostatic display.

## T04-H03C7A\* [2006-2009]

## **Electrophoretic display driver circuitry**

\*This code is now discontinued. See T04-H03F together with T04-H03C3 from 2010.

## T04-H03C8 [2007]

#### Interference based MEMS display

See also U12-B03F1 and V06-M06G.

#### T04-H03C9 [1992]

## Other display types

Includes Braille type displays (Braille printers are coded under S06-K99X).

Head mounted display

#### T04-H03D [1992]

## **Back lighting for displays**

See also X26-U04A.

## T04-H03E [2005]

## **Projectors**

See also W04-Q01 for novel projector details, projectors don't receive any other T04-H codes.

### T04-H03F [2010]

## **Driver circuitry**

Search together with other T04-H02 codes as appropriate to denote application of driver circuitry.

## T04-H03M [2008]

**Multi-display systems** 

#### T04-H03N [2023]

### Flexible display monitors

This code covers constructional aspects of flexible panel of computer displays/ monitors. Details of general foldable/bendable displays are coded under W05-E05F.

#### T04-H04 [2005]

## Construction, manufacturing and testing details of display

Covers display housings, casings, stands, supports, wiring components, etc. previously coded in T04-L. Does not include details of the display elements per se which are covered by the relevant class (e.g. U14 for LCD). Search with other T04-H codes for display types. Packaging of computer displays is coded under Q34-M02.

## T04-H06 [2007] Stereoscopic and 3D displays

## T04-J

## Conveying record carriers between independent stations

Including computer paper perforation and sprocket details, collators and sorting appt. For digitally marked record carriers see T04-A05 from 2005. See also S06-C05 and X25-F02A.

Guide, position, web, card, document

## T04-J01 [1992]

## Media feeding

See S06-K for paper feeding in printer, T04-K02C1 for smart card feeding, and T04-A05 for card feeding.

Transport, path

T04-J02 [1992]

## Collating, sorting

Sort, staple

T04-K [1987]

## Smart media e.g. cards incorporating integrated circuit memory etc.

Includes reading aspects. Constructional details are coded in U11/U14 as appropriate. See also under application (T05, W05, W06 or X25). For protective coatings see V04-R03E. See also X25-F08 if details of the actual attachment of the tag (e.g. RFID tag) to an item.

IC, memory, contactless, smart paper

#### T04-K01 [1992]

#### **Smart media details**

Includes all construction aspects of smart media. *Key, IC* 

## T04-K01A [2006]

## Circuitry, inc. encapsulation

For construction and manufacturing of the circuitry aspects of smart media. See also U11, U14 and V04 for details.

#### T04-K01B [2006]

#### **General construction details**

For all aspects of smart media construction/manufacture except circuitry which is coded in T04-K01A.

## T04-K01C [2007]

#### **Antenna**

See also W02-B codes for aerials, V04-Q for PCB details and U13 for integrated circuit details.

#### T04-K02 [1992]

#### Reading and writing aspects

Including smart card feed/conveying. See also T01-H01B3A. See also W02-C02G7 (near-field radio) or W02-G05 (transponder) for non-contact details.

PCMCIA, contact, non-contact

## T04-K02A [2006]

#### Contact

## T04-K02B [2006]

#### Non-contact

Covers non-contact reading/writing, physical details of the non-contact system only should be covered in K01 and/or K03. For example the construction of the antenna in a transponder is T04-K01C and T04-K03B and would not be included here unless a communication aspect is also described. See also W02-C02G7 (smart cards) and W02-G05 codes (transponders and tags).

## T04-K02C [2006]

#### Reading/Writing apparatus

Covers all aspects of the apparatus used to read from or write to smart media, rather than the media itself.

## T04-K02C1 [2006]

## Feeding mechanisms

Prior to 2006 see T04-J.

## T04-K02C2 [2007]

## Constructional details of card reader / writer

Includes non-electrical constructional details such as housing and mountings. Details of circuits, connectors, interfaces, etc. go under T04-K02C.

#### T04-K02C3 [2010]

#### Control, circuitry of card reader/writer

## T04-K03 [2006]

## Media type

Codes used to highlight the type of media used. Search together with other T04-K codes as required.

T04-K03A	[2006]
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**Smart card** 

T04-K03B [2006]

RFID/transponder

T04-K03C [2006]

Paper/cardboard

T04-K03D [2006]

Memory card/stick

T04-K03D1 [2006]

**USB Memory stick** 

#### T04-K04 [2006]

#### Security

All security aspects including physical protection of the hardware, encryption (see also T01-D01) and fraud protection (previously coded T01-H01C1).

#### T04-K05 [2012]

#### **Testing smart media**

For security aspects see T04-K04

#### T04-L [1987]

## Constructional details of peripheral and ancillary equipment

(T04-X)

Includes construction of peripheral equipment not covered by T04-F01B, T04-F02C, S06-K or T04-H04. Computer housing and constructional details are covered by T01-L02. See also V04-T and V04-S.

## T04-L01 [1987]

#### Casings, cabinets of peripheral equipment

Includes details of housing, stand, support. Furniture aspects of 'electronic office' are coded in T04-L07 from 1992.

Adjust, position, angle, stand, hinges

#### T04-L02 [2005]

## Power supply arrangements for peripheral equipment

See also U24 and X12.

## T04-L05 [1987]

#### **General constructional details**

Includes mounting of PCB's, components, leads, rails, leverage system, etc.

#### T04-L07 [1992]

### Furniture aspects of 'electronic office'

(T04-L01)

Includes furniture aspects. See also T01-L02 for furniture specifically for computer.

Desk, cable, chair, flooring

### T04-L08 [2012]

## Cleaning of computer and peripheral devices; Computer room air cleaning

Includes cleaning details of internal and external components of computer and peripheral equipment. Use in conjunction with other T04 codes to highlight the type of computer equipment. Also includes devices used for removing dust in a computer rooms or laboratories. Electric details of clean rooms are also covered by X25-S01, and electric details of air cleaners are also covered by X27-E01B2. Measurements of air quality in clean rooms are coded by S03-E14N3.

Dust proof, HEPA filter

#### T04-L09 [1987]

### Other peripheral accessories etc.

Includes details of mouse mat, arm rest, theft alarm (see also W05 codes) or document stand.
Packaging of peripheral equipment is coded under Q34-M02.

Filter, screen, antistatic, theft alarm, mouse mats, arm rest, attachments, protective cover

#### T04-M [1992]

## (Digitiser) Scanner for computer input

(W02-J)

See S06-D only from 2010 for scanning arrangements for image forming devices.

#### T04-M01 [1997]

#### 2D scanner, incl. flatbed scanner

See also T04-D codes for image processing aspects, S06 as appropriate, and T01-C06 for computer interfacing details. Details of 3D / 4D printing technology are also coded under X25-A08.

### T04-M02 [1997]

## Hand-held scanner

(T04-F04)

Includes hand-held bar-code scanner (see also T04-A03B1). Pre-1997, hand scanners for computer input were coded under T04-F05 (now discontinued). Details of 3D / 4D printing technology are also coded under X25-A08.

#### T04-M03 [2010]

## Construction and manufacturing details of scanners

Includes details of casing, framework and internal mounting arrangements of components and modules. Details of 3D / 4D printing technology are also coded under X25-A08.

Frames, glass, sheet, PCB

### T04-M04 [2010]

#### **Control circuitry of scanners**

Includes internal control and power management. Details of 3D / 4D printing technology are also coded under X25-A08.

[2016]

Control, circuit, power supply

### T04-M05

#### 3D scanner

Details of 3D / 4D printing technology are also coded under X25-A08.

## T04-N [2012]

### **Audio input/output**

Includes speakers, headphones and microphones specifically for computer applications.

## T04-P [1997]

#### **Drives for computer input**

External drive unit, see also T03.

### T04-X

#### Miscellaneous

Includes card case/wallet (see also T03), office automation, cleaning appt. for computer peripherals, computer equipment for handicapped people (see also S05-K, and for Braille printer see also S06-K99X), and maintenance equipment, shedder, electric stapler and general packaging specifically for office equipment. Details of packaging for office equipment such as keyboards, staplers, etc are also coded under Q34-M02, and electrical stationary such as electric staplers are also coded under X27-A02C.

## T05: Counting, Checking, Vending, ATM and POS Systems

#### T05-A

### **Counting objects**

Counting of coins or banknotes is covered by T05-L07. Vehicle counting is covered by T07-A01C.

#### T05-A01

### On conveyor

For electrical conveyor aspects see X25-F01 codes. *Production line, manufacture, process, monitor* 

#### T05-A02

### In stack or randomly distributed

Sheet, card, lamina, pile

#### T05-B

## **Counting mechanisms**

Includes mechanical, electromechanical, and electronic arrangements. These codes are **not** used for counting circuits in general, which are covered by U21-D codes. T05-B codes are used for counting devices per se which may be used to count objects, events, units of distance travelled, etc. For some non-electronic applications see:

- (1) T05-A codes for object counting
- (2) T05-G codes for registering/indicating
- (3) T05-L09 for currency counting
- (4) S02-B12 for distance recorders and pedometers. Wheel, disc, register, pin, reset, restore

#### T05-B01

#### Counters with additional facilities

Includes arrangements for performing an operation at predetermined count. For tape recorder see T03-J05A and W04-H03 also.

#### T05-C

## Ticket-issuing, fare-registering, franking appts.

For electrical printing aspects see S06 codes also. *Meter, memory, transport, vehicle* 

#### T05-C01 [1992]

#### Ticket and receipt issuing

Includes label printing devices. See T05-H codes as appropriate for payment-operated systems and T05-K02 for mail delivery. See S06 for printing aspects.

Bill, invoice, slip, cut, separate, pass, toll, mark, perforate

## T05-C03 [1992]

## Fare registering

Includes taximeters (see also T05-G01 and X22-E05 for electrical aspects) and charge indicating aspects of vehicle toll systems (see T05-C01 for ticket issuing aspects and T05-D02 for monitoring aspects).

Distance, time, rate

#### T05-C05 [1992]

#### Franking appts.

Includes all aspects of franking equipment, such as registering of credit, security, and control. See also T01 codes e.g. T01-J05A1 for financial data processing systems, and S02-D codes for weighing. Sorting of mail is **not** included - see T05-K02.

Postage, meter, rate, reset, verify, stamp

#### T05-D

#### Individual entry or exit registers

Includes systems for control and recording of access. See W05-B01 codes for intruder alarm aspects and X25-M codes for locks.

Identify, pass, code, enter, security, authorise, door, gate, checkpoint

#### T05-D01 [1992]

#### For personnel control

Turnstiles per se are coded in T05-D01X. Restricted area, banking, lobby, automatic teller/transaction machine, ATM

### T05-D01A [1992]

#### With record carrier

See T05-H02 codes as appropriate for card-freed aspects in payment-based systems, see T04 for record carry types and W02-G for transponders. Includes checking/validating ticket or pre-paid card Data, optical, magnetic, barcode, record, carrier, transponder, token

#### T05-D01A1 [2005]

#### With portable electronic device

Covers the use of a mobile device, e.g. PDA or mobile phone as the record carrier. See also W05-D08C and W05-D06G for remote control aspects.

## T05-D01B [1992]

#### With human characteristic detection

Includes e.g. finger or palm-print analysis by pattern recognition (see S05-D01C5A and T04-D codes also), and voice recognition (see W04-V codes also). Recognise, ID, face, feature, retina, voiceprint

### T05-D01X [1992]

#### Other

Includes turnstiles per se, toll-gate, barrier control, adjustable entry gate and structural details.

Stadium, arena

## T05-D02 [1992]

#### For vehicles

Includes toll systems, automatic fee charging system while entering/exiting motorway. See also T05-C01 and T05-C03 respectively for ticket/card issuing and charge indicating aspects. For automatic vehicle identification see T07-A03. See W02-C and W05-D for communication aspects.

#### T05-E

#### Checking occurrence of condition

Includes pass/fail test in e.g. production line manufacturing process. Also for lottery or bingo games. Audible or visible signalling for industrial aspects refer to W05-A.

Identify, compare, inspect, authorisation, entry

#### T05-F

## Voting and lottery appts; generating random numbers

See T01-E04 for digital random number generators, and U22-A01A for random pulse generators.

Game, select, display, bingo, card, ticket, ballot, cast, majority, register, betting

## T05-G

#### Registering/indicating

Display, record, register, measure, indicate, monitor, check

#### T05-G01

#### Vehicle working

Includes on-board distance and operation recording equipment which is also coded in X22 when electrical. For taximeters see also X22-E05 (fare-indicating aspects are also covered by T05-C03). For tachographs see also X22-E05, and S02-K05/S02-K06 codes for chart recorder details, T01-H01B3 codes for electronic data storage in memory modules.

Tachograph, fuel, speed, tacho-generator, taximeter

#### T05-G02

#### Machine working

Includes systems and apparatus monitoring the operation of a single machine or a group of machines, e.g. in a manufacturing environment. For computer-aided manufacturing aspects see T01-J07B also.

Safety, press, tool, factory, automation, FA, CAM, QC, quality control, idle time, down time

#### T05-G02A [1992]

#### For maintenance

Includes operation cycle counters and logging arrangements to determine maintenance intervals, remaining lifetime, etc.

Log, maintain, repair, recondition

#### T05-G02B [1992]

#### **Production line process monitoring**

Remote monitoring of measured values in general is covered by W05-D codes.

Work-area, workstation, track, conveyor, materials handling, truck

### T05-G02B1 [1992]

### Using record carrier attached to workpiece

Includes arrangements to identify workpiece, manufactured item, etc., using e.g. barcode, magnetic label, or other passive record carrier (See T04 codes also, e.g. T04-A03B1 for optical barcode reading). Transponder systems are covered by T05-G02B1A

Ferromagnetic, magnetise, electrostatic, light, IR, UV, visible, human-readable, pattern recognition

#### T05-G02B1A [1992]

#### **Transponder interrogation systems**

Covers systems using an electronic 'tag' attached to workpiece, manufactured item, etc., which can be interrogated by a central station, or equipment at a particular workstation. Interrogation-based systems of this type are also coded in W06-A04B5, and details of transponders per se in W02-G05 codes.

#### T05-G03

#### Time of events

Time measurement in general is covered in S04. This code is used for arrangements to monitor both the time at which events occur and also their duration (see S04-C03 and S04-E codes also). It includes timing for sporting events (see W04-X01 codes for electrical aspects) e.g. lap time recording systems, start and finish times, etc., and also registering systems for employee attendance, time and motion study, etc.

Clock, clock in, period, elapsed time, night watchman, security, patrol, race, photo-finish. trigger, actuate, work study

#### T05-G03A [1992]

### Parking meter

See T05-H codes also for coin- or card payment aspects. Parking control systems are covered by T07-F.

Vehicle, bay, credit, reset

### T05-H

#### Coin-, token-, or card-freed appts

This section deals with direct or indirect paymentbased arrangements for dispensing, or providing services. Dispensina involvina volume measurement is covered by S02-C04 codes. Documents are assigned T05-H codes either by virtue of G07F IPC, which may involve inventions without electrical aspects, or based on their electrical content. In the latter case, X25-F03 codes may also be assigned e.g. X25-F03B1 for food/drink vending machines. T05-H codes may be assigned for any payment-based provision of goods or services, and hence codes for the particular application should also be searched.

Vending, slot, dispense, cash, denomination, insert, automat, unattended

#### T05-H01

### Coin-actuated mechanisms; interlocks

Includes mechanical and electrical systems. See T05-H03 for coin testing/sorting aspects. Lock, release, activate, chute, lever, switch

#### T05-H02

## Equipment actuated by objects other than

Codes in this section are used with other T05-H codes as appropriate.

#### [1992] T05-H02A

#### Actuated by banknote

#### [1992] T05-H02B

### Actuated by token

#### T05-H02C [1992]

#### Actuated by record carrier

Includes card-operated systems e.g. with data stored in magnetic strip or electronically. See also T04, e.g. T04-A03 codes. Card

#### T05-H02C1

#### [1992]

#### Using dedicated record carrier

Includes e.g. telephone card, pre-paid card not usable for other purposes. (See also T05-H05C and W01-C07A codes).

#### T05-H02C3

#### [1992]

## Using non-dedicated record carrier

Includes use of credit/debit banking card and multipurpose pre-paid card.

#### Charge, account

#### T05-H02C5

#### [1992]

### Characterised by type of carrier

Codes in this section are used to indicate system type only, and not necessarily novel aspects.

## T05-H02C5A

Magnetic card

#### [1992]

See T04-C01 also for card per se, and T04-A03A for reading aspects.

#### T05-H02C5B

#### [1992]

### **Optical card**

See T04-C02 also for card per se, and T04-A03B codes for reading aspects.

#### T05-H02C5C

#### [1992]

#### Smart card, IC card

Integrated circuit memory cards per se are coded in T04-K01. For reading/writing aspects see T04-K02 and T01-H01B3A also. For non-contact type see also W02.

#### T05-H02C5X

#### [1992]

## Other types of carrier

## T05-H02D

## [2005] **Actuated by Mobile Device**

#### For equipment actuated by fund or credit transfer from mobile telephone devices or portable computing devices, via e.g. cellular phone network, Internet, Bluetooth® or local wireless network, See W01-C and T01-N01A1 and T01-M06A1, T05-L02 codes.

## T05-H02E [1992]

## Reverse vending, e.g. for returnable container

Includes arrangement returning deposit on receipt of one or more containers. Returnable-deposit systems for supermarket trolleys are covered by T05-H05A1.

Recycle, returnable, carton, box, bottle, can, crusher, deposit

## T05-H02X [1992]

Other

#### T05-H03

## Coin testing or sorting appts. combined with coin-freed appts.

Includes analogous testing arrangements for tokenor banknote-freed systems. Includes change giving mechanism. See also codes in S03 for e.g. optical, magnetic testing etc. and T04-D codes for pattern recognition aspects.

Select, reject, validate

#### T05-H04

### Apparatus dispensing discrete articles

Includes packaged items such as canned beverages, but arrangements dispensing liquids into cups are covered by T05-H06.

Select, storage, vending, cigarette, confectionery, newspaper, contraceptive, ticket

### T05-H04A [1992]

## Involving heating/cooking

See also X25-F03B1 and X27-C for cooking aspects. Payment-freed cooking/heating apparatus for food supplied by customer is covered by T05-H05. For patents involving heating and cooling, only T05-H04 is applied.

Microwave, IR, grill, conveyor, oven, meal

#### T05-H04B [2011]

## Involving cooling/freezing

For patents involving heating and cooling, only T05-H04 is applied. See also X27-F for refrigeration.

#### T05-H05

Appts. for hiring articles, coin-freed facilities, and services

## T05-H05A [1992]

## **Article hiring apparatus**

Video, tape-cassette, sports equipment

### T05-H05A1 [1992]

## Returning payment or part payment on return of article

Includes supermarket trolley with coin-freed lock. (Reverse vending encouraging return of containers is covered by T05-H02E).

Deposit, unlock, chain, free

#### T05-H05C [1992]

## Payment-freed provision of services

Includes payment of parking meters (see T05-G03A also) and public telephones (see W01-C07A codes also). Automatic banking machines are coded in T05-H02 codes for card/note accepting aspects and in T05-L03 codes.

Prepayment, call box, left luggage, locker, launderette, washing machine, dryer, lighting, illumination, toilet, commentary, cable TV subscription, car wash

#### T05-H05E [1992]

## Payment-freed amusement and entertainment systems

See W04-X02A also for electrical aspects of gaming machines and W04-X03A1 also for jukeboxes. See also T01-J30B for video game machines.

Gambling, prize, reward, award, win, lose, skill, AWP, amusement-with-prizes, slot machine, pinball, pachinko

#### T05-H06

## Apparatus dispensing fluids, granular material or electricity

Includes quantity and tariff adjustment. Meter rental charges. Electricity consumption meters are also assigned S01-B codes. Dispensing of canned drinks is covered by T05-H04.

Beverage, sachet, ingredients, powder, mix, liquid, meter, pump, water

## T05-H08 [1992]

## General details of vending and analogous apparatus

Codes in this section are used alone, or with other T05-H codes as appropriate.

## T05-H08A [1992]

## **Constructional details**

Housing, mounting, casing, support, reinforce, door, access, lock, maintain, refill, cashbox

## T05-H08C [1992]

#### **Control systems**

See also T01 where significant control aspects are included.

Microprocessor, computer, logic, monitor, fault, alarm. antitheft

## T05-H08C1 [2005]

#### **Control from outside unit**

Covers control, management and monitoring of payment freed devices from an external unit such as a central server. Includes inventory monitoring for vending machines (see also T01-J05A2D), control of multiple gambling machines in casino (see also W04-X02A8).

Microprocessor, computer, logic, monitor, fault, alarm, antitheft

#### T05-J

#### **Testing coins or valuable papers**

Testing of coins or banknotes in e.g. vending machines is covered by T05-H03.

Banknote, denomination, value, counterfeit, currency, reject, validate

#### T05-K

### Sorting and delivering

See X25-F06 also for electrical aspects of sorting in general.

Conveyor, select, separate, divert, channel, grade, evaluate, compare

#### T05-K01 [1983]

#### **Coins and tokens**

See T05-H03 for coin-sorting aspects of coin-freed apparatus. Includes change giving apparatus and coin wrapping (see T05-L09 also).

### T05-K02 [1983]

#### Valuable papers (including mail)

Franking equipment is covered by T05-C05. Banknote, dispense, bank, note, sheet, feed, envelope, letter, post, postcode

### T05-K05 [1992]

Objects on conveyor, and manufactured objects

T05-K09 [1992]

Other

#### T05-L

## Point-of-sale equipment, EFT, and other currency handling systems

Cash, bill, note, coin, banking, reject, refund, dispense

#### T05-L01 [1992]

#### Point of sale equipment

Checkout antitheft alarms are coded in W05 only, e.g. W05-B01A codes.

POS, shop, store, retail

### T05-L01A [1992]

#### **Cash register**

See also T01-J05A1 for processing aspects. ECR, till drawer, key, lock, receipt, paper roll, printer,

### T05-L01B [1992]

display, calculate, processor

#### Card reader

Includes credit/debit card reading system. See also T05-H02D codes and T05-L02 for electronic funds transfer aspects.

EFT, EFTPOS, wipe, swipe, terminal, validate

#### T05-L01C [1992]

#### Product code reader

For both checkout and inventory purposes. Scan, laser, polygon, mirror, orient, decode, format, check, portable, data terminal

## T05-L01C1 [2006]

#### Using bar code

See also T04-A03B1 for bar code reading in general.

## T05-L01C3 [2006]

### Using mobile electronic device

Contactless payments using smartphone or other mobile device incorporating RFID/transponder technology. See also T04-K and W02 for RFID/transponders in general.

Digital wallet

### T05-L01C9 [2006]

#### Other

Includes image recognition of item (see T04-D).

#### T05-L01D [1992]

### Data transfer and network aspects

Includes networks linking cash registers and central computer. See also T01 and W01-A06 codes.

LAN, WAN, local area, wide area, bus, loop, ring, interconnect, interface

## T05-L01E [2005]

#### **POS Weighing Scales**

See T05-L01X prior to 2005. See also S02 for weighing apparatus in general. Scales, weigh

### T05-L01F [2005]

## **Electronically Addressed shelf edge** display

Coded as T05-L01X prior to 2005.

T05-L01H [2006]

**POS** printers

T05-L01X [1992]

## Other POS equipment or systems

Conveyor, automatic packing, price

T05-L02 [1992]

#### **Electronic payments**

Includes Electronic Funds Transfer (EFT) and digital wallet systems. See T01-N01A1 for Computer/Internet aspects and W01-C05B3C for telephone line data transmission aspects.

### T05-L03 [1992]

#### Cash dispensing and depositing machines

Includes automatic teller machines. Bank, terminal, banknote, card, ATM

## T05-L03A [1992]

## **Cash-handling aspects**

See T05-K02 for banknote sorting/delivering in general.

T05-L03A1 [1992]

**Cash-receiving** 

Deposit, envelope

T05-L03A5 [1992]

**Cash dispensing** 

T05-L03C [1992]

### Security and control

See T05-H02 codes for card operated access system details, and T05-D01 codes for control of access to enclosure.

Lobby

### T05-L03C1 [1992]

#### **General control system**

Includes display arrangements and selection keys. *Microprocessor, computer, controller, program* 

### T05-L03C5 [1992]

#### Security system aspects

Authorise, validate, personal identification number, PIN

### T05-L03E [1992]

#### **Constructional details**

Includes internal details such as component mounting, and also housing, reinforcement, etc. Casing, support, bezel, escutcheon, display filter

#### T05-L05 [1992]

## Cashboxes, strongboxes, safes, moneyboxes

See W05-B01 codes for theft/burglar alarms.

#### T05-L05A [1992]

## Strongboxes, safes

Lock, combination, tumbler, time delay, release

### T05-L05B [1992]

Personal moneybox, coin holders

## T05-L07 [1992]

Coin and note counting

#### T05-L09 [1992]

#### Other

Coin wrapping, minting

#### T06: Process and Machine Control

These codes cover general or unspecified control systems and methods. T06 codes are often applied due to the presence of guaranteed G05B (T06-A codes) and G05D (T06-B codes) IPCs, as well as G05G (T06-C codes), as long as there is some electrical content for the latter. In the absence of a guaranteed G05B or G05D IPC, if the control is "specific", then T06 codes are not normally applied. For example, non-specific or general torque control will be coded in T06-B12, but if the patent details control of electric motor torque, e.g. for a motor vehicle power steering system, then T06 codes will not be applied (unless there is e.g. a G05D-017 IPC assigned), because the control can be much more accurately highlighted by applying specific V06-N (motor torque control) and X22-C05A (vehicle power steering) codes.

#### T06-A

#### **General control systems**

This code is used for systems for regulating specific variables which are more generally applicable.

#### T06-A01

#### **Comparing elements**

Includes electric analogue and digital comparators. General electronic comparators are coded in U22-A04D5.

Error detectors

#### T06-A02

## Anti-hunting and internal feedback arrangements

Includes electric and fluidic anti-hunting measures; electric and fluidic feedback to obtain proportional, integral and differential characteristics. See also T06-A06A9 for PID control per se.

PI. PD. PID

### T06-A03

## Obtaining smooth (dis)engagement of automatic control; safety arrangements

Includes both electric and fluidic arrangements.

#### T06-A04

#### **Programme-control systems**

### T06-A04A

## **Numerical controllers**

NC

#### T06-A04A1

## Using measuring device

#### T06-A04A2

## Characterised by computer; with central computer controlling several NC machines

See T01-F06 for CNC-related microprocessing. CNC, computerised numerical controller

#### T06-A04A2A

[1997]

### **Total factory control**

For central factory control not using NC systems, see T06-A04B7.

FA, DNC, Direct/distributed numerical controller

#### T06-A04A3

[1997]

## Positioning or contouring control systems

Also includes tool centring, measuring workpiece for machining, backlash and other types of error compensation, and control of velocity, etc.

#### T06-A04A4

[1997]

## Machine data input and handling arrangements

Includes NC systems where form of data input is the characterising feature e.g. manual data input, generating data from the drawing, or using design data from a CAD/CAM system. Also includes reading, buffering or conversion of data.

#### T06-A04A5

[1997]

## Using tool path interpolation

#### T06-A04A6

[1997]

## Monitoring and safety systems

See also T06-A03 and T06-A08 for general safety and monitoring systems, respectively.

#### T06-A04A9

#### Other numerical controller aspects

Includes open loop systems.

### T06-A04B

Non-numerical

## T06-A04B1

[1997]

## Sequence or logic controller

Also includes programmable logic controllers. See also T01-F06 for program control arrangements e.g. using stored programs, such as in PLC, for control of computer peripheral. For general safety and monitoring systems, see T06-A03 and T06-A08, respectively.

PLC, relay ladder, graph set processing

#### T06-A04B3

[1997]

## Fluidic control systems

### T06-A04B5 [1997]

### Recording and playback/teaching systems

## T06-A04B7 [1997]

### **Total central control of factory**

For central factory control using NC systems, see T06-A04A2A.

FMS, Flexible manufacturing system, CIM, computer integrated manufacturing, multi-machine control, IMS, integrated manufacturing system

#### T06-A05

## Adaptive (optimum) control systems

## T06-A05A [1992]

## **Artificial Intelligence-based systems**

Includes expert-, rule-, or knowledge-based systems. See also T01-J16 codes.

Al, KBE, rule acquisition, inference engine, neural network, heuristic rules

### T06-A05A1 [1992]

### **Fuzzy control**

See also T01-J16B.

#### T06-A05C [2007]

#### **Using algorithms**

Includes adaptive control systems using algorithms to optimise system performance. E.g. includes control algorithms used in washing machines (see also X27-D01A5) to optimise wash cycle based on sensed parameters such as weight of clothes, temperature etc.

#### T06-A06

#### **Automatic controllers**

#### T06-A06A

**Electric** 

#### T06-A06A1

#### (Dis)continuous controllers

#### T06-A06A1A [1992]

## Continuous

(T06-A06A3)

Output of controller is continuous function of deviation from desired value. See T06-A06A3 for records from 1983 to 1991.

## T06-A06A1D [1992]

#### Discontinuous

(T06-A06A5)

Output of controller is discontinuous function of deviation from desired value e.g. two or multi-step controllers. See T06-A06A5 for records from 1983 to 1991.

#### T06-A06A2

## With output pulse-train signal; with multiple inputs and outputs

Includes systems where the output of controller is pulse-height, -width, or frequency-modulated; multiple inputs obtained from more than one sensor and outputs applied to more than one correcting element.

## T06-A06A3\* [1983-1991]

#### **Continuous**

\*This code is now discontinued and transferred to T06-A06A1A from 1992 onwards to indicate its proper hierarchical relationship to T06-A06A1. It is still searchable and valid for records of 1983 to 1991.

## T06-A06A5\* [1983-1991]

#### **Discontinuous**

\*This code is now discontinued and transferred to T06-A06A1D from 1992 onwards to indicate its proper hierarchical relationship to T06-A06A1. It is still searchable and valid for records of 1983 to 1991.

#### T06-A06A9

#### Other electric automatic controllers

Includes arrangements to obtain PID and proportional, integral, or differential characteristics.

#### T06-A06B

### Pneumatic or hydraulic only

#### T06-A07

## Computer controlled systems; systems using models

#### T06-A07A [1992]

#### **Computer-controlled systems**

This code is used together with other codes only if substantial computing details are disclosed. For example, CNC machine tool motor control systems would be coded only in T06-A04A. See also T01-J07B for the computing aspects of industrial process controllers.

CAE, CAI, CAM

T06-A07A1

Distributed control systems

T06-A07B

[1992]

[1992]

Systems using models

T06-A08

Testing and monitoring control systems

T06-A10

[1992]

Sampled-variable control systems (T06-A20)

T06-A11

[1997]

## Control systems-related (data) communications arrangements

(T06-A20)

See also W01-A06 codes for data communications in general. RF type communications are in W02 and transmission systems for measurement and control systems are covered by W05-D codes. Only used when 'control' data is being communicated.

MAP

#### T06-A20

#### Other general control systems aspects

Includes open-loop automatic control systems; general constructional details of controllers e.g. control boards or racks for electronic controllers (see V04-T codes for electronic equipment constructional features).

#### T06-B

#### Control of non-electric variables

Includes normally documents with the G05D IPC, or those with substantial electrical content but **no** relevant provision elsewhere in EPI, e.g. flow control. Does **not** cover automotive vehicle controllers like torque (see X22-A03D instead), etc. unless G05D is applied.

T06-B codes are primarily applied with regard to the final variable being controlled, though in some cases, an intermediate variable being controlled may also be coded, if deemed helpful. For example: in a system controlling the flow of fluid by varying the speed of a pump, T06-B04 will be the code normally applied to highlight the desired flow control aspect (if a G05D IPC is assigned or no specific application is detailed), and in most cases the intermediate speed control aspect (T06-B09) will not need to be coded.

#### T06-B01

## Vehicle position, course, altitude or attitude

For aircraft flight controllers, see W06-B01A5.

#### T06-B01A

#### Position or course in two dimensions

Includes vehicles using near-field transmission system e.g. having buried conductors in floor etc. (see W02-C02 also).

Steering, tracking, robotic vehicles, navigation

## T06-B01B

### Altitude or attitude; target seeking control

See W07-A codes also for missile guidance. Aircraft, flight, satellite

#### T06-B01X

## Other vehicle position/course control

Includes 3-dimensional position or course control.

#### T06-B02

Position or direction

#### T06-B02A

Without feedback

#### T06-B02B

With feedback

#### T06-B03

**Material dimensions** 

#### T06-B04

**Flow** 

#### T06-B04A

Without auxiliary power

#### T06-B04B

**Using electric means** 

#### T06-B04X

Other flow controller

## T06-B05

Level

#### T06-B06

Chemical or physico-chemical variables

#### T06-B07

#### Humidity; viscosity; light intensity

Only used for general or non-specific control systems. For illumination control/light dimming see X26-C codes only, for controlling light intensity of display see appropriate U14, W05 etc. display codes only, and for humidifiers per se see X27-E01B2 only.

T06-B08

Ratio

T06-B08A

Of two or more fluid flows

T06-B08A1

**Electrical** 

T06-B08A9

Other ratio control with(out) auxiliary power

T06-B08X

Other ratio control

T06-B09

Speed; acceleration

T06-B09A

Without auxiliary power; with auxiliary non-electric power

T06-B09B

**Using electric means** 

T06-B10

Mechanical force or stress

T06-B11

Fluid/Gas pressure

T06-B11A

Without auxiliary power

T06-B11X

Other fluid pressure control

T06-B12

Torque; mechanical power; mechanical oscillations

#### T06-B13

#### **Temperature**

Control of electric heaters is in X25-B04, central heating control in X27-E01A.

**Thermostats** 

#### T06-B13A

Without auxiliary power

T06-B13B

**Using electric means** 

T06-B13B1

Using elements with temp. dependent electric or magnetic properties

T06-B13B2

With auxiliary heater

T06-B13B9

Other electric temperature control

T06-B13X

Other temperature control

T06-B14

Several variables simultaneously

T06-B20

## Other non-electric variables' control

Includes simultaneous control of electric and non-electric variables.

### T06-C

#### Mechanical control devices or systems

Included in EPI only if application is for electrical systems or devices.

### T06-C01

#### Controlling and controlled members

Includes knobs for switches or variable resistors, etc. See V03-B09, V01-A03.

T06-C02

**Limiting movement** 

T06-C03

Manually operated mechanisms

T06-C03A

With single controlled member

#### T06-C03B

### With several controlled members

#### T06-C09

## Other mechanical control devices or systems

### T06-D

#### **Applications**

In general, relates to items in X25, which should also be searched.

#### T06-D01

#### **Agriculture**

### T06-D01A [1983]

#### Soil working, sowing, harvesting

See also X25-N01A for electrical equipment. Tractor, depth, plough, harvester, agricultural vehicles

#### T06-D01B [1983]

#### Irrigating, fertilising, culture

See also X25-N01B for electrical equipment. Sprinklers

## T06-D01C [1987]

#### **Livestock industry**

Includes feeding, milking, and enclosure heating and air conditioning. See also X25-N02. Feeding control

#### T06-D02

## Food, pharmaceuticals and tobacco processing

See also X25-P.

#### T06-D02A [1987]

#### **Pharmaceuticals**

See also X25-P02.

Drugs, medicines

## T06-D02B [2011]

### **Tobacco**

Includes control of tobacco processing plant.

#### T06-D02C [2014]

#### Food

Includes control of food processing plant.

#### T06-D03

### **Textile and paper manufacture**

## T06-D03A [1983]

### Paper and cardboard making

See also X25-T09.

### T06-D03B [1983]

#### Fiber, yarn, etc. manufacture

See also X25-T04A.

Spinning, winding, twisting, combing, carding, tension-control

#### T06-D03C [1983]

#### **Fabric manufacture**

See also X25-T04B codes.

Looms, knitting machines, wefting machines, warping machines, weaving, textile manufacture

#### T06-D03D [1983]

#### Sewing machine/Embroidery machines

See also X25-T04C.

Embroidery

#### T06-D04

## Separating; crushing; mixing, sorting

See also X25-J for crushing and mixing. Also includes shredder.

## T06-D04A [2020]

Sorting

#### T06-D05

Metal working; casting

#### T06-D05A [1983]

Metal working

### T06-D05A1 [1987]

## Shaping; rolling; hammering; bending; punching

Includes shaping of materials (excluding cutting), e.g. rolling (see also X25-A02B), bending, punching and hammering (see also X25-A02D), and extruding.

#### T06-D05A2 [2011]

#### **Pressing**

(T06-D20)

See also X25-A02A for presses per se.

Press

### T06-D05B [1983]

## Casting

See also X25-A01.

#### T06-D06

#### Machine tool control

Control of portable power driven screw or nut setting.

#### T06-D06A [2019]

#### **Riveting control**

See also X25-A03R and X25-A03F for riveter control. See T06-D20 prior to 2018.

#### T06-D07

## Grinding; polishing; cutting; drilling; manipulators

#### T06-D07A [1983]

## Milling; grinding; polishing

See also X25-A03C codes as appropriate. Abrading, honing, lapping, planing, sanding, burnishing, blasting

### T06-D07B [1983]

## **Manipulators**

Also see X25-A03E. See T06-D08F and X25-F05A instead for autonomous and robotic vehicles. *Robots* 

#### T06-D07C [2011]

## Turning; boring; drilling; cutting

Also see X25-A03A and X25-A03B codes as appropriate.

Sawing, trimming, grooving, lathe

#### T06-D08

## Conveying, lifting, hauling, handling materials

#### T06-D08A

#### Web-advancing

Includes strip and coil handling. Also see X25-F02 for web/strip/coil handling per se. Includes cable winding aspects. Also see X12-D07X or X12-G10 for cable winding machine and cable drums/reels. Sheets, roll, paper, filaments

#### T06-D08B

## Article feeding; tension regulating

#### T06-D08C

#### Conveyors

See also X25-F01A for control details of conveyors. Belts, transporting goods, shelving and retrieving, locating, addressing

#### T06-D08D

#### Lifts

See also X25-F04A for control details of lifts. Elevators, car call control, escalators, cabins, cages

#### T06-D08E

## Cranes, load engaging equipment, soil shifters

Hoists, excavators, winches

#### T06-D08F [1987]

#### Trucks, goods or robotic vehicles

Includes goods conveying vehicle control (see also X25-F05A codes).

Robotic vehicles, autonomous vehicles, trucks, fork lift trucks, trolleys

#### T06-D08X

## Other material handling control systems

## T06-D09 [1983]

#### Metallurgy

See also X25-A codes for metal working, and X25-Q codes for iron and steel manufacture, furnace control (see X25-X13 also), heat treatment etc.

#### T06-D10 [1983]

#### **Chemical processing**

## T06-D11 [1987]

### Mining

(T06-D20)

See also X25-D02 for mining. *Conveyors, machines* 

## T06-D12

## Earth drilling; Well production

(T06-D20)

Includes oil, gas and water wells drilling. Drilling for building construction is **not** covered. See also X25-E01 for drilling equipment. Also see H01 codes. *Boreholes* 

[1987]

## T06-D13 [1987]

#### **Plastics**

(T06-D20)

See also X25-A06 for plastic working per se. *Extruding, injecting, moulding* 

## T06-D14 [2011]

### Rubber

(T06-D20)

Includes control of rubber processing and tyre manufacturing plant. See also X25-A07 for rubber working per se.

### T06-D15 [2014]

## Packaging/filling/dispenser/bottling/labeling

Includes control of packaging/dispensing machines.

## T06-D16 [2017]

Wood

Includes all processing and manufacturing aspects of wood.

## T06-D17 [2022]

## 3D / 4D / 5D printing; Additive manufacturing

See also X25-A08 codes.

## T06-D18 [2022]

**Spraying; Coating** 

See also X25-K for spraying and coating equipment. *Paint spraying* 

## T06-D20 [1997]

## Other applications of control systems

Includes drying (see X25-G), etc. From 2011 control of presses is transferred to T06-D05A2. From 2019 control of riveting machines is transferred to T06-D06A (see also X25-A03R).

#### **T07: Traffic Control Systems**

Traffic control systems specifically for rail, air/marine transport are not included, and are covered by X23 and W06 codes respectively. Some offboard roadside aspect or traffic control centre must be present to be coded in T07. Purely onboard motor vehicle aspects are coded in X22 only.

#### T07-A

## Determining road vehicle position, speed or flow

## T07-A01 [1992]

#### Monitoring flow of traffic

Includes measurement of number of vehicles passing within fixed time period.

Congestion, volume, closed-circuit TV, CCTV, survey, cable, pressure, detect

## T07-A01A [1992]

## Measuring speed of traffic

Includes measurement of average speed.

## T07-A01A1 [1992]

#### Measuring individual vehicle speed

Includes police speed trap using e.g. radar, laser, etc. (For driver countermeasures see X22-E08 and W06-A04E3C).

Gun, check, readout

### T07-A01B [1997]

#### **Detecting presence of vehicle**

This code is for detecting the presence of a vehicle in a known local position, e.g. using cameras or inductive loops embedded in roadway that detect change in magnetic field caused by presence of the vehicle. For detecting the presence of vehicles specifically for traffic signal control, e.g. traffic light control, see T07-C03A only. For detecting free parking space see T07-F also. For systems detecting an unknown geographic location of the vehicle see T07-A05 codes instead.

Video camera

#### T07-A01B1 [1997]

#### Detecting 'wrong way' travel

Use with T07-E codes also.

#### T07-A01C [1992]

#### Vehicle counting

See also T07-F for counting number of vehicles entering car park.

## T07-A01D [2002]

#### Vehicle classification system

Includes classification of vehicle type, e.g. car, lorry, motorbike, and e.g. monitoring of vehicle height. Includes optical systems in which light beam is interrupted when high vehicle such as truck passes by.

Classify, vehicle type, height sensing

#### T07-A03 [19

## Identifying and recording individual vehicle information

## T07-A03A [1997]

#### **Transponder interrogation**

Transponder interrogation systems for vehicle identification in general are covered by T04-K03B, T04-K02 and W06-A04B1 codes and W02-G05 codes for novel RF details.

RFID, transponder, tag

#### T07-A03A1\* [1997-2001]

#### For tolls or other charging systems

\*This code is now discontinued; the transponder aspect is now transferred to T07-A03A and the toll aspect is transferred to T07-A03E from 2002 onwards. T07-A03A1 remains searchable for records between 1997 and 2001.

### T07-A03C [1997]

#### **Recording images**

Includes systems triggered by detecting vehicle speeding, or travelling through stop signal.

Automatic camera, number, offence, violation

### T07-A03C1 [1997]

#### By photography

Electrical aspects of photography are also assigned and are coded in S06-B, especially S06-B02 codes.

### T07-A03C5 [1997]

#### By video systems

Closed circuit TV systems are assigned W02-F01 codes. See W04-M01 codes for details of video cameras.

CCTV, VCR, tape, playback

#### T07-A03C5A [1997]

## With pattern recognition of licence plate information

See T04-D codes also.

## T07-A03E [2002]

### Toll and charging arrangements

Transponder aspects for transmission of data between toll booth and vehicle are coded in T07-A03A also. See T05-D02 also and T05-C03 for charge indicating aspects. See X22-X07 also for onboard vehicle aspects such as windscreen mounted transponder.

Transponder, card, debit, toll

#### T07-A05 [1992]

## Monitoring position of vehicle

This code is for monitoring the geographic position of a vehicle. For position monitoring in conjunction with mobile radio systems see W02-C03C codes (e.g. W02-C03C1E). For T07-A05 to be applied there needs to be some offboard or roadside aspect. Purely onboard vehicle position determination is coded in X22-E06 instead, as well as e.g. S02-B08C and W06-A03A5C if GPS is used for the position fixing. For systems detecting the position or rather presence of a vehicle at a known point on the road, see T07-A01B instead, or T07-C03A if the aim of the presence detection is for road traffic signal control.

Location, city, zone, district, road, street, plan, moving map, destination

#### T07-A05A [1992]

## Monitoring position of scheduled vehicle e.g. bus

Includes systems for monitoring position of buses or other vehicles such as delivery vehicles following a set route or travelling between specific destinations, e.g. to allow off-board controller to monitor vehicle progress. See also T07-A05L for display of vehicle position to controller. See also X22-P05A and other appropriate X22 codes for on-board bus details.

## T07-A05A1\* [1992-2006]

#### Displaying information to passenger

\*This code is now discontinued and transferred to T07-A05D and T07-A05S. T07-A05A1 remains searchable for records from 1992-2006.

Time, interval, indication, boarding, alighting

#### T07-A05A3\* [1992-2001]

#### Displaying information to controller

\*This code is now discontinued; the display to central controller aspect is transferred to T07-A05B and the application to scheduled vehicles is covered by T07-A05A. T07-A05A3 remains searchable for records between 1992 and 2001.

Central station, route

## T07-A05B [2002]

#### Displaying information to controller

Includes informing central station of vehicle position, e.g. to allow controller to monitor vehicle progress and alter vehicle schedule if required (see also T07-A05S). See also X22-E06F for updating vehicle navigation display.

Central station, route

#### T07-A05C [1992]

## Displaying information to driver

Includes arrangements indicating position of vehicle to driver, e.g. using roadside beacons or other roadside based navigational systems. Systems transmitting actual control signals affecting vehicle steering for example, are covered by T07-D01 (and X22-C05B for automatic steering details). See also X22-E06F and S02-B08 codes. Includes use of offboard traffic centre to inform driver of best route to destination, e.g. due to traffic congestion, i.e. to reduce processing requirements of on-board navigation system. T07-G01 may also need to be applied for indication of traffic congestion. *CD-ROM* 

## T07-A05D [2007]

### Displaying information to passenger

(X22-A05A1)

Includes systems for informing passenger of current position of bus or taxi or its expected arrival time. Includes display of vehicle position on hand-held device, in-bus display or on off-board bus stop display.

#### T07-A05U [2007]

## Monitoring position of un-scheduled vehicle e.g. taxi

(X22-A05)

Includes systems for monitoring position of taxis, e.g. to allow dispatcher to efficiently dispatch taxis to most appropriate pick-up points. See also T07-A05L for display of taxi position to controller, T07-A05N for display of pick-up point to taxi driver, and T07-A05J for informing passenger of current taxi location and expected arrival time. See X22-P05C and other appropriate X22 codes for on-board taxi details.

#### T07-B

## Traffic signals and road signs

The codes in this section relate to equipment providing both variable traffic instructions and fixed information.

Display, road, warning, optical, reflect, sign, emergency, light

T07-B01 [1992]

Signal details

T07-B01A [1992]

#### **Light source**

Only includes novel light sources/bulbs etc. per se. See X26 for lamps and U12-A01A codes for LEDs. Lampholders are coded in T07-B01B.

Incandescent, discharge, bulb, fluorescent, light emitting diode, LED, HID

T07-B01B [1992]

#### Reflectors, filters, lenses, fittings

Includes holders for lamps or other light source.

T07-B01C [1992]

## **Constructional details**

Casing, mounting, cable, harness, seal, post, street furniture

T07-B05 [1992]

### Signal type

Codes in this section are used to indicate signal type either alone, in conjunction with T07-B01 codes, or with T07-C codes.

T07-B05A [1992]

#### Traffic intersection control

Includes standard 'traffic lights' and pedestrian crossing systems.

T07-B05A1 [1992]

#### Portable, temporary unit

Includes portable display used at traffic intersection. For movable displays used in other situations see T07-B05G only.

Road works, repairs, one-way, alternate, single line, battery

T07-B05A5 [1992]

#### Indicating elapsed time

Includes indication of time before next signal change.

Period, warning, fuel saving, pollution

T07-B05C [1992]

## Variable information display

Includes matrix displays e.g. indicating temporary speed limit, motorway lane closure, etc.

T07-B05E [1992]

#### Fixed display

Includes illuminated direction signs.

### T07-B05G [2002]

#### Movable display

Includes portable or temporary displays, e.g. mounted on movable trailer, and used at roadworks along motorway to inform drivers of temporary speed limit or lane closures. Portable displays used for traffic intersection signalling such as temporary traffic lights are coded in T07-B05A1 only.

## T07-B07 [2002]

## Traffic signals and road signs with ancillary signalling

Includes roadside transmitters, e.g. incorporated in road sign to transmit radio position signal or speed limit signal to vehicle. See also T07-D03 if vehicle speed is automatically controlled.

Radio transmitter, beacon, speed limit notification

### T07-C

#### Controlling traffic signals

For control of a particular type of signal search with T07-B05 codes (except T07-B05E).

#### T07-C01 [1992]

#### **Control circuitry**

Computer, microprocessor, sequential, program, logic, clock, time

## T07-C03 [1992]

### Switch and detector arrangements

Includes manual switch for e.g. pedestrian crossing. See also V03 codes for novel mechanical switches per se.

Pushbutton

#### T07-C03A [1992]

#### **Detecting presence of vehicle**

Includes using inductive loops below road surface (also coded in S03-C02B) to detect vehicle presence and then control traffic signal. For vehicle presence detection not associated with traffic signal control see T07-A01B only.

Sense, pressure, magnetic field

## T07-C05 [1992]

#### Monitoring and alarms

Includes safety measures to prevent signal conflict, warning of signal lamp failure, etc.

## T07-C07 [1992]

#### Over-ride control system

Includes emergency services vehicle priority system. See also X22 and e.g. W05-D codes for wireless remote control.

#### T07-D

#### Vehicle guidance and control systems

Includes offboard systems that effect automatic control or guidance of land vehicle.

Car

### T07-D01 [2002]

#### Vehicle guidance systems

This code covers arrangements controlling vehicle travel direction in road traffic or off-road traffic system, normally where there is some traffic contention aspect, e.g. to prevent collisions. (See T06-B01A, X22-C05B and W02-C02 codes for inductive loop and radiating cable guidance systems also. For materials handling vehicles, see X25-F05A codes). Systems providing navigational information only, without automatic guidance control, are covered by T07-A05C and also included in X22-E06 codes for onboard aspects, and in S02-B08. Information processing aspects of vehicle guidance irrespectively are covered by T01-J07D codes.

Position, road, track, cable, near field, automatic steering

### T07-D03 [2002]

### Vehicle automatic control systems

Includes automatic regulation of vehicle speed in response to signal transmitted from roadside transmitter. See also T07-B07 if transmitter is incorporated into road sign. X22-A03B and X22-C02D codes may also need to be applied for automatic vehicle speed and braking control. Speed limit enforcement, speed control, automatic braking, by-wire

#### Т07-Е

### **Anti-collision systems**

See X22-J05 codes for self-contained on-board road vehicle systems, which are **not** coded here, and W06-A codes for 'radar' types, e.g. W06-A04H1

Ultrasonic, light, beam, distance, receive, transmit, rear, indicate, safety, warning, obstacle

#### T07-E01 [1992]

### Warning of or preventing collision

Includes warning of insufficient vehicle spacing.

## T07-E05 [1992]

### Warning of unsafe vehicle position

Includes warning of deviation from lane using some road based apparatus such as passive radar reflector or transponder embedded in road. Excludes on-board vehicle optical detection of painted white line.

White line, pattern, stud

#### T07-F

## Parking control systems

Includes indication of occupancy of parking spaces (see T07-A01B also for vehicle presence detector and T07-A01C for vehicle counting) and vehicle access control and direction of vehicle to parking space. See also T05-D codes for barrier/access control aspects per se. See X25-U02 only for vehicle handling/lifting/storing via powered equipment in multi-storey car park. Parking meters are not included-see T05-G03A.

Time, display, vehicle, car, card, fee, ticket, charge

### T07-G [1992]

## Informing driver of traffic, road and weather conditions

From 1997, the scope of this code has been widened to include warning of traffic congestion. Includes use of radio broadcasting or telephone information services. See W01-C05 codes for telephone aspects, W02 codes for radio systems (especially W02-E01B5 for RDS-based systems) and W05 for signalling in general. T07-B codes may be relevant also for signalling aspects.

## T07-G01 [1997]

## Informing driver of traffic congestion

Includes use of roadside display to inform driver of delays or transmission of information directly to onboard vehicle display (see also X22-E11). For systems also displaying alternative route to driver to avoid congestion, also see T07-A05C and X22-E06F codes.

Accident, road works, lane closure, traffic jam, diversion, signal failure, alternative route

### T07-G02 [2013]

#### Informing driver of road surface conditions

Includes informing driver of temporary road surface, resurfacing works, pot holes, raised ironwork etc. For warning of road flooding etc. see T07-G05 instead. If the monitoring system is located on the road, X25-U05 should also be applied. If the monitoring system is mounted on the vehicle, see X22 only.

## T07-G05 [1997]

## Adverse weather condition monitoring and warning

For warning driver of severe weather such as flooding so that alternative route can be used. See S03-D codes for meteorological aspects also.

Visibility, fog, mist, temperature, frost, ice, black ice, flood

## T07-H [2002]

### Intelligent highway systems

Includes general details of intelligent roadways, such as roadside infrastructure, e.g. beacons or transponders beside or embedded in road, to assist with automatic vehicle steering (see also T07-D01) or vehicle separation distance control (see also T07-D03). For vehicle control via a central traffic centre, see T07-A05 codes instead. See X21-K and X22-K codes for motor vehicle and electric vehicle to infrastructure communications and connectivity. *V2I, C-V2I* 

## T07-M [2012]

## Traffic administration and traffic modelling/design

Includes traffic planning and designing. Also see T01-J05A for administration or T01-J15X for computer design and modelling.

### T07-X

### Other electrical traffic control aspects

Includes illuminated road studs and lane markings, and electrically height adjustable road bumps. Includes warning triangle placed on road by vehicle driver, e.g. to guide emergency vehicle to accident site. See also X22-B03.

Cats eye, speed bump, warning triangle

## **Section U: Semiconductors and Electronic Circuitry**

U11: SEMICONDUCTOR MATERIALS AND PROCESSES	416
U12: DISCRETE DEVICES	446
U13: Integrated Circuits	456
U14: Memories, Film and Hybrid Circuits	461
U21: LOGIC CIRCUITS, ELECTRONIC SWITCHING AND CODING	474
U22: Pulse Generation and Manipulation	485
U23: Oscillation and Modulation	493
U24: Amplifier and Low Power Supplies	500
U25: IMPEDANCE NETWORKS AND TUNING	512

#### **U11: Semiconductor Materials and Processes**

U11 covers processing, packaging, assembly, testing and handling of the devices in U12 to U14, but note that aspects of manufacture specific to certain devices can be found in U12 and U14, under codes for LEDs, lasers, solar cells, thick film and hybrid circuits. Liquid crystal layer manufacture is included in U14-K01A1. Chip carrier, multilayer substrate circuit board and chip-on-substrate technologies are coded under integrated circuit packaging in U11-D01A, and hybrid circuits in U14-H03 and U14-H04.

#### U11-A

#### **Materials**

See U11-B03, U11-C01J, U12-B03C, U12-E01 and X12-D01C for chemical details of produced crystals, structures and organic semiconductors.

#### U11-A01

#### Semiconductor materials, dopants

Includes preparation of semiconductor material from precursors, refining and purification, new semiconductor material. For solar cell material see also appropriate code in U12-A02A2.

#### U11-A01A [1992]

#### Silicon

Silane, fluoride, chloride

## U11-A01A1 [1997]

#### **Porous silicon**

(U11-A01A) LED

#### U11-A01B [1992]

### **AIII-BV** compounds

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride, arsinogalanes

#### U11-A01C [1992]

#### **All-BVI** compounds

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

## U11-A01D [1992]

## Group IV elements and their compounds (except elemental silicon)

Silicon carbide, diamond, germanium

#### U11-A01F

## **Organic semiconductor materials**

U11-A01M

[1992]

[1992]

**Dopants** 

U11-A01X [1992]

#### Other semiconductor materials

Includes materials not covered by U11-A01A to U11-A01F codes, e.g. AIV-BVI group, AI-BIII-CVI group, AII-BIV-CV group semiconductors.

Lead sulphide, lead telluride, chalcopyrite compounds, copper indium sulphide, copper gallium selenide, chalcogenide compounds, zinc tin arsenide, cadmium germanium arsenide

#### U11-A02

## Piezoelectric, electrostrictive, magnetostrictive materials

Materials for transducers are also coded in V06-V. Includes electrets of organic materials which exhibit piezoelectric and pyroelectric properties. Also includes Ferroelectric materials

Lead, titanate, zirconate, titanium, zirconium, bismuth, permalloy, lead scandium tantalate, polyvinyl fluoride, polyvinyl chloride, polyacrylonitride

#### U11-A03

#### Liquid crystal, electrochromic materials

#### U11-A03A

[1992]

## Liquid crystal material, compounds, additives

See also V07-K10A.

Chiral, ester, phenyl, smectic, cholesteric, nematic, twisted nematic, cyano, hydroxy, mesogenic, polymer dispersed LC, PDLC, polymer network LC, halo-acetylene derivates, phenyldioxanes, ferroelectric LC

### U11-A03C [1992]

#### **Electrochromic materials**

For details regarding electrochromic display (structures, circuits) see U14-K02 codes.

#### U11-A04

### **Magnetic materials**

Magnetic materials in general are coded in V02-A. *Iron, garnet, alloy, oxide* 

#### U11-A05

#### Thick and thin film materials

Includes conductive pastes and inks, thick film resistive compositions (see also V01-A02C1). For general thick film aspects see U14-H02.

Vehicle, solvent, frit, powder, paste

#### U11-A05A [1987]

#### **Screen print solders**

Gold, silver, glass frit inks

## U11-A05B [1987]

#### Substrate materials

Includes novel composite material, new materials for multilayer ceramic substrate (see also U14-H03B1), materials for other hybrid circuit substrate (see also U14-H03C). For general integrated circuit substrate see also U11-D01A.

#### U11-A06 [1983]

## Resists for semiconductor device manufacture

(U11-A09)

Includes photosensitivity increasing substances. See V04-R01A for resists used in PCB manufacture. Apparatus for coating, processing photoresist are covered by U11-C04A1 codes.

Photolithography, photosensitive, positive, negative

#### U11-A06A [1992]

## Organic resist for semiconductor device manufacture

Quinonediazides, phenol resin

## U11-A06B [1992]

#### **Inorganic resist**

Germanium selenide, amorphous silicon

## U11-A07 [1983]

### **Encapsulants, sealants**

(U11-A09)

See V04-S01A for compounds used to encapsulate complete modules, circuit boards etc.

Resin, epoxy, coating, powder, cure, harden, glass, polythylene terephthalate

## U11-A08 [1992]

## Insulating, conductive materials

### U11-A08A [1992]

#### Insulating materials for dielectric layer

Includes preparation of material from precursors, any other aspect relating to layer structure or deposition being covered by the appropriate codes U11-C05A or U11-C05B.

[1992]

[1992]

#### U11-A08A1

## Organic insulating material for semiconductor manufacture

(U11-A05A)

Polyquinoxalines, polyquinozalones, polybenzoxazoles, polimide crosslinking agents

#### U11-A08A2

## Inorganic insulating material for semiconductor manufacture

(U11-C05B5, U11-C05B7)

Prior to 1992, coded in U11-A09 and/or U11-C05B5, or U11-C05B6, or U11-C05B7.

#### U11-A08B [1992]

## Conductive materials for semiconductor manufacture

(U11-A09, U11-D03A1, U11-D03B)

Includes metals, alloys for e.g. electrodes, wires, interconnections, lead frames. See also appropriate code in U11-D to identify use of respective metal or alloy, e.g. U11-D03A1 for beam leads, U11-D03B for interconnections, electrodes.

## U11-A08B1 [2005]

Organic conductive materials for semiconductor manufacture

#### U11-A08B2 [2005]

## Inorganic conductive materials for semiconductor manufacture

(U11-A09, U11-D03A1, U11-D03B)

#### U11-A09

## Other materials for semiconductor manufacture

Includes resins not used as encapsulants or sealants.

Adhesives

#### U11-A10 [1992]

## Abrasives, polishers, cleaners, etchants used in semiconductor manufacture

(U11-A09)

Includes materials used in mechanical and/or chemical treatment. Resist strippers are also coded here. See also U11-C06A1, U11-C07A1, or U11-C07B as appropriate.

## U11-A11 [1992]

## **Developers for microlithography**

(U11-A09, U11-C04A1)

#### U11-A12 [1997]

#### Gases for semiconductor technology

(U11-A09)

For reactive processing gases see also U11-A13. Argon, nitrogen, helium, ozone

#### U11-A13 [2005]

## Precursors for deposition process in semiconductor manufacture

(U11-A09)

Includes reactive gases, liquid and solid precursors.

### U11-A14 [2006]

#### Nano-structural materials

Use in conjunction with other U11-A codes to indicate type of material. For conductive nanostructural materials in general, see also X12 codes.

#### U11-A15 [1992]

#### **Electroluminescent materials**

(U11-A09, U14-J)

Also includes other novel luminescent materials used in semiconductor devices, e.g. phosphors, photoluminescent and fluorescent materials. See U14-J codes for electroluminescent devices and displays (structure, circuits, manufacture).

#### U11-A15A [2002]

#### Inorganic electroluminescent materials

#### U11-A15B [2002]

#### **Organic electroluminescent materials**

Includes polymeric and organometallic complexes.

## U11-A16 [2007]

### Immersion lithography fluid

See U11-C04K codes for immersion lithography apparatus and method.

#### U11-B

#### **Bulk crystal growth**

Includes methods of growing monocrystals of silicon, germanium and other homogeneous materials except those covered by subclass U11-B03 below. See U11-C01J1 for epitaxy and U11-C01H for liquid phase deposition on substrate.

Single crystal, monocrystalline, polycrystalline

### U11-B01 [1983]

## Pulling from melt crystal growth for semiconductor manufacture

Includes Czochralski method.

CZ pull, boules, liquid encapsulated Czochralski, LFC

#### U11-B02 [1987]

Zone refining, other

#### U11-B02A [1992]

## Zone refining crystal growth for semiconductor manufacture

Includes floating zone method.

Zone melting

### U11-B02B [1997]

### Crystal growth from melt in crucible

(U11-B02X) Bridgman

#### U11-B02C [2002]

### Spherical crystal growth methods

Includes e.g. droplet method. For spherical ICs see U13-D06.

### U11-B02X [1992]

## Other crystal growth methods for semiconductor manufacture

Includes vertical, horizontal gradient freeze method, floating fluidised bed method. For ribbon techniques, edge defined film growth, see U11-B04.

### U11-B03 [1987]

## Characterised by crystal material and crystallographic orientation

Includes chemical techniques rather than apparatus details. This code is usually used in conjunction with other codes, whenever crystallographic structure is emphasised.

Oriented films

#### U11-B03A [1992]

#### **Bulk crystal growth of AIII-BV compounds**

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

## U11-B03B [1992]

## **Bulk crystal growth of All-BVI compounds**

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

### U11-B03C [1992]

## **Bulk crystal growth of AIV elements and their compounds**

Excludes elemental silicon.

Carbon, germanium, silicon carbide

#### U11-B03X [1992]

## Bulk crystal growth of other semiconductor compounds

Includes bulk growth of elemental silicon crystal, or bulk growth of any other semiconductor material not mentioned in U11-B05 section.

#### U11-B04 [1987]

# Ribbon techniques, pulling/casting from melt for semiconductor device manufacture

Includes edge-defined film-fed crystal growth process, forming dendritic web e.g. for photovoltaic applications.

EFG, monocrystal, polycrystal

### U11-B05 [2002]

### Apparatus details for crystal growth

U11-B05A [2002]

Crucibles, crystal holders

U11-B05B [2002]

#### Crystal pulling mechanisms

Includes pulling-rods, pull-seeds etc.

## U11-B05C [2002]

Heating/cooling arrangements for growth vessel, crucible

#### U11-C

## Substrate processing for semiconductor device manufacture

In U11-C, each sub-group (-C01, -C02, -C03 etc.) covers a distinct category of processing e.g. deposition, doping, heat treatment etc. and is further divided to indicate techniques used for a particular device or technology, such as FET or gallium arsenide. For example, electrode manufacture for gallium arsenide devices is coded

in U11-C05E(-1 or -2) and U11-C05F3; in another example, forming smoothing insulating layer over interconnection structure is coded in U11-C05B9 and U11-C05D1. Aspects regarding processing apparatus are covered by U11-C09 codes.

#### U11-C01

## Deposition of active materials (e.g. semiconductors)

U11-C01A to U11-C01H are applied for deposition using specified apparatus, with details about apparatus covered by U11-C09 codes. U11-C01J codes are used to indicate details of substrates or the nature of deposited active layers. Note that U11-C01J1 is used only when epitaxy is emphasised as an important aspect of the invention. For methods which imply epitaxial deposition e.g. molecular beam epitaxy, liquid phase epitaxy, U11-C01J1 is not used.

#### U11-C01A

#### Physical deposition of semiconductor layer

### U11-C01A1 [1987]

## Thermal evaporation for deposition of semiconductor layer

Arc evaporation, thermal vacuum evaporation using e.g. resistive heating, or inductive (RF) heating.

#### U11-C01A2 [1987]

## Molecular beam, atomic beam, ion beam deposition of semiconductor layer

Includes cluster ion beam deposition. For reactive ion beam deposition see U11-C01B.

MBE

#### U11-C01A3 [1997]

## **Sputtering deposition of semiconductor layer**

(U11-C01A9)

Includes deposition by glow/RF discharge, magnetron sputtering. Prior to 1997 sputtering was covered in U11-C01A9.

## U11-C01A9 [1987]

#### Other methods of physical deposition

Includes also laser ablation.

#### U11-C01B

## Chemical vapour deposition of semiconductor layer

For apparatus see U11-C09B and in case of plasma enhanced CVD and electron cyclotron resonance CVD, U11-C09C. Also includes reactive ion beam deposition and seeded crystallisation deposition techniques. Prior to 199201 for PECVD see U11-C01A9 and U11-C01B. Also cover Vapour phase epitaxy (VPE).

CVD, low pressure, LPCVD, PECVD, photochemical, PhCVD, atmospheric pressure, APCVD, ECRCVD, hot filament, HFCVD, metal-organic, MOCVD, organometallic, OMCVD

#### U11-C01B1

[1987]

## Beam/mask assisted CVD of semiconductor layer

Using beam/mask defining areas of localised reactive deposition.

Laser assisted, LACVD

#### U11-C01C

[1987]

#### Large surface area deposition

E.g. physical or chemical vapour deposition for solar cells (see also U12-A02A3), semiconductor memories arrays (see also U11-C18B5).

Roll to roll, continuously moving web, continuous belt

#### U11-C01D

[1987]

## Other methods of deposition of semiconductor layer

(U11-C01X)

### U11-C01F

[1992]

#### Langmuir Blodgett method

(U11-C01D)

Mono-molecular films

#### U11-C01H

[1992]

## Liquid phase deposition of semiconductor layer

(U11-C01D)

Includes sliding or sloping position liquid phase epitaxy, electrophoresis, atomised films, conversion of insulating layer (e.g. oxide) into semiconductor by immersion into solution.

LPE

#### U11-C01J

[1987]

## Nature/structure/material/composition of active layers

When method of deposition is specified, U11-C01J codes are used in conjunction with codes above (-C01A,-C01B, etc.).

#### U11-C01J1

[1987]

#### **Epitaxial growth of semiconductor layer**

Only used when epitaxy is emphasised as essential for method of deposition or structure described. For epitaxy by seeded crystallisation see also U11-C01B and U11-C01J8. This code is **not** used for methods of deposition which imply epitaxy e.g. molecular beam epitaxy, liquid phase epitaxy. Single crystal layer, atomic layer epitaxy, ALE

#### U11-C01J2

[1987]

## Semiconductor amorphous/polycrystalline film

Includes specific crystalline form e.g. HSG, spherical grain.

Thin film

#### U11-C01J3

[1987]

## Deposition of semiconductor layers other than silicon

### U11-C01J3A

[1992]

#### **Deposition of AIII-BV compound layer**

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

#### U11-C01J3B

[1992]

### **Deposition of AII-BVI compound layer**

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

#### U11-C01J4

[1987]

Deposition of other inorganic semiconductor material layers

#### U11-C01J4A

[1997]

## Deposition of group IV element/compound layer

(U11-C01J4)

Silicon carbide, diamond, germanium

#### U11-C01J5

[1987]

#### Polymer, organic film structures

Macromolecular

#### U11-C01J6

[1987]

Heterojunction, superlattice structures, quantum wells, wires, boxes manufacture

#### U11-C01J6A

[2006]

#### Strained layers and their manufacture

Manufacture of strained layers to enhance material properties such as charge-carrier mobility. For device with strained layer structure see also U12-F01B1A.

Strained silicon, strained-layer super lattice, strained layer, relaxed layer, SLS

#### U11-C01J7\*

[1987-1996]

## Other active layers, electroluminescent, ferroelectric

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1996. Includes layers e.g. for bubble memories, SAW devices. For electroluminescent layer deposition see also U14-J01. For ferroelectric layer deposition e.g. for capacitor manufacture, see U11-C05G1B and U11-C05B codes.

#### U11-C01J8

[1987]

#### Characterised by substrate details

E.g. for solar cells, thin films, rugged, trenched substrate, three-dimensional structures with layers built up to include isolation regions. Includes deposition with lattice adaptation on substrate being crystalline insulating material or semiconductor material, also deposition on substrate with particular geometry e.g. grooves, holes. For selective, lateral epitaxy by seeded crystallisation see also U11-C01B and U11-C01J1. Covers also separation of epitaxial device layers (see also U11-C01J1) from substrates on which they are grown (see also U11-C04D1).

Sandwich wafer

## U11-C01J8A

[1997]

#### Substrate bonding

(U11-C01X)

Covers bonding of semiconductor layers to insulation or semiconductor substrate, forming protection film on back of wafer to prevent autodoping, (previously coded in U11-C01X). For silicon on insulator structures see also U11-C08A6. *SOI* 

#### U11-C01J8B

[1997]

### Preventing lattice mismatch

(U11-C01J8)

Includes forming buffer layer for lattice compatibility.

#### U11-C01X

#### Other aspects of deposition

Covers deposition using vibrating substrate, e.g. in liquid phase deposition (see also U11-C01H), etc.

#### U11-C02

## Doping for semiconductor device manufacture

For introducing impurities (dopant) during growth or deposition of material, U11-C02 should be used in conjunction with appropriate codes in U11-B or U11-C. Codes in this sub-class should be used in conjunction which each other. For example, ion implantation of gallium arsenide layers for MESFET using beams oriented at a certain angle is coded in U11-C02B2, U11-C02J1A and U11-C02J6 (if structure of device is novel, or in order to identify type of device, U12 codes will be also used).

#### U11-C02A

## Diffusion, apparatus and associated techniques

## U11-C02A1

[1987]

## **Diffusion apparatus**

Electrical aspects of diffusion furnaces are also covered by X25-C codes.

#### U11-C02A2

[1987]

## Diffusion techniques, dopant layer structures

Used only if special conditions for dopant diffusion or structures are emphasised, e.g. using masks for edge diffusion or under slanted angle. Includes diffusion from solid or gaseous phase dopant source in contact with semiconductor surface.

#### U11-C02B

## Ion implantation, apparatus and associated techniques

Ion injection, ion bombardment

#### U11-C02B1

[1987]

## Ion implantation apparatus

For novel aspects of ion beam apparatus, see also V05-F05A7C.

Ion source, ion beam generator, focussing, deflection, control, processing chamber

## U11-C02B2 [1987]

#### Ion implantation techniques

Used only if special ion implantation conditions are emphasised, e.g. using masks, implantation at certain angle between ion beam and surface plane or crystal planes (to avoid channelling), etc. *Recoil implantation* 

#### U11-C02J

Doping aspects relating to substrate, structures, layers, devices being processed

#### U11-C02J1 [1987]

Doping non-silicon semiconductor substrate

## U11-C02J1A [1992]

#### **Doping AllI-BV compounds**

Includes complex ternary and quaternary compounds

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

#### U11-C02J1B [1992]

### **Doping All-BVI compounds**

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

## U11-C02J1C [1992]

#### Doping AIV elements and their compounds

Germanium, diamond, silicon carbide

#### U11-C02J1X [1992]

Doping other semiconductor materials

#### U11-C02J2 [1987]

**Doping heterojunction structures** 

## U11-C02J3 [1987]

## Doping non-semiconductor layers, insulators, polymers

Includes e.g. implanting wiring surface prior to patterning in order to prevent formation of hillocks (see also U11-C05D3, U11-D03B2).

Macromolecular

### U11-C02J4 [1987]

#### Other techniques and apparatus

Includes doping aspects using wave or particle treatment. Includes alloying of doping materials with semiconductor body.

Radiation-enhanced diffusion

## U11-C02J5 [1987]

### Doping for bipolar device manufacture

Includes doping of electrode regions, formation of buried layers.

Shallow junction

#### U11-C02J6 [1987]

## **Doping for FET manufacture**

Includes doping of electrode regions e.g. using gate electrode as mask for forming source and drain.

Channel stop implants, LDD

#### U11-C02J7 [1987]

## Doping for other semiconductor device manufacture

Capacitor, LED, solar cells

### U11-C02X\* [1988-1996]

#### Other doping

\*This code is now discontinued, but remains searchable and valid for records from 1988 to 1996. See U11-C02J4 from 1997 for alloying aspects.

#### U11-C03

## Heat, electrical, radiation treatment of semiconductor body; Apparatus

Codes from U11-C03B to U11-C03D, representing various treatment techniques, are used in conjunction with U11-C03J1 to U11-C03J3 codes for structures, and/or U11-C03J8 codes for specific materials

## U11-C03A [1987]

### Heat, radiation, furnace treatment

Includes temperature control systems and apparatus for semiconductor manufacture, or substrate in vacuum processing apparatus, e.g. sputtering, CVD or etching apparatus (see also appropriate codes in U11-C09). Electrical aspects of furnaces are covered by X25-C codes.

Heater, temp, control, IR, lamp

U11-C03B [1987]

### Electron/ion beam treatment of semiconductor

For apparatus, see also V05-F05A codes.

U11-C03C [1987]

## Other type of treatment of semiconductor

Plasma, hydrogen plasma, electrical pulse, mechanical pulse

U11-C03D [1992]

Laser treatment of semiconductor

(U11-C03C)

U11-C03E [1997]

#### **Radiation treatment of semiconductor**

(U11-C03B, U11-C03C)

Includes bombardment with wave or particle radiation.

Radioactive pulse

U11-C03J [1987]

Nature of process/techniques, structure/material being treated

U11-C03J1 [1987]

Recrystallising semiconductor layer

(H01L-021/324)

U11-C03J2 [1987]

Annealing, defect control, gettering of semiconductor

U11-C03J2A [1992]

Annealing semiconductor layer

Rapid thermal annealing, RTA

U11-C03J2B [1992]

## Gettering, defect control of semiconductor

Includes introducing internal imperfections, strained layers and methods for external gettering e.g. honing, sandblasting, backside damage. Covers also deep level dopants for lifetime carrier control, killer dopant (see also U11-C02 codes where doping techniques or structures are novel). Intrinsic gettering, bulk micro defects

U11-C03J3 [1987]

### Blanket treatment of semiconductor

E.g. forming punch through implants to reduce short-channel effects in submicron CMOS (see also U11-C02B2, U11-C02J6).

U11-C03J4 [1987]

Heat/radiation treatment for very large surface area

E.g. for solar cell.

U11-C03J5

[1987]

Beam treatment of localised areas on surface

U11-C03J6 [1987]

Semiconductor heat/radiation treatment using masks, structures on substrate

U11-C03J7 [1987]

# Producing localised depth profile, and other structures by semiconductor treatment

Includes e.g. potential barrier diffusion region below deep contact diffusion to suppress software errors produced by radiation (see also appropriate U11-C02 codes and U14-A11), inhibiting dopant diffusion in semiconductor (e.g. silicon) by using preamorphising agent (e.g. germanium) to create shallow junction with lateral containment (see also U11-C02 codes).

U11-C03J8 [1992]

Heat/radiation treatment of non-silicon semiconductor material

U11-C03J8A [1992]

#### **Heat/radiation treating AIII-BV compounds**

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-C03J8B [1992]

#### **Heat/radiation treating All-BVI compounds**

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury sulphide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-C03J8C [1992]

## Heat/radiation treating AIV elements and their compounds

Diamond, silicon carbide

### U11-C03J8X

[1992]

Heat/radiation treating of other semiconductor materials

#### U11-C04

## Lithography (photo-, beam-, etc.), masks, techniques, exposure and alignment

The following codes are no longer applied but remain valid for records prior to 199201: U11-C04A2, U11-C04A3, U11-C04A4, U11-C04A5, U11-C04C1.

#### U11-C04A

[1983]

Resist processing, mask manufacture and inspection, and exposure control in microlithography

(G03F-007)

#### U11-C04A1

[1987]

## Cleaning, rinsing, spin coating, developing, inspection for microlithography

From 1992 all cleaning processes not related to microlithography are covered by U11-C06A1B.

#### U11-C04A1A

[1992]

## Wafer preparation for resist coating

Includes cleaning, rinsing, drying, baking, priming or silylating.

#### U11-C04A1B

[1992]

## Wafer coating with resist for microlithography

Includes forming 'charge-up' preventing layer on top of resist.

Spin coating

#### U11-C04A1C [1992]

## Developing, resist stripping (wet process) for microlithography

For developer materials see U11-A11.

#### U11-C04A1D

[1992]

## Plasma oxidising or ashing for microlithography

Includes resist selective removal by e.g. laser, ion beam. For apparatus, see U11-C09C.

### U11-C04A1E

[1992]

## Testing, measurement and Inspection of mask for microlithography

For inspection of lithographic layers see also U11-F01B code. For all other measurement, testing or inspection for microlithography see also U11-F01 and S02/S03 codes as appropriate.

#### U11-C04A1F

[2005]

#### Resist processing

Includes all post wafer coating processes to prepare resist on wafer for lithographic exposure.

Hard bake, soft bake, surface treatment, hydrophilization, solvent evaporation

#### U11-C04A1H

[1997]

## Anti-reflective layers for microlithography

See also U11-C04E1.

#### U11-C04A2\*

[1987-1991]

#### **Optical masks**

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04E2.

Shielding layer

### U11-C04A3\*

[1987-1991]

## X-ray masks

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04H2.

#### U11-C04A4\*

[1987-1991]

#### Other masks

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. Includes masks e.g. for sputter apparatus. From 1992 see U11-C04F2, U11-C04G2.

## U11-C04A5\*

[1987-1991]

## Electron/particle beam apparatus

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04F1 for electron beam apparatus, and U11-C04G1 for ion beam apparatus.

#### U11-C04A6

[1987]

### Control of exposure apparatus

From 1992 this code is used in conjunction with U11-C04E1 for control of optical exposure light source (e.g. laser, lamp), or with U11-C04F1 for control of electron beam apparatus, or with U11-C04G1 for control of ion beam apparatus, or with U11-C04H1 for control of X-ray apparatus.

## U11-C04A7 [2005]

## Other lithographic aspects for microlithography

Includes e.g. biological process. For Micro- and Nano imprint lithography from 2005 see U11-C04J codes.

U11-C04B [1983]

**Alignment** 

U11-C04B1 [1987]

Producing alignment marks on substrate, mask and mark details

U11-C04B2 [1987]

## Mark detection and position control signal generation in microlithography

See also S02-A03 codes for optical systems, in particular S02-A10D2 for checking of alignment. *Optical recognition, through-the-lens, TTL* 

U11-C04B3 [1987]

## Alignment for beam equipment in microlithography

(H01L-021/027, G03F-007/20)

U11-C04C [1983]

**Exposure for microlithography** 

U11-C04C1\* [1987-1991]

#### **Exposure source details**

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04 (-E1,-F1,-G1,-H1) codes, as appropriate for type of exposure source used in lithographic process.

### U11-C04C2 [1987]

#### Focussing control for exposure apparatus

This code is used in conjunction with other U11-C04 (-E1,-F1,-G1,-H1) codes, depending on type of exposure source used, e.g. lens focussing in laser microlithographic system is coded in U11-C04C2 and U11-C04E1.

Optical system adjustment, lens positioning

#### U11-C04C3 [1987]

## Vertical alignment and tilt control for exposure apparatus

Through-the-lens, TTL

### U11-C04C4 [2002]

#### Reticle and stage drive mechanisms

This code is used in conjunction with other U11-C04 (-E1,-F1,-G1,-H1) codes, depending on type of exposure source used.

Step-and-repeat, wafer stepper scan.

#### U11-C04C5 [2005]

## Vibration control and compensation for microlithography

Includes e.g. reaction frames, balance mass, and mounts.

## U11-C04D [1987]

## Masking techniques for microlithography

Relates to lithographic structures on semiconductor or active layer. Until 200701 includes e.g. lift-off, sequences of masking and etching techniques to produce patterned structures on integrated circuit, and masking techniques used in non-microlithographic steps of semiconductor manufacture. From 200701 see U11-C06C for all non-microlithographic masking, along with other relevant codes, e.g. U11-C05D3 for masking techniques applied to interconnection manufacture, U11-C07D1 for masks used in etching fine details, U11-C18D and U14-K01A1C for masks used in optical filter manufacture. for LCD, etc. Pattern transfer, Dissolving mask

#### U11-C04D1 [1987]

## Conformal masks, lift-off techniques for microlithography

#### U11-C04D2 [1987]

## Non-mask fine line width production for microlithography

Includes e.g. use of holograms, diffraction grating, phase segregation of metals.

Two beam interference exposure

#### U11-C04E [1992]

## Photolithography for semiconductor manufacture

## U11-C04E1 [1992]

## Apparatus and method for photolithography

(U11-C04C, U11-C04C1)

Includes exposure using optical and non-ionising ultraviolet radiation (for exposure using ionising ultraviolet radiation e.g. EUV see U11-C04H codes). For control and focusing aspects see also U11-C04A6 and U11-C04C2 respectively. Includes e.g. exposing peripheral portion of wafer.

Laser, UV, lamp, stepper, light source, projection, dummy wafer

### U11-C04E1A [2005]

## Optical elements and systems for photolithography

Includes individual lenses and mirrors as well as multiple lens/mirror systems, and other non-electrical optical elements for beam focus.

#### U11-C04E2 [1992]

## **Optical masks for photolithography**

(U11-C04C2)

Includes mask repair, pellicle protection, case holders for masks (see also U11-F02), mask inspection.

Phase shifting, photomask, reticle

## U11-C04F [1992]

## Electron beam lithography for semiconductor manufacture

#### U11-C04F1 [1992]

## Apparatus and method for electron beam lithography

(U11-C05A5, U11-C04C, U11-C04A6)

For control and focusing aspects see also U11-C04A6 and U11-C04C2 respectively. Includes methods of avoiding 'charge up' of resist. See V05-F codes for novel details of apparatus and methods of apparatus monitoring, operation and control. Beam modulation, electrodes

### U11-C04F2 [1992]

## Masks for electron beam lithography

(U11-C04A4)

Also see V05-F codes for novel electron beam lithography masks.

Stencil mask

#### U11-C04G [1992]

## Ion beam lithography for semiconductor manufacture

### U11-C04G1 [1992]

## Apparatus and method for ion beam lithography

For control and focusing aspects see also U11-C04A6 and U11-C04C2 respectively. See V05-F codes for novel details of apparatus and methods of apparatus monitoring, operation and control.

#### U11-C04G2 [1992]

#### Masks for ion beam lithography

(U11-C04A4)

Also see V05-F codes for novel ion beam lithography masks.

Stencil mask

## U11-C04H [1992]

## X-ray lithography for semiconductor manufacture

Roentgen

### U11-C04H1 [1992]

## Apparatus and method for X-ray lithography

(U11-C04C, U11-C04C1)

Includes exposure using X-ray, soft X-ray and ionising ultraviolet radiation (for exposure using non-ionising ultraviolet radiation e.g. DUV see U11-C04E codes). For control and confinement aspects see also U11-C04A6 and U11-C04C2 respectively. See V05-E and V05-F codes for novel details of apparatus and methods of monitoring, operation and control.

Extreme ultraviolet, EUV

#### U11-C04H2 [1992]

### X-ray masks

(U11-C04A3)

Also see V05-E08 codes and V05-F codes for novel X-ray, soft X-ray and EUV lithography masks.

#### U11-C04J [2005]

## Imprint lithography for semiconductor manufacture

Includes use of stamps and presses to form pattern.

Soft lithography

#### U11-C04J1 [2005]

Stamp design and manufacture

#### U11-C04J2 [2005]

**Process methods and control** 

## U11-C04K [2005]

#### **Immersion Lithography**

Includes all apparatus and methods for exposure through a liquid. See other U11-C04 codes for type of exposure source used. For immersion fluid composition see U11-A16.

### U11-C04K1 [2007]

#### Fluid management apparatus

Includes all apparatus associated with handling, processing and delivering fluids for immersion lithography.

## U11-C04K2 [2007]

#### Fluid management methods

Includes all methods and processes for fluid manipulation, including measurement and monitoring aspects (see also appropriate S02 and S03 codes)

#### U11-C05

#### **Layer formation**

Includes insulating, passivating and conductive layers.

#### U11-C05A

### **Organic insulating layer formation**

Prior to 1992 this code included new materials as well as methods and structures related to organic insulating layer. From 1992 see U11-A08A1 for new materials. See also other relevant codes, e.g. U11-C05B9 when organic layer is used for planarising interconnection structures, U14-H03A1 or U14-H03A4B4 when used for packaging mountings or multichip interconnect.

#### U11-C05A1 [1987]

#### Combined with organic materials

#### U11-C05B

#### Inorganic insulating layer deposition

U11-C05B1 to U11-C05B4 are used where apparatus and associated techniques are emphasised (see also U11-C09 codes for apparatus details); U11-C05B5 to U11-C05B8 are used for type of deposited material and substrate; e.g. CVD of a silicon dioxide layer on gallium arsenide substrate is coded in U11-C05B2, U11-C05B7 and U11-C05B8. For novel materials see U11-A08A2.

#### U11-C05B1 [1983]

## Chemical reaction of semiconductor substrate for insulating layer formation

E.g. oxide, nitride.

Oxidation, thermal oxidation, anodic oxidation, nitridation

### U11-C05B2 [1987]

## Insulating layer deposition using physical/chemical vapour apparatus

For apparatus details see also U11-C09 codes.

#### U11-C05B3

[1987]

## Localised deposition of insulating layer

Includes e.g. deposition using beam induced CVD or masks.

#### U11-C05B4

[1987]

## Modifying materials deposited on substrate (metallic oxides)

Includes e.g. oxidation of metallic layer (e.g. forming alumina film by oxidation of aluminium layer).

#### U11-C05B5

[1987]

## Deposited inorganic nitrogen containing insulating layers

Includes all nitrides of silicon and silicon oxide using methods in U11-C05B1, U11-C05B2 or U11-C05B3. Silicate glasses and silicon oxides without nitride content are covered by U11-C05B7.

#### U11-C05B6

[1987]

### Chemically altered deposited layers

Alumina layer, metal nitrides, metal oxides, hafnium oxide

#### U11-C05B7

[1987]

## Chemically altered semiconductor material and other nitrogen free dielectric layers

Includes all silicate glasses and silicon oxides without nitride content. Includes also fluoride type dielectric layers. It also covers deposition of ferroelectric film e.g. for capacitor dielectrics.

Phospho-silicate glass, PSG, BPSG, spin on glass, SOG, calcium fluoride, barium strontium fluoride, calcium strontium fluoride, silicon dioxide

## U11-C05B8

[1987]

## Non-silicon semiconductor substrate for insulating layer deposition

#### U11-C05B8A

[1992]

## AIII-BV compound substrate for insulating layer deposition

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

#### U11-C05B8B

#### [1992]

## All-BVI compound substrate for insulating layer deposition

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

### U11-C05B8C

#### [1992]

## AIV element/compound substrate for insulating layer deposition

Silicon carbide, diamond

#### U11-C05B8X

[1992]

## Other non-silicon substrate for insulating layer deposition

#### U11-C05B9

[1987]

## Characterised by sequence of steps to produce insulating layer structure, shape

Includes e.g. dielectric layer applied over interconnection structure (see also U11-C05D1), planarisation layers, passivation films, patterning, etching dielectric layers with metallic interconnection aspects (see also other relevant codes e.g. U11-C05D1, U11-C05D3). Also covers layers to prevent soft errors (inside device, rather than package adaptations). Includes post-treatment of insulating layers.

#### U11-C05B9A

[1997]

#### Planarisation/protection

(U11-C05B9)

Includes e.g. dielectric layer applied over interconnect structure (see also U11-C05D01), planarisation layers, patterning etching dielectric layers with metallic interconnect aspects (see other relevant codes e.g. U11-C05D1, U11-C05D3). Also covers passivation films, films for moisture protection, etching stop layers and films for radiation protection.

Smoothing, field oxide

#### U11-C05B9B

[1997]

## Insulating side wall formation

(U11-C05B9)

Includes forming side wall spacers.

#### U11-C05B9C

[1997]

## **Buried insulating film formation**

(U11-C05B9, U11-C08A1) Buried layer

## U11-C05C

## Electrode and interconnection layer formation

Includes methods of deposition of conductive layers. For apparatus details see U11-C09 codes. From 1997, U11-C05C codes cover specific deposition methods for superconductive films (see also U14-F02A). Prior to 1997 for superconductive film deposition see U11-C01 codes.

Silicide, polysilicon, metallisation

#### U11-C05C1\*

[1983-1986]

#### Interconnections

\*This code is now discontinued, but remains searchable and valid for records from 1983 to 1986. See U11-C05D from 1987.

#### U11-C05C2

[1987]

#### Physical deposition of conductive layer

E.g. sputter, thermal evaporation, electron beam evaporation, etc. For apparatus see U11-C09A. *Magnetron sputter deposition, refractory metal silicide* 

#### U11-C05C3

[1987]

## Reactive chemical deposition of conductive layer

For apparatus, see U11-C09B. *CVD* 

### U11-C05C4\*

[1983-1986]

#### **Electrodes**

\*This code is now discontinued, but remains searchable and valid for records from 1983 to 1986. See U11-C05E from 1987.

Silicide

#### U11-C05C5

[1987]

## Localised deposition of conductive layers, selective deposition

Covers beam induced deposition or use of masks. *Anisotropic directional deposition* 

### U11-C05C6

[1987]

## Other methods of forming conductive layer

Includes electroplating, transformation of deposited layer, (e.g. semiconductor into conductor, or insulator into superconductor), deposition by solution process (electroless by chemical reaction) etc. For doping aspects related to permanent or temporary change of conductivity, e.g. reduction of contact resistance, see also U11-C02J3.

## U11-C05C7 [1987]

# Chemical, metallurgical details of conductive layers, using CVD, sputter deposition

Includes pre or after-treatment of deposited layer or substrate on which conductive layer is deposited.

### U11-C05C9 [1983]

## Other aspects of conductive layer formation

From 198701 for formation of resistive layers and bumps see U11-C05G.

#### U11-C05D [1987]

#### Interconnections

(U11-C05C1)

## U11-C05D1 [1987]

#### Nature of material

Mainly used for multilayer wiring insulating layers, e.g. for smoothing surface topography. Covers use of dielectric layers in multilayer interconnects both in integrated circuit chips and in multichip modules. Includes interlayer insulating film for mutually insulating wires (including electrodes) arranged on same plane or upper and lower wires. Includes shaping of insulator around deposited interconnection (see also U11-C05B9).

#### U11-C05D2 [1987]

## Multilayer metallisation manufacturing techniques

Includes sequence of steps to result in multilayer structure i.e. deposition, shaping in which the techniques may be routine, but succession of steps or final structure is novel. Covers metallic layer deposited simultaneously over two differing apertures on two different levels. Includes Damascene processes.

## U11-C05D3 [1987]

### Lateral/vertical interconnection manufacture

Includes lithographical aspects, etching, deposition for shaping conductor, through holes to accommodate contacts to devices and contacts between levels. For opening, etching vias, windows into dielectric over region to be contacted see also U11-C07D2. Also covers filling of contact holes with conductive material or forming conductive plugs in windows. For 'back-side metallisation', vias, substrate through holes see also other relevant codes, e.g. U11-C05G2, U11-D03B3, U11-D03C3. For metallurgical aspects, e.g. electromigration, diffusion barriers, low resistance interconnection, see also U11-D03B2. Includes dual-damascene processes.

Buried interconnections, windows, contacts, step coverage, runners

#### U11-C05D4 [1987]

## Interconnections to semiconductor device electrodes

Includes metallisation that facilitates electric current conduction to and from semiconductor device (see also U11-C05E, U11-C05F codes). For metallurgy related to e.g. electromigration, low resistance interconnections, see also U11-D03B2.

### U11-C05E [1987]

#### Electrode manufacture

(U11-C05C4)

Includes metallic, dielectric and doped semiconductor regions that form electrode with or without electrical connection thereto. For contacts to electrodes see also U11-C05D4, for metallurgical aspects see also U11-D03B2. For electrode bump see U11-C05G2B and/or U11-D03B1. If electrode structure is novel see also U12-E02.

#### U11-C05E1 [1987]

## Ohmic, Schottky etc. electrode manufacture

For contacts to semiconductor device electrodes see also U11-C05D4, for metallurgical aspects see also U11-D03B2.

#### U11-C05E2 [1987]

## Geometric structure miniaturisation for electrode manufacture

Includes e.g. submicron gate, T-shaped gate manufacture.

### U11-C05E3 [1992]

### Self-alignment for electrode manufacture

Used e.g. for self-aligned silicon gate manufacture (see also U11-C05F1), self-aligned emitter-base contacts in bipolar transistor (see also U11-C05F2).

#### U11-C05F [1987]

Electrode manufacture for specific device, semiconductor substrate

U11-C05F1 [1987]

**Electrode manufacture for FET** 

U11-C05F1A [2005]

#### Gate insulation layer manufacture

Includes forming insulated gate structures for all MOS gated devices.

#### U11-C05F2 [1987]

#### Electrode manufacture for bipolar device

Includes electrode manufacture for diodes, bipolar transistors.

#### U11-C05F2A [1992]

Electrode manufacture for bipolar device with polysilicon emitter

U11-C05F3 [1987]

Electrode manufacture for non-silicon semiconductor

#### U11-C05F3A [1992]

## Electrode manufacture for AIII-BV substrate

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

### U11-C05F3B [1992]

#### Electrode manufacture for AIV substrate

Diamond, germanium, silicon carbide

#### U11-C05F3D [1992]

## Electrode manufacture for All-BVI substrate

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

## U11-C05F3X [1992]

Electrode manufacture on other semiconductor substrate

U11-C05F4 [1987]

#### Electrode manufacture for heterojunction

Heterojunction gate

U11-C05F5 [1987]

Electrode manufacture for thin film transistor

U11-C05F6 [1987]

## Electrode manufacture for other devices e.g. SAW, CCD, semiconductor lasers, photovoltaic, superconducting devices

This code is used in conjunction with other relevant codes to identify type of device, e.g. U14-G for SAW, U13-A02 for CCD, U14-F for superconducting devices, etc. It also includes electrode manufacture for resistors (see also U11-C05G1A), capacitors (see also U11-C05G1B).

#### U11-C05G [1987]

#### Passive component manufacture

Includes formation of resistive layers, contact bumps, fuses.

#### U11-C05G1

#### **RLC** component manufacture

#### U11-C05G1A [1992]

#### Resistor manufacture

For details regarding resistor structure see also U12-C03.

## U11-C05G1B [1992]

#### **Capacitor manufacture**

For details regarding capacitor structure see also U12-C02 codes.

#### U11-C05G1C [1992]

#### Inductor manufacture

For details regarding inductor structure see also U12-C03.

## U11-C05G2 [1987]

Fuses, contact bumps and pads, vias manufacture for semiconductor device

# U11-C05G2A [1992]

#### **Fuses manufacture**

Includes antifuse manufacture. See also U12-C04 for fuse structure after 2002. Prior to 2002 see U11-D03B2A.

#### U11-C05G2B [1992]

# Contact bumps, bonding pads manufacture

See also U11-D03B1 for metallurgical details.

#### U11-C05G2C [1992]

# Vias, pillars, studs manufacture

See also U11-C05D3, U11-D03C3, U11-D03B9. Includes e.g. back side metallisation (see also U11-D03B9) and metallised vias through ceramic substrate for HF circuits.

'plated through holes', plug

# U11-C05X [1992]

# Other aspects of layer formation

#### U11-C06

Mechanical treatment, surface chemical treatment of semiconductor substrate and beam lead manufacturing techniques

#### U11-C06A [1987]

Mechanical and surface chemical treatment

#### U11-C06A1 [1992]

# Cleaning, polishing or grinding

(U11-C04A1)

Prior to 1992 all cleaning processes are covered by U11-C04A1. From 1992 for cleaning processes relating to microlithography see U11-C04A1A. For cleaning leads after package encapsulation see U11-E02B. For materials involved e.g. polishers, abrasives, etc. see also U11-A10.

# U11-C06A1A [1992]

# Grinding, bevelling, lapping, polishing

#### U11-C06A1B [1992]

# Cleaning

(U11-C04A1)

Includes drying of wafer after cleaning process. Includes dry cleaning e.g. electrostatic. It also covers native oxide removal, but not etching of previously deposited Insulating layer. Includes cleaning apparatus but excludes cleaning of processing apparatus or package.

# U11-C06A1C [2002]

# Process endpoint detection for cleaning, polishing or grinding

#### U11-C06A2 [1992]

#### **Cutting, dicing**

Includes wafer production by crystal slicing or sawing, also dice preparation from wafer by scribing, making grooves, cracking, cleaving, breaking or cutting. For 'sticky-back' adhesive tape which holds wafer in place while cutting it into separate dice see also U11-F02A2.

Grind, groove, slice, divide

#### U11-C06B [1987]

# Beam lead device manufacturing techniques

See also U11-C08A5 when beam lead technique is used as isolation method between circuit elements. See also U11-C05D4 or/and U11-D03A1 codes when metallisation process is emphasised as main part of lead beam technique. Also includes manufacture of other structures on wafer usually assembled after dicing, e.g. lenses and encapsulant structures.

#### U11-C06C [2007]

# Masking techniques unrelated to microlithography

Masks and masking techniques for general etching, deposition or treatment, for semiconductor manufacture. Before 2007 see U11-C04D for all masking, along with other relevant codes, e.g. U11-C05D3 for masking techniques applied to interconnection manufacture, U11-C07D1 for masks used in etching fine details, U11-C18D and U14-K01A1C for masks used in optical filter manufacture for LCD, etc.

#### U11-C07

# **Etching; Chemical treatment for semiconductor manufacture**

Includes processes, e.g. dry, wet, beam etching to produce patterned structures. Also covers nature of material being etched and techniques to obtain intended etched structure.

# U11-C07A [1983]

#### Dry etching

For microlithography, e.g. plasma ashing, see U11-C04A1D.

# U11-C07A1 [1987]

# Reactive vapour, plasma-assisted etching techniques

Includes reactive ion etching, sputter etching and ion milling, plasma etching, reactive ion beam etching. For apparatus, see also U11-C09C. For etchant composition see also U11-A10.

#### U11-C07A2 [1987]

# Using optical or particle beam to induce localised etching in ambient atmosphere of reactive gas

Includes e.g. selective laser induced etching (e.g. for metal-interconnection etching, where laser beam cracks oxide formed on metal surface prior to reactive etching).

# U11-C07A3 [1987]

## **Detecting dry etching completion**

Includes instrumentation and control. See also appropriate S02-A codes.

Monitor, endpoint

# U11-C07A4 [1987]

# Laser or beam scribing, usually using air/inert atmosphere

Used also for fuse cutting or melting by laser (see also U11-D03B2), circuit trimming or repair (see also U11-C19A). For apparatus see also V05-F05A1.

Pattern, surface, trim, laser zapping

# U11-C07B [1987]

#### Other wet-etching

Includes apparatus used for wet etching. For etchant composition see also U11-A10. For wet etching intended as cleaning process see also U11-C06A1B. For microlithography see also U11-C04A1 codes

Solution, tank, water, fluid, acid, spray etching, aerosol jet, electrolytic etching

#### U11-C07B1 [1987]

#### **Detecting wet etching completion**

Includes instrumentation and control. See also S02-A codes.

Monitor, endpoint

#### U11-C07C [1987]

#### Nature of materials being etched

# U11-C07C1 [1987]

## **Etching silicon**

For polysilicon used as conductive layer, or in gate manufacture see also U11-C07C2.

#### U11-C07C2 [198

**Etching conducting layers** 

U11-C07C3 [1987]

**Etching insulating layers** 

U11-C07C4 [1987]

**Etching non-silicon semiconductor** 

## U11-C07C4A [1992]

# **Etching AllI-BV compounds**

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

#### U11-C07C4B [1992]

# **Etching All-BVI compounds**

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

## U11-C07C4C [1992]

# Etching AIV elements and their compounds

Excludes elemental silicon. Silicon carbide, diamond

## U11-C07C4X [1992]

**Etching other semiconductor material** 

U11-C07C5 [1987]

**Etching thin film** 

Layer

# U11-C07D [1987]

#### **Etching techniques**

Includes techniques for specific objectives.

#### U11-C07D1 [1987]

# **Etching to produce finer details**

Includes use of sequence of etch and mask stages. For lift off see also U11-C04D1.

# U11-C07D2 [1987]

# Etching to produce taper or structural profiles of deposited layers on substrate

# U11-C07D3 [1987]

#### Planarisation by etching

Includes e.g. etching followed by smoothing layer (which may be also covered by U11-C05B9A).

Smoothing layer

# U11-C07D4 [1992]

Etching to produce trenches, grooves in semiconductor substrate

(U11-C07D9)

U11-C07D9 [1987]

Other etching aspects

U11-C08

**Isolating IC components** 

U11-C08A [1987]

Methods for isolating IC components

U11-C08A1 [1987]

## P-N junction for isolating IC components

From 1997 buried insulating layer is coded in U11-C05B9C.

Diode isolation, buried layer

# U11-C08A2 [1987]

# LOCOS or local substrate chemical reaction for isolating IC components

Bird's beak, sidewall masked isolation, SWAMI, sealed interface local oxidation, SILO, selective polysilicon oxidation, SEPOX

#### U11-C08A3 [1987]

# Dielectric, polycrystalline silicon trench for isolating IC components

Includes trench refilling with dielectric or e.g. polysilicon. If used as sidewall isolation e.g. for SOI structures, P-N junction structures, see also U11-C05B9B, U11-C08A6 and U11-C08A1 codes as appropriate.

Buried oxide, BOX

# U11-C08A4 [1987]

# Dielectric isolation process (sacrificial substrate) for isolating IC components

Dielectric islands, epitaxial passivated IC, EPIC

# U11-C08A5 [1987]

# Other methods for isolating IC components

Includes proton bombardment, combination of above methods. Includes air gaps for isolation.

#### U11-C08A6 [1992]

#### Semiconductor on insulator

(U11-C08A5, U13-D)

Includes bonded wafers (see also U11-C01 and U11-C01J8A), full isolation by porous oxidised silicon (FIPOS), zone melted recrystallisation (ZMR), separation by silicon implanted buried oxide layer (SIMOX). See also U11-C08C for recrystallisation over insulating layers, selective epitaxial growth. SEG, epitaxial lateral overgrowth, ELO, SOI, silicon on sapphire, SOS

#### U11-C08B [1987]

IC component isolation characterised by non-silicon semiconductor substrate

#### U11-C08B1 [1992]

# Isolating IC components on AIII-BV substrate

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

# U11-C08B2 [1992]

# Isolating IC components on AII-BVI substrate

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

#### U11-C08B3 [1992]

Isolating IC components on AIV element/compound substrate

Silicon carbide, diamond

# U11-C08B9 [1992]

Isolating IC component on other substrate material

# U11-C08C [1987]

# Isolating IC component combined with subsequent further semiconductor material deposition

Includes recrystallisation of semiconductor over insulating layers (see also U11-C03J1), 3-D structures (see also U13-D05), selective epitaxial growth/epitaxial lateral overgrowth. SEG. ELO

## U11-C09 [1983]

# Sputtering, vapour deposition, plasma etc. apparatus for semiconductor processing

From 1997 vacuum apparatus for semiconductor processing is covered by U11-C09Q. For electrical details see also X25-A04 codes. For generic deposition process masks use appropriate U11-C09 code with U11-C06C, and for specific material deposition use U11-C06C with other U11-C codes. Chamber, vessel, gas, vacuum, holder, wafer boat

# U11-C09A [1987]

# Sputtering and other physical deposition apparatus

Includes targets, power supply and control. Also covers apparatus for thermal evaporation. See also V05-F05C codes.

Chamber, vessel, gas, vacuum, holder

#### U11-C09B [1987]

#### **Chemical vapour deposition apparatus**

For Plasma enhanced CVD apparatus, electron cyclotron resonance CVD apparatus see also U11-C09C. Also cover vapour phase epitaxy (VPE) apparatus.

CVD, PECVD, ECRCVD, vertical reactor

#### U11-C09B1 [2002]

# Gas delivery head details for chemical vapour deposition

Showerhead, gas flow

### U11-C09C [1987]

#### Plasma, reactive ion apparatus

Includes dry etching apparatus (see also U11-C07A1), and apparatus for plasma activated CVD (see also U11-C09B). See also V05-F05C codes. *Microwave, source, generator, PECVD, ECRCVD* 

#### U11-C09D [1992]

#### Molecular beam epitaxy apparatus

(U11-C09X, U11-C01A2)

Includes molecular beam and ion beam apparatus.

# U11-C09E [2002]

## Sintering/curing furnaces

Details of furnaces used for ceramic sintering, photoresist/other layer baking/drying, or encapsulant curing. For all other heating methods and equipment for semiconductor manufacture see U11-C03A.

#### U11-C09F [1987]

#### Cleaning and maintenance of apparatus

Refers mainly to apparatus covered by U11-C09 codes.

Surface-trap, particle

## U11-C09F1 [2006]

# **Testing of manufacture apparatus**

See also U11-C09 codes for type of apparatus being tested.

Fault diagnosis

# U11-C09G [2010]

# **Laser Treatment apparatus**

Includes all laser treatment apparatus used for manufacturing semiconductor devices. If used for heating a semiconductor substrate or wafer then also see U11-C03D.

#### U11-C09M [1997]

# Multi-chamber apparatus for semiconductor processing

(U11-C09)

Includes self-contained apparatus with several rooms for various processes e.g. cleaning, deposition, etching.

# U11-C09Q [1997]

# Vacuum equipment and pumps for semiconductor processing

(U11-C09)

Prior to 1997, for vacuum equipment see U11-C09. General pumps, vacuum, holder

#### U11-C09X [1987]

# Other apparatus for semiconductor processing

# U11-C10 [2005]

# Prevention of charge build-up on wafer

Includes methods and apparatus for removing charge build-up on wafer which can cause incorrect operation of apparatus or damage to wafer during e.g. plasma process, charged particle beam lithography and charged particle beam microscopy. See also U11-F01B1 and S01 codes for monitoring of wafer charging.

Plasma damage

#### U11-C11 [2005]

# Pattern formation using scanning tunnelling microscope

Includes e.g. patterning, localised deposition and oxidation using scanning probe microscopes and other analogous microscopy techniques. Use in conjunction with other U11-C codes where applicable to particular process (e.g. U11-C11 and U11-C05C5 for localised deposition of conductive layer using SPM). Does not include microscopy per se, see S03-E02F codes and U11-F01B4 for application to semiconductor wafer measurement. See V05-F codes for novel apparatus and methods of apparatus monitoring, operation and control. Scanning probe microscope, SPM, scanning tunnelling microscope, STM, atomic force microscope, AFM

#### U11-C12 [2006]

# **Self-assembly monolayers**

Includes self-assembled monolayer deposition of all material types for semiconductor manufacture. *SAM, viral deposition* 

U11-C13 [2007]

Nano scale structure formation and deposition

U11-C15 [1987]

General aspects of semiconductor manufacture

U11-C15A [1992]

# Wafer identification, shaping

Includes wafer labelling and reading wafer markings. Covers also shaping, bevelling wafer edges (see also U11-C06A1A). For marking IC package see U11-E02B. For marking defective chips on wafer as result of testing procedure see U11-F01D.

Wafer tracking, optical character recognition, bar code

U11-C15B [1992]

Semiconductor plant and facilities

#### U11-C15B1 [1997]

## Semiconductor equipment and clothing

(U11-C15B)

Includes systems for air conditioning, filtering, hazardous gas leak monitor. Covers protective clothing and anti-static materials used in clean room.

Air conditioning, filtering, environmental control, anti-static systems, gas supply, hazardous gas leak monitor

# U11-C15B3 [1997]

# **Water purification**

(U11-C15B)

Water purification

#### U11-C15C [1992]

# Semiconductor manufacture process control

For large scale process control, not for single processes. See also T01-J07B2 for computerised control systems.

Production management

# U11-C15D [2006]

# Control and monitoring of single or specific process/apparatus only

Includes automated fluid/gas control systems. See also U11-F01B and S02/S03 codes for film measurement. See U11-C04 codes or U11-C03A for control of lithography or temperature respectively. For process control of complete production facility and multiple processing stages see U11-C15C and T06 and T01 codes.

[1997]

# U11-C15Q

# Waste reprocessing and disposal in semiconductor processing

(U11-C15X)

Includes exhausts and exhaust management systems. For vacuum pumps and systems associated with exhaust and gas removal see also U11-C09Q. Prior to 1997 see U11-C15X.

# U11-C15X [1992]

Other semiconductor plant aspects

U11-C18 [1987]

Multistep processes for semiconductor device manufacture

# U11-C18A [1987]

# Complete manufacture of transistor devices

This code is used for a sequence of steps with claims encompassing several of the above sections. For phototransistor manufacture see U11-C18B4. For BiCMOS complete manufacture see U13-D03B2. For CMOS manufacture see U13-D02A.

#### U11-C18A1 [1992]

#### Thin film transistor manufacture

(U11-C18)

For TFT manufacture for active matrix LCD see also U14-H01A and/or U14-K01A2B.

#### U11-C18A2 [1992]

# **Bipolar transistor manufacture**

This code may be used in conjunction with U12-D01A codes to identify type of transistor.

# U11-C18A3 [1992]

# **Unipolar transistor manufacture**

This code may be used in conjunction with U12-D02A to U12-D02X codes to identify type of transistor.

FFT

#### U11-C18B [1987]

# Multistep processes for manufacture of electronic devices other than transistors per se

Capacitor manufacture is covered by U11-C05G1B, resistor manufacture by U11-C01G1A, inductor manufacture by U11-C05G1C. For Hall-effect device, galvanomagnetic device manufacture, see U12-B01 codes.

#### U11-C18B1 [1992]

#### Complete manufacture of diode devices

Photodiode manufacture is covered by U11-C18B4.

U11-C18B2 [1992]

Complete manufacture of thyristor devices

U11-C18B3 [1992]

Complete manufacture of charge coupled devices

# U11-C18B4 [1992]

# Complete manufacture of optoelectronic devices

Includes manufacture of monolithic and thin film photosensitive device e.g. photodiode, phototransistor, light emitting diode, laser diode, integrated optics. Laser diode manufacture is also covered by U12-A01B2. For LED manufacture see also U12-A01A2.

**OEIC** 

## U11-C18B5 [1992]

## Complete manufacture of memory

See also appropriate codes in U13-C, U13-D and/or U14.

# U11-C18B9 [1992]

## Complete manufacture of other devices

Includes manufacture of e.g. SAW devices (see also U14-G), field emitting structures (see also U12-B03D), superconductive devices (see also U14-F02B), photovoltaic devices (see also U12-A02).

#### U11-C18C [1987]

# Mechanical structures e.g. membranes etc., transducers manufacture

See also U12-B03E or U12-B03F.

Pressure diaphragm, anisotropic, pressure

## U11-C18D [1987]

#### Optical filter, lens array manufacture

Includes e.g. filters for CCD, transparent conductive layers for e.g. LCD, integrated optics. See also U14-H01E for thin-film spin-coated or dipped layers. Includes pixel/colour filters, lithography for general imager/display use.

# U11-C19 [1992]

# Trimming, circuit repair, safety circuits for semiconductor device

(U11-C20)

#### U11-C19A [1992]

# Circuit repair and redundant circuitry for semiconductor device

Includes late stage tailoring, cutting fuses with laser, focused ion beam (see also U11-C07A4), or opening fusible links with high current. For circuit repair by localised deposition see also U11-C05C5. For trimming thin/thick film for hybrid circuit see U14-H04B3B. For repair of integrated circuits using redundant circuitry. For memory redundancy see U14-D01A.

Laser zapping

# U11-C19B [1992]

# Method of securing IC from unauthorised copying and use

Includes narrow circuit cuts in metallised connections lines, disordering lattice structure or changing the doping level of a semiconductor region, by using e.g. laser or ion beam. For package adaptations see U11-D01C4.

#### U11-C20

# Other aspects of semiconductor manufacture

#### U11-D

# Packages, mountings and terminals for semiconductor devices

Includes on-chip interconnection layout and metallurgical details.

#### U11-D01

# Containers, enclosures and housing for semiconductor device

From 1997 sockets, connectors, holders for semiconductor devices are coded in U11-D01Q and V04-K02.

#### U11-D01A [1987]

#### Integrated circuit packages and mountings

Includes substrates, mountings, e.g. ceramic, glass, metallic, used in packaging. Multilayer circuit packages, e.g. high density interconnect, are covered by U14-H03A1, U14-H03A4, and also, where appropriate, U11-D03C3 and/or U11-D03B codes. See also U14-H03C for high grade ceramic substrate, e.g. aluminium nitride. Multilayer ceramic substrates are also covered by U14-H03B codes for materials/structure.

# U11-D01A1 [1987]

# Lead frame or brazed type ceramic/resin encapsulated/metallic packages

Includes packages for both through hole and surface mounted devices (see also U11-D01A3). Prior to 199201 brazed type packages are covered by U11-D01A9.

Case, dual in line package, DIP, single in line package, SIP, zigzag in line, ZIP, CERDIP, CERQUAD, pin insertion type, chip in tape, TAB, anodised aluminium, hollow package, LOC, lead on chip

# U11-D01A3 [1987]

# Leadless/Surface mounting for semiconductor packages

Includes leadless with via holes, but leadless arrays with stand-offs, e.g. pad grid arrays, are also covered by U11-D01A5. Prior to 199201 for chip carrier package see U11-D01A. For sockets for surface interconnect package to board see U11-D01 and V04-B01 or V04-K02. For flip-chip process and package see U11-E01C.

Surface mounted device, SMD, small outline integrated circuit, SOIC, flat pack, chip carrier, plastic leaded chip carrier, PLCC, gull-wing leads, TAB package, chip in tape, plastic quad flat pack, PQFP, ball grid array, BGA

# U11-D01A3A

# [1997]

#### Chip on board packages

Includes direct attachment with protective polymer overcoat (see also U14-H03A3).  $\label{eq:control} % \begin{center} \begi$ 

COB, glob top

# U11-D01A4

## [1992]

# **High frequency packages**

(U11-D01A9)

Includes packages for high speed IC with large number of transmission and power lines. See also U14-H03C2 for microstrip/stripline circuitry and/or U11-D03B9 for metallurgical details. For terminals for high frequency devices see U11-D03A6.

Microwave, MMIC package

#### U11-D01A5

## [1987]

# High pin count packages

E.g. pin/pad grid arrays, and high ball count BGAs (see also U11-D01A3).

Pad grid array, PGA, BGA

#### U11-D01A6

#### [1992]

## Multichip modules, high density packages

(U11-D03D, U14-H03C3)

For multichip PGA modules see also U11-D01A5. For high-density package mountings, e.g. high density interconnect, see U14-H03A1 and/or U14-H03A4, with manufacture covered by the appropriate subclasses in U11-C05D, U11-D03B, U11-D03C, U14-H04A. For hybrid circuit package see also U14-H03C3.

MCM

# U11-D01A7 [1987]

# Low profile card type packages for e.g. unencapsulated IC

Includes package for 'smart' card (see also T04-K). See U14-H01D for thin film aspects.

# U11-D01A8

## Wafer level packages

Includes chip packaging on wafer.

#### U11-D01A9

## [1987]

[1987]

#### Other types of packages

Includes e.g. transistor outline (plug type) package and bare chips (unpackaged).

TO package

#### U11-D01B

# [1987]

#### Discrete device package structure

Aspects regarding terminals for low/high power devices are covered by U11-D03A4/U11-D03A5. *Seal* 

## U11-D01B1

#### [1987]

# Two terminal packages

For LED packages see U12-A01A4, for laser diode package see U12-A01B3, for solar cell see U12-A02A1, for photodiode package see U12-A02B3. *Diode* 

#### U11-D01B3

#### [1987]

# Three or more terminal packages

Includes bridge rectifier. For phototransistor package see U12-A02B3.

Transistor, bipolar, FET

#### U11-D01C

#### [1987]

#### Special package adaptations

Includes package getters.

## U11-D01C1

## [1987]

# Window structures e.g. for image sensors, ROM's

Glass, pick-up, light, transparent, translucent, UV erasable memory

#### U11-D01C2

#### [1992]

# Package protection against radiation

Includes protection against e.g. light, alpha radiation, etc.

#### U11-D01C3

#### [1992]

# Package protection against electrostatic discharge

(U11-D03C1)

See X25-S for general applications for static electricity prevention.

#### U11-D01C4

# [1992]

# Package protection from inspection and reverse engineering

(U11-D01C9)

Includes e.g. security coatings and/or other adaptation to prevent unauthorised reproduction of the integrated circuit.

#### U11-D01C5

[1997]

# Electromagnetic shielding for semiconductor packages

(U11-D01C9)

# U11-D01C6

[1997]

# Thermal protection for semiconductor packages

(U11-D01C9)

# U11-D01C9

[1987]

# Other special package adaptations

Includes e.g. special moisture barrier, protection against short-circuit. For fire retardant barriers. Hermetic seal structures (for sealing process see also U11-E02A2)

#### U11-D01Q

# [1997]

# Sockets, connectors and holders

(U11-D01)

Previously coded in U11-D01. For conversion sockets. Sockets, connectors, holders for semiconductor devices are also coded in V04-K02. See also appropriate package code.

#### U11-D02

# Cooling, heating and ventilating arrangements for semiconductor packages

See V04-T03 codes for cooling/heating of electronic equipment in general.

Fin, heat sink, block, radiate, coolant, liquid

#### U11-D02A

[1987]

# High power thyristor, transistor, rectifier cooling arrangements

#### U11-D02A1

[1987]

#### Stacks, installations cooling

# U11-D02B

[1987]

# Medium power transistor modules and heat sinks

Includes materials that facilitate heat transfer.

# U11-D02B1 [1987]

# Internal cooling structures on chip or within package

Includes permanent, non-removable heat sinks.

#### U11-D02B2 [1987]

# External heat sink mounted on package

Includes mainly detachable heat sinks.

#### U11-D02C [1987]

# Cryogenic - for photodetector or superconductor electronics

Search with U14-F for superconductor aspects. See X25-V for electrical aspects of cryogenic system per se.

Cryostat

#### U11-D02D [1987]

Cooling for surface mounted chip assemblies, modules, chip on substrate

#### U11-D02D1 [1992]

Cooling arrangements with heat transfer by fluid means

#### U11-D02D2 [1992]

Cooling arrangements with Peltier element

#### U11-D02E [2007]

# Heating arrangements for semiconductor package

Includes package structures, internal or external to cause or facilitate heating within a semiconductor package.

#### U11-D03

Lead-frames, terminals, interconnections, wiring layout

U11-D03A [1983]

Lead and terminal arrangements

U11-D03A1 [1987]

Lead frames; Carrier tapes (structure, manufacture)

# U11-D03A1A [1992]

# Lead frames

For transporting, handling lead frames see also U11-F02A. Materials, e.g. metallic alloys, are also covered by U11-A08B and U11-D03B. Includes manufacture, although if particular aspects of manufacture are emphasised, other relevant codes

may be used, e.g. U11-C05C6 for electroplating.

# U11-D03A1B [1992]

## **Carrier tapes**

Includes leads in insulating substrates, e.g. tapes for TAB; multilayer metal beam tape e.g. for area array TAB. Also covers editing or cutting to remove defective pattern units from TAB tape and to rearrange remaining desired portions. For carrier tapes for transporting semiconductor device packages see U11-F02A4.

ATAB

# U11-D03A2 [1987]

# Connection details between lead frame and chip terminals

Includes wire and gang bonding (see also U11-E01A, U11-E01B respectively). For bonding pads, bump terminals, e.g. raised pad on bonding tape, see also U11-D03B1.

#### U11-D03A3 [1987]

# Details of other types of terminals for IC packages

Includes aspects regarding shape of leads, pins. For forming leads after encapsulation see U11-E02B.

J leads, gull-wing leads

# U11-D03A4 [1987]

Terminals for low/medium power diodes and transistors

# U11-D03A5 [1987]

Terminals for higher power diodes/transistors/thyristors

# U11-D03A6 [1987]

Terminals for high frequency devices

U11-D03A9 [1987]

Microwave

# Other types of connection to chips

For solder preforms see also U14-H03A2 (hybrid circuits). See also V04-A06 for direct connections to PCBs using conductive adhesives, and V04-A11 for direct connection using anisotropic connectors.

#### U11-D03B [1983]

Metallurgical connections, materials, structure, details of interconnections on or within chip, bonding pads, wire bonds

# U11-D03B1 [1987]

# Terminals to chip, bonding pads, wire bonds, bonding wire, bump terminals

Includes flip chip pads (see also U11-E01C). For complete manufacture of contact bumps or bonding pads see U11-C05G2B.

Ball limiting metallurgy, BLM, top surface metallurgy, TSM

# U11-D03B2 [1987]

# Metallurgical aspects of interconnections within chip, packaging

Includes forming of diffusion barrier, e.g. titanium nitride, titanium tungsten, to prevent spiking, methods and structure to prevent electromigration, e.g. slits in bent wiring section etc. Also includes metallurgical aspects related to electrodes. Covers structure which ensures minimum resistance interconnections, also air-bridges, fuses (for fuse manufacture, see U11-C05G2A).

Electromigration, air bridges

#### U11-D03B2A\*

[1997-2001]

### Fuses, antifuses

(U11-D03B2)

\*This code is now discontinued, but remains searchable and valid for records from 1997 to 2001. See U12-C04 from 200201. For manufacture of fuse see U11-C05G2A.

# U11-D03B3 [1987]

# Metallurgy, solder, conductive adhesive connecting chip base to substrate or lead-frame

Includes forming conductor patterns on ceramic, glass based packaging, joints or bonds in multilayer packages between metallised components such as pins, leads or heat sinks and ceramic substrates. Covers joining metal-ceramics when, e.g. attaching lids to ceramic package (see also U11-E02A2). Also includes adhesives for die bonding (see also U11-E02A3).

Plated heat sink, eutectic alloying, self-soldering, solder reflow, solder mask

# U11-D03B9 [1987]

#### Other metallurgical aspects

Includes high frequency monolithic signal transmission lines (see also U14-H03C2 and, where appropriate, U11-D03C1, U11-D03C3), wafer scale and thin film circuit multilayer interconnection. Also covers back-side metallisation for MMIC.

Microstrip

# U11-D03C [1987]

# Integrated circuit wiring details

Includes layout, logic, signal transfer and multichip interconnection details. See also corresponding U13 and U14 codes where appropriate. *Cell* 

#### U11-D03C1 [1987]

# Power supply, grounding details, wiring layout

Includes analogue wiring, capacitors or other passive components, protection fuses fixed inside package, I/O pad layout, wiring reconfiguration, wafer test pad wiring layout e.g. for built-in testing (see also U11-F01D2). For design aspects regarding wiring layout see U11-G.

## U11-D03C1A [1997]

# Wiring layout, power supply

(U11-D03C1)

Includes analogue wiring, I/O pad layout, wiring reconfiguration, wafer test pad wiring layout e.g. for built-in testing (see also U11-F01D2). For design aspects regarding wiring layout see U11-G.

#### U11-D03C1B [1997]

# Passive elements within package

(U11-D03C1)

Includes by-pass capacitors or other passive components, protection fuses fixed inside package. Decoupling capacitor

## U11-D03C2 [1987]

#### High density digital wiring

Includes wiring for gate arrays (see also U13-C04D).

Master-slice

# U11-D03C3 [1987]

#### Power/signal transfer

Includes e.g. opto-electronic, inductive, capacitive, feed-through arrangements for high speed devices. For multichip high-density interconnect see also U14-H03A1 and/or U14-H03A4.

# U11-D03C3A [1997]

#### **Noise reduction**

For noise reduction interconnections, and removal of cross talk, coupling/decoupling capacitance.

Cross talk, Parasitic capacitance

# U11-D03C3B [1997]

# 3-D interconnection, chip on chip

Includes e.g. opto-electronic, inductive, and capacitive feed through arrangements for high speed devices. For multi-chip high density interconnect see also U14-and/or U14-H03A4. Also includes interconnects for spherical ICs.

# U11-D03D [1987]

# Other metallurgical aspects of lead frames

# U11-E

# Assembly for semiconductor package

#### U11-E01

## Attaching leads to semiconductor package

#### U11-E01A [1983]

# Wire bonding for semiconductor package

For wire material see also U11-A08B and U11-D03B1. Includes e.g. thermosonic and thermocompression bonding.

Capillary

#### U11-E01B [1987]

# Tape automated bonding for semiconductor package

Includes inner and/or outer lead bonding by, e.g. thermosonics, thermocompression, laser bonding. Also covers beam lead bonding. For carrier tape structure and manufacture, see U11-D03A1B. *TAB, Bread-board, ILB, OLB, gang bonding* 

# U11-E01C [1992]

# Flip chip technology for semiconductor package

Contact bump manufacture is covered by U11-C05G2B. For metallurgical aspects relating to bumps, e.g. ball limiting and/or top surface metallurgy, see also U11-D03B1.

Controlled collapse bonding, CCB, controlled collapse chip connection, C4, face down

#### U11-E01X [1987]

# Other methods for attaching leads to package

Covers e.g. cleaning aspects related to lead attaching, fitting PGA pins, etc.

# U11-E02

#### Mounting; Encapsulating; Filling

[1987]

## U11-E02A

# **Encapsulation**

For non resin or metallic encapsulation. *Seal, glass, glaze* 

#### U11-E02A1 [1987]

#### Resin encapsulation

Includes mould design, manufacture, materials. Also covers coatings to protect stress sensitive areas, e.g. wires or die during encapsulation. If mentioned covers are meant to improve radiation immunity, see also U11-D01C2. For encapsulant materials see U11-A07.

Transfer moulding

## U11-E02A2 [1987]

# Package assembly. Attaching covers, joining dissimilar materials

Includes CERDIP technology to ensure hermetic seal ceramic packages. For joining metal-ceramic interfaces see also U11-D03B3.

Alignment, airtight seal, hollow package

# U11-E02A3 [1987]

#### Handling chip, die bonding

Includes die attachment to appropriate mount media, e.g. paddle of lead frame or refractory ceramic packages. If die attach pad is novel, e.g. for reducing die stress in semiconductor die assembly, see also U11-D03A1. For metallurgical aspects of eutectic, solder or polymer die bonding see also U11-D03B3. For positioning aspects see also U11-F02B.

Wafer, slice

# U11-E02A9 [1987]

## Other encapsulation details

Includes e.g. positioning of chip in rapport with predeterminable stress factors to reduce voltage offsets, marking TAB before encapsulation, forming lens on package, etc. Also includes use of phosphor within package encapsulant e.g. for white light LED (see also U12-A01A4A).

#### U11-E02B [1987]

## Processes undertaken after encapsulation

Includes opening package for internal inspection and package repairs.

# U11-E02B1 [1997]

## **Shaping and trimming leads**

(U11-E02B)

Includes isolation of leads and paddle from each other and frame, i.e. lead frame trimming, lead forming. Also covers forming shorting bar protection to prevent lead deformation during transport, lead cladding or solder application to outer leads.

Cut, bend, press, shape, soldering barrier, chip carrier ring

#### U11-E02B3 [1997]

# Cleaning and marking package

(U11-E02B)

Includes cleaning, deburring and marking package.

Mark, deflashing, deburring

#### U11-F

# Measuring; Positioning for semiconductor technology

# U11-F01 [1983]

# Measuring; Testing (including sorting) for semiconductor technology

See also S01-G01, S01-G02, for testing electrical properties. For checking store/memory operation see also U14-D. Measurement of non-electrical properties, e.g. dimensions, flaw detection etc., is also coded in S02 and S03 as appropriate.

#### U11-F01A [1983]

# Measuring material properties for semiconductor manufacture

## U11-F01A1 [1992]

# Doping and carrier transport related measurements

Includes measuring doping level, concentration, minority carrier lifetime, carrier mobility, semiconductor wafer conductivity. See also S03-E02 codes.

Deep level

#### U11-F01A2 [1992]

# Measuring level and nature of defects in semiconductor material

Includes measurements related to e.g. stacking faults, dislocations, inherent stress in material.

Oxidation-induced stacking fault, OSF

# U11-F01A3 [1992]

# Surface topography measurements for semiconductor processing

See also S02-A codes.

Flatness, curvature, profile, smoothness

#### U11-F01A4

# Measurements of physical parameters, e.g. temperature for semiconductor processing

[1992]

Includes measurements for various processes in semiconductor manufacture, e.g. annealing, deposition. See also S03-B, S03-A codes.

# U11-F01A5 [1997]

# Chemical composition measurement for semiconductor processing

Bragg diffraction testing for semiconductor wafer. Also includes impurity analysis.

Spectroscopy

# U11-F01A9 [1992]

# Other measurements for semiconductor processing

Includes energy bandgap measurement. Covers also dielectric test (e.g. measuring relative dielectric constant). For crystal structure.

#### U11-F01B [1983]

Film parameter measurement for semiconductor processing

# U11-F01B1 [1987]

# Measuring during semiconductor manufacturing process, within reaction vessels

In situ

# U11-F01B2 [1987]

# Measuring using beam scanning

Includes measurements related to point defects, e.g. dust on wafer surface. For optical inspection in general see S03-E04 codes, In particular, S03-E04F codes cover optical techniques for flaw detection or contamination. For Electron beam microscopy see also U11-F01B4 and V05-F01 codes as appropriate. See also V05 codes for novel electron beam methods and apparatus aspects.

#### U11-F01B3 [1987]

# Measuring using image recognition

See T04-D codes also.

Pattern, memory, compare, discriminate

# U11-F01B4 [1997]

# Optical or electron microscopy for semiconductor processing

(U11-F01B9)

Includes visual inspection. For electron microscopy at film level. For electron microscopes per se see also S03-E06B1 and V05-F01 codes.

#### U11-F01B5 [1997]

# Film thickness measurement for semiconductor processing

(U11-F01B)

Includes measuring thickness of deposited layer, profile of semiconductor structure. (See also S02-A02 codes). Prior to 199701 see U11-F01B.

#### U11-F01B6 [2007]

## X-ray testing for semiconductor package

Includes all testing of semiconductor chip at package level.

#### U11-F01B7 [2007]

# X-ray testing for semiconductor processing

Includes testing at wafer level during manufacture using X-ray equipment. See also U11-F01D3 for test apparatus.

#### U11-F01B9 [1987]

# Other measuring/testing aspects for semiconductor processing

## U11-F01C [1983]

#### Semiconductor device testing

Includes measurements on individual semiconductor chips, after separation from wafer and/or individual module package. Measurements at internal circuit nodes for wafers are covered by U11-F01D. If details regarding type of testing are emphasised, see appropriate code in U11-F01C and U11-F01G. For on-chip testing, e.g. built-in test, see U11-F01D2, U13-C07, U21-C03D. *Known good die* 

# U11-F01C1 [1987]

# Probes, connector apparatus for semiconductor device testing

Includes probe heads, contact parts, e.g. clips, sockets, liquid or conductive rubber contacts, connection to mount, strip line. See also S01-G02B5 and S01-H03 codes. Probes for testing semiconductors mounted on PCB's are coded in V04-R06 codes.

Burn in board, prober

# U11-F01C3 [1987]

## **Testing integrated circuits**

Includes measurement on encapsulated chip, or die prior to encapsulation, the IC being regarded as a functional block (see also S01-G02B codes). Covers also automated testing by using off-chip random pattern generators (see also U11-F01D2B). "Stuck at" fault testing, IDDQ, quiescent current, DUT

#### U11-F01C5 [1987]

# Testing diodes, transistors, solar cells, CCD, others

Includes semiconductor laser testing (see also V08-A04A, V08-A06) and memory testing (see also U14-D codes).

# U11-F01D [1983]

## Testing circuits on wafer

Includes testing performed on individual device at wafer level, marking defective chips on wafers. Also covers built-in testing (U11-F01D2). For testing at interval circuit nodes see S01-G01A1 or S01-G01C1; for checking device as functional block see S01-G02B1.

## U11-F01D1 [1987]

# Probes, contacts, signal transfer methods for testing circuits on wafer

Includes wafer prober, probe card. See also S01-G02B1 and S01-H03 codes. For probes for testing semiconductors mounted on PCB's are coded in V04-R06 codes.

# U11-F01D2 [1987]

# Circuitry on chip to aid testing

See also U13-C07 and/or U21-C03D for digital/logic circuit aspects. For computer processing details see also T01-G02A2B. *Built-in self-test, BIST* 

## U11-F01D2A [1992]

# Scan based testing method for integrated circuits

(U11-F01D, U13-C07)

Includes level sensitive scan design. LSSD, scan path, set/scan logic

#### U11-F01D2B [1992]

# Signature analysis and random pattern generation for testing integrated circuits

(U13-C07, U21-C03D)

For off-chip random pattern generators see also U11-F01C3.

# U11-F01D3

# Separate electronic testing apparatus for testing semiconductor devices, ICs, etc

[1987]

Includes all apparatus for testing of semiconductor devices, separate or at substrate level, includes apparatus for testing of e.g. LED/OLED displays, solar panels etc.

#### U11-F01E [1987]

# Testing circuit packages, chip carriers and multilayer circuit boards

Includes e.g. bonding strength test, detection of abnormal bonding, air-tightness test, moisture resistance of encapsulation, lead or bump inspection. For automatic visual inspection see also T04-D07 codes.

Pin

# U11-F01F [1987]

## **Hybrid circuit testing**

Includes also testing matrix array, for LCD (see also U14-K01A8). For hybrid circuits testing see also U14-H04B9.

#### U11-F01G [1992]

# Characterised by type of tests being carried out

This code is usually applied with one of above U11-F01 codes depending on device being tested. Includes life test, ageing, e.g. acceleration test, burn-in test, fatigue test, also mechanical strength test, e.g. vibration, impact test, moisture resistance, e.g. pressure cooker test, thermal impact test (see also appropriate codes in S01, S02, S03).

## U11-F02 [1983]

# **Handling components**

#### U11-F02A [1983]

#### Wafer/chip holders and conveyors

Includes e.g. lead frame transfer, transport (see also U11-D03A1 codes).

#### U11-F02A1 [1987]

# Wafer holders and conveyors for storage, transport

Includes transfer from processing station to another. Also includes transfer and storage of LCD parts during LCD panel manufacture and assembly, also U14-K01A1K.

Carry, position, feed, support, tweezers, SMIF, standard mechanical interface, pod

# U11-F02A1A [1992]

# Wafer protection during transport and storage

Includes covering wafer with cling film, oxide layer for protection during wafer handling.

#### U11-F02A2 [1987]

# Jig holders for handling wafers within processing apparatus

Includes also clamping mechanism with temperature regulated platen (see also U11-C09 codes).

Chuck, table, vacuum, hold down, susceptor, electrostatic

#### U11-F02A3 [1987]

## Chip die handling

Includes carrier tapes for die transport.

#### U11-F02A4 [1987]

# Holders and transport for IC packages, encapsulated devices

Includes carrier lines to e.g. test devices (see also U11-F01C), integrated circuit magazine, sockets to prevent lead deformation during transport, carrier tapes. For transporting packages and storage of devices.

## U11-F02B [1983]

# Positioning for semiconductor device manufacture

Includes detecting, positioning, of wafer orientation flat.

Orient, angle, align, rotate, stage, control, notch

## U11-G [1987]

# Integrated circuit design including wiring layout, use of CAD etc.

Includes geometrical layout of components, e.g. standard cell, custom LSI, semi-custom input/output layout, automatic routing. See also T01-J15A2. See also U11-C15C for computer simulation of manufacture process. For computer simulation of semiconductor device operation see also U11-F01.

Pattern, LSI, connect, computer aided design

#### U11-G01 [200

#### Integrated circuit design using CAD

# U11-G02 [2002]

# Automated component/interconnect layout design

Includes software packages. For software simulation see T01-J15 and U11-C15C codes.  $\it VHDL$ 

U11-G03 [2002]

# Circuit simulation and/or fault-finding techniques

Includes software simulations.

U11-G09 [2002]

Other IC design aspects

U11-H [2007]

# End of life-cycle product recycling

Includes: old displays, LCDs or any U11 to U14 product recycling that has reached the end of its life-cycle.

#### **U12: Discrete Devices**

This section deals with individual semiconductor devices for use either as discrete device per se, or as an element of an integrated circuit. U12 codes are also used for inventions involving manufacture (together with U11 codes) to define as far as possible the nature of the device being manufactured. From 9201 U12-Q code has been introduced to indicate devices used in integrated circuit embodiments.

#### U12-A

#### **Opto-electronic devices**

#### U12-A01

# Light emitting devices with jump or surface barrier

Including packages, arrays and electronic drive circuitry.

#### U12-A01A

# **Light emitting diodes**

# U12-A01A1 [1987]

#### Semiconductor structure of individual LED

Covers chip layer structure of LED. See U12-A01A4 for LED package structure.

# U12-A01A1A [1992]

# **LED with AIII-BV compound layers**

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium indium phosphide, gallium phosphide, gallium aluminium arsenide, indium phosphide

#### U12-A01A1B [1992]

# **LED with All-BVI compound layers**

Includes complex ternary and quaternary compounds.

Cadmium telluride, cadmium sulphide, zinc sulphide, mercury selenide, cadmium selenide, cadmium mercury telluride

# U12-A01A1C [1992]

# LED with AIV element/compound (except elemental silicon) layers

Diamond, silicon carbide

#### U12-A01A1D [1997]

#### LED with indirect bandgap semiconductor

Silicon, germanium

#### U12-A01A1E [2006]

#### **LEDs with Organic Materials**

(U12-A01A1X) OLED

#### U12-A01A1X [1992]

#### LED with other type of semiconductor

From 2006 see U12-A01A1E for polymeric and organic LEDs, see also U12-B03C for general organic device aspects.

Lead sulphide

# U12-A01A2 [1987]

#### LED manufacture

Includes manufacture of single LED device of LED display, or more specific aspects e.g. polarizing/optical film, electrodes, arrays of LEDs. If deposition/etching techniques are emphasised, see also U11-C01/U11-C07 codes.

LED, OLED, QLED display manufacture

#### U12-A01A3 [1987]

# Monolithic or hybrid circuit LED arrays

Display, optical print head

## U12-A01A4 [1987]

## Package construction for LED

See also U11-D01B1.

Resin. seal. lens

#### U12-A01A4A [2005]

# **Packages for white LEDs**

Covers package aspects for white LEDs, including phosphors for white LEDs.

#### U12-A01A4B [2006]

#### **Packages for coloured LEDs**

Covers package aspects for red, green or blue and other non-white LEDs, including phosphors for coloured, non-white LEDs.

### U12-A01A5 [1987]

#### **Drive circuitry for LED**

See also under application. Switch, control, modulator

#### U12-A01A5A [1992]

**Drive circuit for individual LED** 

#### U12-A01A5B [1992]

**Drive circuit for LED array** 

## U12-A01A6 [1987]

# **Arrays of encapsulated LEDs**

Display, optical print head

#### U12-A01A7 [2007]

## Light emitting diode displays

For display drivers see also U12-A01A5 codes. For monolithic and un-encapsulated LED array displays see also U12-A01A3, and for encapsulated LED array displays see also U12-A01A6.

LED display, OLED display

#### U12-A01B

#### **Semiconductor lasers**

See V08-A04A also. For testing of semiconductor laser see U11-F01C5.

## U12-A01B1 [1987]

#### Semiconductor details of laser body

Includes p-n junction lasers. For manufacture of laser electrodes see U11-C05F6 and V08-A01B also.

Ohmic contact, Schottky barrier layer, PN-junction, homojunction laser

## U12-A01B1A [1992]

#### Heterojunction semiconductor laser

Includes carrier confinement structures e.g. inverted rib, ridge waveguide, etched mesa, buried heterostructure, channelled substrate buried heterostructure, constricted mesa. For quantum well, superlattice lasers U12-A01B1B takes precedence.

#### U12-A01B1B [1992]

#### Quantum well semiconductor laser

Includes superlattice aspects.

Vertical-cavity surface-emitting, stripe confinement, double heterojunction

#### U12-A01B1J [1992]

#### Semiconductor laser arrays

(U12-A01B1, U13-D04)

# U12-A01B2 [1987]

# Laser diode manufacture

Use instead of U12-A01B1 if emphasis is on manufacture rather than semiconductor body details. See also appropriate codes in U11 if particular aspects of e.g. deposition, etching, isolation, electrode manufacture are emphasised. Excludes any packaging aspects.

Etch, cladding layer

# U12-A01B3 [1987]

#### Packages for semiconductor lasers

For particular aspects of packaging which may be also applicable to other semiconductor devices, see also U11-D codes. Includes impedance matching, terminals. For connection to optical fibber see also U12-A01C.

Bond, mount, cap, cover, glass, interconnect

#### U12-A01B3A [1992]

# Cooling arrangements for semiconductor laser package

See also appropriate codes in U11-D02 and V08-A05.

#### U12-A01B4 [1987]

# Electronic drive circuitry for individual semiconductor laser

See also V08-A02A.

#### U12-A01B6 [1992]

# Semiconductor laser characterised by type of semiconductor material

This code does not apply to semiconductor lasers using conventional materials belonging to AIII-BV group. It includes e.g. heterojunction with beryllium carbon nitride, boron nitride, cadmium telluride layers.

Chalcopyrite, zinc blend crystal

# U12-A01C [1987]

# Optical fiber connections to LEDs, lasers or photoreceivers

When the connection to optical fiber implies package alterations see also appropriate code i.e. U12-A01A4 for LED, U12-A01B3 for laser, U12-A02B3 for photoreceiver. See also V07-G10C. Couple, align, waveguide, photocoupler

## U12-A01X

# Other aspects of light emitting devices

#### U12-A02

## Radiation sensitive devices

#### U12-A02A

# Radiation sensitive devices for energy conversion

See X15 also for solar power generation. *Photovoltaic, solar cell* 

# U12-A02A1 [1983]

## Single solar cell

Prior to 1997 all packaging aspects of individual solar cells were covered by this code, from 1997 they are covered by U12-A02A4E.

#### U12-A02A2 [1987]

# Semiconductor materials and structures for solar cells

E.g. for monocrystalline, amorphous and heterojunction structures. For thin film solar cells see also U12-B03B.

# U12-A02A2A [1992]

Solar cells with AII-BVI compounds

U12-A02A2B [1992]

Solar cell with AIII-BV compounds

# U12-A02A2C [1992]

# Solar cell with AIV compounds

Excludes elemental silicon.

# U12-A02A2D [2006]

# Solar cells with organic materials

Excludes elemental silicon.

#### U12-A02A2E [1997]

# Solar cell with chalcogenide/chalcopyrite compounds

(U12-A02A2X)

Includes materials not covered by U12-A02A2A to U12-A02A2C codes, e.g. AI-BII-CVI, AII-BIV-CV, AII-BIV-CVI group semiconductors. For heterojunctions with e.g. copper indium selenide/cadmium sulphide films or copper indium selenide/cadmium sulphide films see also U12-E01 codes.

Copper indium sulphide, copper gallium selenide, copper indium selenide, lead sulphide

#### U12-A02A2F [1992]

# Solar cell with amorphous, polycrystalline semiconductor

Hydrogenated a-Si

# U12-A02A2Q [1992]

# Solar cell structure

For tandem solar cells see U12-A02A4C. Back surface field, textured cell, V-groove multijunction

# U12-A02A2X [1992]

# Other semiconductor materials for solar cells

From 2006 see U12-A02A2D for devices using polymeric and organic layers. Includes perovskite material for solar cells.

#### U12-A02A3 [1987]

## Characterised by solar cell manufacture

Includes manufacture of single or assembly of solar cells and manufacturing apparatus. If material manufacturing details are emphasized use U12-A02A2 section. See also U11-C18B9 for photovoltaic devices manufacture.

# U12-A02A4 [1987]

# Solar cell substrate, electrode and packaging

#### U12-A02A4A [1992]

#### Solar cell electrodes

Include electrode structure and material. For manufacture see U11-C05F6. For thin film transparent conductive layer details see also U14-H01E.

# U12-A02A4B [1992]

Solar cell substrate details

# U12-A02A4C [1992]

# Multijunction tandem solar cells Includes both mechanically stacked cells (held

together by an adhesive or bonding techniques), and monolithically integrated multijunction cells.

#### U12-A02A4D [1992]

#### Covering layers for solar cells

Includes e.g. passivating, anti-reflection film, back surface layers. Also resin layers and/or adhesive layers as part of protection film/barrier layer only.

#### U12-A02A4E [1997]

Packaging aspects for solar cells

(U12-A02A1)

#### U12-A02A5 [1983]

## Assemblies of solar cells

(U12-A02A5, U12-A02A6)

Microlithography for forming interconnections. Monolithic integration. Solar battery. Also includes frame assembly, installation of solar panels, supporting of solar power generation module. Solar battery

#### U12-A02A6\*

# Assemblies of cells on separate substrates

[1987-1996]

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1996. From 1997 all aspects regarding solar cell assemblies are covered by U12-A02A5.

## U12-A02A7 [1992]

# Power transfer, circuitry arrangements for solar cells

(U12-A02A9)

Control, voltage/current regulator, charge

## U12-A02A8 [2005]

# Dye sensitised solar cells

See also X15 codes as appropriate.

# U12-A02A9 [1987]

# Other radiation sensitive devices for energy conversion

Includes e.g. hybrid systems (wind-photovoltaic, thermophotovoltaic, etc.). For photoelectrochemical cells after 2005 see U12-A02A8.

#### U12-A02B

## Photoreceiver for controlling current flow

Optical, IR, light, photoelectric, photodetector, avalanche

#### U12-A02B1 [1987]

Photoresistor, photoconductor

#### U12-A02B2 [1987]

# Phototransistor, photodiode

Infrared light, optical, photoelectric

## U12-A02B2A [1992]

#### **Photodiode**

Includes p-n junction diode, p-i-n diode, metalsemiconductor diode (Schottky barrier), heterojunction diode, avalanche photodiode. *APD, PD, PIN* 

# U12-A02B2B [1992]

# **Phototransistor**

Includes bipolar and field effect phototransistor. *FET* 

# U12-A02B2C [1992]

# **Photothyristor**

(U12-A02B, U12-A02B2, U12-D01B) Light activated thyristor

#### U12-A02B3 [1987]

## Package details for photoreceiver

Includes packages for devices in U12-A02B1 and U12-A02B2. For specific packaging aspects which may be also applicable to other semiconductor devices, see also U11-D codes.

Window, cap

## U12-A02B4 [1987]

# Electronic circuits for photodiodes and phototransistors

See also under application, e.g. for opto-receiver amplifiers in general see U24-G01A5, and for such amplifiers in optical communication systems see also W02-C04A3B.

Bias, current, amplify, demodulate

# U12-A02B5 [1992]

**Photoreceiver characterised by material** (U12-A02B)

#### U12-A02B5A [1992]

# **Photoreceiver with All-BVI compounds**

Includes complex ternary and quaternary compounds.

Cadmium sulphide, cadmium telluride, mercury selenide, cadmium mercury telluride, zinc sulphide, mercury zinc selenium telluride

# U12-A02B5B [1992]

# **Photoreceiver with AIII-BV compounds**

Includes complex ternary and quaternary compounds.

Gallium indium arsenide, gallium arsenide phosphide, gallium arsenide, gallium phosphide, indium arsenide

### U12-A02B5C [1992]

# Photoreceiver with amorphous, polycrystalline semiconductor

Hydrogenated a-Si

#### U12-A02B5D [1997]

# Photoreceiver with AIV elements and their compounds

(U12-A02B5X)

Diamond, silicon carbide, germanium

# U12-A02B5E [2006]

## Photoreceiver with organic materials

(U12-A02B5X)

# U12-A02B5X [1992]

# Photoreceiver with other semiconductor materials

Includes materials not covered by U12-A02B5A to U12-A02B5D codes, e.g. AI-BIII-CVI group and AII-BIV-CV group semiconductors.

Chalcopyrite compounds, copper indium sulphide, copper gallium selenide, chalcogenide compounds, zinc tin arsenide, cadmium germanium arsenide, lead sulphide, bacteriorhodopsin

#### U12-A02C

# Structurally combined with light emitter

#### U12-A02C1

[1987]

[1987]

[1987]

# **Optocouplers, optoisolators**

Includes structure, packaging aspects. Light, LED, photodiode, phototransistor, photocoupler

#### U12-A02C2

# Light path emerging from package

E.g. for reflective light barrier, rotary encoder. (See also S03-C09, U21-A03J/W05-D01 codes respectively).

Light switch, photointerrupter, reflection switch

## U12-A02C3

# Semiconductor light transmitting and receiving device

Includes light amplifiers, modulators (see also V07-K01A, V07-K01C1).

# U12-A03 [1992]

# Devices sensitive to X-ray, gamma ray, particle and ions

(U12-A02B, U12-B03X)

See S03-G02B2G for radiation intensity measurement using semiconductor sensors or S03-E06H5A for semiconductor x-ray imaging detectors.

# U12-B

Hall-, Ovshinsky- and Gunn-effect devices; Dielectric triodes and other devices not catered for elsewhere in U12

#### U12-B01 [1987]

# Hall-effect, magnetoresistive or spintronic devices

# U12-B01A [1992]

#### Hall effect devices

Includes materials, manufacture and structure of device.

#### U12-B01B [1992]

# **Magnetoresistive or spintronic devices**

Covers manufacture or structure of all magnetoresistive devices. Includes spintronic devices that involve giant magnetoresistance. Also covers spin detection in ferromagnetic semiconductor sources.

Giant magnetoresistive (GMR) device, spintronic device

#### U12-B02 [1987]

# Ovshinsky devices. Bulk negative differential resistance (NDR) devices

For negative resistance FET see U12-D02J1.

# U12-B02A [1992]

#### **Gunn-effect devices**

Includes Transferred-Electron Devices. *TED* 

## U12-B03 [1987]

# Other devices and thick/thin film and organic semiconductor devices

See also U14-H codes for film circuits.

## U12-B03A [1987]

## Thin/thick film transistors (inorganic)

Covers materials and structural details of individual device rather than array or layout details. Includes coplanar type, stagger structure TFT.

Reverse staggered

#### U12-B03B [1987]

# Thick/thin film devices (inorganic) other than transistors

Includes e.g. thin film solar cells (see also U12-A02 or U12-A02A2Q).

# U12-B03C [1987]

#### **Organic devices**

Excludes chemical or pressure-sensitive transducers (see U12-B03E). For LEDs, Solar cells and photoreceivers with organic layers see U12-A01A1E, U12-A02A2D and U12-A2B5E respectively.

Bacteriorhodopsin

# U12-B03D [1992]

#### Cold cathode field emission devices

(U12-B03X)

See also V05 codes. Covers micro-scale, or smaller, devices created using IC manufacturing processes. For complete manufacture see also U11-C18B9, or relevant U11-C codes for specific processes.

**FED** 

## U12-B03E [1992]

#### Semiconductor transducers

(U12-B03X)

See also appropriate codes in S02, S03 and V06 classes. For non-semiconductor piezoelectric elements/transducers see V06 codes only. Includes e.g. pressure sensitive (see also S02-F04B3), piezoresistive, and chemical sensors. For manufacture see also U11-C18C.

CHEMFET, ISFET

#### U12-B03F [1992]

# Microstructural or nanostructural devices or systems

(U12-B03X)

For manufacture, see also U11-C18C codes. See X25-L01A and X25-L03A codes for microvalves and micropumps respectively, and V06-M06G codes for micromotors.

#### U12-B03F1 [2002]

#### Microstructures

See S03-H02A for micrometre scale instrumentation.

# U12-B03F1A [2002]

#### Microstructural devices

Includes individual MEMs devices

# U12-B03F1B [2002]

#### Microstructural systems

Includes assemblies of MEMs devices, and MEMs systems.

#### U12-B03F1C [2006]

#### Micromachine packages

See also V06 codes. For package details see also U11-D codes and for packaging processes see also U11-E codes.

#### U12-B03F2 [2002]

#### **Nanostructures**

See S03-H02B for nanometer scale instrumentation.

# U12-B03F2A [2002]

Nanostructural devices

# U12-B03F2B [2002]

Nanostructural systems

#### U12-B03X [1987]

#### Other discrete devices

From Jan 2002 see U12-B03F2 codes for nanotechnology.

#### U12-C

# Other two terminal devices (incl. resistors, capacitors)

Resistors and capacitors not implemented in semiconductor form are covered by V01 codes.

# U12-C01 [1983]

#### Diodes (incl. rectifier assemblies)

The following codes are no longer applied but they remain valid for records prior to 9201: U12-C01A, U12-C01B. For complete manufacture of diode devices see U11-C18B1. For Gunn diodes see U12-B02A. For variable capacitance diode, see U12-C02B. For Shockley diode and two terminal semiconductor controlled rectifier (SCR) see U12-D01B4.

#### U12-C01A\* [1987-1991]

#### Diodes - low, medium power

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U12-C01C to U12-C01X codes.

# U12-C01B\* [1987-1991]

# **Diodes - high power**

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U12-C01C to U12-C01X codes.

# U12-C01C [1992]

#### **Rectifier diodes**

Includes Schottky, planar, p-i-n diodes. PIN, PN, hot carrier diode, hot electron diode, Schottky barrier

#### U12-C01D [1992]

#### **Breakdown diodes**

Includes Zener, avalanche diodes.

Avalanche breakdown, voltage reference

# U12-C01E [1992]

#### IMPATT and related transit time diodes

(U12-B, U12-B02)

Includes barrier junction injection and transit time diode, trapped plasma avalanche triggered transit diode, double velocity transit time diode, mixed tunnelling avalanche transit time.

BARRITT, TRAPPATT, DOVETT, MITATT

# U12-C01G [1992]

#### **Tunnel diodes**

(U12-C, U12-B)

Includes metal-insulator-semiconductor tunnel diode, metal-insulator-metal tunnel diode, Esaki diode, but also quantum effect diodes, e.g. resonant tunnelling diodes.

MIS, MIM, RTD

U12-C01X [1992]

Other types of diode

U12-C02 [1987]

**Capacitors** 

U12-C02A [1987]

Metal-insulator-semiconductor capacitors e.g. MOS

U12-C02A1 [1987]

For memories e.g. dynamic RAM

# U12-C02B [1992]

#### p-n junction capacitors

Includes variable capacitance diodes, e.g. varactors. See V01-B02B1 for discrete diode embodiments.

# U12-C02C [1992]

#### **Metal-insulator-metal capacitors**

When used as LCD driving element in active matrix see also U14-H01A and U14-K01A2A.

MIM

#### U12-C02F [1997]

# Ferroelectric capacitor for integrated circuits

(U12-C02X)

For capacitors used in ferroelectric memories see also U14-A03F.

# U12-C02X [1992]

#### Other types of capacitor

# U12-C03 [1987]

#### Resistors, inductors

Includes resistors with PN junction.

#### U12-C03A [2002]

#### Resistors

Includes PN junction structure aspects.

## U12-C03B [2002]

#### **Inductors**

Includes structure of inductive aspects of monolithic microwave integrated circuits (MMIC) (see also U14-H03C2 codes). For telecommunications aspects see W01 codes.

# U12-C04 [2002]

#### Fuses

For all structural aspects of fuses/antifuses including memory redundancy circuits (see also U14-D01A). Before Jan 2002 see U11-D03B2A for structural aspects. For fuse manufacture see U11-C05G2A.

#### U12-D

# Electrically controllable semiconductor devices

Codes in this section are used on their own for novel device structures, but also together with U11 codes to identify type of device whose manufacture is covered by U11 codes. For example, electrode manufacture for SOI insulated gate field effect transistor is coded in U11-C05F1 and U12-D02A4. For thin film transistor see U12-B03A and appropriate U12-D codes according to type of transistor.

#### U12-D01

# **Bipolar devices**

#### U12-D01A

#### **Bipolar transistors**

Bipolar junction, Darlington transistor

# U12-D01A1 [1992]

#### MOS gated bipolar transistor

Includes insulated gate bipolar transistor IGBT, conductivity modulation MOS

# U12-D01A2 [1992]

#### Heterojunction bipolar transistor

See also U12-E01 for details regarding materials, structures of the heterostructure.

# U12-D01A3 [1992]

# Hot electron bipolar transistor

This code takes precedence over U12-D01A2, e.g. for HBT with heterostructures. For hot electron unipolar transistors see U12-D02J.

Auger transistor

#### U12-D01A4 [1992]

# Bipolar transistor with tunnelling mechanism

Includes resonant tunnelling bipolar transistor. *RTBT* 

#### U12-D01A5 [1992]

# Bipolar transistor with semiconductor on insulator substrate

(U11-C08A5, U13-D, U12-D01A)

For manufacturing aspects regarding silicon-oninsulator structures see U11-C08A6.

SOI

#### U12-D01A9 [1992]

## Other types of bipolar transistor

Covers aspects such as lateral/vertical collector diffused isolation structure.

#### U12-D01B

# **Thyristors**

For light activated thyristors see U12-A02B2C.

#### U12-D01B1 [1992]

# Field controlled thyristor (FCT)

For MOS gated control turn-off see also U12-D01B3.

МСТ

#### U12-D01B2 [1992]

## **Bidirectional thyristors**

Includes triacs (triode ac switch), diacs (diode as ac switch).

Bilateral diode switch, diac, bilateral triode switch, triac

## U12-D01B3 [1992]

# **Gate turn-off thyristor**

GTO

#### U12-D01B4 [1997]

#### Semiconductor controlled rectifier

(U12-D01B9)

Prior to 1997 for SCR see U12-D01B. For bilateral devices see U12-D01B2. Includes Shockley diodes. Forward blocking, reverse blocking

# U12-D01B5 [1997]

## Static induction thyristor

(U12-D01B9)

Static induced thyristor

#### U12-D01B9

[1992]

#### Other types of thyristor

Includes silicon unilateral/bilateral switch. From 1997 see U11-D01B4 for Shockley diodes and U11-D01B5 for static induced thyristors.

#### U12-D02

# **Unipolar devices**

#### U12-D02A

#### **IGFETs**

Also includes device in which insulator is made of material other than oxide e.g. nitride, and gate electrode is made of material other than metal, e.g. polysilicon. See also S03 codes for FETs used as sensors.

MOSFET, MISFET, CHEMFET, ISFET

#### U12-D02A1 [1983]

### **FET with floating gate**

For memories using floating gate FETs see U13-C04A, U13-C04B2, U14-A03B7 codes.

# U12-D02A2 [1992]

# FET with metal-insulator-silicon oxidesilicon (MIOS) structure for memories

Includes metal-nitride-oxide-semiconductor type. For memories using this type of transistor see U13-C04 codes and/or U14-A03B7.

MNOS

# U12-D02A3 [1992]

#### FET with lightly doped drain

(U11-C02J6, U12-D02A) LDD

#### U12-D02A4 [1992]

# FET with semiconductor on insulator substrate

(U11-C08A5, U12-D02A, U13-D)

For manufacturing aspects regarding silicon-on-insulator structures see U11-C08A6.

SOI

# U12-D02A5 [1992]

#### **IGFET** with heterostructure

HIGFET, SISFET, heterostructure MISFET

# U12-D02A7 [1997]

#### Ferroelectric transistor

(U12-D02A9)

## U12-D02A9 [1992]

#### Other IGFETs

Includes vertical MOS, trench, U-shaped grooved MOS, double diffused MOS, trench type MOSFET, Schottky barrier source and drain MOS. Also includes magnetoelectric FET, Spin-FET, Magnetic-FET MAGFET. For superconductive FET see also U14-F02B. From Jan 2006 see U12-D02E for multigate MOSFETs.

VMOS, UMOS, DMOS, DIMOS

## U12-D02B [1992]

# FET with pn-junction or Schottky barrier diode gate

(U12-D02X)

MESFET, JFET, dual-gate MESFET

# U12-D02C [1992]

# Transistor with static field regions

(U12-D02X)

Includes static induction transistor, permeable base transistor.

SIT, PBT

# U12-D02D [1992]

#### FET with quantum well, wire

(U12-D02X, U12-E01)

Includes doped channel hetero-MISFET (see also U12-D02A5), semiconductor gate heterostructure FET (see also U12-D02A5), double heterostructure FET. See also U12-E01 codes for details regarding materials, structures of the heterostructure.

#### U12-D02D1 [1997]

# **One-dimensional charge carrier FET**

(U12-D02D)

Quantum wire FET

#### U12-D02D2 [1997]

## **High electron mobility transistor**

(U12-D02D)

Includes Modulation doped FET, Two dimensional electron gas FET, Separately doped FET, Quantum well FET, Two dimensional hole gas FET.

SQWFET, HEMT, MODFET, TEGFET, 2DHGFET, SISFET, DHFET, HFET, doped channel heterojunction

# U12-D02E [2006]

#### **Multi-gate Unipolar transistors**

Used in conjunction with other U12-D02 codes where necessary to indicate the type of device, e.g. for Dual-gate MESFET see also U12-D02B.

Double-gated MOS. FINFET

#### U12-D02J

[1992]

## Hot electron transistor (HET)

(U12-D01A, U12-D02X)

Includes metal base transistor, planar doped barrier transistor.

PDB

## U12-D02J1 [1992]

## Real space transfer transistor

Includes negative resistance FET, charge injection transistor.

NERFET, CHINT, delta doping

# U12-D02J2 [1992]

# FET with tunnelling mechanism

Includes resonant tunnelling hot electron unipolar transistor, resonant tunnelling gate field effect transistor, ballistic transistor, tunnelling hot electron transfer amplifier, MIMIM structure tunnel transistor.

RHET, RT-FET, THETA

#### U12-D02K

[1992]

#### **Quantum interference devices**

(U12-D02X)

Covers devices whose operation is based on wave phenomena (e.g. electrons in two parallel highmobility channels are made to interfere constructively).

# U12-D02X

#### Other unipolar devices

# U12-E

# General

#### U12-E01

#### **Semiconductor bodies**

Heterojunction

#### U12-E01A

[1992]

# Semiconductor body characterised by materials

# U12-E01A1 [1992]

# Semiconductor body with AIII-BV compound layers

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium indium phosphide, gallium nitride, cubic boron nitride

# U12-E01A2 [1992]

# Semiconductor body with AII-BVI compound layers

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium sulphide, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium mercury telluride

# U12-E01A3 [1992]

# Semiconductor body with group IV element/compound (except elemental silicon) layers

Includes silicon-germanium layers.

Silicon carbide, diamond, germanium

# U12-E01A4 [1997]

# Semiconductor body with chalcogenide/chalcopyrite compounds

For solar cells, see U12-A02A2E. Includes semiconductors such as AI-BII-CVI, AII-BIV-CV, AII-BIV-CVI, etc.

Copper indium sulphide, copper gallium selenide, copper indium selenide

#### U12-E01A5 [1997]

#### Silicon-on-insulator structure

(U12-E01A, U12-E01A9)

For SOI manufacture, see U11-C08A6. This code is used for discrete device with SOI substrate. For integrated circuit with SOI substrate see U13-D07. *SOI* 

# U12-E01A9 [1992]

Semiconductor bodies characterised by other materials

#### U12-E01B [1992]

Characterised by semiconductor structure

# U12-E01B1 [1992]

# Semiconductor body with heterojunctions

U12-E01B2 code takes precedence.

# U12-E01B1A [2006]

## **Device with strained layer structure**

Includes strained channel to enhance chargecarrier mobility. For strained layer super lattice see also U12-E01B2.

Strained silicon, strained layer, relaxed layer, SLS

#### U12-E01B2 [1992]

# Semiconductor body with quantum wire, wells, superlattice

SQW, multi-quantum well, MQW

#### U12-E02

#### **Electrodes for semiconductor devices**

Includes ohmic electrodes, Schottky barrier electrodes and metal-insulator-semiconductor electrodes. Also includes novel gate structures. For electrode manufacture see U11-C05E and U11-C05F codes.

Schottky, ohmic

#### U12-Q [1992]

# Device intended to be used as part of integrated circuit

This code is used for individual devices intended to be used as elements of an integrated circuit. For example, a floating gate transistor for an EPROM is coded in U12-D02A1, U12-Q, U14-A03B7 and, if integration aspects are important, in U13-C04A.

# **U13: Integrated Circuits**

U13-B/C codes in this section are not used for circuitry which is routinely integrated e.g. logic gates, low power amplifiers etc. for which codes indicating the form of implementation in the appropriate sections of U21-U25 should be used. See U14-H01 for thin film circuitry e.g. for memories, display devices and large area contact image pick-up devices. For individual devices intended to be used in an integrated circuit see U12-Q and the more specific U12 code indicating the type of device (e.g. U12-D02A1 for floating gate IGFET, U12-C02A1 for capacitors used in DRAMs).

#### U13-A

# Charge transfer devices; Radiation sensors/detectors

Includes most types of solid state image sensors e.g. charge coupled devices, MOS. For video cameras see W04-M01.

#### U13-A01 [1983]

# IC radiation sensors, e.g. imagers characterised by detecting element

For complete manufacture see U11-C18B4. For Line image sensors (thin film) see U14-H01B. For CMOS image sensor structure and manufacture see also U13-D02A.

Image pick-up, matrix, row, column, photoelectric

# U13-A01A [1987]

# IC radiation sensor with photodiode, photoconductor

For individual device see U12-A02B2A. Includes MOS imagers.

# U13-A01B [1987]

# IC radiation sensor with phototransistor

For individual device see U12-A02B2B. Vertical, horizontal transistor

#### U13-A01B1 [1987]

IC radiation sensor with static induction transistor (SIT)

# U13-A01D [1997]

# Packaging aspects of IC radiation sensor

(U13-A01X)

Specific package aspects for individual photodiode, phototransistor are covered by U12-A01B3.

#### U13-A01F [1997]

# **Optical elements for IC radiation sensor**

(U13-A01X)

Includes optical filters, lenses. For complete optical filter manufacture see U11-C18D. For package window structures see U13-A01D and U11-D01C1. Filter, lens

#### U13-A01G [2002]

# Wavelength conversion layers for IC radiation sensors

Includes phosphors coated onto photodiodebased MOS imagers which fluoresce under X-ray radiation (see S05 codes for medical applications).

# U13-A01H [2006]

Circuits, drivers for IC radiation sensors

# U13-A01X [1987]

## Other aspects of IC radiation sensors

Includes focal plane array constructional details. Smear, blooming

# U13-A02 [1983]

#### Charge transfer devices

Includes acoustic charge transport devices, (see also U14-G if SAW driving employed). For complete manufacture see U11-C18B3. For CTD used as shift registers see U14-A01B. See also W04-M01 codes for area imagers, and S06-D05 codes for linear imagers. Includes any aspect regarding discrete CCD and also integrated CCD for imagers (see also W04-M01B).

Read, shift, register, clock

# U13-A02A [1992]

## Charge transfer device structure

Includes charge coupled devices, bucket brigade devices, charge injection devices.

Surface channel, SCCD, buried channel, BCCD, fill and spill, CCD, BBD, CID

#### U13-A02B [1992]

Circuits, drivers for CCD

#### U13-A02C [1992]

Packaging aspects of CCD

#### U13-A02D [2006]

#### **Optical elements for CCD imagers**

Includes optical filters, lenses that are inside, or part of, the package. For complete optical filter manufacture see U11-C18D. For package window structures see U13-A02C and U11-D01C1.

#### U13-A02X [1992]

## Other aspects of CCD

Smear, blooming

#### U13-B

## **Analogue circuits**

Mainly used for A-D and D-A converters (see also U21-A codes), but includes also modulators, demodulators, mixers and active filters which are integrated and do not have a specific code breakdown indicating IC details. Prior to 1997 for analogue and digital circuits integrated on same semiconductor chip see U13-B and U13-C; from 1997 for analogue/digital integration on same semiconductor substrate see U13-C09.

#### U13-B01

# Analogue circuits with bipolar devices

For semiconductor structure see U13-D01 codes.

#### U13-B01A\*

[1987-1991]

#### With FET elements

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U13-B03.

#### U13-B02

#### **Analogue circuits with FETs**

For semiconductor structure see U13-D02 codes.

#### U13-B02A [1987]

**Analogue circuits with MOSFETs** 

**CMOS** 

U13-B02B [1987]

Analogue circuits with MESFET, JFET

U13-B02C\* [1987-1991]

#### **FET with bipolar transistor**

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U13-B03.

#### U13-B03 [1992]

# Analogue circuits with combined FET and bipolar devices

(U13-B01A, U13-B02C)

Includes e.g. Bi-FET operational amplifier. For semiconductor structure see U13-D03 codes. **BiCMOS** 

#### U13-B04 [1992]

# Analogue circuits with diodes and/or capacitors and/or resistors

(U13-B01A, U13-B02C)

For semiconductor structures see U13-D01B.

#### U13-B09

[1987]

# Other aspects for analogue circuits

Includes custom analogue array.

## U13-C

## **Digital circuits**

Binary

#### U13-C01

# Digital circuits with bipolar devices

For semiconductor structures see U13-D01 codes.

#### U13-C01A [1992]

# Digital circuits with diodes, capacitors, resistors

For semiconductor structures see U13-D01B.

#### U13-C02

## **Digital circuits with FETs**

For semiconductor structures see U13-D02. Buffer, compound

# U13-C02A

[1987]

# **Digital circuits with MOSFETs**

**CMOS** 

# U13-C02B

[1987]

[1987]

## Digital circuits with MESFET, JFET

U13-C02C [1992]

# Digital circuit with FET and diodes, capacitors, resistors

For semiconductor structures see U13-D03A.

#### U13-C03 [1987]

# Digital circuits with combined bipolar and FET

For semiconductor structures see U13-D03B.

#### U13-C04

# Digital circuits with repetitive structures

E.g. matrix layout for read-only memories, programmable logic arrays, random access memories, gate arrays (for wiring and layout details see also U21-C01E and/or U11-G).

# U13-C04A [1987]

# Read only memory (non-electrically alterable)

Includes read only memory, programmable read only memory, erasable programmable read only memory, matrix layout. For more specific memory aspects see U14-A03B7, U14-A06C (for EPROM), U14-A06B1 (for PROM), U14-A06B5 (for ROM). For complete memory manufacture see also U11-C18B5.

Mask ROM

#### U13-C04A1 [1997]

# **Electrically-programmable ROM**

(U13-C04A) EPROM

# U13-C04B [1987]

## For RAMs and electrically alterable ROMs

Includes matrix layout. For complete memory manufacture see also U11-C18B5.

# U13-C04B1 [1992]

#### **Dynamic/static RAMs**

Random access

## U13-C04B1A [1992]

#### **Dynamic RAM**

Includes single transistor-single capacitor cell, three transistor cell. For specific aspects regarding capacitor manufacture, see U11-C05G1B, for capacitor structure see U12-C02A1. Prior to 1992 for transistor-capacitor DRAM structure, see U13-D03; after 1991 see also U13-D03A. For data refreshing, see U14-A03B4A.

# U13-C04B1B [1992]

#### Static RAM

For bipolar static RAM, E/R static RAM, flip flop, see also e.g. U14-A03A or U14-A03B1 codes.

Pseudo-static RAM, PSRAM

# U13-C04B2 [1992]

#### **Electrically erasable (alterable) PROM**

For specific transistor structure see e.g. U12-D02A1, U12-D02A2 as appropriate. See also U14-A03B7 for memory details.

EEPROM, E2PROM, EAROM, FLASH EPROM

# U13-C04C [1987]

# Integrated circuit Programmable Logic Devices

Includes field programmable logic devices, programmable logic arrays, programmable array logic, logic cell arrays. See also U21-C01E for circuitry for PLD e.g. power controller, sense amplifiers etc.

FPLA, PLA, PAL, fixed OR array, FOA, programmable interconnect, user configurable arrays

#### U13-C04D [1987]

# Full custom or semi-custom integrated circuit arrays

Includes application specific integrated circuits e.g. gate arrays, master slice, uncommitted logic arrays, configurable gate arrays.

Sea of gates, channel-less, channel type gate array, logic array, ASIC, basic cell, ULA

# U13-C05 [1987]

# Computer integrated circuit aspects. Single chip computer

See also T01-M05.

Microcomputer, microprocessor, one chip, system on chip, SOC

#### U13-C06 [1997]

# Large scale IC, Ultra large IC, wafer scale digital circuit aspects

Covers circuit and logic aspects only, for constructional details see U13-D codes. Cellular, VLSI, ULSI, LSI

# U13-C07 [1987]

#### On-chip testing circuits

Includes scan based testing, pattern generation (See also U11-F01D2A, U11-F01D2B). For computer aspects of shift path maintenance techniques, see T01-G02A1 also. Includes analogue test/trimming and multiple usage of terminals.

Scan testing

#### U13-C08 [1997]

#### **Circuit trimming**

For physical circuit repair see U11-C19A. For trimming thin/thick film for hybrid circuits see U14-H04B3B.

# U13-C09 [1997]

# Analogue/digital integration on same semiconductor chip

(U13-B, U13-C)

Prior to 199701, see U13-B and U13-C.

#### U13-D

#### Integrated circuit structures

Prior to 1992, for integration on all insulating (e.g. SOI) substrates see U11-C08A5 and U13-D. From 1992 for integrated circuits on insulating substrates see U13-D07.

#### U13-D01

Integrated circuit structure with bipolar devices

#### U13-D01A [1992]

Integrated circuit structure with complementary bipolar devices

Includes NPN-PNP structures.

#### U13-D01B [1992]

# Integrated circuit structure with diodes, passive components

Includes bipolar transistor-diode, diode-diode, capacitor, resistor integration.

# U13-D02

# Integrated circuit structure with FET

Field effect

#### U13-D02A [1983]

# **CMOS** integrated circuit structure

Includes manufacture.

Complementary metal oxide semiconductor

#### U13-D03 [1983]

Combined FET and bipolar integrated circuit structure

## U13-D03A [1992]

# FET in combination with diodes and/or capacitors and/or resistors

For one-transistor DRAM cell see also U14-A03B4. For transistors, diodes, used as protective elements e.g. for MOS devices see also U13-E01.

# U13-D03B [1992]

# **Bipolar-FET transistor integrated circuit structures**

Includes BiCMOS, BiFET structures.

# U13-D03B1 [1992]

Integrated circuit characterised by novel structure

#### U13-D03B2 [1992]

Integrated circuit characterised by novel method for structure manufacture

#### U13-D04 [1987]

# Integrated circuit structure in combination with other elements

Includes integration with e.g. SAW devices, piezoelectric, thermoelectric, Hall effect devices.

# U13-D04A [1992]

# **Opto-electronic integrated circuits**

For optoelectronics using integrated optical waveguides see also V07-F01A5.

OEIC

# U13-D04B [2005]

# Lab-On-Chip (LOC)

Includes DNA microarrays or biochips using semiconductor based technology. For instrumentation details see also \$03-H01 codes. For MEMs aspects see V06, and U12-B03F codes for micro- and nano-structural electronic or MEMs aspects. For glass microarray or non-semiconductor fluorescence based techniques see \$03 codes only.

Microfluidic, microarray, DNA chip, biochip, Gene ChipTM

# U13-D05 [1987]

# Three-dimensional, wafer-scale integration

Includes constructional details of master-slice circuitry. See also U11-D01A8 (packages) and U11-D03C3 (chip-on-chip). For 3-D structure manufactured by semiconductor recrystallisation over insulating substrates see also U11-C08C, U11-C03J1. For wafer scale circuitry see U13-C06. *Laminate* 

# U13-D06 [2002]

# Spherical integrated circuit structures

Includes spherical sensor circuits for in-situ monitoring of body functions (see also S05 codes for medical applications).

# U13-D07 [1992]

# Integrated circuit with semiconductor on insulator structure

For semiconductor on insulator manufacture see U11-C08A6. For bipolar and field effect transistor on insulating substrate see U12-D01A5 and U12-D02A4 respectively.

SOI, SOG, SOS

# U13-D08 [1997]

#### **Radiation hardened integrated circuits**

Rad hard

#### U13-D09 [2006]

# Integrated circuit with strained structures

Includes CMOS with strained channel structure to enhance charge-carrier mobility (see also U13-D02A), lattice mismatch and bandgap engineering. Strain

U13-E [1987]

**Circuitry in general** 

#### U13-E01 [1992]

# Electrical and thermal protection of integrated circuit

Includes protection against transient condition, reverse battery condition, electrostatic discharge. For fuses see U11-D03B2. For logic circuit aspects see U21-A03A2. For general low power electronic circuit protection see U24-F codes. For electrostatic, electromagnetic, thermal protection implemented as IC package adaptation see U11-D01C codes.

Latch-up prevention

# U13-E02 [1992]

# Power supply, substrate biasing of integrated circuit

For supply grounding see U11-D03C1. For amplifier protection see U24-G03C. For logic circuit aspects see U21-C03A2.

Charge pumps

# U13-E03 [1997]

# Input/output circuitry for integrated circuit

Includes input/output circuitry on integrated circuit chip. For layout design see U11-G.

Buffer

U13-E04 [2002]

# Clocking and synchronisation circuitry for integrated circuits

Includes on chip real-time clocks.

U13-E09 [1992]

Other general aspects IC of circuitry

# **U14: Memories, Film and Hybrid Circuits**

#### U14-A

#### **Digital static stores**

Dynamic recording is in T03 and W04. Storage systems for digital computing are in T01-H.

#### U14-A01

Shift stores (serial access)

#### U14-A01A

# **Magnetic devices**

For magnetic film/core memories, see U14-A04 codes.

#### U14-A01A1

[1983]

# **Bubble memories (non-volatile)**

Includes Bloch line memory, but when used as RAM see U14-A04A.

#### U14-A01B

# **Charge transfer devices**

Includes serpentine, serial parallel serial (SPS) structure, recirculating shift registers. Any aspect regarding CTD structure, packaging is covered by U13-A02 codes.

#### U14-A01X

## Other types of shift store memories

For FIFO aspects see U14-A08B1 also. *Inverter, LIFO* 

# U14-A02

Memories using (electro-, magneto-) optical elements

U14-A02A

[1992]

Memories using electro-optical or magneto-optical elements

U14-A02B

[1992]

Memories using optical storage elements

U14-A02B1

[1992]

Optical memories with interference, diffraction patterns

Includes e.g. holograms.

U14-A02B9

[1992]

Other types of optical memories

#### U14-A03

Memories using electric elements

#### U14-A03A

## Memories with bipolar devices

Includes memories with diodes and thyristors.

#### U14-A03A1

[1992]

# Memories with bipolar transistors

Covers memories using bipolar transistors as main constituents. Includes ECL RAMs (bipolar static RAM), ECL and Schottky TTL PROMs (programmed by blowing fusible links, see also U14-A06B1). For static RAM structures and/or complete manufacture see also U13-C04B1B and/or U11-C18B5. SRAM

#### U14-A03B

Memories with FETs (NMOS, CMOS)

#### U14-A03B1

[1983]

# Memories with FET in bistable cell configuration

Includes flip-flop, enhancement/resistance, six transistor cell static RAM (see also U13-C04B1B). For complete memory manufacture see also U11-C18B5.

(E/R)SRAM, (4T-2R)SRAM, random access

#### U14-A03B4

[1983]

#### Memories with capacitor store

(U14-A03X)

Includes planar, trench, stacked capacitor dynamic RAM. For structure and manufacture see U13-C04B1A, U13-D03 and U11-C18B5. If only capacitor manufacture and/or structure emphasised see U11-C05G1B and/or U12-C02A1. DRAM, random access

## U14-A03B4A

[1992]

#### **Data refreshing for memories**

(U14-A20)

Includes both internal and external refresh for dynamic RAM, pseudo-static RAM.

#### U14-A03B5

[1992]

# **Memories with FET-bipolar integration**

(U14-A03A, U14-A03B)

For bipolar static RAM with e.g. CMOS circuitry, i.e. BiCMOS static RAM, see also U14-A03A and/or U13-C04B1B, U13-D03B codes if structure and manufacture are important. For BiCMOS dynamic RAM see also U14-A03B4 and/or U13-C04B1A, U13-D03B codes if structure and manufacture are important. Complete memory manufacture is covered by U11-C18B5.

BIMOS, SRAM, DRAM

# U14-A03B7 [1983]

# Memories with adjustable threshold MOS transistor

(U14-A03X)

Covers electrically programmable read-only memory, electrically erasable programmable read-only memory, electrically bulk erasable programmable read only memory. Includes variations of floating gate type e.g. floating gate tunnel oxide, textured polysilicon, split gate, floating gate avalanche MOS, stacked gate avalanche injection MOS, as well as variations of silicon-nitride-oxide-silicon type e.g. silicon-oxide-oxide-silicon, metal-nitride-oxide-silicon. For more specific details regarding floating gate MOS transistor or MIOS type transistor see also U12-D02A1, U12-D02A2 respectively. For matrix layout see U13-C04A1 for EPROMs, and U13-C04B2 for EEPROMs.

EPROM, EEPROM, FLASH EEPROM, FLOTOX, FAMOS, SAMOS, SNOS, SONOS, MNOS, Fowler-Nordheim tunnelling, hot carrier injection

#### U14-A03B9 [1987]

# Memories with combined ROM and RAM memory cells

Includes e.g. non-volatile RAM in which SRAM array is duplicated (shadowed) by an equivalent EEPROM.

NOVRAM, shadow RAM

#### U14-A03F [1992]

#### Memories with ferroelectric elements

(U14-A03X)

Includes e.g. non-volatile variable resistive EEPROMs, non-volatile ferroelectric RAMs, ferroelectric capacitor memories (see also U14-A03B4).

'Cross point arrays'

# U14-A03G [1992]

#### Memories with superconductive elements

(U14-A03X)

See also U14-F02B.

Josephson, superconducting

#### U14-A03H [2006]

# Programmable conductor RAM (PCRAM)

Includes chalcogenide memories, phase change ovonic unified memories, phase change memories, and programmable resistor memories, resistive memories.

OUM

#### U14-A03X

# Other types of memories with electric elements

Includes e.g. memories based on electrochemical cell, organic films etc. For variable resistance memories see U14-A03H from 2006.

#### U14-A04

## Memories with magnetic elements

#### U14-A04A

[1992]

#### Memories with magnetic thin films

Includes crosstie random access memory, Bloch line memory element used for non-volatile RAM. *CRAM, magnetoresistive RAM* 

# U14-A04A1 [2006]

## Using giant magnetoresistance effect

E.g. using ferromagnetic layers separated by metallic layer. Includes pseudo spin valve MRAM devices.

GMR, spin valve, spin transistor, pseudo spin valve, PSVMRAM

# U14-A04A2 [2006]

## Using tunnel magnetoresistance effect

E.g. using ferromagnetic layers separated by electrically insulating layer. Includes magnetic tunnel junction or tunnelling magneto-resistance MRAM devices.

TMR, spin tunnel transistor, tunnel junction, MJT

#### U14-A04X

#### Memories with core stores

Includes ring shaped ferrite cores.

# U14-A05

#### **Associative memories**

Includes content addressable memory. *CAM* 

#### U14-A06

# (Semi-)permanent (non-volatile) ROM

# U14-A06A\*

[1983-1986]

# **Electrically alterable semiconductor stores**

\*This code is now discontinued, but remains searchable and valid for records from 1983 to 1986. From 1987 see U14-A03B7.

# U14-A06B [1983]

# Non-reprogrammable stores (fixed-program memory)

Includes one-time programmable or 'one shot' EPROMS (without guard window to allow UV erasure).

OTP

#### U14-A06B1 [1987]

# Non-reprogrammable memories using diodes or fuses

Includes PROM based on e.g. bipolar transistors (ECL or Schottky TTL) which are programmed by blowing fusible links.

Zener-zap

#### U14-A06B5 [1987]

# Mask programmable, ion implantation programmable ROM

Includes ROM custom programmed during manufacture, obtained both with bipolar or MOS technology, by using e.g. contact window method, diffusion layer method, or ion implantation. For details of manufacture, see appropriate codes in U11 and for structure see also U13-D codes and/or U13-C04A.

#### U14-A06C [1987]

## Non-electrically (e.g. UV) erasable ROM

Includes EPROM which can be programmed by user. See also U13-C04A and/or, prior to 1992, U13-C04B, U14-A03B7, as appropriate.

### U14-A06X [1987]

## Other non-volatile memories

## U14-A07

#### Reading/writing

Includes data-in/data-out (I/O) control circuits, I/O signal interface, bit line control e.g. precharge and equalisation circuitry, voltage boosters, clocking circuits for read/write operations, safety circuits to prevent inadvertent reading/writing, initialisation circuits. Prior to 1992, some aspects regarding circuitry for reading/writing were covered by U14-A20.

## U14-A07A [1983]

#### Reading, sensing circuits

Includes reading methods, sense amplifiers and associated circuitry e.g. sense reference voltage generator, charge pump circuits for providing current to sense amplifiers.

#### U14-A07B [1992]

## Programming, erasing circuits

Includes voltage boosters for e.g. erasing/programming EEPROMs.

#### U14-A07C

#### [1997]

## Clocking circuits, synchronisation

(U14-A07

General aspects of digital circuit synchronisation are covered by U22-H.

Time skewing

# U14-A08

# Address selection; Transmission of information between stores

For shift aspects of FIFO stores see U14-A01X also. Includes address, decoders and associated circuits, word line control circuits, timing circuits for address selection, two dimensional and multiplexed addressing. Prior to 1992 some aspects regarding circuitry for addressing were covered by U14-A20.

# U14-A08A [1983]

#### **Address-selection**

Includes e.g. page mode and static column mode operation, chip selection circuitry.

Row address strobe, RAS, column address strobe, CAS

#### U14-A08B [1983]

# Transmission of information between stores

Serial transmission, cache memory

# U14-A08B1 Multiport memories

[1992]

[1992]

Includes both random access memories and sequential memories (for the latter see also U14-A01X). Prior to 1992, first in-first out aspects are covered by U14-A08 and, for shift stores, by U14-A01X.

FIFO, dual port RAM, dual port burst access memory, BAM

# U14-A09

#### **Power supply for memories**

(U14-A20)

Includes power back-up and data preservation aspects.

## U14-A10 [1992]

## **Packages for memories**

(U14-A20)

For specific aspects of packaging see appropriate subclasses in U11-D, U11-E. Includes special adaptations e.g. small battery provided inside package.

#### U14-A11 [1992]

# Software error prevention modifications

(U14-A20)

Includes e.g. method to prevent errors introduced by radiation (see also U11-D01C2 for package adaptations).

#### U14-A20

## Other memory circuits

#### U14-B

# **Electric analogue stores**

Sample-and-hold arrangements are coded in U21-B03.

Analogue memory

#### U14-B01

# **Multilevel memory**

Includes digital memory functionality with cells holding more than two voltage levels (not strictly digital)

## U14-B02 [2002]

#### With elements simulating neuronal cells

For complex neuronal configurations see T01-E05B and/or T02-A04A5.

# U14-C

# General layout aspects regarding memories; Interconnection arrangements

Core, matrix, plate, unit, frame

#### U14-C01 [1992]

# Interconnecting storage elements

(U14-A20)

Include power/signal transmission line layout relating to bit and word lines. See also appropriate codes in U11-C05, U11-D03, U11-G.

Open bit line architecture, folded bit line architecture

#### U14-D

# Checking store operation, redundancy

#### U14-D01 [1987]

## Memory built-in self test, redundancy

Includes detecting defective memory elements and replacing them with redundant memory elements.

[1987]

#### U14-D01A

#### Redundant arrangements, fuses

Includes redundant memory cells used to replace defective cells of main memory array and associated techniques e.g. cutting the fuse with laser beam.

#### U14-D01B [1997]

# Testing memory operation using internal circuit

(U14-D01)

Self-test, built-in circuit

## U14-D02 [1987]

# Testing memory using error correction codes

Includes two dimensional codes e.g. Hamming codes, horizontal and vertical parity, BCH codes and multidimensional codes.

#### U14-D03 [1987]

# Testing memory using external circuit or apparatus

E.g. for testing bubble memories.

# U14-D09 [1987]

Other memory testing aspects

# U14-E

# Thermoelectric/magnetic devices

Peltier effect, Seebeck effect

#### U14-E01 [1987]

# Radiation pyroelectric detector

Includes image sensors. See also S03-A03 and S03-A01B codes.

#### U14-E01A [1992]

# Pyroelectric device characterised by material

(U11-A02, U14-E)

For pyroelectric materials see also U11-A02.

# U14-E01B [1992]

# Structure of pyroelectric device

See also S03-A03 for pyrometry in general. Dielectric bolometer, pyroelectric sensor

# U14-E01C [1992

Pyroelectric device manufacture

# U14-E02 [1992]

## Thermomagnetic devices

(U14-E)

Includes devices using Nernst-Ettinghausen effect. Covers manufacture.

## U14-E05 [1987]

# Power generation, cooling, temperature sensors

Includes devices with junction of dissimilar materials exhibiting Seebeck, Peltier effect.

#### U14-E05A [1992]

Characterised by function of thermoelectric device

#### U14-E05A1 [1992]

# Power generating thermoelectric device

Thermopiles

#### U14-E05A2 [1992]

# Heat extracting thermoelectric devices

Heat pumps, cooling, Peltier, electrocaloric effect, thin film perovskite PZT

#### U14-E05A3 [1992]

#### Thermoelectric sensors

(U14-E09)

See also S03-B01A.

Thermocouple

## U14-E05B [1992]

# Thermoelectric device characterised by material

(U14-E)

Bismuth telluride (with antimony)

#### U14-E05C [1992]

Thermoelectric device manufacture

#### U14-E09 [1987]

# Other aspects regarding thermoelectric devices

#### U14-F

# Superconductive devices

Josephson

## U14-F01 [1992]

#### Materials for superconductive devices

Includes novel compositions (chemical and crystalline structures), and their manufacture and processing to improve characteristics, (e.g. grinding, mixing, pressing, sintering etc.). Materials, devices and equipment specifically for heavy/power electrical use are covered by X12-C05, X11-H05, X12-D06 codes. Materials for unspecified uses are covered by U14 and X12-D06B codes. For testing aspects see also U11-F01 codes.

#### U14-F01A [1992]

Superconductive metal alloys and their manufacture

## U14-F01A1 [1992]

Superconductive alloy manufacture and processing

#### U14-F01A5 [1992]

**Novel superconductive metal alloys** 

#### U14-F01B [1992]

Non-metal superconductive materials and their manufacture

#### U14-F01B1 [1992]

# Manufacture and processing of ceramic superconductive materials

Milling, mixing, calcination, sintering, cold/hot pressing

#### U14-F01B5 [1992]

# Superconductive oxide novel materials

## U14-F01B7 [1997]

#### Other superconductive materials

(U14-F01B)

For materials not covered by U14-F01A5 and U14-F01B5, e.g. for superconductive organic material.

#### U14-F02 [1992]

#### Superconductive device, circuits

These codes imply use of oxide materials unless specified by presence of U14-F02H code.

## U14-F02A [1992]

## Superconductive thin/thick film

Includes deposition, patterning, metallurgical details, patterned layers. For techniques of deposition or etching see also U11-C05C codes U11-C01 or U11-C07 codes, for apparatus see also U11-C09 codes. See also U14-H02 for thick film.

# U14-F02B [1992]

#### Superconductive devices

For manufacture of complete device see also U11-C18B9; for specific aspects e.g. electrode manufacture, see also U11 codes e.g. U11-C05F6. For superconductive FET see also U12-D01A9. Josephson tunnel junction, SQUID

#### U14-F02C [1992]

# Circuits using superconductive devices

(U21-A03G, U21-C01X)

For logic circuits see also U21-C01F. For analogue to digital converters using superconductive elements see U21-A03G.

#### U14-F02H [1992]

# Superconductive devices, circuits using metal alloys

This code is used in conjunction with U14-F02 codes to indicate use of alloy material rather than oxide for particular circuit, device.

# U14-G

#### **Acoustic wave devices**

For surface acoustic wave generator, see also V06-V01E1. For acoustic charge transport device using SAW see also U13-A02A.

Elastic, surface, SAW

#### U14-H

# Film and hybrid circuits, multilayer substrates, IC chip mounting

See V04-R also for details applicable to PCB manufacture.

#### U14-H01

## Thin film

# U14-H01A [1987]

# Thin film two dimensional arrays e.g. for memories, LCDs, ELDs

Used for layout and manufacturing aspects. Use U12-B03A for semiconductor physics, material and heterostructure details. For LCD see also U14-K01A2 codes; for electroluminescent displays see also U14-J codes.

Display, matrix

# U14-H01B [1987]

# Thin film transducers, printers, line image sensors

For facsimile applications see S06-D05 also. Used for sensor arrays not having sufficient semiconductor body details for inclusion in U12-A02B. For thermal printer heads/materials see S06-H03 or for thermal ink jet printer see S06-G01. Does not include thin film magnetic heads, for which see T03-A03E.

# U14-H01C [1987]

# Thin film circuits, amplifiers, filters

For thin film capacitors, resistors with emphasis on semiconductor body see U12-B03B and U12-C02 or U12-C03 as appropriate.

# U14-H01D [1987]

# Thin film packages, interconnections

See also U11-D codes.

## U14-H01E [1987]

## Thin film transparent conductive layers

See U11-C18D also for sputtered optical layers. Includes pixel/colour filters, lithography, and general imager-display use.

Indium tin oxide, ITO, lead oxide, zinc oxide

# U14-H01E1 [2015]

#### **Transparent conductive oxides**

Includes indium tin oxide (ITO), zinc oxide compounds etc.

#### U14-H01E2 [2015]

#### **Transparent conducting polymers**

Includes polythiophenes, e.g. Poly(3,4-ethylenedioxythiophene) (PEDOT), Poly(4,4-dioctylcyclopentadithiophene) etc.

#### U14-H01E3 [2015]

# **Metal compositions**

Includes metal halides, such as silver halide, copper iodine. Can be used in conjunction with U14-H01E1 for example film containing indium oxide (ITO) and copper iodide.

## U14-H01E4 [2015]

## Nanowire transparent conductive films

Includes use of carbon, silver or copper nanowires or nanotubes or nano-particles as transparent conductive films.

#### U14-H01E5 [2015]

#### Mesh structured films

Includes copper mesh, silver mesh, metal mesh PET

## U14-H01F [1987]

## General thin film layer details

Includes e.g. insulating, conductive, lithography, multi-layer structures (e.g. for chip-carrier boards), using thin-film deposition (see also U11-C and U11-D codes).

#### U14-H02

#### Thick film

For material composition of thick films see U11-A05 codes.

#### U14-H03

## **Hybrid circuits**

From 2009 IC chip mountings have been transferred to U14-H05. See also V04-R and V04-Q codes.

## U14-H03A\* [1987-2008]

# Mountings for unpackaged IC chips onto substrate (ceramic, polymer, dielectric)

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes.

#### U14-H03A1\* [1987-2008]

# Un-encapsulated IC chip mounting arrangement (ceramic, multilayer ceramic, polymer, semiconductor substrate)

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. Used for chip carrier which implies subsequent encapsulation of device once mounted (for encapsulation see U14-H03A3). See also U11-D01 for package details. For general chip carrier substrate aspects see U11-D01A. For high density multilayer interconnect see U14-H03A4. Multilayer ceramic boards are also covered by U14-H03B for structure/material, and by U14-H04A3 for manufacture.

## U14-H03A2\* [1987-2008]

### Other chip to substrate connection

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For solder preforms see also U11-D03A9 (semiconductor mountings and terminals). Prior to 1992 this code included flip chip technology, (from 1992 see U11-E01C).

## U14-H03A3\* [1987-2008]

# **Encapsulation details for individual chip** mounted on substrate

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For general aspects regarding multi-chip module, see U11-D01A6 or, for hybrid circuit packages see U14-H03C3.

## U14-H03A4\* [1987-2008]

# Interconnections between several chips on substrate

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. Includes use of e.g. wire bonding between chips on same substrate (which may also include semiconductor, e.g. silicon). Covers Advanced VLSI packaging, high density interconnect. Also includes optical contactless connection for communication between chips (see also U11-D03C3).

AVP, HDI, high density multi-chip interconnect, HDMI

#### U14-H03A4A\* [1992-2008]

# Thick film modules using e.g. ceramic dielectric

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. See also relevant codes in U11 class, e.g. U11-D03B9, U11-D03C3 and/or other relevant codes in U14 class, e.g. U14-H03A1, U14-H02, U14-H03B, U14-H04A3.

#### U14-H03A4B\* [1992-2008]

# Thin film modules using e.g. polymer dielectric

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. See also relevant codes in U11 class e.g. U11-C05A, U11-C05D2, U11-C05D3, U11-D03B9, U11-D03C3 and/or relevant codes in U14 class, e.g. U14-H01D, U14-H01F, U14-H03A1.

Polyimide thermoset, KAPTON

## U14-H03B\* [1987-2008]

## Multilayer ceramic wiring boards

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For chip carriers see also U11-D01A, for unencapsulated IC mountings see also U14-H03A1. For high density multilayer interconnect see U14-H03A4.

#### U14-H03B1\*

[1987-2008]

# Details of materials/structures for multilayer ceramic substrates

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes.

#### U14-H03B2\*

[1987-2008]

# Other details associated with chip mounted on multilayer ceramic substrate

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. Includes e.g. recess to facilitate enclosure of chip, terminals, capacitors included in the multilayer board (see also U11-D03C1) etc.

#### U14-H03C\*

[1987-2008]

### Hybrid circuits (general)

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03G. Includes substrates not covered elsewhere in U14-H03. See also U11-A05B for material aspects, and U11-D01A for chip carrier.

Aluminium nitride, silicon carbide

## U14-H03C1\*

[1987-2008]

#### Alignment of chips in array

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. E.g. for line image sensor, facsimile, photoelectric reader.

Facsimile, reader, photoelectric

### U14-H03C2\*

[1987-2008]

# Analogue circuitry - transistor and transmission line details

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. See W02-A also for microstrip/stripline circuitry.

Triplate

#### U14-H03C2A\*

[1997-2008]

## High frequency integrated circuits

(U14-H03C2)

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see code U14-H03H for high frequency circuits. Includes monolithic microwave integrated circuits. For package aspects see U11-D01A4. For integrated circuit structures see also U13-D codes.

MMIC

#### U14-H03C3\*

[1987-2008]

## Hybrid circuit packages and terminals

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For multi-chip modules see also U11-D01A6.

Lead, Pin

## U14-H03D

[2009]

Hybrid circuits using thick films

#### U14-H03E

[2009]

Hybrid circuits using thin films

#### U14-H03F

[2009]

**Substrates for hybrid circuits** 

#### U14-H03F1

[2009]

### Ceramic substrates

Includes any details of ceramic substrates to do with hybrid circuits.

# U14-H03F2

[2009]

## Other substrates types

Includes all substrates other than ceramic substrates associated with hybrid circuits.

#### U14-H03G

[2009]

## Hybrid circuits(general)

Covers general hybrid circuit aspects that are not covered in above H03 codes. Replaces retired code, H03C.

## U14-H03H

[2009]

### High frequency integrated circuits

(U14-H03C2A)

Covers all high frequency integrated circuits. Includes high frequency ICs for RFID tags and other RF devices.

MMIC, RFID

#### U14-H04

Hybrid and thick film circuit manufacture

U14-H04A [1983]

Film and substrate processing for hybrid circuits

U14-H04A1 [1987]

# Screen printing; Thick film layer processing

Includes ceramic 'wafer' dicing. Squeegee, print, bake

### U14-H04A2 [1987]

# Electroplating, vapour beam deposition, sputtering processes to apply conductive layers to ceramic or hybrid substrates

For metallurgical aspects regarding conductor patterns on ceramic substrate see also U11-D03B3.

### U14-H04A3 [1987]

Ceramic circuit board manufacture (For hybrid circuits only)

U14-H04A4 [2009]

Trimming of thin/thick film components (U14-H04B3B)

U14-H04A9 [1987]

Other hybrid circuit manufacturing aspects

## U14-H04B [1983]

### Hybrid circuit assembling

Includes all aspects of hybrid circuit assembling and manufacture, previously coded before 2009 in U14-H04B1 to U14-H04B9.

#### U14-H04B1\* [1987-2008]

#### Hybrid circuit packaging

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture. Coating with resin, sealing package.

# U14-H04B2\* [1987-2008]

## Applying terminals for hybrid circuits

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture. Includes e.g. connector for hybrid circuit (see also V04-K02 and V04-B01).

# U14-H04B3\* [1987-2008]

# Mounting components onto substrate; Trimming of layer components

\*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture.

## U14-H04B3A\* [1992-2008]

# Bonding, mounting components on hybrid circuit substrate

\*This code is now discontinued, but remains searchable and valid for records from 1992 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture.

## U14-H04B3B\* [1992-2008]

## Trimming of thin/thick film components

\*This code is now discontinued, but remains searchable and valid for records from 1992 to 2008. From 2009 see U14-H04A4.

# U14-H04B9\* [1992-2008]

## Other hybrid circuit assembling aspects

\*This code is now discontinued, but remains searchable and valid for records from 1992 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture. Includes e.g. demounting defective components in multi-chip modules (see also U11-E02B). For testing aspects see also U11-F01F.

#### U14-H05 [2009]

# Hybrid circuit package and/or terminal arrangements

(U14-H03)

Includes mountings of chips on substrates, leads, terminals, sockets, holders and packaging.

### U14-J

### **Electroluminescent light sources**

For electroluminescent materials see U11-A15. See also X26-J only if device is used for illumination purposes. Excludes devices covered by U12-A01.

#### U14-J01 [1992]

#### Electroluminescent source manufacture

## U14-J01A [2005]

# Manufacture for electroluminescent displays

Includes all methods of manufacture for electroluminescent displays.

### U14-J01B [2005]

# **Equipment for manufacture of electroluminescent devices or displays**

Includes all equipment for both electroluminescent devices or displays.

### U14-J02 [1992]

# **Electroluminescent display structure**

ELD

## U14-J02A [1992]

# With electrode details of electroluminescent display

For thin film transparent conductive layer on glass substrate see also U14-H01E. From 2002 use with U14-J02D codes to indicate material aspects of structure.

Indium tin oxide, ITO

## U14-J02B [1992]

# Module details and sealing arrangements of electroluminescent display

Includes connections to external electrodes or PCBs.

#### U14-J02C [2005]

#### **EL** display optical components

For complete filter manufacture see also U11-C18D.

#### U14-J02D [2002]

Inorganic/organic electroluminescent displays

U14-J02D1 [2002]

Inorganic electroluminescent displays

U14-J02D2 [2002]

# Organic or polymeric electroluminescent displays

Includes structures with polymeric and organometallic complexes.

U14-J02E [2005]

# Switching elements for active matrix electroluminescent displays

Includes two and three terminal switching arrays

U14-J03 [1992]

# Circuits and drivers for electroluminescent devices

From 2002 use with U14-J02D codes to indicate material aspects of structure.

U14-J03A [2007]

**Circuits and drivers for electroluminescent displays** 

U14-J03B [2007]

Circuits and drivers for other electroluminescent devices

U14-J04 [2005]

# Testing aspects of Electroluminescent displays

Testing for active matrix see also U11-F01F and U11-F01D codes. For module testing see also S01-G01A3 and V04-Q02A2.

U14-J05 [2007]

#### **Electroluminescent device structure**

For electroluminescent devices other than displays.

U14-J05A [2007]

Electrode details for electroluminescent devices

U14-J05B [2007]

Module/Package details and sealing arrangements of electroluminescent devices

U14-J05C [2007]

Optical elements for electroluminescent devices

U14-J05D1 [2007]

Inorganic electroluminescent device

U14-J05D2 [2007]

Organic electroluminescent device

#### U14-K

### **Passive displays**

Refers to displays modifying light generated elsewhere.

## U14-K01 [1983]

### Liquid crystal displays

For materials see U11-A03A, V07-K10A. For light valves, shutters, light spatial modulator see V07-K01A2. Testing aspects of active matrix are also covered by U11-F01F. For storage effect see U14-A02A.

LCD

## U14-K01A [1983]

Cells, constructional details, and circuits of LCD

### U14-K01A1 [1987]

Transparent conductive films, alignment layers, spacers of LCD

## U14-K01A1A [1992]

## LCD alignment layer

(U11-A09, U14-K01A1)

Includes films and materials used for alignment, cloths for rubbing the alignment coating, etc.

Orientation

#### U14-K01A1B [1992]

# Transparent conductive films, and electrodes of LCD

Includes electrode details for passive LCD, i.e. with parallel conductive tracks. See also U14-H01E for transparent conductive film.

## U14-K01A1C [1992]

## **LCD** optical components

Includes filters, polarisers, phase retarders. For complete filter manufacture see also U11-C18D.

#### U14-K01A1D [1992]

## Spacers used in LCD

(U14-K01A, U14-K01A2)

## U14-K01A1G [1992]

# Characterised by specific electro- or magneto-optical effect of LC material

Includes field induced birefringence, guest-host effect, dynamic scattering, etc. For optical addressing (thermally induced phase transitions) see V07-K01A2.

Field induced phase change, cholesteric, twisted nematic, orientation, plechroic dye

## U14-K01A1J [1992]

#### **LCD** manufacture

(U14-K01, U14-K01A)

Include e.g. filling the cell with LC material. For manufacture of switching elements for driving active matrix see U14-K01A2 codes.

### U14-K01A1K [2005]

## **Equipment for manufacture of LCDs**

Includes all equipment for manufacture of LCD, including substrate handling equipment, etching, lithography etc. See also U11 codes for individual processes and equipment.

## U14-K01A1L [2007]

## LCD repair and correction

See also U14-K01A8 for LCD testing aspects.

## U14-K01A2 [1987]

# Other constructional details, coating, and optical layers of LCD

Includes manufacture and structural details regarding switching elements for driving active matrix display. Also covers antireflective coatings.

#### U14-K01A2A [1992]

# For two terminal switching elements of LCD

Includes diodes, MIM elements, varistors. For thin film aspects see also U14-H01A. See also other appropriate codes in U11 and U12 e.g. U11-C05G1, U11-C18B1, U12-C01, U12-C03.

### U14-K01A2B [1992]

# For three terminal switching elements of

Includes thin film transistor (TFT) aspects. See also U14-H01A and where appropriate, U11-C18A1, U12-B03A, U12-D02A.

#### U14-K01A2C [1997]

#### Plasma addressed LCD

(U14-K01A2, U14-K01A1B) See also V05-A01A7.

### U14-K01A2D [1997]

# LC cells integral with photoconducting, ferroelectric layer

Prior to 1997 see also U14-K01A1G, V07-K01A, V07-K05.

## U14-K01A2E [2007]

#### **Coatings for LCD**

Covers all protective coatings, includes antireflective films coating for LCDs

## U14-K01A3 [1987]

#### Circuits, drivers of LCD

Includes mainly drive circuitry integral with LCD or circuitry which depends on specific characteristics of LCD., e.g. feedback control for detection of ambient light and control of light valve. More general aspects of drive circuitry are covered by T04-H03C2 or W03-A08B codes. See also under application.

## U14-K01A4 [1987]

# LCD associated with mountings, PCB connectors. Module details

Includes back-lighting aspects (see also W05-E05B).

## U14-K01A4A [1997]

## **Modular details of LCD**

(U14-K01A4)

Includes sealing aspects.

#### U14-K01A4B [1997]

# Connections of LCD to external electrodes or PCB

(U14-K01A4)

See also V04 codes. Includes connections from electrodes to cell terminals.

## U14-K01A4C [1997]

## **LCD** illumination arrangements

(U14-K01A4)

Includes internal and reflection type LCD illumination. From 2007, also see X26-U04A1 for backlighting and backlight circuitry including ambient environment detection and feedback control. See W05-E05B1 and relevant X26 codes prior to 2007.

## U14-K01A5 [1997]

## LCD substrate details

(U14-K01A, U14-K01A2)

For production and processing aspects of substrate. See U11 codes also. For active matrix aspects see U14-K01A2 codes.

Glass

#### U14-K01A8 [1997]

#### Testing aspects of LCD

(U14-K01A)

For testing of liquid crystal materials see also S02-J04A3; for active matrix testing see also S02-J04A3A and U11-F01F and/or U11-F01D codes. For module testing see also S01-G01A3 and V04-Q02A2.

Probe

## U14-K02 [1992]

## **Electrochromic displays**

(U14-K09)

For building and vehicle windows using electrochromic layers see X25-U01 and X22-J codes respectively.

### U14-K02A [1992]

# Constructional details and manufacture of electrochromic display

(U14-K09)

## U14-K02A1 [1997]

# Structural arrangements for electrochromic display

(U14-K02A)

Includes spacers, gaskets, electrodes.

## U14-K02A2 [1997]

## **Electrochromic display manufacture**

(U14-K02A)

For materials see U11-A03C only.

#### U14-K02B [1992]

# Circuits, drivers of electrochromic display (U14-K09)

## U14-K03 [1992]

#### **Electrophoretic displays**

(U14-K09)

Includes materials, constructional details. For electrostatic ball displays see appropriate W05-E08 codes.

#### U14-K03A [2005]

Constructional details and manufacture of electrophoretic displays

### U14-K03A1 [2005]

Structural arrangements for electrophoretic displays

## U14-K03A2 [2005]

**Electrophoretic display manufacture** 

### U14-K03B [2005]

Circuits, drivers of electrophoretic displays

# U14-K04 [1992]

# Electro-optic displays based on ceramics or electro-optical crystal exhibiting Kerr or Pockells effect

(U14-K09)

For optical shutters see V07-G15 and V07-K01A. PLZT

## U14-K05 [2014]

## **Electrowetting displays**

Includes manufacture, structure, drive circuits etc.

# U14-K09 [1983]

## Other passive displays

Includes electronic paper, can be used in conjunction with any other U14-K codes. For electronic paper in general see also W05-E10. *Magnetophoretic* 

## U14-L [2021]

## Non-display switchable glass panels

Includes electronic switching glass panels used for non-display purposes, e.g. for privacy, or light dimming in places such as building windows, privacy screens, vehicle windows, dimming mirrors etc.

Smart glass, Electrolytic PDLC Film, Electrochromic glass, LCD Glass

# U21: Logic Circuits, Electronic Switching and Coding

#### U21-A

## Coding, decoding

Encode, compress, predict

# U21-A01\* [1980-1991]

#### Pulse code modulation

\*This code is discontinued from 1992. In addition to U21 codes, inventions involving PCM may be assigned the following codes depending on applications and their precise nature:

- (1) W02-C06 for general transmission systems using PCM  $\,$
- (2) W02-F07 codes for PCM TV transmission systems
- (3) S06-K07A4D for facsimile coding and compression
- (4) W04-F01F codes for video recording using compression coding
- (5) W04-G01F for audio signal recording coding and compression
- (6) W04-P01A codes for video signal coding
- (7) W04-V05G codes for speech signal coding
- (8) W04-V10 codes for coding of audio signals in general

#### U21-A02

#### D/A conversion

Search with U21-A04A for sigma-delta type.

U21-A02A [1987]
Digital-to-analogue converters

DAC

U21-A02A1 [1992]

Binary-weighted D/A converters

Weighted resistor

U21-A02A2 [1992]

Ladder-type D/A converters

R-2R ladder

U21-A02A3 [1992]

D/A converters with intermediate conversion to time or frequency of pulses

U21-A02A4 [2006]

**Resistor string** 

U21-A02A5 [2007]
Switched capacitor D/A converters

U21-A02A9 [1992]

Other D/A converters

Includes e.g. multiplying D/A converter.

U21-A02B [1987]

Broader system details, testing of D/A converters

U21-A02B1 [1997]

**Broader system details** 

(U21-A02B)

U21-A02B1A [2005]

Input/output circuitry

U21-A02B1B [2006]

## Voltage reference circuits

Also see relevant U24 codes for novel voltage reference circuits.

U21-A02B1C [2005]

Clock arrangements

U21-A02B1X [2005]

Other details

U21-A02B2 [1997]

#### Testing and calibrating

(U21-A02B, U21-A03F1)

Prior to 1997 testing and calibrating for DAC was covered by U21-A02B and U21-A03F1.

DC offset, auto-zero

#### U21-A02B3\* [1997-2004]

#### Noise reduction and error correction

(U21-A02B, U21-A03F3)

\*This code is now discontinued and from 2005 noise reduction and error correction for DACs is covered by U21-A02B7G. Prior to 1997 noise reduction for DAC was covered by U21-A02B and U21-A03F3.

U21-A02B7 [2005]

Improvements to DA converter performance

U21-A02B7A [2005]

**Increased resolution** 

U21-A02B7C [2005]

Increased conversion speed

## U21-A02B7E [2005]

### Increased range

Covers increase in number of bits or other change in representation of data, or on analog side by increasing dynamic range, output voltage swing, etc.

U21-A02B7G [2005]

Noise reduction and error correction

U21-A02B7J [2006]
Reducing power consumption

U21-A02B7L [2006]

Size reduction

U21-A02B7N [2012]

## Increased accuracy or precision

Prior to 2012 see U21-A02B7G or U21-A02B7X depending on emphasis.

U21-A02B7X [2005]

Other DA converter performance improvement

U21-A03

#### A/D conversion

Search with U21-A04A for sigma-delta type. *ADC* 

## U21-A03A

# A/D converters with conversion to duration/frequency

Includes counter ramp (counting) converter when type of conversion is emphasised, otherwise coded in U21-A03B as a converter with feedback. Also includes integrating type e.g. dual slope or ratiometric converter. Search U21-A03X also prior to 1983.

Tracking, servo converter

## U21-A03B

# A/D converters using D/A converter (feedback type)

Includes successive approximation type. SAR, serial comparator

U21-A03B1 [2006]

SAR

Successive approximation type converters.

U21-A03B3 [2006]

**Pipeline** 

U21-A03B5 [2007]
Switched capacitor A/D converters

U21-A03B9 [2006]

Other feedback types

U21-A03C [1987]

Flash A/D converters

Parallel comparator, simultaneous ADC

U21-A03E [1987]

Interpolating A/D converters, hybrid arrangements combining different converters

Includes serial-parallel type (see also U21-A03B).

U21-A03F [1987]

Testing and calibrating, broader system details

U21-A03F1 [1992]

Testing and calibrating

DC offset, auto-zero

U21-A03F3\* [1992-2004]

#### Noise reduction and error correction

\*This code is now discontinued and from 2005 noise reduction and error correction for ADCs is covered by U21-A03F7G.

U21-A03F5 [1992]

**Broader system details** 

U21-A03F5A [2005]

## Input/output circuitry

Includes scaling and gain control arrangements, see U24-C codes for novel amplifier/gain control aspects.

U21-A03F5B [2006]

Voltage reference circuits

U21-A03F5C [2005]

**Clock arrangements** 

U21-A03F5X [2005]

Other details

U21-A03F6 [2005]

## Sampling

This code covers sampling arrangements and wider sampling aspects. See U21-B03 for novel sample and hold arrangements and U21-A04A for sigma delta converters.

## U21-A03F6A [2005]

### **Novel sampling circuit**

This code covers all novel sampling arrangements. See other U21-A03F6 codes for sampling function aspect.

U21-A03F6B [2005]

Oversampling

U21-A03F6C [2005]

Undersampling

U21-A03F6D [2005]

## Sample modification

Modification of digital samples in DSP is covered by U22-G03B1 codes ('Re-sampling').

U21-A03F6X [2005]

Other sampling functions

U21-A03F7 [2005]

Improvements to AD converter performance

U21-A03F7A [2005]

Increased resolution

U21-A03F7C [2005]

**Increased conversion speed** 

U21-A03F7E [2005]

Increased range

U21-A03F7G [2005]

Noise reduction and error correction

U21-A03F7J [2006]

Reducing power consumption

U21-A03F7L [2006]

Size reduction

U21-A03F7N [2012] Increased accuracy or precision

Prior to 2012 see U21-A03F7G or U21-A03F7X depending on emphasis.

U21-A03F7X [2005]

Other AD converter performance improvement

#### U21-A03G [1987]

# A/D converters implemented using other technology

Includes use of e.g. SAW, optical, Josephson junction devices (for superconductive devices, circuits, see also U14-F02 codes).

U21-A03H [1992]

**Reversible converters** 

(U21-A02B, U21-A03F)

U21-A03J [1992]

#### Position encoders

(U21-A03X)

For absolute encoders for which displacement directly generates unique digital value U21-A03J5 is assigned with other U21-A03J codes as appropriate. See also S02-K03

U21-A03J1 [1992]

## **Optical position encoders**

(U21-A03X)

Rotary encoders, shaft angle, moire fringes

U21-A03J2 [1992]

Magnetic or inductive position encoders

(U21-A03X)

U21-A03J5 [2002]

#### **Absolute position encoders**

This code is assigned with other U21-A03J codes as appropriate, depending on technology, and refers to encoders with a unique relation between position and output code. Such types were indicated by the additional assignment of W05-D01 codes (now discontinued) prior to 2002.

Gray code, disc, scale, track.

### U21-A03J9 [1992]

## Other types of position encoders

(U21-A03X)

Includes electric type e.g. capacitive, brush arrangements.

Wiping contact, potentiometer

#### U21-A03X

Other aspects of A/D conversion

#### U21-A04

## **Delta and differential modulation**

For testing aspects see also U21-A03F1.

## U21-A04A [1992]

## **Delta-sigma converters**

Includes oversampled converter architectures. Where sampling is novel see U21-A03F6 and also see U21-A02/A03 codes as appropriate.

Sigma-delta, continuously variable slope delta, CVSD, delta modulator, oversampling

## U21-A04B [1992]

#### Differential modulation

Adaptive differential PCM, ADPCM

#### U21-A05

#### **Code conversion**

See W01-A02 also for application of code conversion to data transmission in general. Coding of audio and video signals is not included and is covered by W04-P01A codes (video signals), W04-V05G codes (speech signals) and W04-V10 codes (audio signals in general). Coding for error detection and correction in general is covered by U21-A06 codes.

Bit structure, character interval, format, mapping, recoding

#### U21-A05A

#### Static code converters

#### U21-A05A1 [1987]

# Parallel code conversion. Conversion to or from (non-) weighted or stochastic codes

Includes decimal code, binary coded decimal code, conversion from or to n out of m codes, to or from one out of m codes, conversion to or from floating point codes, conversion to or from Gray codes.

BCD

## U21-A05A2 [1987]

# Compression, expansion, suppression of redundancy

This code is used in a general way to represent 'coding', e.g. for data compression. It is assigned alone or in conjunction with other codes - e.g. for audio or video coding, or coding for data transmission - if U21-A05A2 codes can highlight additional detail e.g. if using U21-A05A2A enables 'variable length coding' to be highlighted. When specific codes exist for the type of coding involved in an invention and U21-A05A2 codes do not provide additional focus, they are not assigned. Specific codes for particular coding applications are: S06-K07A4D for document imaging and copying; T01-D02 for computer data coding; T01-J10D for image compression; T03-P01B for compression of recorded data; W01-A02A for data transmission; W04-F01F for video signal recording coding, W04-G01F for audio signal recording

coding, W04-P01A codes for video signal coding, W04-V05G for speech coding; W04-V10 for general audio coding.

## U21-A05A2A [1992]

# Conversion to or from variable length codes

Shannon-Fano code, Huffman code, Morse code

#### U21-A05A2B

[1992]

## Conversion to or from run length codes

#### U21-A05B

[1987]

# Parallel/series and series/parallel conversion

Series-in parallel-out register, SIPO, series-in seriesout register, SISO, parallel-in series-out register, PISO, serial-parallel, parallel-serial

## U21-A05C [1987]

# Series transmission code. Manchester, biphase level coding

Includes conversion to or from representation by three or more level pulses.

NR7

### U21-A05D [1987]

# Coding associated with computer keyboard or printers. Language scripts

For key scanning and coding aspects see also T04-F01A5. For keyboard interfacing see also T01-C codes.

## U21-A05D1 [1987]

## Language script coding techniques

Includes coding for dealing with e.g. Chinese, Arabic characters. Search with W01-C01B8M for application to coding for telephone keys. *Kanji, Kana, Arabic characters* 

#### U21-A06

#### **Error detection and correction**

U21-A06 codes are assigned for error detection/correction in general, and to provide specific details of error correction coding in conjunction with codes in other classes, such as with T03-P01A for data recording error correction. For applications specific to telecommunications alone, W01-A01B codes are applied instead.

## U21-A06A [2005]

## **Using block codes**

Covers error detection/correction coding where a predetermined number of check bits are joined to a predetermined number of information bits.

U21-A06A1 [2005]

Cyclic redundancy check

U21-A06A2 [2005]

**Parity bit** 

U21-A06A3 [2005]

**Hamming codes** 

U21-A06A4 [2005]

**Reed Solomon coding** 

U21-A06A9 [2005]

Other block codes

U21-A06C [2005]

## **Using convolutional codes**

Covers error detection/correction coding where the coded sequence is algorithmically achieved through the use of current data bits plus some of the previous data bits from the incoming stream.

U21-A06C1 [2005]

Viterbi coding

U21-A06C2 [2005]

**Turbo coding** 

U21-A06C3 [2005]

**Trellis coding** 

U21-A06C9 [2005]

Other convolutional codes

U21-A06E [2005]

#### **Using Interleaving techniques**

Covers error detection/correction arrangements where the data structure is re-organised to reduce errors

U21-A06G [2006]

## Using multiple coding techniques

This code covers error correction/detection using either multiple (two or more) block or convolutional codes or a combination of block and convolutional. The coding types of the combination are applied in addition to this code. Please note, this code is only applied where the combination is the novel aspect and not where multiple coding techniques are merely listed as separate possibilities.

## U21-A06G1 [2014]

### Multiple codes used together

Covers the simultaneous use of two or more errordetecting or error-correcting codes, e.g. either multiple block or multiple convolutional codes or a combination of block and convolutional codes, used together.

## U21-A06G5 [2014]

# Multiple codes used separately (i.e. one at a time)

Covers the separate use of two or more errordetecting or error-correcting codes, e.g. either multiple block or multiple convolutional codes or a combination of block and convolutional codes, used at different times.

## U21-A06X [2005]

## Other error detection/correction

#### U21-B

## **Electronic switching or gating**

Purely mechanical and electromechanical switches using moving metallic contacts are covered in V03 and X13. Note that mechanical details of actuating elements and the like for electronic switches in which part of the switch moves (e.g. as denoted by U21-B02C2) are also covered in V03 (e.g. by V03-B and V03-C codes) when necessary. Electronic switching without any physical movement is covered in U21 only.

#### U21-B01

Electronic switching or gating characterised by switching device

### U21-B01A

# Switching using bipolar transistors and diodes

Includes Darlington configuration.

U21-B01A1 [2006]

Switching using IGBTs

## U21-B01B

**Switching using field effect transistors** 

#### U21-B01C

## Switching using thyristors, triacs etc.

Note that U21-B02H (novel bi-directional switching arrangements) is not routinely applied with this code for devices such as triacs which are inherently bi-directional.

Gate turn-off, GTO

## U21-B01D [1987]

Compound switches (FET/bipolar, thyristor/FET), other semiconductor switches

#### U21-B01D1 [1992]

**Switching using transformer coupling** (U21-B01D)

#### U21-B01E [1992]

### **Using optoelectronic devices**

(U21-B01X)

Opto-coupler

## U21-B01P [2009]

# Switching using phase-change devices

(U21-B01X)

This code is intended for electronic switching arrangements using devices with phase-change properties, e.g. based on materials such as chalcogenides. Logic circuits applying this technology are covered by U21-C01P. Phase-change memories are covered by U14-A03H and optical recording materials based on phase-change effects are covered by T03-B01B codes.

Amorphous, chalcogen, crystalline, selenide, sulfide, telluride

## U21-B01T [2006]

#### **Using nano-tubes**

Other U21-B01 codes are applied where applicable, only electronic switches are coded here, if electromechanical see V03 and if solely optical see V07.

#### U21-B01X

#### Other devices

Includes switches using Hall effect devices (when used for proximity switches see U21-B02C), superconductive devices (see U14-F02B also), gas or vacuum tubes, etc.

## U21-B02

**Circuit details** 

#### U21-B02A

Controlling switching point/instant

### U21-B02A1 [1987]

Introducing delay before switching using capacitor and transistors

## U21-B02A2 [1987]

Introducing delay before switching using digital counter, timer, computer modules

#### U21-B02A3 [1987]

# Providing predetermined threshold before switching and switching at zero-crossing

See U22-D07A for circuits delivering a pulse in response to zero-crossing and U22-A04D5 for comparators in general.

#### U21-B02B

### Affecting states; Power-on resetting

Includes storing actual state of switch when supply voltage fails.

Reset

### U21-B02C [1983]

#### Proximity/touch switches

See T04-F01 also for computer keyboard switches.

## U21-B02C1 [1987]

# Capacitive/inductive/resistive not requiring displacement of switch element

This code covers 'touch' switches operating without any movement of the switch or switch parts and includes electronic switching aspects of touch screens and the like, which in general are also coded as T04-F02A2. Capacitive, inductive, magnetic or resistive electronic 'touch' switches in which part of the switch moves during operation are covered by U21-B02C2.

#### U21-B02C2 [1987]

Inductive/capacitive/resistive responding to physical displacement of plate or magnetic flux element

## U21-B02C3 [1987]

## Using optical or other switching elements

See S03-C08 codes.

Light barrier

### U21-B02D [1987]

Accelerating switching speed, reducing power consumption, ensuring fully conductive state, increasing max. current or voltage

(U21-B02X)

Includes also modifications for improving heat dissipation.

### U21-B02D1 [1987]

Using series/parallel switches to distribute current/voltage

## U21-B02E [1987]

## **Switch protection**

(U21-B02X)

See U24-F for protection of electronic circuits in general.

### U21-B02F [1992]

Eliminating interference voltages or currents, or other sources of noise

(U21-B02X)

U21-B02G [1992]

Compensating variations of physical values e.g. temperature

(U21-B02X)

## U21-B02H [2006]

#### **Bidirectional switching**

This code covers novel bi-directional switching arrangements and is not routinely applied for devices such as triacs which are inherently bi-directional

### U21-B02J [2006]

**Switch testing** 

U21-B02X

Other aspects of electronic switching

U21-B03

Sample-and-hold arrangements

U21-B05 [1987]

Applications of electronic switching circuits

U21-B05A [1987]

#### **Analogue switching**

Transmission gate, multiplexer/demultiplexer, signal selector

U21-B05B [1987]

#### Very high power/speed switching

Includes power-pulse techniques.

U21-B05C [1987]

### Power converters and power switching

For low and very high power converters see separately U24-D and X12-J codes.

Semiconductor relay

## U21-B05D [1987]

### Logic

This code is used to indicate the application of electronic switching to logic circuitry and is applied for novel electronic switching inventions which can be used in logic circuits. Details of logic circuits themselves are covered by U21-C codes which can be assigned in addition to U21-B05D when an electronic switching invention includes specific details of those circuits. In general, since it is understood that logic circuits involve switching, inventions presented as novel logic circuits are not also assigned U21-B codes.

## U21-B05E [1992]

## Signal switching

(U21-B05X)

Includes digital telecommunications, multiplexing/demultiplexing aspects, single/multiple switch arrangements. See also W01-B codes.

## U21-B05X [1987]

# Other applications of electronic switching circuits

Includes computer applications, pulse distributors etc.

### U21-C

**Logic circuits** 

### U21-C01

Logic circuits characterised by components

#### U21-C01A

**Bipolar transistors and diodes** 

## U21-C01A1 [1992]

#### Diode- or resistor-transistor logic

Includes complementary transistor logic, Schottky transistor logic.

CTL, STL

#### U21-C01A2 [1992]

#### **Emitter coupled logic**

Includes emitter function logic, base coupled logic. *ECL, EFL, BCL* 

## U21-C01A3 [1992]

#### **Transistor-transistor logic**

TTL

## U21-C01A4 [1992]

## Integrated injection logic

Includes integrated Schottky logic, static induction logic.

ISL, STIL, IIL, I2L

#### U21-C01B

**FET** 

U21-C01B1 [1987]

**MESFET** 

U21-C01B3 [1987]

**MOSFET** 

Complementary, CMOS, enhancement/depletion mode, source coupled field effect logic, SCFL

U21-C01B5 [1987]

**Dynamic MOSFET** 

U21-C01C [1987]

## **Combined FET and bipolar**

Schottky diode-FET logic, SDFL, BiCMOS, BiMOS, BiFET, BiMIS

U21-C01D [1987]

# Logic circuits implemented with circuit blocks

Includes use of e.g. operational amplifiers and multiplexers, and also use of logic gates as 'blocks' to make up larger logic circuits and systems.

#### U21-C01E [1987]

# Programmable logic arrays, gate arrays, reconfigurable logic

(U21-C01X)

This code is intended to highlight the **use** of programmable logic, such as semi-custom ASIC e.g. gate arrays (uncommitted logic arrays, configurable gate arrays, logic arrays), programmable logic devices categorised as programmable logic arrays, programmable array logic, programmable logic sequencers. For physical layout and interconnection details see also U11-D03, U13-C04C. To identify type of transistor employed, U21-C01B or U13-C codes are used. Novel logic circuitry details of programmable logic are covered by U21-C03B3.

PLA, PLD, FPGA

## U21-C01F [1992]

# Logic circuits using superconductive devices

(U21-C01X)

See also U14-F02C.

#### U21-C01G [1992]

# Logic circuits using optoelectronic devices

(U21-C01X)

For optical logic elements, see V07-K06. For digital computing aspects, see T01-E05.

#### U21-C01P [2009]

## Logic circuits using phase-change devices

(U21-C01X)

This code is intended for logic circuits using devices with phase-change properties, e.g. based on materials such as chalcogenides. Electronic switching circuits applying this technology are covered by U21-B01P. Phase-change memories are covered by U14-A03H and optical recording materials based on phase-change effects are covered by T03-B01B codes.

Amorphous, chalcogen, crystalline, selenide, sulfide, telluride

#### U21-C01R [1997]

# Logic circuits using devices with tunnelling mechanism

Includes resonant tunnelling transistor or diode. *RTBT, RHET, tunnel diode* 

## U21-C01T [2006]

## Logic circuits using nano tubes

(U21-C01X)

#### U21-C01X

# Logic circuits using other technology or components

Includes logic circuits using magnetic, galvanomagnetic (Hall-effect) devices, ferroelectric capacitors.

#### U21-C02

#### Interface circuits

input circuit, output circuit, buffer, transistor level shifting

#### U21-C02A [1987]

## Inter-family; Logic level shifting

TTL-CMOS, TTL-ECL

## U21-C02A1 [2007]

#### Inter-family

This code is intended for circuits interfacing between different logic families. Circuits providing an interface between logic circuits of the same type operating from different supply voltages are covered by U21-C02A5.

## U21-C02A5 [2007]

## Logic level shifting

This code is intended for circuits providing an interface between logic circuits of the same type operating from different supply voltages. Interfacing between different logic families is covered by U21-C02A1.

## U21-C02B [1987]

## Drivers for displays, relays etc.

See also T04-H codes for displays, V03-D02 for relays.

## U21-C02C [1987]

## Tri-state driver and parallel bus

See also appropriate codes in T01 and W01.

## U21-C02D [1987]

#### Serial line transmission

See also appropriate codes in T01 and W01.

# U21-C02D1 [2007]

#### **Differential transmission**

This code includes e.g. low voltage differential signalling (LVDS) circuits, from 2007 see also W01-A08D for differential data transmission systems in general.

## U21-C02E [2006]

#### **IC** termination

Covers interface for termination of transmission line for integrated circuits using active or passive components. Includes stand alone or on-chip, see also U25-D05 and/or W01/W02.

#### U21-C03 [1983]

Logic function and general integrated circuit details

U21-C03A [1987]

Integrated circuit - general gate aspects

# U21-C03A1 [1987]

## Input-output details, increased speed

Includes modifications to increase fan-in and fanout, and protection against short-circuited output.

## U21-C03A2 [1987]

## Power supply and noise prevention

'Power supply details' refers to **internal** details of the logic circuit. Novel circuits for power supplies in general are covered by U24-D and U24-E codes which are also assigned as appropriate when part of the logic circuit itself.

## U21-C03A2A [1992]

## Modifications to reduce power dissipation

Includes power supply substrate bias.

## U21-C03A2B [1992]

#### **Noise suppression**

Includes modifications for eliminating interference or parasitic voltages and currents, compensating for variations in temperature, supply voltage etc.

Ground bounce

### U21-C03A3 [1992]

#### Inverter circuit details

(U21-C03A9)

Includes details of pulses for e.g. NMOS, CMOS, BJT inverters (see also U21-C01A, U21-C01B). For pulse aspects see also appropriate U22-D01 codes. Includes also modifications of threshold for gating or switching. Complete novel inverters are coded as logic gates under U21-C03B.

#### U21-C03A5 [2006]

Reducing circuit size

U21-C03A9 [1987]

Other aspects of logic circuits

## U21-C03B [1987]

### Logic gates

Includes novel circuits which perform logic functions e.g. AND, OR, NOR, NOT, EXCLUSIVE-OR, NAND.

### U21-C03B1 [1987]

Tri- or multi-level, fuzzy logic

## U21-C03B1A [1992]

Tri- or multi-level logic

## U21-C03B1B [1992]

### **Fuzzy logic**

See T01-J16B for complex systems.

### U21-C03B2 [1987]

# Arithmetic

Includes majority and minority circuits. See also T01-E02.

Add, carry, computation, equivalence, multifunction, majority, arithmetic logic unit, ALU

## U21-C03B3 [2005]

# Programmable logic circuitry, including programmable controllers

This code covers novel aspects of programmable logic circuits and programmable controllers. The use of this kind of device in logic systems is covered by U21-C01E and both codes can be assigned together when necessary, e.g. for a novel programmable controller implemented by configurable logic circuits. See also T01 codes for programme control aspects and T06 codes for process and machine control aspects.

Programmable controllers without any logic circuit details are not coded in U21 and are generally covered in T06, e.g. by T06-A04B1.

# U21-C03B4 [2005]

#### State machines

See also relevant T01 codes
State Machine, Finite State Machine

U21-C03B9 [1987]

Other types of logic circuits

U21-C03C [1987]

Fail-safe

Monitor, fault detection, majority

## U21-C03D [1987]

# Logic simulators, design logic circuit construction, circuit board wiring

Includes e.g. piggy-back construction for bus systems. For CAD applied to integrated circuits, see also U11-G.

Computer-aided logic design, logic CAD, layout optimisation, logic synthesis

### U21-C03D1 [1997]

#### Logic circuit testing

See also S01-G01A codes and, for integrated circuit aspects, U11-F01D and/or U13-C07 codes. Signal analysis, set/scan logic

## U21-D

### Pulse counters and frequency dividers

## U21-D01

# Input/output circuits

Serial-in parallel-out, serial-in serial-out

#### U21-D02

## Starting/stopping/monitoring

U21-D02A [1992]

Starting/stopping

Reset

U21-D02B [1992]

Monitoring; Error correction

#### U21-D03

#### Synchronous counting chains

Includes both series (ripple) carry and parallel (look-ahead) carry for enable signal of synchronous counter.

### U21-D03A [1992]

#### **Ring counters**

Includes feedback shift register counters. For random output counters see U21-D05C6.

Twisted-ring, switched tail, moebius, Johnson

#### U21-D04

## Asynchronous counting chains

Ripple counters

U21-D05 [1992]

Characterised by counter details

U21-D05A [1992]

Reversible

Up-down, forward-backward

U21-D05B [1992]

## With non-binary base

Excludes counters with base which is power of two.

U21-D05B1 [1992]

With variable counting base

U21-D05B2 [1992]

**Divide-by-N counters** 

U21-D05B2A [1992]

**Decade counters** 

U21-D05B2B [1992]

In which the base is an odd number

U21-D05B3 [1992]

In which the base is a non-integer

U: Semiconductors and Electronic Circuitry

## U21-D05C [1992]

# Counters characterised by random or specific code output

Excludes standard base types e.g. binary, hexadecimal etc. Includes counting systems for specific coding formats e.g. reflected codes.

U21-D05C1 [1992]

**Using Gray code** 

U21-D05C2 [1992]

Using excess three code

U21-D05C3 [1992]

Using biquinary code

U21-D05C6 [1992]

#### **Random counters**

See U22-A01A for random pulse generators in general.

U21-D06 [1992]

Characterised by the type of the device used

U21-D06A [1992]

**Using semiconductor devices** 

U21-D06A1 [1992]

**Field effect transistors** 

CMOS counters

U21-D06A2 [1992]

**Bipolar transistors** 

TTL, ECL

U21-D06A3 [1992]

**Opto-electronic devices** 

U21-D06B [1992]

**Using electromechanical devices** 

Includes counters using e.g. relays.

U21-D06X [1992]

#### Other devices used as counters

Includes counters using semiconductor devices not covered by U21-D06A, e.g. thyristors, diodes, CCD and other types of device e.g. magnetic cores, gas-filled tubes etc.

### U21-D09

Other aspects of pulse counters and frequency dividers

## **U22: Pulse Generation and Manipulation**

#### U22-A

## **Generating electric pulses**

#### U22-A01

## **Generators producing trains of pulses**

#### U22-A01A

# **Random pulse generators**

See T01-E04 for data processing arrangements for generating random numbers. Random counters are covered by U21-D05C6. Random number generators for e.g. gaming purposes are covered by T05-F and W04-X02 codes.

[1983]

Pseudo-random generator, pseudo-random binary sequence (PRBS), shift register

#### U22-A02

## Characterised by active element

#### U22-A02A

**Bipolar transistors** 

U22-A02A1 [1987]

In integrated circuit form

U22-A02B

**FET** 

U22-A02B1 [1987]

In integrated circuit form

## U22-A02C

#### Other semiconductor devices

Includes discrete and integrated devices.

## U22-A02D [1987]

#### **Using logic blocks**

E.g. gates, counters and flip-flops. *RS/JK/D-type, inverter* 

#### U22-A02E [1987]

# Using operational amplifiers or comparators

This code covers the **use** only of comparators or operational amplifiers, i.e. where the devices themselves are not novel. Novel OPAMPs are covered by U24-G02A5 codes and novel comparator circuits of general application by U22-A04D5. From 1992 - 2011, U22-A04D1 also covered pulse generators with an overall comparator function.

#### U22-A02X

#### Other active element

Includes Josephson superconductor (with U14-F), and use of Wiegand wire.

#### U22-A03

# Using energy-accumulating element and external switching signal

Includes capacitor store discharging into load, transmission line, etc. See also X12-J09 for high power types.

Blumlein, inductive store

U22-A04 [1983]

**Circuit type** 

U22-A04A [1983]

**Astable** 

U22-A04A1 [1987]

## **Blocking oscillator**

Transformer, winding, flux, saturation, inverter, converter

#### U22-A04A2 [1987]

## Crystal

Also coded in U23-A01A codes, based on inherent 'single frequency' aspect. Includes oscillator using other electromechanical resonator types, such as ceramic, SAW, etc. See V06-V codes for details of electromechanical resonators per se.

Piezoelectric, quartz, series, parallel, resonance

# U22-A04A3 [1987]

#### **Feedback**

Includes oscillator with e.g. logic gates (also covered in U22-A02D) in ring circuit or similar. U22-A04A2 takes precedence for feedback arrangement including resonator element.

U22-A04A4 [1987]

## Relaxation

Capacitor, charge

U22-A04A9 [1987]

With voltage or current control

Includes VCO.

U22-A04B [1983]

Mono-stable

U22-A04C [1983]

Bi-stable

## U22-A04D\* [1987-2011]

#### Comparator

\*This code is now discontinued and from 2012 this subject matter is transferred to U22-A02E in the case of pulse generators based on comparators and U22-D01A1C for circuits performing a thresholding function on pulses. U22-A04D remains valid and searchable for records between 1992 and 2011 when it was used for comparator circuit pulse generators in general.

## U22-A04D1\* [1992-2011]

### Comparator pulse generator

\*This code is now discontinued and from 2012 this subject matter is transferred to U22-A02E in the case of pulse generators based on comparators and U22-D01A1C for circuits performing a thresholding function on pulses. U22-A04D1 remains valid and searchable for records between 1992 and 2011 when it was used for circuits configured as comparators with the purpose of generating pulses. Novel comparator circuits are coded in U22-A04D5, irrespective of application. (See note for that code).

#### U22-A04D5 [1992]

## **General comparator circuits**

This code is used to denote novel comparator circuits per se of general application, i.e. without regard to the pulse/continuous nature of either the input signal(s) or the output produced. The following codes may also be applied depending on the purpose of the circuit:

- 1. Thresholding circuits, i.e. determining that a pulse has reached a preset amplitude are covered by U22-D01A1C.
- 2. Circuits comparing pulses or pulse trains with one another are covered by U22-D02 codes.
- 3. Circuits generating a pulse in response to a given characteristic of an input signal, are covered by U22-D07 codes.
- 4. Circuits providing a switching function in response to a given input signal characteristic are covered by U21-B02A3.

## U22-A04X [1983]

## Other circuit type

Includes multistable pulse generating circuits.

## U22-B

#### **Generator details**

See U22-H also, if phase frequency/control is involved.

### U22-B01

## Output regulation/control

U22-B02 [1987]

On-chip integrated circuit details

U22-B03 [1987]

## **General details of larger IC systems**

Includes e.g. reset circuits.

## U22-B05 [1997]

### **Parameter compensation**

U22-B05 codes are assigned for compensation of parameters of the oscillator/pulse generator circuit itself and for the effect of external parameters. The codes are **not** used for similar arrangements applied to subsequent circuitry such as pulse shaping or pulse amplifying circuits.

U22-B05A [1997]

**Active device characteristics** 

U22-B05C [1997]

### **Physical characteristics**

Temperature, voltage

#### U22-B09

## Other pulse generator details

Includes generator starting circuits.

## U22-C

Generating finite slope or stepped portion pulses

#### U22-C01

Generating triangular shape pulses

## U22-C09

Other finite slope or stepped portion pulse generation

#### U22-D

Manipulating pulses

### U22-D01

Shaping pulses

### U22-D01A

Thresholding, changing duration, limiting, amplifying, steepening

[1987]

#### U22-D01A1

Thresholding, limiting, amplifying, steepening

## U22-D01A1A [1992]

## Level clamping

Covers limiting of amplitude and establishment or removal of offsets.

## U22-D01A1C [1992]

### **Thresholding**

This code is used for circuits determining that a pulse signal has attained a preset threshold level, i.e. comparing the amplitude of a pulse with a (usually fixed) reference. For example, a circuit reestablishing logic levels in data read from a magnetic hard disc would be coded here (also in T03-A06C3 and T03-A08A1C). When comparators are used for this purpose U22-D10F is also assigned.

Slicing

#### U22-D01A3 [1992]

## General pulse noise reduction circuits

This code is used for anti-contact-bounce arrangements and for circuitry suppressing the effects of other noise sources on pulses.

#### U22-D01A5\*

[1987-1991]

# Changing duration without time reference signals

\*This code is now discontinued and from 1992 this subject matter is transferred to U22-D01A6A.

## U22-D01A6 [1992]

# **Changing pulse duration**

This code covers material previously coded in U22-D01A5 and U22-D01A7, and has been introduced to better reflect the hierarchical relationship of those codes which are now no longer used, but remain valid for records prior to 1992.

## U22-D01A6A [1992]

# Changing duration without time reference signals

(U22-D01A5)

Includes use of delay line, resonant circuit, etc. *Pulse stretching* 

#### U22-D01A6C [1992]

# Changing duration using time reference signals

(U22-D01A7)

## U22-D01A7\* [1987-1991]

# Changing duration using time reference signals

\*This code is now discontinued and from 1992 this subject matter is transferred to U22-D01A6C.

#### U22-D01D\*

[1987-1996]

# Characterised by active element technology

\*This code is now discontinued. From 1997 see U22-D10 codes which are intended to provide information on active element technology for all U22-D subdivisions. U22-D codes remain valid for records from 1987-1996.

## U22-D01D1\*

[1987-1996]

## Integrated circuit implementation

\*This code is now discontinued.

#### U22-D01D3\*

[1987-1996]

**Discrete: FET, bipolar, etc.**\*This code is now discontinued.

## U22-D01D5\*

[1987-1996]

## Gates, flip-flops, counters

\*This code is now discontinued.

#### U22-D01D7\*

[1987-1996]

## Operational amplifier, comparator

\*This code is now discontinued.

#### U22-D01D9\*

[1987-1996]

## Other technology for pulse shaping

\*This code is now discontinued.

## U22-D01X

Other pulse shaping

#### U22-D02

## Comparing/sorting pulses

Includes comparison of individual pulses or pulse trains. See note for U22-A04D5 (comparators in general).

## U22-D02A

[1997]

### With respect to amplitude

U22-D02C

[1997]

## With respect to phase

Includes time-of-arrival comparison pulses.

# U22-D02E

[1997]

## With respect to frequency

U22-D02G [1997]

With respect to duration

U22-D02X [1997]

Pulse comparison based on other characteristic

#### U22-D03

## **Monitoring pulses**

Includes circuits to detect deviation from desired characteristic of individual pulse and also missing pulses in pulse trains.

U22-D03A [1997]

With respect to amplitude

U22-D03C [1997]

With respect to phase

U22-D03E [1997]

With respect to frequency

U22-D03G [1997]

With respect to duration

U22-D03X [1997]

Pulse monitoring based on other characteristic

#### U22-D04

## Changing timing of pulses at single output

Synchronization, clock, phase, delay, gate

## U22-D04A [1997]

# Changing pulse timing using active devices

This code covers the use of individual transistors, amplifiers, logic gates etc. to alter the timing of pulses and takes precedence over U22-D04C. Counter, D-type, flip-flop, memory, register

#### U22-D04C [1997]

# Changing pulse timing using passive devices

This code covers the use of passive components only such as resistors, capacitors, delay lines and networks to alter the timing of pulses.

Coil, CR, filter, inductor, LC, RC, RL, transmission line, winding

#### U22-D05

### Changing pulse train pattern

Includes circuits separating pulses from composite pulse train. For TV synchronizing signal separation in receivers see W03-A06 codes also.

[1987]

#### U22-D05A

## Frequency multipliers and dividers

In addition to coverage of circuits providing fixed multiplication or division of pulse signals, from 2011 the scope of this code has been expanded to include digitally controllable devices and circuits, which were previously excluded. Novel aspects of variable divider and multiplier circuits based on counters are covered by U21-D codes which are also assigned as necessary. See U23-B02 for digital frequency multipliers for analog signals, e.g. sinusoidal oscillator signals.

#### U22-D06

#### **Pulse distributors**

Includes clock signal distributors. See T01-K codes also for arrangements specifically for computers.

Clock tree, multiple output

U22-D06A [1997]

With outputs differing in phase

U22-D06C [1997]

## With outputs differing in frequency

Clock doubler

#### U22-D07

# Delivering pulse as function of input signal characteristics

Includes comparator type circuits generating a pulse when input signal reaches a preset threshold, and edge triggered circuits. See note for U22-A04D5.

#### U22-D07A [1987]

## Zero crossing, responding to power supply

Includes e.g. power-on-reset circuits (see U21-B02B also). See U21-B02A3 for switching circuits operating at zero-crossing.

# U22-D07C [1997]

## Individual pulse peak detector

Covers arrangements delivering a pulse in response to the peak value of an input signal. For peak detectors in the context of signal rectifiers see U24-C03A, and for electrical measuring instruments in particular, S01-D01A3.

## U22-D10 [1997]

## Pulse manipulation circuit implementation

Codes in this section are applied, in conjunction with other U22-D codes, to indicate the technology used only. They do not, in general, represent novel aspects which are indicated by the accompanying code(s) appropriate to the particular pulse manipulation involved. Prior to 1997, technology was indicated for pulse shaping only by U22-D01D codes, which are no longer assigned.

<del>-</del>	=
U22-D10A	[1997]
Bipolar transistor	
U22-D10A1	[1997]
Integrated	
U22-D10A2	[1997]
<b>Discrete</b> (U22-D01D3)	
U22-D10B	[1997]
Field effect transistor	
U22-D10B1	[1997]
Integrated	
(U22-D01D1)	
U22-D10B2	[1997]
<b>Discrete</b> (U22-D01D3)	
	[4007]
U22-D10C	[1997]
Bipolar and FET combin	nea
U22-D10C1	[1997]
Integrated (U22-D01D1)	
U22-D10C2	[1997]
<b>Discrete</b> (U22-D01D3)	
U22-D10D	[1997]
<b>Using logic blocks</b>	
U22-D10E	[1997]
Using computer/microprocessor	
U22-D10F	[2002]

**Using comparator** 

# U22-D10X [1997] Other pulse manipulation technology

#### U22-E

## Modulating/demodulating pulses; Transforming modulation type

From 1997, this code is expanded to include demodulation of pulses and transformation of modulation type, previously covered by U22-F. U22-F is no longer used but remains valid for records prior to 1997. Pulse amplifying circuits per se are covered by U22-D01A1.

#### U22-E01 [1997]

## Characterised by modulation type

U22-E01 codes are assigned to indicate the type of modulation (or demodulation with U22-E05A) only, and do not themselves represent novel aspects, these being highlighted by other U22-E codes.

U22-E01A	[1997]
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**PWM** 

PDM, duration, edge modulation, width

U22-E01C	[1997]
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**PPM** 

Position

U22-E01E [1997]

**PAM** 

Amplitude

U22-E01G [1997]

**PFM** 

Frequency

U22-E01X [1997]

Other pulse modulation type

U22-F03 [1997]

Novel circuitry (including systems)

U22-E05 [1997]

# Demodulation of pulses; Transforming modulation type

(U22-F)

Used with other U22-E codes when emphasis is on demodulation.

#### U22-E05A [1997]

# **Demodulating pulses**

(U22-F)

# Transforming pulse modulation type

[1997]

(U22-F)

U22-E05C

U22-E07 [1997]

# Application of pulse modulation/demodulation

(U22-F)

This code is intended to represent, with U22-E01 and/or U22-E05 codes as appropriate, applications of pulse modulation or demodulation. It may be assigned, therefore, for inventions where circuitry aspects are not novel per se.

U22-E09 [1997]

Other pulse modulation/demodulation

U22-F\* [1980-1996]

# Demodulating pulses, transforming modulation type

\*This code is now discontinued and the subject matter is incorporated into U22-E codes. U22-F remains valid for records prior to 1997.

#### U22-G

#### **Digital filters and networks**

U22-G03 codes cover digital signal processing/networks in general and U22-G01 codes are applied in addition when concerned with digital filters. See U25 codes for analogue equivalent filters and networks. See also T01-J08B for data processing aspects.

U22-G01 [1992]

### **Digital filters**

Codes in this section are split into filter type and filter function. For construction, performance, operation and application see relevant U22-G03 codes. See T01-J08B for computer aspect.

U22-G01A [1992]

**Digital filter types** 

U22-G01A1 [1992]

Recursive

Covers filters incorporating feedback. *Infinite impulse response, IIR* 

U22-G01A1A [1992]

**Wave digital filter** 

U22-G01A1B [2005]

Kalman filter

U22-G01A3 [1992]

#### Non-recursive

Covers filters without feedback and includes digital transversal filters. See U25-A02 for analogue transversal filters.

Finite impulse response, FIR

U22-G01A5 [1992]

## Adaptive and variable filter

From 2015, the title of this code has been changed to reflect the existing coverage of filters with characteristics that are adjustable but not necessarily varied in response to input signal characteristics, i.e. not necessarily adaptive.

U22-G01A5A [1997]

Coefficient derivation details

Тар

U22-G01A5B [2005]

**Matched filter** 

U22-G01B [1992]

**Filter function** 

U22-G01B1 [1992]

Low pass

U22-G01B6 takes precedence where emphasis is on decimation filtering.

U22-G01B2 [1992]

**Band pass** 

U22-G01B3 [1992]

High pass

U22-G01B4 [1992]

**Notch filter** 

This code covers digital filters which attenuate a band of frequencies and pass those on either side. Band stop filter

U22-G01B5 [1992]

Comb filter

U22-G01B6 [1992]

**Decimation filter** 

U22-G01B9 [1992]

Other filter function

## U22-G01C\* [1992-2004]

#### Filter construction

\*This code is now discontinued. From 2005 details of components/configuration of digital signal processing/networks in general are covered by U22-G03 codes.

## U22-G01D\* [1992-2004]

### **Filter operation**

\*This code is now discontinued. From 2005 details of operation and application of digital signal processing/networks in general are covered by U22-G03 codes.

### U22-G01X [1992]

# Other digital filter aspects

## U22-G03 [2005]

## **Digital Signal Processing/Networks**

U22-G03 codes cover digital signal processing and networks and are split to cover constructional details (U22-G03A), digital sampling (U22-G03B), functions and performance (U22-G03C) and operation and application (U22-G03E). U22-G01 codes applied in addition to U22-G03 codes to highlight digital filter aspects.

## U22-G03A [2005]

#### Construction

This code covers constructional details including design, z-transform blocks, DSP block architectures, etc. Testing aspects are covered in U22-G03A1. Other U22-G03 are applied where applicable.

U22-G03A1	[2005]
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**Testing** 

## U22-G03A5 [2015]

# Design of digital filters and digital signal processors in general

This code is assigned for novel aspects of apparatus, methods or software for use in the DSP design process. For computer-aided design (CAD) aspects see also T01-J15A codes.

#### U22-G03B [2006]

#### **Digital sampling**

Includes systems that sample signals that are already digital, for sampling of analog signals see U21-A03F6 codes. Interpolation aspects are coded here.

## U22-G03B1 [2006]

## Re-sampling

Includes arrangements for interfacing two DSP blocks/systems that have different sampling rates.

U22-G03B1A [2006]

**Up-sampling** 

U22-G03B1C [2006]

Down-sampling

U22-G03C [2005]

**Functions and performance** 

U22-G03C1 [2005]

## Functions used in digital signal processing

U22-G03C1 codes are applied to highlight functions performed by digital signal processors and networks. These codes are used to highlight block level functions and not the overall application, which is represented by U22-G03E3 codes. Filtering using digital filters is covered by U22-G01 codes.

### U22-G03C1A [2005]

## **Addition and multiplication**

For integration function see U22-G03C1G.

U22-G03C1C [2005]

**Delay** 

U22-G03C1E [2005]

#### Array handling

This code is applied to highlight the function of fetching values from memory locations and/or copying data from memory to memory.

U22-G03C1G [2006]

Integration

U22-G03C1X [2005]

Other function

U22-G03C2 [2005]

**Performance** 

U22-G03C2A [2005]

Size reduction

U22-G03C2C [2005]

Reduction in power consumption

U22-G03C2E [2005]

Increasing processing speed

U22-G03C2X [2005]

Other performance aspect

## U22-G03E [2005]

### **Operation and application**

These codes are used to highlight overall operation and application of a DSP system/network, i.e. the use of DSP blocks to perform e.g. Fourier transform, where the novelty may not be the blocks themselves but is the way the blocks are used to perform the operation.

### U22-G03E1 [2005]

## **Operation**

This code is applied to highlight general operation of digital signal processing/networks.

### U22-G03E1A [2005]

## Software and algorithms

See T01-J04B1 for transformation functions in general.

Fourier transform, Hilbert transform, Polynomial transform, WALSH functions

## U22-G03E3 [2005]

## **Applications of DSP**

U22-G03E3 codes are applied to highlight the application of a digital signal processor or network. Filtering using digital filters is covered by U22-G01 codes but applications of filtering can be indicated by assignment of U22-G03E3 codes as well, e.g. a digital filter used for reducing noise would be represented by appropriate U22-G01 codes in conjunction with U22-G03E3A.

## U22-G03E3A [2005]

Noise reducing/cancelling

U22-G03E3C [2005]

**Equalization** 

U22-G03E3D [2005]

Correlation

See T01-J04B2 for correlation functions in general.

U22-G03E3F [2005]

Phase shifting and delay

U22-G03E3X [2005]

Other DSP application

U22-G05\* [1992-2004]

## **Digital networks**

\*This code is now discontinued. From 2005 digital Networks in general are covered by U22-G03 codes.

## U22-G05A\* [1992-2004]

#### **Network construction**

\*This code is now discontinued. From 2005 digital network construction in general is covered by U22-G03 codes.

### U22-G05B\* [1992-2004]

#### **Network operation**

\*This code is now discontinued. From 2005 digital network operation in general is covered by U22-G03 codes.

### U22-G09 [1992]

Other digital network aspects.

#### U22-H

# Automatic digital phase/frequency-control and synchronization

This is a general code used to indicate control of phase or frequency in digital systems, especially for synchronization, and includes non-PLL phase control and clock extraction circuits (see W01-A04 codes for data transmission aspects). Other U22 codes are also assigned as necessary, such as U22-D04 codes for delay circuits and U22-D06 codes for clock distribution arrangements. Inventions concerned with digital phase lock loops (PLLs) and delay lock loops (DLLs) are covered by U23-D01 codes which are assigned instead of U22-H.

Fourier, clock signal, clock skew, clock tree.

#### **U23: Oscillation and Modulation**

In general this class covers circuits dealing with sinusoidal oscillations, but also includes digital implementations of circuits such as phase-locked loops, phase detectors etc. which may be interfaced with analogue systems. Applications may involve codes in section W for data transmission, radio and TV receivers. etc.

#### U23-A

## Sinusoidal oscillators, (using)

See U23-E codes for control of output.

## U23-A01

## **Amplifier with regenerative feedback**

Negative resistance oscillator circuits are coded in U23-A02.

#### U23-A01A

#### Electromechanical resonator

Oscillators using logic inverters and the like in a feedback arrangement with an electromechanical resonator are also assigned U22 codes (e.g. U22-A02D and U22-A04A2). Novel aspects of resonators themselves are covered by V06-V01E codes with other V06-V codes as appropriate.

Quartz, crystal, piezoelectric, fundamental, overtone, parallel, series, resonance, effective series resistance, ESR, trim

#### U23-A01A1 [1987]

#### **SAW** resonator

See U14-G and V06-V codes for SAW resonators per se

Surface acoustic wave, IDT, interdigitated

# U23-A01A2 [2006]

## **MEMs** resonator

See V06-V codes for MEMs and NEMs resonators themselves.

Surface acoustic wave, IDT, interdigitated

#### U23-A01A5 [1992]

## With voltage control, e.g. VCXO

This code is used with U23-A01A or U23-A01A1, as appropriate. Voltage controlled oscillators for PLLs are covered by U23-D01A1, and astable multivibrator type VCOs by U22-A04B9.

## U23-A01B

#### Inductive/capacitive resistive elements

## U23-A01B1 [1987]

#### **Discrete LCR**

Frequency/phase-shift, Wien bridge, parallel-T, tuned circuit, coil, inductor, capacitor, resistor

#### U23-A01B2 [1987]

# Distributed LCR, YIG or dielectric resonator etc.

Includes the use of waveguide-type elements, novel aspects of which are coded in W02-A, e.g. W02-A03A codes for resonators. See U23-Q also for constructional and layout aspects influenced by the frequency of operation.

Coaxial, cavity, tuned line, stripline, microstrip, YIG sphere, magnetic

## U23-A01B5 [1992]

# With voltage control e.g. VCO

This code is used with U23-A01B1 or U23-A01B2 as appropriate. (See note for U23-A01A5).

#### U23-A02

## Negative resistance element or transittime effects

Includes oscillators with conventional threeterminal device in negative resistance circuit configuration.

Gunn diode, IMPATT, klystron, magnetron, TWT

### U23-A05 [2014]

# Oscillators based on spin transport electronics

Covers oscillators using 'spintronics' or 'magnetoelectronics', e.g. spin torque oscillators as used in microwave-assisted magnetic recording, for which T03-A06N3 codes are also assigned. U23-Q is also assigned to denote significant high-frequency (e.g. microwave) aspects.

Giant magnetoresistance, GMR, MAMR, oscillating field, STO, TMR, tunnel magnetoresistance

## U23-A06 [2016]

## **Atomic oscillators**

This code is intended to cover oscillators in which signals, e.g. at microwave frequencies, are emitted by electrons in the atoms of gaseous alkali metals changing energy levels. Prior to 2016 this kind of oscillator was coded as U23-A when appropriate but was chiefly covered by U23-D02 which will continue to be assigned for inventions based on the use of such oscillators as a reference frequency source.

Cesium, coherent population trapping, CPT, double resonance, energy transition, gas cell, laser, light, quantum interference, rubidium

#### U23-B

## Frequency multipliers/dividers

## U23-B01 [1987]

### **Analogue**

Harmonic resonator, varactor, injection, diode bridge

### U23-B02 [1987]

## **Digital**

See U22-D05A for circuits multiplying or dividing pulse rate. Counter circuits are covered by U21-D codes.

## U23-C

## Phase or frequency comparators

This code covers circuits for comparing the phase of frequency of sinusoidal signals. U23-D01A3A, which covers phase comparators / detectors in phase lock loops or delay lock loops takes precedence over U23-C codes.

#### U23-C01 [1987]

## Analogue phase or frequency comparator

This code covers analogue circuitry used for comparing the phase or frequency of sinusoidal signals.

#### U23-C02 [1987]

#### Digital phase or frequency comparator

This code covers digital circuitry used for comparing the phase or frequency of sinusoidal signals. Digital circuits comparing the phase of pulse signals are covered by U22-D02C and their frequency by U22-D02E.

## U23-D

# Automatic phase/frequency control; Synchronization

Purely digital circuitry e.g. for clock extraction from incoming data stream, is coded in U22-H. From 1992 U23-D01 codes are used for **all** aspects of phase-locked loops, whether of analogue or digital type. U23-D01A8 codes are used to distinguish analogue, digital, or hybrid types when this is significant. Prior to 1992 see U23-D01 codes and U22-H codes as appropriate.

## U23-D01 [1987]

## Delay lock loop and phase lock loop

In 2005, the title of this code was changed to better reflect its inclusion of delay lock loops as well as phase lock loops. In the case of DLLs U23-D01D is assigned with other U23-D01 codes as appropriate. U23-D01 codes take precedence over the 'general synchronization' code U22-H, which is assigned for digital phase and frequency control circuits not involving a PLL or DLL.

DLL. PLL

## U23-D01A [1987]

Loop details

## U23-D01A1 [1992]

## Voltage controlled oscillator

Reference oscillators for frequency synthesizers are covered by U23-D01B3.

Current/voltage/numerically controlled oscillator, CCO, VCO, NCO, voltage controlled crystal oscillator, VCXO

#### U23-D01A2 [2007]

#### Active loop control

Includes control of loop gain, for which U24-C01 codes are also assigned as appropriate.

#### U23-D01A3 [1992]

## Phase detectors and charge pumps

From 2002 the title of this code has been changed to better reflect the previous inclusion of charge pumps, now coded separately as U23-D01A3C.

## U23-D01A3A [2002]

Phase detector

## U23-D01A3C [2002]

#### Charge pump

Charge pumps in general are covered by U24-D02A1.

## U23-D01A5 [1992]

#### **Lock detector**

False lock protection is covered by U23-D01F3. Out-of-lock detector

## U23-D01A6 [2005]

#### Delay array

Includes delay lines, gates, etc. making up the delay chain. U22-D04 and U25-A05 are also assigned where relevant.

## U23-D01A7 [1992]

#### **Loop filter**

U23-D01A7A [1992]

Variable bandwidth

U23-D01A8 [1992]

**Loop type** 

U23-D01A8A [1992]

**Analogue** 

U23-D01A8B [1992]

Digital

U23-D01A8C [1992]

Hybrid analogue/digital PLL system

U23-D01B [1987]

#### Frequency synthesizers

See W02-G03A codes also for application to radio communications equipment in general, and U23-F01 codes for direct synthesizers.

Synthesis, step, select, preset channel, radio receiver, transceiver, transmitter

U23-D01B1 [1992]

Division circuit, e.g. variable ratio divider

U23-D01B1A [1997]

### For fractional synthesis

Fractional-N

U23-D01B3 [1992]

## **Reference oscillator**

See U23-A01A also for oscillator circuits employing an electromechanical resonator. VCOs (and VCXOs) are coded in U23-D01A1 and the appropriate U23-A code. For temperature compensation aspects U23-E05 is also assigned. *Quartz, crystal, SAW, oven, temperature, control* 

## U23-D01B5 [1992]

# Output filter arrangements, improving purity

This code covers arrangements to reduce noise, spurious signals, etc. which are specific to the synthesizer circuit, i.e. it is not routinely assigned for noise reduction that is actually a property of the PLL itself which is covered by U23-D01F5.

## U23-D01B7 [1997]

# Characterised by use of more than one loop

Includes dual-loop PLL synthesizers.

U23-D01C [1987]

## Modulation/demodulation applications

See also other U23 codes for type of modulation.

U23-D01C1 [1992]

**Costas loop system** 

U23-D01D [2005]

#### **Delay lock loop**

This code is assigned to indicate that an invention relates to a delay lock loop rather than a phase lock loop, other U23-D01 codes being assigned with it depending on novelty. When U23-D01 codes are assigned without U23-D01D, it is assumed that a PLL is involved or that the invention is not specific to DLLs.

U23-D01E [2006]

## PLL and DLL testing

Includes calibration aspects.

U23-D01F [1997]

# Modifications and improvements to loop characteristics

These codes are used with other U23-D01 codes as appropriate.

U23-D01F1 [1997]

## Lock acquisition time reduction

See also U23-D01A7A. *In-lock, pull-in, track* 

U23-D01F3 [1997]

# **False lock prevention**

See also U23-D01A5.

U23-D01F5 [1997]

#### **Noise reduction**

Arrangements specific to indirect frequency synthesizers where the improvement is not a function of loop performance itself, e.g. an improved reference oscillator or an output filter, are covered by U23-D01B5 instead, but both codes can be used together when appropriate.

U23-D01F7 [1997]

Broadening capture range

U23-D01F9 [1997]

Other modifications to PLLs

## U23-D02 [1987]

## Other phase/frequency shift correction

Includes systems not relying solely on PLLs to correct phase or frequency, e.g. non-feedback frequency control of an oscillator based on sensed temperature, injection locking and use of atomic oscillators. (Time and frequency standards based on atomic oscillators are covered by S04-B02X and S04-C09). Prior to 2016 details of atomic oscillators themselves were chiefly assigned this code but from 2016 novel details of such oscillators, e.g. gas cells containing alkali metals, are covered by U23-A06.

### U23-E

## Oscillator starting and output control

U23-E codes are assigned for oscillator circuit control and for temperature compensation arrangements associated with the oscillator itself. The codes are **not** used for subsequent circuitry such as phase shifting, phase splitting or amplifying circuits. See U22-B codes for analogous arrangements for pulse generators.

U23-E01 [1992]

**Output control** 

U23-E01A [1992]

#### **AGC-based system**

See U24-C01 codes also for automatic gain control circuits.

## U23-E05 [1992]

### **Temperature compensation**

Includes choice of components (e.g. complementary temperature-dependent characteristics), temperature-responsive 'trimming' of oscillator circuits, and 'oven' arrangements.

### U23-F

# Miscellaneous oscillation and noise generators

## U23-F01\* [1987-2004]

#### **Direct frequency synthesizers**

\*This code is now discontinued. From 2005 direct frequency synthesizers are covered by U23-F03 codes.

## U23-F01A\* [1997-2004]

#### **Memory aspects**

\*This code is now discontinued. From 2005 memory aspects of direct frequency synthesizers are covered by U23-F03A1.

## U23-F01C\* [1997-2004]

### Improving output signal purity

\*This code is now discontinued. From 2005 improvements in spectral purity of direct frequency synthesizers are covered by U23-F03B5.

#### U23-F02\* [1987-2004]

# Waveform generators using computer ROM and A-D/D-A converters

\*This code is now discontinued. From 2005 direct frequency synthesis and direct digital synthesis is covered by U23-F03 codes.

## U23-F03 [2005]

## **Direct Frequency Synthesizers**

From 2005 U23-F03 codes have been introduced to better reflect direct frequency synthesis and includes direct digital synthesis. Indirect frequency synthesis is coded in U23-D01B.

U23-F03A [2005]

**Novel synthesizer details** 

U23-F03A1 [2005]

Memory aspect and look-up tables

U23-F03A3 [2005]

Phase accumulators

U23-F03A5 [2005]

D/A and A/D aspects

U23-F03A7 [2005]

Analog circuitry

U23-F03A9 [2005]

Other

U23-F03B [2005]

**Synthesizer performance** 

U23-F03B1 [2005]

Improving frequency resolution

U23-F03B3 [2005]

**Increasing frequency transition** 

Includes improving hopping speed.

U23-F03B5 [2005]

Improve spectral purity

U23-F03B9 [2005]

Other

U23-F05 [1997]

**Noise generators** 

Chaos, white noise

U23-F09 [1997] Other oscillation generation

#### U23-G

## **Amplitude modulation**

This code relates to amplitude modulation of a carrier wave by an analogue signal. For AM using digital modulating signals see U23-P01C codes. See also U23-P codes for relevant additional details and W02-G01D for transmitter application. This code is intended to highlight novel aspects of amplitude modulators, e.g. with U23-P codes, or novel modulation schemes. It is **not** applied merely to indicate the **use** of AM in a general sense.

Balanced modulator, DSB/SSB modulator

#### U23-H

## Angle modulation

This code relates to frequency or phase modulation of a carrier wave by an **analogue** signal. For FM or PM using digital modulating signals see U23-P01A codes. See also U23-P codes for relevant additional details and W02-G01D for transmitter application. This code is intended to highlight novel aspects of frequency or phase modulators, e.g. with U23-P codes, or novel modulation schemes. It is **not** applied merely to indicate the use of FM or PM in a general sense.

Reactance modulator, varactor, varicap, phase shifter

## U23-J

## Mixing; Frequency changing

Radio receiver applications (general) are coded in W02-G03A5.

U23-J01 [1997]

#### Mixer

See also under applications, e.g. W02-G03A5 for radio receivers in general, W03-B01A5 for broadcast radio receivers, and W03-A01B5 for TV receiver tuners. For image-suppression mixers, search with W02-G03B4A.

U23-J01A [1997]

Characterised by active device

U23-J01A1 [1997]

Diode

U23-J01A3 [1997]

**Bipolar transistor** 

U23-J01A5 [1997]

Field effect transistor

U23-J01A5A [1997]

**JFET** 

U23-J01A5C [1997]

**MOSFET** 

U23-J01A9 [1997]

Other implementation technology

U23-J01C [1997]

Characterised by configuration

U23-J01C1 [1997]

Single-ended

U23-J01C5 [1997]

**Balanced** 

U23-J01C5A [1997]

Single-balanced

U23-J01C5C [1997]

### **Double-balanced**

For ring configurations, U23-J01C5E takes precedence.

DBM

U23-J01C5E [1997]

## Rina

This code takes precedence over U23-J01C5C.

U23-J01C5G [2017]

#### Triple-balanced

Covers use of two double-balanced mixers driven in a push-pull configuration.

Doubly double-balanced mixer, TBM

U23-J01C9 [1997]

Other configuration

## U23-J01E [2002]

## Integrated or film circuit implementation

This code is assigned with other U23-J01 codes as necessary, to indicate a self-contained mixer in integrated form. Specific novel constructional and manufacturing aspects of monolithic and film circuits are also assigned codes from classes U11-U14 as appropriate.

U23-J05 [1997]

Frequency changing

U23-J05A [1997]

**Single conversion** 

U23-J05C [1997]

## **Double and multiple conversion**

This code denotes two or more frequency conversions being performed.

#### U23-K

## **Amplitude demodulation**

See also U23-P codes for relevant additional details and W02-G03E for (general) radio receiver applications. Demodulators of signals amplitude modulated by digital signals are covered by U23-P01C and U23-P01J3. Signal rectifiers, e.g. for AGC purposes, are covered by U24-C03.

## U23-L

#### Angle demodulation

See also U23-P codes for relevant additional details and W02-G03E for (general) radio receiver applications. Demodulators of signals frequency or phase modulated by digital signals are covered by U23-P01A and U23-P01J3.

Frequency, phase, FM, discriminator, quadrature detector, limiter

## U23-P [1987]

#### Modulation/demodulation, general

Codes in this section are used either alone, or with other U23 codes as appropriate. Additional codes may be assigned from section W for radio equipment applications.

## U23-P01 [1987]

## **Digital Modulation/Demodulation**

From 2005 the title of this code has been changed to better reflect its content. U23-P01 codes are chiefly used with W01-A09 codes for carrier systems data transmission. They describe modulation of a carrier by **digital** signals.

U23-P01A [2005]

## **Angle Modulation**

Angle modulation with **analogue** modulating signals is covered by U23-H.

U23-P01A1 [2005]

**Frequency Shift Keying** 

**FSK** 

U23-P01A3 [2005]

**Phase Shift Keying** 

PSK, QPSK

U23-P01A5 [2005]

Minimum Shift Keying

MSK

U23-P01A9 [2005]

Other

U23-P01C [2005]

#### **Amplitude Modulation**

Amplitude modulation with **analogue** modulating signals is covered by U23-G.

U23-P01C1 [2005]

Amplitude Shift Keying

ASK

U23-P01C9 [2005]

Other

U23-P01E [2005]

**Hybrid Modulation** 

U23-P01E1 [2005]

Quadrature Amplitude Modulation

QAM

U23-P01E9 [2005]

Other

U23-P01G [2005]

Multi-frequency code techniques

U23-P01J [2005]

**Novel Modulator/Demodulator Circuits** 

U23-P01J1 [2005]

#### Modulator

Amplitude and angle modulators with **analogue** modulating signals are respectively covered by U23-G and U23-H.

U23-P01J3 [2005]

**Demodulator** 

U23-P01J3A [2005]

**Coherent detection** 

U23-P02 [1987]

## **Analogue circuit details**

This code is used in conjunction with U13-B codes for significant integrated circuit aspects.

U23-P03 [1987]

## Implementation using digital techniques

See T01-J codes for computer circuit aspects.

U23-P04 [1987]

## **Broader systems details**

Covers circuit blocks used for signal processing, rather than 'internal' circuit details. For amplitude-locked loop demodulation applications, use with U24-C01G.

U23-P05 [1987]

### Stereo, mixed AM/FM

See W02-E and W02-F06 codes also for stereophonic broadcasting. Decoders in TV and radio receivers are also coded in W03-A02B1 and W03-B02C3 codes respectively.

# U23-Q [1987]

### Microwave and HF circuits

(U23-X)

This code is intended to indicate construction and layout aspects of microwave circuits and is used in conjunction with other relevant U23 codes. Waveguide components per se (including microstrip) are covered by W02-A codes. Construction and layout of microwave amplifiers is covered by U24-G04M.

Microwave integrated circuit, MIC, stripline, resonator, cavity

U23-R [2006]

#### Testing/calibration

This code covers all testing/calibration aspects for U23 type circuits apart from PLLs and DLLs for which U23-D01E is applied. See also S01 codes.

U23-R01 [2006]

**Testing** 

U23-R02 [2006]

**Calibration** 

#### U23-X

# Other aspects of modulation/demodulation

This code includes (de)modulation of EM waves, e.g. in a waveguide, and aspects of modulation or demodulation not otherwise catered for in U23.

## **U24: Amplifier and Low Power Supplies**

Heavy current equipment is in section X.

#### U24-A\*

[1980-1986]

#### Semiconductor/valve amplifiers

\*This code is now discontinued. The codes U24-A01 to U24-A09 in this group remain valid for records prior to 1987.

#### U24-A01\*

[1980-1986]

## DC and low frequency amplifiers

\*This code is now discontinued.

U24-A02\*

[1980-1986]

## High frequency and wideband amplifiers

\*This code is now discontinued.

U24-A03\*

[1980-1986]

## Power and switching amplifiers

\*This code is now discontinued.

U24-A04\*

[1980-1986]

# Differential, operation, push-pull amplifiers; Phase splitters

\*This code is now discontinued.

#### U24-A05\*

[1980-1986]

## Feedback arrangements; Raising efficiency

\*This code is now discontinued.

## U24-A06\*

[1980-1986]

Modification for reducing noise/internal impedance effects/ temp. and supply voltage influence/ distortion; Bandwidth extension

\*This code is now discontinued.

#### U24-A09\*

[1980-1986]

# Other (incl. protection circuitry, multichannel amplifiers)

\*This code is now discontinued.

## U24-B\*

[1980-1991]

# Parametric, magnetic and dielectric amplifiers, etc.

\*This code is now discontinued but remains valid for records prior to 1992. For parametric amplifiers see U24-G04E, dielectric amplifiers see U24-G04X, magnetic amplifiers see U24-E04.

## U24-C

#### Gain control

Includes compression/expansion, AGC, muting, general signal rectifiers.

#### U24-C01

## **Automatic gain control**

AGC

U24-C01A

[1987]

AGC amplifiers with analogue control

U24-C01B

[1987]

AGC amplifiers with digital control

U24-C01C

[1987]

**Control signal derivation** 

U24-C01C1

[1997]

#### Novel signal processing per se

Includes processing of derived control signal to achieve particular gain control characteristic.

#### U24-C01C5

[1997]

## Taking other parameters into account

E.g. using ambient acoustic signal, signal produced from mechanical parameters such as vehicle or engine speed, etc.

In-car-entertainment, passenger compartment, microphone, volume

### U24-C01G

[1997]

### Amplitude-locked loop

See U23 codes also for AM and FM demodulation applications. Phase lock loops are covered by U23-D01 codes.

ALL

## U24-C02

## **Companders; Amplitude limiters**

U24-C02A

[1987]

## Limiters

Clipper circuit

#### U24-C02A1

[1992]

## **Soft limiter**

(U24-C02)

## U24-C02A5 [1992]

## DC limiting i.e. level clamp circuit

Video signal clamping circuits for TV receivers are coded in W03-A04C.

## U24-C02B [1987]

## Companding, compression, expansion

Emphasis, pre-emphasis, compressor, compander, expander, Dolby®, Dolby-B®

## U24-C03 [1987]

## **General signal rectifiers**

Covers rectifiers for control signal derivation. Amplitude demodulators in general are covered by U23-K.

## U24-C03A [1997]

#### **Peak detector**

See U21-B03 for sample-and-hold circuits.

## U24-C05 [1987]

# Manual control, combined gain/tone control, muting

(U24-C09)

See W03-C codes also for audio amplifier aspects.

## U24-C05A [1987]

## Manual gain control

Also coded in W03-C03 for audio amplifiers. *Volume* 

## U24-C05A1 [1997]

## **Continuously variable**

Potentiometer

## U24-C05A5 [1997]

#### Stepped variation

Ladder, resistor, network, switch, tap

## U24-C05B [1987]

## Digital control details, e.g. by computer

Includes e.g. computer circuit details.

## U24-C05C [1987]

## Muting

Muting in radio receivers is covered by W02-G03B1.

#### U24-C05D [1987]

## Combined gain and tone control

### U24-C09

## Other gain control

#### U24-D

#### **Power converters**

Includes normally low electronic power converters. High power converters are in X12-J and their controllers in X13-G03. Indeterminate power converters are in U24 and X12. Unregulated or unstabilized converters are in U24-D. Stabilisers or voltage regulators are in U24-E. Does **not** cover individual components e.g. capacitors, transformers even if specifically intended for converters.

#### U24-D01

#### General converter details

#### U24-D01A

## **Generation of control voltages**

See also U21-B01 and U21-B05 codes for electronic switching.

## U24-D01A1 [1992]

For bipolar transistor

U24-D01A1A [1992]

For IGBTs

U24-D01A3 [1992]

For FETs

U24-D01A7 [1992]

## For control of other devices

## U24-D01A8 [2007]

#### **Multi-phase control**

This code is applied in conjunction with other U24-D codes to highlight novel multi-phase control.

## U24-D01A9 [1992]

#### **Characterised by PWM**

See U22-E codes for PWM in general.

## U24-D01B [1992]

### **Protection**

See also U24-F. For high power converters see X12-J01B and X13-C04D.

## U24-D01B1 [2005]

**Snubber circuits** 

#### U24-D01B1A [2005]

### **Passive**

Includes the use of RLC elements and diodes.

## U24-D01B1C [2005]

#### Active

Includes the use of transistors, etc.

## U24-D01B1F [2005]

#### **Dissipative**

Includes arrangements for dumping excess switching energy into a resistor. May be used in conjunction with other U24-D01B1 codes.

## U24-D01B1H [2005]

### **Non-dissipative**

Includes arrangements for excess switching energy to be fed back or fed forward, respectively, to the input or output.

## U24-D01E [1992]

## **Reducing harmonics and ripples**

(U24-D01X)

See U25-E codes for filters in general.

## U24-D01E1 [2006]

**Harmonics reduction** 

### U24-D01E2 [2006]

**Ripple reduction** 

## U24-D01E5 [2014]

## Reducing electromagnetic interference

This code covers measures to reduce electromagnetic interference generated by the converter itself, e.g. based on circuitry or on constructional details such as screening for which V04-U codes are also assigned. W02-H01 codes (general codes for EMI/RFI reduction at source) are also assigned as appropriate.

Electromagnetic compatibility, EM, EMC, filter, harmonic, PWM frequency, radio frequency interference, RF, SMPS, switched mode, switching frequency, switching regulator, switching transient

## U24-D01G [1992]

## **General cooling details**

(U24-D01X)

See also V04-T03 codes.

# U24-D01J [2005]

## Measurements/testing/monitoring

Includes self-checking arrangements and also monitoring by external equipment. See S01 codes for related electrical instrumentation aspects.

### U24-D01K [2007]

## **Constructional details**

#### U24-D01X

#### Other converter aspects

Includes converter details not covered elsewhere.

#### U24-D02

**DC-DC** converters

#### U24-D02A

#### Without intermediate AC

Charge pump

U24-D02A1 [2005]

Charge pump

U24-D02A2 [2005]

Chopper

U24-D02B

With intermediate AC

U24-D02B1 [1992]

Flyback; Forward

U24-D02B3 [1992]

Half-bridge or single-ended push-pull;

**Push-pull** 

**SEPP** 

U24-D02B5 [1992]

Full bridge

U24-D02B7 [1992]

Resonant

U24-D03

**AC-AC** converters

U24-D04

**AC-DC** converter

Rectifier

U24-D04A [1992]

Half-wave

U24-D04C [1992]

**Full-wave** 

U24-D04C1 [1992]

Bridge

U24-D04C1A [1992]

Characterised by diodes

U24-D04E [1992]

Voltage multiplier

U24-D04G [2002]

Synchronous rectifier

(U24-D04C)

Includes rectifiers using active transistor switches.

U24-D05

**DC-AC** converter

Inverter

U24-D05A

Full- and half-bridge

U24-D05A1 [1992]

**Characterised by bipolar transistors** 

U24-D05A1A [1992]

**Characterised by IGBTs** 

U24-D05A3 [1992]

**Characterised by FETs** 

U24-D05A5 [2006]

Characterised by combination of bipolar/IGBTs/FETs

U24-D05A9 [1992]

Other inverters

Includes inverters characterised by type of switch not covered elsewhere.

U24-D05B [2005]

Inverter-type

To be used in conjunction with other inverter codes such as U24-D05A.

U24-D05B1 [2005]

Voltage source inverter

U24-D05B2 [2005]

**Current source inverter** 

U24-D05B3 [2005]

**Utility inter-tie inverter** 

Includes inverters fed by solar/wind power/etc generators for connecting to a mains/utility supply. For high power inverters, see X12-J codes.

U24-D06 [2005]

## **Pulse voltage supply**

See X12-J06 for high power pulse supply. See U22-A03 also for energy-storage pulse generation.

## U24-D09

#### Other converters

Includes other converters not covered elsewhere e.g. dynamic types.

U24-D10 [2007]

#### **Bidirectional converter**

This code is used in conjunction with other codes to indicate a bidirectional novelty.

U24-D11 [2007]

## Multiple input/output

This code is used in conjunction with other codes to indicate multiple input/outputs aspects. Caters for, for example, converters that output voltages of different magnitudes.

U24-D12 [2007]

## Intelligent power supply

Includes power supplies characterised by having a microcontroller for providing programmable features. The latter include the ability to adaptively respond to external conditions, adaptive current limit for different phases of the PSU operation, programmable output voltage, supervisory features, fault recovery, status information provision for remote diagnostics, etc. See also relevant T01-J08 codes.

#### U24-E

## Regulating power/current/voltage

#### U24-E01

## Non-feedback systems

Includes e.g. Zener diode.

U24-E01A [2005]

**AC** variable

U24-E01C [2005]

**DC** variable

U24-E01C1 [2005]

Zener diode-based

## U24-E01C5 [2005]

#### **Current mirror circuits**

Includes current sinking/sourcing configurations for the regulating transistor to connect a load to the ground/DC power supply terminal.

## U24-E01C7 [2005]

## **Band gap reference circuits**

Includes, generally, regulators using the difference between base-emitter voltages of two bipolar transistors operating at different current densities. For voltage reference circuits using feedback, see U24-E02B7.

#### U24-E02

Feedback systems

U24-E02A

For AC

U24-E02B

For DC

U24-E02B1

With overload protection

U24-E02B1A [1992]

With overload protection and series dissipative transistor

(U24-E02B3)

U24-E02B2

With transistor

U24-E02B2A [1992]

Switching regulator or switched mode power supply

(U24-E02B4) SMPS

U24-E02B2D [1992]

**Dissipative regulators** 

(U24-E02B6)

U24-E02B3\* [1983-1991]

## With overload protection and series dissipative transistor

\*This code is now discontinued and was formerly a subdivision of U24-E02B1. From 1992 this subject matter is transferred to U24-E02B1A to indicate its proper hierarchical relationship to U24-E02B1. It remains valid and searchable for documents from 1983 to 1991.

## U24-E02B4\* [1983-1991]

#### Switching regulators

\*This code is now discontinued and was formerly a subdivision of U24-E02B2. From 1992 this subject matter is transferred to U24-E02B2A to indicate its proper hierarchical relationship to U24-E02B2. It remains valid and searchable for documents from 1983 to 1991.

## U24-E02B6\* [1983-1991]

#### **Dissipative regulators**

\*This code is now discontinued and was formerly a subdivision of U24-E02B2). From 1992 this subject matter is transferred to U24-E02B2D to indicate its proper hierarchical relationship to U24-E02B2. It remains valid and searchable for documents from 1983 to 1991.

## U24-E02B7 [2006]

#### Voltage reference circuit

Includes circuit using feedback. For non-feedback voltage reference circuits, see U24-E01C7.

#### U24-E02B9

## Other DC regulators

Includes other DC feedback systems to control power/current/voltage.

U24-E02C [1987]

Regulation for AC or DC variable

U24-E02D [1987]

Regulation of electric power

U24-E02D1 [1987]

Maximum energy transfer from generator

Includes e.g. solar cell circuits.

## U24-E02D1A [1997]

Solar power system and associated converter interconnection with commercial utility system

(U24-E02D1)

Generally includes inverter control (see also U24-D codes) to enable max. power transfer. See also X12-H01B.

## U24-E02D2 [1987]

## Regulating power factor

Capacitor banks for power factor correction in heavy current systems are in X12-H01A.

#### U24-E03 [1987]

## Regulating electric variables using input deviation detection

Phase/firing angle, phase-switching, fire, zero-crossing detector, trigger

U24-E03A [1987]

AC input with thyristors or triacs

U24-E03B [1987]

AC input with transistors, FETs

U24-E03X [1987]

## Other electric output regulation based on input deviation

Includes other electric variables regulation.

U24-E04 [1987]

**Regulating magnetic variables** 

(U24-X)

Includes magnetic amplifiers using e.g. transductors.

## U24-F [1983]

#### **Protective circuits**

(U24-X)

Protection for heavy current systems is covered by X13-C codes.

## U24-F01 [1983]

## For automatic disconnection

(U24-X)

This code covers protection arrangements for low-power electrical and electronic circuits involving disconnection which may be capable of being reset or may be non-resettable, e.g. based on fuses. Novel details of fuses themselves are not included and are covered by X13-D01 codes.

## U24-F02 [1983]

## Limiting excess current/voltage

(U24-X)

Surge protection

#### U24-F03\* [1997-2016]

## **Smart protectors**

\*This code is now discontinued and from 2017 this subject matter is covered by U24-F05, i.e. as digital protectors. U24-F03 remains valid and searchable for records between 1997 and 2016 when it covered smart protectors using microprocessors and the like. See also U13-E01 for IC protectors and relevant T01-J08 codes for microprocessor control.

## U24-F04 [1997]

## Solid-state (analogue) protectors

## U24-F05 [1997]

## **Digital protectors**

From 2017 the scope of this code is expanded to cover all low-power circuit protection devices which rely on digital circuitry and devices to detect fault conditions and initiate protective measures, including smart protectors which prior to 2017 were covered by U24-F03.

ADC, analog-to-digital converter, digital relay, digital protective relay, logic, microprocessor, neural network, numerical relay, smart circuit protector, software

U24-F06 [2002]

**Electrostatic protection** 

U24-F07 [2002]

Thermal protection

U24-F08 [2018]

## **Charging protection**

This code covers protection for energy stores such as secondary cells and capacitors, and equipment using them, from damage arising from charging. The protection may be triggered by an undesired electrical condition or by a physical change, such as deformation of battery casing or temperature rise. Other U24-F codes are also assigned as appropriate, e.g. U24-F01 for protection involving disconnection from a charging source or U24-F07 for protection initiated by rise in temperature. Charging of batteries is also covered by X16-G codes and of capacitor energy stores by U24-L and X16-L02. Protection for high-power batteries and battery systems is covered by X13-C04X.

Fast charging, gas pressure, overcharging, rapid charging

#### U24-G [1987]

#### Semiconductor/valve and other amplifiers

Codes in this section are divided into categories of circuit application (U24-G01 codes), circuit type and configuration (U24-G02 codes), circuit modifications (U24-G03 codes) and implementation technology (U24-G04 codes). In general, codes from the U24-G01,-G02 and -G04 sections are assigned to describe general aspects of the amplifier, novel features being chiefly represented by U24-G03 codes. From 1992, subject matter previously covered by U24-B has been incorporated in this section.

## U24-G01 [1987]

## **Circuit applications**

U24-G01A [1987]

Instrumentation servo, sensor optoreceiver (U24-A01, U24-A09)

U24-G01A1

## Instrumentation

Instrumentation in general is covered in section S.

[1992]

#### U24-G01A5 [1992]

### **Opto-receiver amplifiers**

Covers amplifiers with e.g. photodiode, phototransistor at input. See also codes for application, e.g. W02-C04A3B for optical communication receiving amplifier.

U24-G01B [1987]

**Power** 

U24-G01B1 [1987]

#### Low frequency

Also coded in W03-C01C when used as an audio power amplifier.

#### U24-G01B5 [1987]

### **High frequency**

Also coded in W02-G01B when used as transmitter power amplifier. See U24-G04M for microwave amplifier constructional aspects.

HF, RF, microwave, millimetre, wave

#### U24-G01C [1987]

## Audio and general low frequency

See W03-C codes also for non-power audio amplifiers, e.g. W03-C01A for audio preamplifiers.

#### U24-G01D [1987]

#### **High frequency**

Covers HF/RF signal amplifiers for video and radio equipment. See also under application, e.g. W02-G03A3 for radio receiver RF amplifiers. See U24-G04M for microwave amplifier constructional aspects.

#### U24-G01F [1992]

## Logarithmic amplifier

Compression in general is covered by U24-C02B. Circuit modifications to introduce deliberate nonlinearity are covered by U24-G03K.

U24-G01X

Other amplifier application

U24-G02 [1987] Circuit type and configuration

U24-G02A [1987]

Differential amplifier, current mirror, operational amplifier

(U24-A04)

#### U24-G02A1 [1992]

#### Differential amplifier

From 2002, U24-G02A1C is assigned for amplifiers with both differential input and output, and takes precedence over the other two subdivisions of U24-G02A1.

U24-G02A1A [2002]

Differential input

U24-G02A1B [2002]

Differential output

U24-G02A1C [2002]

## Differential input and output

This code takes precedence over U24-G02A1A and U24-G02A1B.

U24-G02A3 [1992]

**Current mirror** 

U24-G02A5 [1992]

Operational amplifier

U24-G02A5A [1997]

Transconductance amplifier

 $OT\Delta$ 

#### U24-G02A5C [1997]

## **Current mode operation**

Covers amplifier with predominately current-based feedback.

U24-G02A7 [1992]

Follower circuit e.g. emitter follower

U24-G02B [1987]

## Switched capacitor

This code covers switched-capacitor amplifier technology, and includes any amplifier circuit using this technique. Circuits of this type using 'off-theshelf' (i.e. not novel) operational amplifiers, used as a functional block or 'black box', are covered by U24-G04C1, which is assigned as well as U24-G02B when necessary. Switched capacitor filters and switched capacitor networks in general are covered by U25 codes.

U24-G02C [1987]

Push-pull, phase splitters

U24-G02C1 [1992]

## **Phase splitter circuits**

This code is used for novel phase splitting circuits of general application.

Transformer, transistor

U24-G02C5 [1992]

**Push-pull amplifier** 

U24-G02D [1987]

**DC** coupled

U24-G02E [1987]

## **Switching Amplifier**

From 2005, the title of this code has changed to better reflect its content. This code covers switching amplifier arrangements or as they are more commonly known Class D amplifiers. Digital Amplifiers and Class E amplifiers are also covered here. See U22-E codes for pulse modulation in general, U21-B codes for electronic switching in general and U24-G01 codes and W03-C codes for audio applications.

Digital Amplifier, Class D, Class E, PWM, Switching Amplifier

U24-G02F [1987]

Gated, two-way, cascade, cascode, bridge, and combination amplifiers

U24-G02F1 [1992]

**Gated amplifier** 

Amplifier muting in general is covered by U24-C05C.

U24-G02F2 [1992]

Multichannel amplifier

U24-G02F3 [1992]

**Bidirectional amplifier** 

Two-way

U24-G02F4 [1992]

**Bridge amplifier** 

U24-G02F5 [1992]

**Cascaded amplifier** 

Multistage

U24-G02F7 [1992]

**Cascode amplifier** 

U24-G02X [1987]

Other amplifier circuit configurations

Includes reflex amplifiers.

U24-G03 [1987]

Modifications and improvements to amplifiers

(U24-A05, U24-A06)

U24-G03A [1987]

**Negative feedback** 

NFB

U24-G03B [1987] Positive feedback, feedforward

U24-G03B1 [1992]

**Feedforward** 

See U24-G03D5 also when object is distortion reduction.

U24-G03C [1987]

**Protection** 

(U24-A09)

Overvoltage or overcurrent protection in general is covered by U24-F codes.

U24-G03D [1987]

Noise/distortion reduction

U24-G03D1 [1992]

**Noise reduction** 

For application to radio receivers, see W02-G03B codes also.

U24-G03D1A [2002]

Noise arising from amplifier components

U24-G03D1B [2002]

Reducing effect of external noise sources

U24-G03D3 [2002]

Improvement in dynamic range

U24-G03D5 [1992]

Distortion reduction, linearity

improvement

For pre-distortion see U24-G03K and when relating to RF systems, W02-G04B codes also.

U24-G03D5A [2002]

**Harmonic distortion** 

U24-G03D5C [2002]

Intermodulation distortion

U24-G03D5X [2002]

Other distortion

U24-G03E [1987]

## For integrated circuits

Inventions coded in U24-G03E codes deal with improvements to amplifiers where the integrated aspect is a significant factor, and are not normally coded in U13 unless structural aspects are involved. See U24-G04A codes for general integrated circuit implementation aspects of amplifiers.

## U24-G03E1 [1992]

## Measures improving performance

This code may be used with other U24-G03 codes depending on the nature of the improvement. Includes e.g. improvement in noise figure, slew rate, (see U24-G03D1 and U24-G03J respectively also) etc.

## U24-G03E5 [1992]

#### **Physical measures**

This code is used to denote measures not involving changes to the circuit per se, but to physical characteristics, e.g. enabling reduction of chip area.

#### U24-G03F [1992]

#### Offset reduction

For application to DC amplifiers search with U24-G02D.

U24-G03G [1992]

Improving immunity to supply voltage change, novel biasing networks

U24-G03G1 [1997]

**Novel biasing networks** 

U24-G03H [1992]

Improving immunity to temperature change

U24-G03J [1992]

## **Extending bandwidth**

Includes improvements to wideband performance, increasing slew rate, etc.

## U24-G03K [1992]

### **Deliberate nonlinearity introduction**

For pre-distortion see U24-G03D5 and when relating to RF systems, W02-G04B codes also.

U24-G03L [1992]

#### Measures to improve stability

Bode, Nyquist, compensation, open, loop, closed loop, feedback

U24-G03N [1992]

Improving efficiency, reducing supply voltage

(U24-G03X)

U24-G03N1 [1997]

## Improving efficiency

This code mainly relates to power amplifiers in which case U24-G01B codes are also applied. Battery saving, headroom improvement

## U24-G03N5 [1997]

## Reducing supply voltage

Includes arrangements for enabling operation with reduced supply voltage, e.g. in battery-operated equipment.

Headroom, saturation, voltage swing, rail

U24-G03P [1997]

Improving CMRR, improving gain

(U24-G03X)

U24-G03P1 [1997]

## Improving CMRR

(U24-G03X)

See U24-G02A5 codes for differential amplifier per se.

Common mode rejection ratio

U24-G03P5 [1997]

Improving gain

(U24-G03X)

U24-G03Q [1997]

## Reducing dependence on device characteristics

This code may be used with U24-G03E and U24-G04 codes as appropriate.

U24-G03R [1997]

Modifying input-output impedance

(U24-G03X)

U24-G03X [1987]

Other modifications and improvements to amplifiers

## U24-G04 [1987]

## **Amplifier implementation technology**

These codes are applied whenever the implementation is specific to a single main type.

## U24-G04A [1987]

#### Integrated transistor circuits

Inventions assigned U24-G04A codes are not normally coded in U13 unless structural aspects are involved.

U24-G04A1 [1987]

**Bipolar** 

U24-G04A2 [1987]

## Field effect transistor

CMOS, FET, IGFET, JFET, MESFET, MISFET, MOS, MOSFET

U24-G04A3 [1992]

**Bipolar and FET combined** 

U24-G04B [1987]

**Discrete transistor circuits** 

U24-G04B1 [1987]

**Bipolar** 

U24-G04B2 [1987]

#### Field effect transistor

CMOS, FET, IGFET, JFET, MESFET, MISFET, MOS, MOSFET

U24-G04B3 [1987]

**Bipolar and FET combined** 

U24-G04B9 [1987]

Other discrete semiconductor device implementation

U24-G04C [1987]

# Amplifier modules using operational amplifiers

Includes circuits using general amplifier configurations as functional blocks. (Analogue computing elements are covered by T02-A04B codes).

## U24-G04C1 [1987]

## Switched capacitor amplifier using OPAMPs

This code covers the use of non-novel operational amplifiers in switched capacitor amplifier circuit configurations. All aspects of switched capacitor amplifiers are covered by U24-G02B (which is therefore assigned with this code). Switched capacitor networks in general are covered by U25-A01.

## U24-G04D [1987]

#### Valve

Includes klystron, travelling wave tube, etc. amplifiers. For novel details of tubes themselves see V05-B and V05-C codes.

#### U24-G04E [1992]

## **Parametric amplifier**

Parametric amplifiers are generally coded in U24-G01D also.

## U24-G04M [1992]

## Amplifiers using microwave or millimeter wave constructional techniques

From 2017 the title of this code has been changed to clarify its coverage of amplifiers whose operating frequency dictates the techniques used, e.g. distributed or transmission line amplifiers (also assigned U24-G02F5) and those employing distributed-constant elements such as waveguides, cavity resonators, and the like. Novel constructional details of amplifiers in general, such as PCB mountings, housings etc. are covered by U24-G05A which can be assigned with this code as necessary. Small-signal amplifiers of this kind are also assigned U24-G01D and RF power amplifiers are also assigned U24-G01B5. Distributed-constant elements such as waveguides, filters and resonators are covered by W02-A codes.

Dielectric resonator, directional coupler, finline, microstrip, probe, stripline

#### U24-G04X [1987]

Other amplifier implementation technology

U24-G05 [1997]

Constructional details and testing

## U24-G05A [1997]

## **Constructional details of amplifiers**

Includes cooling, housings, mounting details, etc. V04-S and V04-T codes for electronic equipment casings and constructional details in general are also assigned as necessary. Amplifiers using microwave or millimeter wave constructional techniques, e.g. microstrip or other types of waveguide, are covered by U24-G04M and are only assigned this code as well for novel constructional details of the amplifier as a whole.

Circuit board mounting, coolant, fan, heatsink, PCB mounting, pillar, rack mount, screening, shielding

## U24-G05C [1997]

## **Testing**

Includes amplifier calibration, self-testing and testing using external equipment. To denote testing of a specific amplifier property U24-G03 codes are also assigned as appropriate, e.g. U24-G03F and U24-G05C are assigned for measurement of amplifier offset voltage. For electrical tests S01 codes are also assigned as appropriate.

## U24-G09 [1987]

## Other amplifier details

## U24-H [1992]

#### Low power systems

(U24-X)

This code is analogous to X12-H.

## U24-H01 [2005]

#### **Protection**

Includes arrangements to protect LV power networks. For example, vehicle 12V network protection. To be used with U24-F codes, as appropriate. For individual PSU protection, see U24-D01B/F. For high power networks, see X13-C codes.

## U24-H02 [2005]

### Wireless/non-contact power distribution

Includes low level non-contact power transfer. For non-contact high power distribution see X12-H01E codes. See X16-G03 for non-contact battery charging, W01-C01E5E for wireless phone charging and X21-B01A1C for offboard non-contact charging of electric vehicle batteries. WPT, near-field

## U24-H02A [2021]

### Using capacitive coupling

### U24-H02B [2021]

## Using inductive coupling

Also see V02 for novel inductive components, e.g. V02-G01D for inductive connections. See S05 for biomedical and implant applications.

[2021]

#### U24-H02C

### Using radio waves or microwaves

See also W02 codes for novel RF details such as directional array or Yagi antennae, satellite communications and telemetry.

#### U24-H02D [2021]

#### **Usina liaht**

Includes use of off-board mains supply. See X16-G01 for mains battery charging.

#### U24-H02E [2021]

## **Using ultrasonic waves**

See also V06 codes for novel ultrasonic transducers.

## U24-H02L [2021]

## Wireless power transmission control, monitoring and optimization

Includes optimizing position for non-contact power transfer; reducing electric, magnetic or electromagnetic leakage/interference; detecting foreign objects; as well as transmitting data during power transfer.

#### U24-H03 [2005]

## Arrangement of power bus(es) fed by multiple sources

Includes several PSUs supplying main bus, or several buses at same or different voltages, that feeds power to one or more loads. Covers, for example, switch control to distribute power where required.

## U24-H04 [2005]

#### Power management techniques

Includes operation of a PSU to save/reduce battery energy dissipation and mains power. Operation measures may include switching off or operating in low power consumption mode, slowing of processor clock frequency, current/voltage control (for which U24-D/E codes are also assigned), to reduce power consumption. Changes to the operation of a PSU within portable equipment so as to reduce battery dissipation are covered by U24-K.

### U24-H05 [2006]

## Power distribution over communication network

Includes power supply distribution, and its control, over a communication network such as a LAN, for which W01-A06 codes are also assigned as appropriate. The use of power distribution conductors as a communications medium for a data network is covered by W01-A06C6, and for communications in general, by W02-C01A3.

PoE, power over Ethernet®

## U24-H06 [2006]

Low power network control

U24-H07 [2006]

#### **Vehicle LV distribution network**

Includes systems for IC engine-driven vehicles for voltages up to 42V. HV electric traction vehicle distribution systems are covered by X12-H01B codes and X21/X23. Also includes low voltage electric distribution systems for vehicles (see also X21-B and X22-F codes).

## U24-J [1992]

## Standby power supply

Includes uninterruptible power supplies. See T01-L01B for computers, W01-A07K for data communications and W01-C07B for telephone systems.

U24-J01 [2005]

**Battery back-up** 

U24-J02 [2005]

Capacitor back-up

U24-J03 [2005]

Power converter back-up

U24-J04 [2005]

Combination of battery and capacitor back-up

## U24-K [2005]

## PSU power-saving mode/operation

This code covers operation of a power supply unit within portable equipment to reduce battery dissipation. Power management techniques with the emphasis on power distribution are covered by U24-H04.

## U24-L [2005]

## **Capacitor charging circuits**

This is analogous to X16-G for battery chargers.

#### U24-T [2017]

## Constructional details of low power supplies and power distribution systems

Includes construction details of all types of low power supply except power converters covered by U24-D01 codes (e.g. U24-D01K). Also covers constructional details of power distribution systems. This code is assigned in conjunction with other U24 'power' codes as necessary, and is intended to highlight mechanical or physical details, including cooling, of inventions in this field. V04 codes dealing with electronic equipment constructional details in general are also assigned as necessary.

Bracket, casing, circuit board mounting, fan, fixing, heatsink, housing, PCB, printed circuit board mounting, ventilation

#### U24-X

## Other low power supply details

Portable power supply, power bank, wearable power supply.

## **U25: Impedance Networks and Tuning**

This section includes mainly lumped-constant circuit elements. Impedance networks with distributed-constant elements are covered by W02-A codes. Subject matter coded in U25 is generally for use in analogue circuits. Digital implementations of filters and similar networks are **not** included here and are covered chiefly by U22-G codes and T01-J08 codes for computing aspects. For application to radio equipment see W02 and W03 codes as appropriate.

## U25-A

Time delay and time-varying (incl. adaptive) networks

#### U25-A01 [1983]

## Switched capacitor networks; N-path filters

Switched capacitor amplifiers are covered by U24-G02B.

## U25-A02 [1983]

#### **Transversal filters**

Digital transversal filters are covered by U22-G01A3.

## U25-A03 [1992]

#### **Comb filters**

Digital comb filters are covered by U22-G01B5.

## U25-A05 [1992]

### **Time delay circuits**

Covers arrangements with emphasis on achieving a required time delay. Circuitry to produce a specific phase shift is covered in U25-F01 codes. Other delay aspects, e.g. for equalisation, are covered by U25-E05Q.

#### U25-B

#### **Electromechanical networks**

This code covers networks of electromechanical devices, i.e. two or more resonators forming e.g. a lattice or ladder filter such as a bandpass filter or a duplexer for a radio transceiver (in which case W02-G02A5B is also assigned). Individual piezoelectric, electrostrictive and magnetostrictive devices are covered by V06-V codes and SAW devices by U14-G, and are not assigned U25-B unless specifically intended for use in a network made up of these devices. U25-B also includes matching transformers (with V02-F02) and other components for electromechanical networks, for which other codes are also assigned as appropriate. U25-D codes are also assigned as necessary, e.g. U25-D01 codes when a splitting

function is performed, U25-D03 for a balun function, and U25-D05 for impedance matching aspects.

Crystal filter, ceramic filter, block filter

#### U25-C

## Active networks simulating reactances; impedance converters

This code covers circuits for simulating reactances, changing their sign (e.g. producing an inductive reactance from a capacitor) and changing their magnitude, such as a 'capacitor amplifier' or 'capacitor multiplier'.

Gyrator, negative/positive impedance converter, NIC, PIC, reactance multiplier, Miller effect

#### U25-D

Signal splitting/combining, impedance matching, balanced-to-unbalanced networks: Attenuators

## U25-D01 [1992]

## Signal splitters and combiners

This code and its subdivisions cover active and passive networks for splitting and combining signals, generally without regard to frequency. Splitting and combining circuits based on electromechanical filters are assigned U25-B and U25-D01 codes as appropriate. Where splitting or combining networks involve use of frequency-selective elements such as filters implemented with coils and capacitors, U25-E05K is assigned (with other U25-E codes as appropriate) **instead of** U25-D01 codes. Note that loudspeaker cross-over networks are not included in U25 unless other aspects or wider applications are involved, being covered by W04-T05 and V06-V02S.

U25-D01A [1997]

Active

U25-D01C [1997]

**Passive** *Transformer* 

U25-D03 [1992]

## **Balanced-to-unbalanced converters**

Distributed-constant balanced-to-unbalanced converters are covered by W02-A02A5.

Balun

## U25-D05 [1992]

## Impedance matching networks

Distributed-constant impedance matching is covered by W02-A02A5.

## U25-D07 [1992]

#### **Attenuators**

Waveguide-technology attenuators are covered by W02-A04C codes.

Insertion loss

## U25-D07A [1997]

#### Active

This code covers the use of semiconductor devices in attenuator circuits, both as switches and as controllable resistances.

PIN diode, FET

U25-D07C [1997]

**Passive** 

## U25-E

## Frequency selective networks

Codes in this group are used for filters (excluding those covered by U25-A codes and U25-B) involving at least two types of elements, i.e. RC, RL, or LC networks. Thus individual components described as 'filters' or 'noise filters' in a power supply or other circuit are not included, unless intentionally using a secondary property such as series inductance of a capacitor, or stray capacitance of an inductor. Noise filters for RFI suppression are covered in general in W02-H01 codes and for power supply lines in W02-H03 and U24/X12 codes, whether single components or combinations. Where filter function is specified, codes from the U25-E05 section are used with either U25-E01 or U25-E02. Active networks other than filters are assigned appropriate codes elsewhere in U25. For digital filters see U22-G01 codes. Waveguide technology filters are covered by W02-A05 codes.

Filter, lowpass, bandpass, highpass, notch

U25-E01

**Active** 

U25-E01A [1997]

**Biquadratic filter** 

Biquad

U25-E02

**Passive** 

U25-E02A [1997]

#### With structurally-associated components

Includes networks implemented with 'composite' components. See also V01-A02G5 and V01-B03C8 for composite resistor and capacitor aspects respectively, and V02-F01J for filter inductors.

## U25-E05 [1992]

## Characterised by function and operation

From 2009 U25-E05K is introduced for frequency selective networks with emphasis on separation or combination of frequency bands and takes precedence over other U25-E05 codes.

U25-E05A [1992]

**Lowpass filter** 

U25-E05B [1992]

**Bandpass filter** 

U25-E05B1 [1997]

Single LC resonant circuit

U25-E05C [1992]

**Highpass filter** 

U25-E05D [1992]

#### **Notch filter**

This code covers analog filters which attenuate a band of frequencies and pass those on either side. Band stop filter

## U25-E05H [1992]

#### Variable characteristic

This code is used with other U25-E05 codes or alone, as appropriate.

#### U25-E05K [2009]

# **Combining or separating different frequencies**

(U25-E05X)

This code is intended for frequency selective networks, i.e. filters normally, where the emphasis is on combination or separation of frequency bands. Examples include duplexers for radio transceivers, for which W02-G02A5B is also assigned. Where there are significant novel aspects in specific filters making up the frequency separating or combining network other U25-E05 codes are also assigned as appropriate, but otherwise U25-E05K takes precedence. Combining and splitting networks (lumped constant type) in general, without emphasis on frequency separation, are covered by U25-D01 codes. When frequencybased separation is involved U25-E05K takes precedence. Note that loudspeaker cross-over networks are not included, being covered by W04-T05 and V06-V02S

### U25-E05Q [2009]

## Delay equalisation and all-pass networks

(U25-E05X)

This code is intended for circuits in which emphasis is on delay equalization (and not amplitude equalization) and all-pass networks, in which all frequencies are passed, but the phase of the output is modified. Analogue circuits based on lumped constant impedances for correcting amplitude-frequency distortion are covered by U25-E05X but U25-E05Q takes precedence when delay equalisation is the main purpose.

Group delay

## U25-E05X [1992]

#### Other filter network function

This code includes frequency-dependent circuits used for amplitude equalisation, e.g. to compensate for increasing attenuation in a circuit or transmission line with frequency. (W02-C01B2B is also assigned when the application is to equalization of transmission lines for communications purposes and W01-A08B2 when the emphasis is on pulse shaping for data transmission). Prior to 2009 U25-E05X was also used for circuits with emphasis on delay equalization, now covered by U25-E05Q which takes precedence over this code when both amplitude and delay equalization are involved. Analogue time delay networks are covered by U25-A05. See U25-F01 codes for networks with emphasis on achieving a particular phase shift. From 2009 frequency selective networks (i.e. filters normally) with emphasis on the separation or combining of frequency bands are no longer coded here and are covered by U25-E05K.

#### U25-F

Tone or bandwidth control; Other impedance networks (incl. phase shifters)

Amplitude fall-off, frequency-dependent loss,

lowpass characteristic, peaking, roll-off

U25-F01 [1992]

#### Phase shift networks

Covers arrangements to produce a particular phase shift, e.g. at a single frequency. Time delay networks are covered by U25-A05 and delay equalisation networks by U25-E05X.

U25-F01A [1992]

Variable phase shifter

U25-F05 [1992]

#### **Bandwidth control**

See W03-C05 codes also for audio amplifier tone control circuits.

U25-F05A [1992]

**Automatically varied or switched** 

U25-F05A1 [1992]

**Continuous variation** 

U25-F05A5 [1992]

Switched bandwidth

U25-F05C [1992]

**Manual control** 

U25-F05C1 [1992]

Continuously variable

U25-F05C5 [1992]

Switched bandwidth

U25-F09 [1992]

Other impedance networks

### U25-G

#### **Continuous tuning**

Includes tracking adjustment.

U25-G01 [1992]

#### Mechanically varied

Covers tuning by conventional variable capacitor or inductor, either manually or by motor drive. For capacitors and inductors per se see V01-B and V02 codes, e.g. V02-F01.

MEMS actuator, permeability

U25-G03 [1992]

## **Electrically varied**

Includes use of varactor diodes, saturable core inductors, etc.

Varicap, reactance circuit, Miller

#### U25-H

## **Discontinuous tuning; Band selection**

Step, preset, pushbutton, select

## U25-H01 [1992]

#### **Bandswitching**

Includes electromechanical and electronic methods and circuits for switching tuning range. (Step tuning within a frequency band is covered by U25-H03).

#### U25-H03 [1992]

## Step tuning e.g. by synthesiser

See U23-D01B codes for details of PLL synthesisers and U23-F03 codes for direct types. (Switching between frequency bands is covered by U25-H01).

#### U25-H03A [1992]

With channel memory

### U25-J

## Automatic band scanning; Automatic frequency control

Lock, AFC

## U25-J01 [1992]

## **Bandscanning**

Bandscanning arrangements for spectrum analysers/panoramic receivers are coded in S01-D03C1 also, and in W02, e.g. W02-C05 and W02-G03A codes.

Sweep, scan

## U25-J01A [1992]

## Using synthesiser tuning

See U23-D01B codes for details of PLL synthesisers per se and U23-F03 codes for direct types.

#### U25-J01A1 [1992]

## With channel memory

Preset, select, priority channel

#### U25-J01C [1992]

## Stopping on detected station

## U25-J05 [1992]

### **Automatic frequency control**

See U23-D codes for frequency/phase control circuits, and under application, e.g. W03-A02A for AFC in TV receivers, W03-B01B for broadcast radio receivers respectively.

AFT, automatic fine tuning

#### U25-K

#### Other tuning

Includes testing and production trimming of tuned circuits and filters, either manually or automatically. (See S01-G08 codes also, together with appropriate code in e.g. W02 or W03). This code also includes remotely-controlled tuning per se. For wider aspects of remote control see W03-A02C, W03-G05A and W04-E04A codes for remote control of TV receivers, audio/video equipment, and recording equipment respectively. (Remote control in general is covered by W05-D codes). Tuning scale, dial, drive, drum, pointer, illumination, test, align, set-up

# **Section V: Electronic Components**

V01: RESISTORS AND CAPACITORS	517
V02: Inductors and Transformers	529
V03: SWITCHES, RELAYS	536
V04: Printed Circuits and Connectors	543
V05: Valves, Discharge Tubes and CRTs	560
V06: ELECTROMECHANICAL TRANSDUCERS AND SMALL MACHINES	592
V07: FIBER-OPTICS AND LIGHT CONTROL	610
V08: LASERS AND MASERS	617

## **V01: Resistors and Capacitors**

This section deals with resistors and capacitors usable as discrete components, so that components forming part of an integrated circuit are **not** included. Similarly, thick and thin film circuits are **not** included and are covered by U14-H codes. Power resistors and capacitors are covered by X12-A and X12-B codes respectively.

## V01-A

#### Resistors

#### V01-A01

#### Mounting, housing, coding; Terminals

Marking, colour coding, lead, wire

## V01-A01A [1992]

#### Substrate details

Includes composition, structure etc. *Baseplate, ceramic* 

## V01-A01B [1992]

## Housing, encapsulation, mountings

Casing

## V01-A01B1 [1992]

### **Encapsulation**

Includes compositions.

## V01-A01C [1992]

Electrodes and terminals

## V01-A01C1 [1992]

## Electrodes

Film, end cap, contact

## V01-A01C5 [1992]

#### **Terminals**

Includes lead arrangements.

Wire, axial, tag, pad

## V01-A01D [1992]

## Coding, marking

Colour code, value, tolerance

## V01-A01X [1992]

#### Other

Includes shielding and cooling arrangements (for low-power resistors only).

#### V01-A02

#### **Fixed resistors**

#### V01-A02A

#### **Thermistors**

For temperature measurement application see V01-A02A7A and S03-B01F also. This code is intended for resistors using e.g. oxides of transition metals, and not linear TCR devices based on metallic conductors, for which S03-B01B is assigned, (although novel details of such resistances are assigned other V01 codes when appropriate).

Temp, coefficient resistance, PTC, NTC, circuit protector, cold conductor

[1992]

#### V01-A02A1

## **Novel thermistor composition**

## V01-A02A1A [1997]

#### Manufacture of thermistor material

This code covers the manufacture of material for use in thermistors and does **not** relate to manufacture of thermistors per se, which is covered by V01-A04 codes (especially V01-A04K1).

### V01-A02A5 [1992]

## Characterised by temperature dependence

TCR, resistance, coefficient

#### V01-A02A5A [1992]

## Negative temperature coefficient

NTC

## V01-A02A5B [1992]

### Positive temperature coefficient

PTC

#### V01-A02A7 [1992]

## **Characterised by intended function**

#### V01-A02A7A [1992]

## Measurement of temperature per se

Temperature measurement using thermistors is also coded in S03-B01F.

Thermometer, sensor

## V01-A02A7B [1992]

#### **Current limiting**

Includes use as cold conductor.

Circuit protector

## V01-A02A7C [1992]

## **Time-dependent current control**

Includes use of heating to gradually decrease or increase current, e.g. for degaussing CRT, (see W03-A08A4C also) or for motor starting (see V06-N05 also).

Decay, decrease, time delay, demagnetising

## V01-A02A7D [1992]

## For self-regulating heating

See X25-B01 codes also.

Self heater

## V01-A02A7X [1992]

#### Other thermistor function

#### V01-A02B

## Voltage dependent resistors

Includes current-responsive resistors.

Nonlinear resistor, varistor, VDR, protection, zinc oxide, sintered

#### V01-A02B1 [1992]

#### **Novel varistor composition**

## V01-A02B1A [1997]

#### Manufacture of varistor material

This code covers the manufacture of material for use in varistors and does **not** relate to manufacture of varistors per se, which is covered by V01-A04 codes (especially V01-A04K2).

#### V01-A02C

#### Film resistors

Note - resistors forming part of a film or integrated circuit are not coded in V01- see appropriate codes in section U, e.g. U11-C05G1A for manufacture, U12-C03 for resistors per se, and U14-H01C for film circuit resistors.

Thick film, thin film, layer resistor

## V01-A02C1 [1992]

## **Novel film resistor composition**

See U11-A05 also for film compositions.

## V01-A02C3 [1992]

#### Film structure

Covers film structures for discrete resistor components only.

## V01-A02C3A [1992]

## Thin film

V01-A02C3C [1992]

Thick film

V01-A02D [1987]

## Chip resistor

Leadless, surface mounting

V01-A02F [1992]

#### Wire-wound resistor

(V01-A02X)

V01-A02G [1992]

## **Composite resistor**

(V01-A02X)

Includes resistors structurally associated with other discrete components.

Multiple

V01-A02G1 [1992]

### With other resistive components

(V01-A02X)

Includes resistor array.

## V01-A02G5 [1992]

## With other non-resistive components

(V01-A02X)

Includes RL and RLC elements.

RC, CR, capacitor, inductor, coil

#### V01-A02H [1992]

#### Temperature compensation

(V01-A02X)

Resistors with deliberately manufactured positive or negative temperature coefficient are covered by V01-A02A codes.

### V01-A02J [2024]

**Piezoresistor** 

#### V01-A02X

### Other

Includes low-power liquid resistors. Power types are coded in X12-A only.

## V01-A03

## Variable resistors

Codes in this section include variable resistors as preset or manual controls, and also resistive transducers in which physical movement is involved. For other types see V01-A02 codes.

Linear, rotary, potentiometer, dual, ganged, winding, track, shaft, spindle

## V01-A03A [1992]

## Housing, casing, mounting kit

(V01-A01, V01-A03)

From 1992 housing and mounting details of variable resistors are coded in V01-A03 codes only.

## V01-A03A1 [1992]

#### Variable resistor housing

(V01-A01, V01-A03)

## V01-A03A5 [1992]

## Mounting details for variable resistors

(V01-A01, V01-A03)

Bushing, nut, washer, bracket

## V01-A03B [1992]

## Electrodes, terminals, slider

(V01-A01, V01-A03)

## V01-A03B1 [1992]

#### **Electrodes and terminals**

(V01-A01, V01-A03)

Covers end-of-track electrodes. Slider/wiper is covered by V01-A03B5.

## V01-A03B5 [1992]

## Slider, contact brush

(V01-A01, V01-A03)

## V01-A03C [1992]

#### Novel resistance element details

Includes compositions. Codes in this section are applied to indicate novel aspects only. V01-A03D codes are used for general aspects (not necessarily novel).

V01-A03C1 [1992]

Film track

V01-A03C3 [1992]

#### Wire track

Includes wirewound variable resistors. Power variable resistors are covered by X12-A.

## V01-A03C5 [1992]

#### Linear track

Covers shape of track only. Arrangements to achieve a particular control law are covered by V01-A03C8. For general details of slide-type potentiometers, see V01-A03D6.

## V01-A03C7 [1992]

#### **Rotary track**

For general details of rotary potentiometers, see V01-A03D5.

## V01-A03C7A [1992]

#### Helical

Includes track having shape of short section of

#### V01-A03C8 [1992]

## Characterised by resistance law or characteristic

Linear, logarithmic

### V01-A03C9 [1992]

#### Other

Includes other resistive component configurations, such as switched resistance network, and **use** of magnetoresistors and movable permanent magnet. (Magnetoresistors per se are not covered in V01 - see U12-B01B codes and S02-K03A5A for transducing aspects, these codes also being assigned for this type of 'potentiometer').

## V01-A03D [1992]

## Characterised by type of adjustment/component

Codes in this section are applied irrespective of claimed novelty to indicate the type of device/adjustment only, either in combination with novel aspect codes, or alone.

#### V01-A03D1 [1992]

## Manual e.g. front panel control

Volume, gain, tone, adjust, set

### V01-A03D2 [1992]

#### Semi-variable

Covers preset control, adjusted for e.g. setting-up. *Trimmer, test* 

## V01-A03D3 [1992]

## Measurement transducer

Covers component with variation of resistance value by physical movement, including force, compression, etc. Variation of resistance due to physical parameter other than movement is covered by V01-A02 codes.

#### V01-A03D4 [1992]

## Surface mounting variable resistor

Chip, leadless

V01-A03D5 [1992]

**Rotational adjustment** 

Rotary

V01-A03D5A [1992]

With more than 360 degree rotation

Includes helical potentiometer.

V01-A03D6 [1992]

Linear

Includes slide-type potentiometer.

Audio, mixing, fade, balance, graphic equaliser

V01-A03F [1992]

Control knob, actuator mechanism

Includes mechanical drive arrangement for e.g. joystick (see T04-F02B3 also).

Gear, proportional, two-dimensional, X-Y

V01-A03X [1992]

Other

V01-A04

**Manufacturing resistors** 

Includes single and multiple-step resistor manufacturing methods and equipment, and testing of manufactured resistors.

V01-A04A [1992]

Substrate processing

Includes firing, sintering, etc.

V01-A04B [1992]

Coating

Covers deposition of resistive material. Sputtering, vapour, flame spraying

V01-A04C [1992]

Treating deposited layer

Use V01-A04E also for heat treatment.

V01-A04D [1992]

Encapsulation

V01-A04E [1992]

Firing, heat treatment

Includes sintering, etc.

V01-A04F [1992]

Attaching leads, manufacturing electrodes

V01-A04G [1992]

Multistep manufacturing process and novel manufacturing equipment

V01-A04G1 [1997]

Multistep manufacturing process

This code is used when a sequence of manufacturing steps is claimed without apparent emphasis on any one aspect.

V01-A04G2 [2024]

Winding

Includes winding of resistors.

V01-A04G5 [1997]

**Novel manufacturing equipment** 

Use with other V01-A04 codes as appropriate.

V01-A04H [1992]

Testing, sorting, trimming, marking

V01-A04H1 [1992]

**Testing and sorting resistors** 

See S01-D05B1 and S01-G12A for electrical testing of resistors.

Aging test

V01-A04H3 [1992]

**Trimming resistor value** 

See X24-D03B for laser trimming apparatus.

V01-A04H5 [1992]

**Marking resistors** 

V01-A04J [1992]

Tape carriers, packing

Includes 'bandolier' tape carriers per se (see V04-V01A also), loading finished resistors onto tapes, shipping containers, etc.

V01-A04K [1992]

**Resistor type** 

Codes in this section are used to indicate the type of resistor being manufactured only. V01-A04K codes are not used if a manufactured resistor is also claimed resulting in the assignment of a V01-A02 or V01-A03 code.

V01-A04K1 [1992]

Thermistor

Manufacture of thermistor material is **not** covered here - see V01-A02A1A.

V01-A04K2 [1992]

Varistor

Manufacture of varistor material is **not** covered here - see V01-A02B1A.

V01-A04K3 [1992]

Film resistor

V01-A04K4 [1992]

**Chip resistor** 

V01-A04K5 [1992]

Wirewound resistor

V01-A04K6 [1992]

Variable resistor

Potentiometer

V01-A04K9 [1992]

Other resistor type

V01-A04R [2005]

Resistor manufacture process waste disposal and recycling

(V01-A04X)

V01-A04R1 [2005]

#### Waste handling and disposal

Includes all aspects of waste disposal and waste treatment equipment to make the waste safe in the environment.

V01-A04R2 [2005]

## Materials treatment and recycling

Includes all aspects of recovery of materials, solutions, and the like for reuse in resistor manufacture.

V01-A04X [1992]

Other resistor manufacturing details

**V01-B** 

**Capacitors** 

V01-B01

**Electrolytic devices** 

V01-B01A

**Electrodes** 

Lead, terminal wire, anode, tag, lug

V01-B01A1 [1983]

#### Sintered

This code is assigned alone or with V01-B01A4 codes describing composition or manufacture of materials.

Tantalum, solid powder, oxide, alloy, anodised

V01-B01A3 [2006]

## Double-layer and supercapacitor electrodes

This code is assigned alone or with V01-B01A4 codes describing composition or manufacture of materials. For all other aspects of double-layer and supercapacitors V01-B01D codes are assigned with other V01-B codes as appropriate. Manufacture of these capacitor types is covered by V01-B01G8D and other V01-B01G codes as appropriate.

V01-B01A4 [2006]

## Novel electrode materials composition and materials manufacture

These codes are normally assigned with V01-B01A1 or V01-B01A3 as appropriate. For details relating to foil electrodes, see V01-B01A5 codes.

V01-B01A4A [2006]

**Novel electrode materials composition** 

V01-B01A4C [2006]

#### Manufacture of electrode materials

This code is intended to cover manufacture of materials to be subsequently used as an electrolytic capacitor electrode, and does not include manufacture or treatment of electrode materials forming part of a process for mfg the capacitor itself, which is covered by V01-B01G1.

V01-B01A5 [1983]

Foil

Aluminium, etched, wound

V01-B01A5A [1992]

#### Foil manufacture

Manufacture and preparation of foil other than as a step in a complete process for making a capacitor is coded here, otherwise see V01-B01G1.

V01-B01A5C [1992]

Foil composition

V01-B01A7 [1992]

**Terminals and lead arrangements** 

Wire, axial

#### V01-B01B

## **Electrolytes and electrolyte manufacture; Separators; Containers**

From 2006 the scope of this code has been expanded to allow electrolyte compositions and electrolyte manufacture to be separately highlighted, and where neither of these aspects are novel, the solid or liquid/paste nature of the electrolyte to be indicated (to define the overall capacitor type) by means of V01-B01B6 codes. *Encapsulation, mounting* 

#### V01-B01B1 [1983]

## Novel details of solid electrolytes

From 2006, this code has been subdivided to allow novel solid electrolyte compositions (V01-B01B1A) and electrolyte manufacture (V01-B01B1C) to be separately highlighted. The two new codes take precedence over V01-B01B6A which is assigned to indicate that the capacitor is characterised by having a solid (non-novel) electrolyte.

Tetra cyano di-quino methane (TCNQ), complex

#### V01-B01B1A [2006]

## Solid electrolyte composition and materials

Novel details of solid electrolyte composition, and/or materials used in the preparation/manufacture of the solid electrolyte.

## V01-B01B1C [2006]

## Solid electrolyte and material manufacturing aspects

This code covers the manufacture of materials destined to be used as a solid electrolyte. Manufacture of the capacitor itself is covered by V01-B01G8A and other V01-B01G codes as appropriate.

V01-B01B3 [1992]

**Separators** 

V01-B01B5 [1983]

#### Novel details of liquid or paste electrolytes

From 2006, this code has been subdivided to allow novel liquid or paste electrolyte compositions (V01-B01B5A) and electrolyte manufacture (V01-B01B5C) to be separately highlighted. The two new codes take precedence over V01-B01B6C which is assigned to indicate that the capacitor is characterised by having a liquid or paste (non-novel) electrolyte.

Aqueous, solvent, ethylene glycol, carboxylic acid, boric acid

## V01-B01B5A [2006]

## Liquid or paste electrolyte compositions and materials

Novel details of liquid or paste electrolyte composition and/or materials used for the preparation/manufacture of the liquid/paste electrolyte.

## V01-B01B5C [2006]

## Liquid or paste electrolyte manufacture

This code covers the manufacture of materials destined to be used as a liquid or paste electrolyte. Manufacture of the capacitor itself is covered by V01-B01G8B and other V01-B01G codes as appropriate, e.g. forming aspects in V01-B01G7A.

#### V01-B01B6 [2006]

## Electrolytic capacitor characterised by electrolyte type

These codes are assigned to indicate the physical state of electrolyte only, and are not assigned when novel aspects of electrolyte composition or manufacture can be highlighted by V01-B01B1 or V01-B01B5 codes. For inventions concerned solely with capacitor manufacture V01-B01B6 codes are not assigned and V01-B01G8 codes are applied instead. In cases where novelty exists in both the capacitor and its manufacture V01-B01B6 codes take precedence.

#### V01-B01B6A [2006]

## Solid electrolyte capacitor

This code is assigned just to indicate that a capacitor has a solid electrolyte, which is not itself novel. If the solid electrolyte is novel in some way, V01-B01B6A is not used and V01-B01B1 codes are used instead.

#### V01-B01B6C [2006]

#### Liquid or paste electrolyte capacitor

This code is assigned just to indicate that a capacitor has a liquid or paste electrolyte, which is not itself novel. If the liquid or paste electrolyte is novel in some way, V01-B01B6C is not used and V01-B01B5 codes are used instead.

#### V01-B01B7 [1992]

Housings, seals, mounting

## V01-B01B7A [1992]

## With pressure-relieving vent

See V01-B01F5 also for pressure relief also causing electrical disconnection.

Blowout, plug

V01-B01B7C [1992]

Mounting kit

Clamp, bracket, lead-spacer, base

V01-B01B7D [1992]

Housing for several capacitors

Multiple capacitor

V01-B01C [1983]

**Devices other than capacitors** 

Electrolytic transducer, photosensitive device, acceleration sensor, electrokinetic cell

V01-B01D [1987]

**Double-layer capacitor** 

See X16-L02 also for energy-storage using capacitors, and T01-H01/T01-L01 codes for computer memory module and power supply systems.

Memory back-up

V01-B01D1 [1992]

Stack of cells

V01-B01D5 [2002]

**Super-capacitor** 

(V01-B01D, V01-B01X)

See T01-H01/T01-L01 codes for computer memory module and power supply systems, e.g. memory back-up; and for high power applications e.g. electric/hybrid vehicles, see X12-B, and X21-B codes. Includes electrostatic double layer capacitors, electrochemical pseudocapacitors and hybrid capacitors such as lithium ion capacitors. Ultracapacitor, electrochemical double layer, EDLC, high capacitance, pseudocapacitor, hybrid lithium ion. LiC. LIC

V01-B01E [1992]

Leadless electrolytic capacitor

Surface mounting, chip

V01-B01F [1992]

**Electrical protective arrangements** 

(V01-B01X)

Excess pressure venting is covered by V01-B01B7A.

V01-B01F1 [1992]

**Involving fuse protection** 

(V01-B01X)

V01-B01F5 [1992]

**Involving mechanical disconnection** 

(V01-B01X)

Use with V01-B01B7A for end cap movement rupturing leads.

V01-B01G [1992]

**Electrolytic capacitor manufacture** 

See V01-B04 codes for manufacture of nonelectrolytic capacitors.

V01-B01G1 [1992]

Electrode manufacture

Includes sintering. Covers treatment of foil to form electrodes, but not manufacture of foil per se which is covered in V01-B01A5A.

Etching, degreasing, anodising

V01-B01G3 [1992]

Winding, laminating, dielectric impregnation

V01-B01G5 [1992]

**Assembly** 

Includes manufacture of leads and external electrodes. Attachment of manufactured leads and external electrodes is covered by V01-B01G5C. Production of internal electrodes is covered by V01-B01G1.

V01-B01G5A [1992]

**Encapsulation** 

V01-B01G5C [1992]

**Attaching leads** 

This code covers the attachment of leads and external electrodes only. Manufacture of leads and external electrodes is covered by V01-B01G5.

V01-B01G6 [1992]

Multistep manufacturing process and novel manufacturing equipment

Includes waste treatment and recovery processes.

V01-B01G6A [1997]

Multi-step manufacturing process

This code is used for processes involving a sequence of steps without emphasis on any particular one.

V01-B01G6C [1997]

Novel manufacturing equipment

Use with other B01G codes as appropriate.

### V01-B01G6E [2005]

## **Process waste management**

(V01-B01G6)

This code includes all aspects of treatment of waste and contaminants arising from electrolytic capacitor manufacture, including making safe, waste classification, and separation aspects. Recycling of materials to be reused in the manufacturing process is covered by V01-B01G6G. Prior to 2005 coded in V01-B01G6.

#### V01-B01G6F\*

[2005-2007]

## Waste handling and disposal

(V01-B01G6)

\*This code is now discontinued. From 2008 all aspects of handling, making safe, and disposal of waste from electrolytic capacitor manufacture are now covered by V01-B01G6E.

#### V01-B01G6G

[2005]

## **Materials recycling**

(V01-B01G6)

Includes treatment and recycling, handling equipment and environmental protection and safety equipment aspects for electrolytic capacitor manufacture. Prior to 2005 coded in V01-B01G6. See V04-X01C for other electronics components recycling.

V01-B01G7 [1992]

Forming, testing, ageing, packing

V01-B01G7A [1992]

Forming, ageing

V01-B01G7C [1992]

## Testina

Measurement of capacitance value in general is coded in S01-D05A3, and general electrical testing of capacitors in S01-G12C.

V01-B01G7E [1997]

**Packing** 

Includes tape carriers.

V01-B01G8 [1992]

## Characterised by type of capacitor

Codes in this section are applied irrespective of claimed novelty to indicate the type of capacitor only. These codes are not used if a manufactured capacitor is also claimed, for which the appropriate V01-B01 code will be assigned.

V01-B01G8A [1992]

Solid dielectric

V01-B01G8B [1992]

Liquid/paste dielectric

V01-B01G8D [1992]

**Double layer capacitor** 

V01-B01G8E [1992]

**Leadless capacitor** 

V01-B01G8X [1992]

Other capacitor type

V01-B01X

Other

V01-B02

## Variable capacitors

Capacitive transducers for physical quantities are coded in V01-B02A, where motion of plates or dielectric is involved, otherwise in V01-B02B. For tuning of resonant circuits see U25 codes.

#### V01-B02A

#### Mechanically varied

Tuning capacitor, double, differential, ganged, dielectric, shaft, spindle, preset, trimmer

V01-B02A1 [1992]

**Electrode details** 

V01-B02A1A [1992]

Rotor, moving electrode

V01-B02A1B [1992]

Stator

V01-B02A1C [1992]

Terminals, external connections

V01-B02A3 [1992]

**Dielectric details** 

V01-B02A4 [1992]

Substrate, housing, mounting kit

Mount, screw, nut, bushing

V01-B02A5 [1992]

## Characterised by type of capacitor

Codes in this section are applied irrespective of claimed novelty to indicate the type of capacitor only.

## V01-B02A5A [1992]

## Variable during normal operation

Includes e.g. tuning capacitor operated manually or by motor drive.

Tune, resonate, peak

#### V01-B02A5B [1992]

#### Pre-set/semi-variable

Includes e.g. trimmer capacitor.

Tune, resonate, peak

## V01-B02A5C [1992]

#### **Transducer**

Covers transducer where physical movement of plates and/or dielectric is involved. Non-mechanically varied types are coded in V01-B02B3. See also appropriate code in S02 or S03 for the parameter being measured and, in general, S02-K03A1C.

#### V01-B02A5E [1992]

## Surface-mounted variable capacitor

Chip, leadless

### V01-B02A5F [1992]

### Multi-section variable capacitor

Covers ganged types.

#### V01-B02B

## Non-mechanically varied capacitors

#### V01-B02B1 [1992]

#### Varicap diodes

See also U12-C02B. Covers discrete component embodiments only (or where integrated circuit aspect not specified). Prior to 1992 coded in U12 only

Varactor, depletion layer, reverse bias, voltagetuned

## V01-B02B3 [1992]

#### **Transducer**

Covers capacitors changing value in response to physical variable where movement is **not** involved. Types involving movement of plates or dielectric are covered by V01-B02A5C. See also appropriate code in S02 or S03, and in general, S02-K03A1.

## V01-B02B5 [1992]

#### **Electrets**

Includes devices in non-circuit application, e.g. as air filter.

## V01-B02B9 [1992]

#### Other

Includes ferroelectric capacitors.

#### V01-B03

## **Fixed capacitors**

See X12-E also for dielectric compositions. Search dielectric codes with V01-B03E1 for self-healing aspects. Capacitors with mixed, i.e. inorganic and organic dielectrics, are assigned V01-B03A5.

#### V01-B03A

## With inorganic dielectric

From 1992 see V01-B03A1 to distinguish novel capacitor from novel dielectric compositions.

Ceramic, perovskite, metal-oxide, green sheet

### V01-B03A1 [1992]

#### **Novel dielectric composition**

See X12-E01 codes also, e.g. X12-E01A for ceramic compositions.

### V01-B03A3 [1992]

#### Manufacture of dielectric material

Covers manufacture of dielectric per se other than as part of capacitor manufacture, which is covered by V01-B04 codes.

## V01-B03A5 [2005]

## Hybrid dielectric (organic-inorganic) polymer material

Includes all compositions of hybrid dielectric material regardless of percentage of organic/inorganic materials ratio in the composite. See V01-B03A1 and V01-B03B1 for new dielectric compositions.

#### V01-B03B

## With organic dielectric

Plastics, polymer, film, paper, impregnated

#### V01-B03B1 [1992]

#### **Novel dielectric composition**

See also X12-E02 codes, e.g. X12-E02B for synthetic polymer materials.

## V01-B03B3 [1992]

#### Manufacture of dielectric material

Covers manufacture of dielectric per se other than as part of capacitor manufacture, which is covered by

V01-B04 codes.

#### V01-B03C

## **Characterised by structure**

Codes in this section are applied to indicate the structure of the capacitor only and do not necessarily represent novel features.

V01-B03C1 [1983]

Wound

V01-B03C3 [1983]

Flat plate

V01-B03C3A [1992]

**Multilayer capacitor** 

Includes stacked types.

Laminated, layer-built, chip, co-fire

V01-B03C5 [1983]

Leadless

Chip, surface mounting

V01-B03C5A [1992]

Film capacitor

Covers discrete components only.

V01-B03C7 [1987]

#### Feedthrough capacitor

Use with V01-B03C8 for feedthrough-type LC filter. See W02-H codes for noise suppression at source in general.

V01-B03C8 [1992]

## **Composite capacitor**

(V01-B03X)

Covers capacitor structurally associated with other component such as RC, LC, or multiple capacitor. For feedthrough type capacitor filter use with V01-B03C7 also.

## V01-B03D

#### **Electrodes; Housings; Terminals**

Marking, colour coding, lead wire, tag, lug, can, casing, foil

V01-B03D1 [1992]

## **Electrodes**

This code is intended for **internal** electrodes e.g. in the case of a multilayer capacitor. External electrodes, i.e. terminals if a leadless type, are covered by V01-B03D5.

V01-B03D1A [1992]

Film

Metallisation, sputtered layer

V01-B03D1C [1992]

Foil

V01-B03D1E [1992]

Novel shape or configuration

V01-B03D1G [1992]

**Novel composition** 

V01-B03D3 [1992]

#### Housing, encapsulation

Includes markings, e.g. of component value.

V01-B03D3A [1992]

## Pressure relieving arrangement

See V01-B03E5 for electric protection arrangements.

V01-B03D5 [1992]

#### Lead and terminal arrangements

This code is intended for **external** electrodes such as terminals of a chip-type laminated capacitor. Internal electrodes are covered by V01-B03D1 codes.

V01-B03D7 [1992]

**Mounting kit** 

V01-B03E [1992]

**Protection and self-healing capacitors** 

V01-B03E1 [1992]

#### Self-healing dielectric type

See V01-B03A/B codes as appropriate for dielectric details.

V01-B03E5 [1992]

#### Fuse or other electrical disconnection

See V01-B03D3A for pressure-relief arrangements.

V01-B03H [1997]

### **Temperature compensation**

(V01-B03X)

Use with V01-B03A or V01-B03B codes as appropriate.

V01-B03X

Other

#### V01-B04

## **Manufacturing capacitors**

Includes testing of manufactured capacitor. See V01-B01G codes for electrolytic capacitor manufacture.

### V01-B04A [1992]

## Characterised by capacitor type

(As defined by V01-B03C codes). Codes in this section are assigned to indicate capacitor type only. They are not used if the manufactured capacitor itself is also claimed, in which case the appropriate V01-B codes for the capacitor per se will also be applied.

V01-B04A1	[1992]
Wound capacitor	
V01-B04A3	[1992]
Flat capacitor	
V01-B04A3A	[1992]
Single layer	
V01-B04A3C	[1992]
Multi-layer	
V01-B04A5	[1992]
Chip capacitor	
V01-B04A5A	[1992]
Film capacitor	
V01-B04A6	[1992]
Variable capacitors	
V01-B04A7	[1992]
Feedthrough capacitor	
V01-B04A8	[1992]
Composite capacitor	

[1992]

[1992]

[1992]

Manufacture of other capacitor types

**Capacitor manufacturing process** 

**Treatment of dielectric** 

V01-B04A9

V01-B04B

V01-B04B1

## V01-B04B3 [1992]

## Manufacture and application of electrodes

This code relates to manufacture of **internal** electrodes only. Manufacture of external electrodes is covered by V01-B04B5.

Sputtering, metallising, etching, cutting

#### V01-B04B5

[1992]

## **Assembly processes**

Includes winding, laminating, pressing, impregnating, etc., and also manufacture of **external** electrodes. Production of internal electrodes is covered by V01-B04B3.

#### V01-B04B7

[1992]

## Heat treatment, firing, drying

Co-fire

#### V01-B04B8 [1992]

## Multistep manufacturing processes and novel manufacturing equipment

Includes waste treatment and recovery processes. From 1997 the scope of this code is expanded to include novel equipment for manufacture, which is assigned V01-B04B8C together with other V01-B04 codes as appropriate.

#### V01-B04B8A

[1997]

[1997]

[2005]

## **Multistep manufacturing process**

#### V01-B04B8C

## **Novel manufacturing equipment**

Use with other V01-B04 codes as appropriate.

## V01-B04B8E

## **Process waste treatment and recycling**

(V01-B04X)

Includes all aspects of waste and contaminant treatment and recycling equipment, for dielectric capacitor manufacture, and all waste classification and separation aspects. Prior to 2005 coded in V01-B04X.

## V01-B04B8F\*

[2005-2007]

#### Waste handling and disposal

(V01-B04X)

\*This code is now discontinued and from 2008 all aspects of handling, making safe, and disposal of waste from capacitor manufacture are now covered by V01-B04B8E.

## V01-B04B8G [2005]

## **Materials recycling**

(V01-B04X)

This code covers treatment and recycling of materials, chemicals and the like for reuse in dielectric (i.e. non-electrolytic) capacitor manufacture. Prior to 2005 these topics were covered in V01-B04X. See V04-X01C for other electronics components recycling.

V01-B04B9 [1992]

Other capacitor manufacturing processes

V01-B04C [1992]

Testing, sorting, trimming, marking

V01-B04C1 [1997]

**Testing and sorting capacitors** 

See S01-D05A3 and S01-G12C also for electrical tests on capacitors.

V01-B04C3 [1997]

**Trimming capacitor value** 

See X24-D03B for laser trimming apparatus.

V01-B04C5 [1997]

**Marking capacitors** 

V01-B04E [1992]

Tape carriers, packing, shipping

Includes 'bandolier' tape carrier per se (see V04-V01A also), loading finished capacitors onto tape, packaging cartons, etc.

V01-B04X [1992]

Other capacitor manufacturing aspects

#### **V02: Inductors and Transformers**

For power transformers and reactors, see X12-C codes. Inductors/transformers implemented as IC devices are not included; see U11/U12 codes. Printed coils are, however, included here and in V04.

See T03-A codes only for details of recording media and heads.

#### V02-A

## **Magnetic materials**

From 2007, V02-A01 codes are only applied for magnetic materials of general application. Therefore, V02 codes are no longer routinely assigned for magnetic recording media and heads with the exception of nano-structures, which are coded in V02-B04. See T03-A codes for specific details of recording media and heads.

## V02-A01

## Hard magnetic materials

#### V02-A01A

## Metals or alloy

Iron, boron, cobalt, ferromagnetic, neodymium, nickel. rare earth metals

## V02-A01A1 [1987]

#### For permanent magnet

## V02-A01A2\* [1987-2006]

## For magnetic recording medium

\*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

## V02-A01A8 [2006]

## Novel hard magnetic metals or alloys

Composition

#### V02-A01A9 [1992]

## Manufacture of hard magnetic metals or alloys

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

#### V02-A01B

## Non-metallic substances

Oxide, ferrite, ferric oxides, metal hydroxide

## V02-A01B1 [1987]

#### For permanent magnet

## V02-A01B2\* [1987-2006]

#### For magnetic recording medium

\*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

[2006]

#### V02-A01B8

## Novel hard magnetic non-metallic materials

Composition

## V02-A01B9 [1992]

## Manufacture of hard magnetic nonmetallic materials

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

## V02-A01C [1992]

#### **Mixtures**

Includes mixtures of metallic and non-metallic magnetic substances.

#### V02-A02

## Soft magnetic materials

### V02-A02A

#### Metals or allovs

Iron, silicon steel, boron, cobalt, nickel, aluminium, chromium, ferromagnetic

#### V02-A02A1\* [1987-2006]

#### For magnetic head

\*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

## V02-A02A2 [1987]

For electric machine and reactor core

#### V02-A02A8 [2006]

#### Novel soft magnetic metals or alloys

Composition

## V02-A02A9 [1992]

# Manufacture of soft magnetic metals or alloys

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

### V02-A02B [1987]

#### Non-metallic substances

Ferrites, metal oxide

## V02-A02B1\* [1987-2006]

### For magnetic head

\*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

#### V02-A02B2 [1987]

For electric machine and reactor core

## V02-A02B8 [2006]

Novel soft magnetic non-metallic materials

Composition

## V02-A02B9 [1992]

## Manufacture of soft magnetic non-metallic materials

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

## V02-A02C [1992]

#### **Mixtures**

(V02-A02A, V02-A02B)

Includes mixtures of metallic and non-metallic magnetic substances.

### V02-A03 [1997]

#### Organic or organo-metallic materials

(V02-A01.V02-A02)

Used together with V02-A01 and V02-A02 codes to denote coercivity, if indicated.

#### V02-A04 [1997]

## Magnetic liquids

(V02-A02A)

Used together with V02-A01 and V02-A02 codes to denote coercivity, if indicated.

Ferrofluid

## V02-A05 [1997]

#### **Magnetic semiconductor materials**

(V02-A01, V02-A02)

Used together with V02-A01 and V02-A02 codes to denote coercivity, if indicated. See also U11-A.

CdCr<sub>2</sub>S<sub>4</sub>, galvano-magnetic

#### V02-A09 [2002]

# Binders and other additives for magnetic materials

Includes binders/additives for both hard and soft materials. This code will be used in conjunction with the magnetic materials' codes.

#### V02-A10 [2005]

#### Nanomaterials and their manufacture

Used in conjunction with hard/soft, metal/non-metallic substances.

## V02-A10A [2005]

Novel nanomaterials

V02-A10C [2005]

Manufacture of nanomaterials

#### V02-B

### Thin magnetic films

Prior to 2007, magnetic film details of thin film heads were coded under V02-B03, which has now been discontinued. From 2007, thin film heads are coded only under T03 codes (T03-A03E). However, nanostructures of thin film heads are still coded under V02-B04.

## V02-B01\* [1987-2006]

## For recording medium

\*This code is now discontinued and has been transferred to T03-A01 codes from 200701. It remains searchable for records prior to 2007. Includes magnetic films, per se, for tapes, discs or drums. SeeT03-A01 codes for record carrier details e.g. binders, bases, backing layers.

Magnetic media, photomagnetic/magneto-optical film

#### V02-B02 [1987]

#### For bubble memory

See also U14-A01A1 codes.

## V02-B03\* [1992-2006]

## Thin film heads

(V02-B01)

\*This code is now discontinued and has been transferred to T03-A03 codes from 200701. It remains searchable for records prior to 2007. See also W04-B codes if audio/video application is intended. Manufacture of thin film heads is covered by T03-A04 codes.

## V02-B04 [2005]

#### **Nanostructures**

Includes nanostructures of thin film heads. Other details of thin film heads are only coded under T03-A03E codes. Manufacturing details of nanostructures are coded under V02-H02G.

#### V02-C

#### Cores, yokes and armatures

For general cases only. For particular application see V02-E, V02-F and V02-G. For high power devices see X12-C.

Magnetic circuits, laminates

#### **V02-D**

## Coils (incl. connections); (de)magnetising

Includes general coils where an application is not clear. Coils designed for communication or HF applications are coded under V02-F codes (e.g. HF coils are coded under V02-F03B), and coils for power supplies or other uses are coded under V02-G codes.

For high power coils, see X12-C codes.

Degaussing

#### V02-E

#### **Magnets**

High strength magnets and super-conducting electromagnets are, respectively, in X12-C06 and X12-C05A.

#### V02-E01

## **Permanent magnets**

Rare earth magnets

#### V02-E02

#### **Electromagnets**

Solenoids, operating circuit, coils, cores, energising circuit

#### V02-E02A

#### With armature

## V02-E02A1 [1987]

#### For electromagnetic valve

See also X25-L for EM valves and X22 for automotive application.

Fuel injection valves, EM-brake, -gear, -clutch

## V02-E02A2 [1987]

### For relay, or printer hammer

See also V03-D codes for relays, and S06-D to S06-K codes for details of printers.

V02-E02A3 [2002]

**Linear actuator** 

V02-E02A4 [2002]

**Rotary actuator** 

Rotary solenoid

V02-E02X

Without armature

V02-E02X1 [1992]

**Using superconducting coils** 

V02-E02X2 [2006]

#### Shim coil

Includes small current-carrying coils that generate the auxiliary magnetic fields for improving the homogeneity of a main field e.g. in an MRI equipment (see also S01-E01 and S03-E07 codes).

#### V02-F

## Inductive components for communications or HF

Inductive components used in applications other than communication or HF applications are coded under V02-G codes. General coils where an application is not clear are coded under V02-D.

## V02-F01

## Inductances

Includes coils for telecommunications and radio equipment (see also W01 and W02). Constructional details are in V02-F03.

Chokes, HF inductor, antenna coils, radio tuning coils

## V02-F01A [1987]

#### For CRT beam deflection

See also V05-D and W03-A codes for TV deflection. Vertical-, horizontal- deflection coils

V02-F01D [1992]

**Variable** 

V02-F01G [1992]

## MRI/NMR equipment gradient/HF coil

Also see S01-E02, S03-E07 and S05-D02 codes, respectively, for magnetic properties sensor, MRI/NMR equipment and medical use.

V02-F01G1 [2006]

**Gradient coil** 

V02-F01G2 [2006]

HF coil

Includes receiver/transmitter antenna coil for detecting an NMR/MRI signal.

Bird cage-, resonator-, saddle-, surface-coils

V02-F01J [1992]

Filter coils

See W02-H and U25-E01 codes also.

V02-F01L [1992]

**Chip inductor** 

V02-F01N [1992]

Flat coils

V02-F01N1 [1992]

**Printed circuit coils** 

See also V04-Q04 and V04-R codes, respectively, for printed circuits and their manufacture.

V02-F01P [2005]

Inductive connector

For HF use. See V02-G01D for power supply inductive connector.

V02-F02

**Transformers** 

Includes pulse, audio and broad-band transformers. Constructional details are in V02-F03.

V02-F02A [1987]

For TV

See also W03-A codes.

Flyback transformers, television line output transformers

V02-F02D [1992]

**Rotary transformer** 

See also T03-A05D3A, W04-B03B1 codes for helical scan head positioning.

V02-F02G [1992]

**Variable** 

V02-F03

**Construction details** 

Includes constructional details of signal and HF transformers and coils. Used in conjunction with the type of coil or transformer, e.g. V02-F02D.

Manufacturing details are coded by V02-H codes.

V02-F03A [1997]

Casings, mounting, cooling; Magnetic cores

V02-F01,V02-F02,V02-F03)

V02-F03A1 [1997]

Cooling

(V02-F03)

V02-F03A2 [1997]

**Magnetic cores** 

(V02-F01,V02-F02)

Laminates

V02-F03A3 [2005]

**Cases**Housing

V02-F03B [1997]

Windings

(V02-F01, V02-F02)

Bobbins, connections, leads, coils

V02-F03B1 [1997]

Insulating

(V02-F01, V02-F02)

V02-F03C [1997]

**Control** 

Includes current collector sliding or rolling on, or along, winding.

V02-F03C1 [1997]

Using tappings on coil or winding

V02-F03C2 [1997]

Using movable core, coil or winding, or shield

V02-F03D [2005]

Shielding

(V02-F03X)

Includes screens, shields, etc.

V02-F03X [1997]

Other HF transformer/inductor constructional details

Includes terminals, circuits for changing electrical characteristics e.g. flux linkage by driving device magnetic circuit into saturation, etc.

Temperature sensors

## V02-F05\* [1992-2006]

## Magnetic recording heads

(V02-C, V02-D, V02-E02X)

\*This code is now discontinued and has been transferred to T03-A03 codes from 200701. It remains searchable for records prior to 2007.

#### V02-G

## Inductive components for power supplies or other uses

Includes inductive components used in applications other than communication or HF applications. Inductive components used in communications or HF applications are coded under V02-F codes. General coils where an application is not clear are coded under V02-D. High power components are coded in X12-C.

#### V02-G01

#### Transformers, reactors, choke coils

Includes vehicle ignition coil (see also X22-A01A).

V02-G01A [1983]

**Power transformers** 

Power supply

V02-G01A1 [1987]

**Variable** 

V02-G01A2 [1997]

Non-linear

Includes transformer, e.g. ferro-resonant, for frequency changing or wave-shape changing.

V02-G01B [1983]

#### **Instrument transformers**

Includes current-, voltage-transformers (also in S01-D01D1A), linear variable displacement **transducers** (LVDT).

Measurement transformers

V02-G01C [1983]

Reactors, choke coils

Lamp ballasts

V02-G01C1 [1987]

**Variable** 

V02-G01D [1997]

#### Inductive connector

For power supply use. See V02-F01P for HF inductive connector.  $\label{eq:power_supple}$ 

Inductive coupling

## V02-G01E [2002]

#### Inductive sensor

Includes non-transformer type current/voltage/other sensors.

Voltage-, current-sensor, inductive probe

## V02-G01F [2005]

#### **Heating inductor**

Low power induction heating coils are included here with high power ones covered by X12-C codes. For general high or low power induction heating, see X25-B02A codes, and X27-C06 for induction cookers.

## V02-G02

#### **Constructional details**

Manufacturing details are coded by V02-H codes.

#### V02-G02A

Casings, mounting, cooling; Magnetic cores

V02-G02A1 [1987]

Cooling

V02-G02A2 [1987]

**Magnetic cores** 

Laminates

V02-G02A3 [2005]

**Cases**Housing

V02-G02B

Windings

Bobbins, connections, leads, coils

V02-G02B1 [1987]

Insulating

V02-G02C [1987]

**Control** 

(V02-G02B)

Includes current collector sliding or rolling on or along winding.

V02-G02C1 [1987]

Using tappings on coil or winding

(V02-G02B)

V02-G02C2 [1987]

Using movable core, coil winding or shield

(V02-G02B, V02-G02X)

V02-G02D [2005]

**Shielding** 

(V02-G02X)

Includes screens, shields, etc.

#### V02-G02X

## Other power supply transformer/inductor constructional details

Includes terminals, circuit for changing electric characteristics e.g. flux linkage by driving device magnetic circuit into saturation, etc.

Temperature sensors

#### V02-H

#### Manufacture

Includes apparatus, methods and testing. Manufacture of recording media and magnetic heads is not coded under V02 anymore, but only under T03-A codes.

#### V02-H01

#### **Coil manufacture**

Includes winding, insulating, connecting leads.

V02-H01A [1987]

For reactor, choke coil

V02-H01B [1987]

For transformer

V02-H01C [2002]

For electromagnet

V02-H01C1 [2002]

For EM relay

See also V03-D06B.

V02-H01C2 [2002]

For EM valve

See also X25-L01A.

V02-H01C3 [2002]

For printer

See also S06-D to S06-K codes for details of printers.

V02-H01C9 [2002]

Electromagnet coil manufacture for other

devices

V02-H01X [2002]

Coil manufacture for other devices

V02-H02 [1983]

## Applying magnetic films to substrate

(V02-H09)

Manufacture of recording media is not coded under V02 anymore, but only under T03-A02 codes.

V02-H02A [1987]

Vacuum evaporation

V02-H02B [1987]

**Sputtering** 

V02-H02C [1987]

**Electroless and electrolytic plating** 

V02-H02D [2002]

Plasma processing

V02-H02E\* [2005-2006]

## Magnetic head

\*This code is now discontinued and has been transferred to T03-A04 from 200701. It remains searchable for records prior to 2007.

## V02-H02F\* [2005-2006]

#### Magnetic medium

\*This code is now discontinued and has been transferred to T03-A02 from 200701. It remains searchable for records prior to 2007.

## V02-H02G [2005]

#### Nanostructures manufacture

Non-manufacturing details of nanostructures are covered by V02-B04.

V02-H03 [1987]

#### Core manufacture

(V02-H09)

Also includes the rest of the magnetic circuit e.g. yoke, armature. From 2007, manufacture of magnetic heads is not coded under V02 anymore, but only under T03-A04 codes. Also includes the rest of the magnetic circuit e.g. yoke, armature. Manufacture of magnetic heads is not coded under V02 from 2007, but only under T03-A04 codes.

Annealing, laminating

V02-H03A [1987]

For transformer

(V02-H09)

V02-H03C [2002]

For electromagnet

V02-H03C1 [2002]

For EM relay

See also V03-D06B.

V02-H03C2 [2002]

For EM valve
See also X25-L01A.

V02-H03C3 [2002]

For printer

See also S06-D to S06-K codes for details of printers.

V02-H03C9 [2002]

For electromagnet core of other devices

V02-H03E [2002]

For inductor

V02-H03X [2002]

Core manufacture for other devices

V02-H04 [1987]

**Magnet manufacture** 

(V02-H09)

V02-H05\* [1992-2006]

## Magnetic recording heads

(V02-H01, V02-H03, V02-H09)

\*This code is now discontinued and has been transferred to T03-A04 codes from 200701. It remains searchable for records prior to 2007. Includes manufacture of coil/winding and core plus other aspects and testing.

#### V02-H06 [2002]

#### **Terminal manufacture**

(V02-H09)

Includes manufacture of terminals for all devices and is generally coded in conjunction with the relevant device code, e.g. V02-G01A for transformer terminals.

## V02-H07 [2002]

## **Case manufacture**

(V02-H09)

Includes manufacture of casings for all devices and is generally coded in conjunction with the relevant device code, e.g. V02-G01A for transformer casing.

## V02-H08 [2002]

## **Testing**

(V02-H09)

For all aspects of testing transformer, inductor, etc. From 2007, testing of magnetic heads is not coded under V02 anymore, but only under T03-A04 codes.

#### V02-H09

# Other inductive device manufacturing aspects

Includes manufacture of devices not specified above.

## V02-H10 [2005]

## Device, per se, manufacture

Includes indeterminate detail manufacture as well as multi-step processes.

## V03: Switches, Relays

**NOTE:** V03 codes cover low power mechanical and electromechanical switches, i.e. those involving switching by moving contacts to make and break a circuit.

High power switches, circuit breakers and circuit protectors are coded in X13.

Electronic switching and gating are coded under U21-B codes.

### V03-A

## **Contacts (general)**

Relay and connector contacts are in V03-D and V04-D, respectively.

#### V03-A01

#### Contact material and structures

## V03-A01A [1983]

#### Material

Includes materials such as composite materials containing noble metals, metal with carbide or oxide, copper, carbon particles or fibers, conducting materials dispersed in binding materials, etc.

## V03-A01B [1983]

## Surface shape/structure

Includes details of the shape or structure of the contact-making surface, e.g. grooved, wetted with mercury, laminated, etc.

### V03-A02

## **Contact engagement techniques**

Includes engagement by abutting and sliding.

#### V03-A03

#### **Protective enclosures**

Includes protective enclosures, baffle plates or screens for contacts. Includes contacts sealed in an evacuated or gas-filled envelope, e.g. for reed switches. Reed switches are coded under V03-C06A.

#### V03-A08 [1992]

#### Contact manufacture; Testing; Monitoring

Includes manufacturing details of switches contacts, and details for testing and monitoring the integrity of contacts.

#### V03-A09

#### Other contact details

Includes increasing contact pressure, preventing vibration of contacts, holding contacts together after engagement, terminals, cleaning or lubricating contact-making surfaces, heating or cooling contacts, etc.

## V03-B

#### Switch operating mechanisms (general)

Details of relays are in V03-D.

#### V03-B01

#### Non-hand-operated switches

## V03-B01A [1992]

#### **Limit switches**

Includes switches actuated when reaching a specified limit, e.g. safety switches.

#### V03-B01B [1997]

## Foot pedal switches or mouth operated switches

From 2009, this code covers both foot pedal switches and mouth operated switches. For constructional details, see also V03-B04 codes.

### V03-B01C [1997]

#### **Door switches**

See also V03-U18 for doors and windows. If vehicle doors, see also V03-U03A codes for land vehicles, and X22 codes. For other types of doors, see also X25.

#### V03-B01D [1997]

#### Mat switches

Includes mats triggering opening of automated doors when user walks on the mat, dance mats or platforms used with game consoles and arcade games, etc. If the mat is part of a game, see also V03-U08.

## V03-B01E [1997]

#### Seat switches

Includes switches triggered when sitting on a seat. If vehicle seat, see also V03-U03A for land vehicles and X22 codes.

#### V03-B02

## Internal power arrangements and driving mechanisms

Includes pneumatic or hydraulic actuator, motordrive, electromagnet. Also includes transmitting driving force to contacts by ratchet, belt etc.

Switch-actuating, -operating, -driving

#### V03-B03

## **Snap-action and time-delay arrangements**

Includes devices for introducing a predetermined time delay between the initiation of the switching operation and the opening/closing of the contacts such as dash-pots, flies (e.g. fan governors), thermal timing devices (see also V03-C06B for thermal switches), etc.

## V03-B03A [1987]

### **Snap-action**

Includes use of magnet, deformation of elastic member e.g. coil springs, flexing of blade springs, buckling of disc springs, etc., to first store operation energy which is then released to produce or assist the contact movement.

#### V03-B04

# Housing; Fuse, earthing and safety arrangements

Includes built-in fuses, earthing arrangements, antistatic arrangements, and built-in safety spark gaps. Anti-static arrangement

## V03-B04A [1987]

## Housing

Includes dust-proof, splash-proof, drip-proof, waterproof or flameproof casings, bases or covers. Also includes arrangements to enable replacement of switch, e.g. cartridge housing.

Walls, cases, boxes, covers, seals

#### V03-B05

## **Indicators and markings**

Includes 'on-off' switching conditions, markings for easy location in the dark.

Illuminated marking, light display, symbols

#### V03-B06

## Interlocking, locking or latching; Arc control; Cooling

### V03-B06A [1987]

#### Interlocking, locking or latching

Includes interlocking between casing, cover, protective shutter and operating mechanisms, interlocking of two or more switches, locking using a key, etc.

Safety feature, key, latch

## V03-B06B [1987]

#### Arc control

Includes arrangements for extinguishing or preventing arc between current-carrying parts, for preventing discharge to non-current-carrying parts, and for detecting the presence of an arc or discharge.

Blow-out magnet, arcing horns, corona ring, insulation

#### V03-B09

#### Other switch details

Includes mechanical arrangements for preventing or damping vibration or shock, lubricating means, levers, turn-knobs and pushbuttons, etc.

### V03-B10 [2002]

Modular construction

#### V03-C

**Switches** 

#### V03-C01

Linearly-movable operating parts

#### V03-C01A

#### Adapted for actuation in one direction only

Pushbutton switches

#### V03-C01A1

## With single operating member

Includes e.g. button switches for cameras, doorbells, flashlights, etc. See also V03-C01A3 for constructional details.

Camera, doorbell, flashlight

## V03-C01A1A [2002]

## Membrane switch with single operating member

Includes mechanical contact based membrane switches with single operating member. Includes details of the circuit printed on a polyethylene terephthalate (PET) or indium tin oxide (ITO) layer. For electronic membrane switches e.g. detecting a change in resistance caused by depression of the switch, see U21-B codes instead.

PET layer, ITO layer

#### V03-C01A2

## With two or more operating members

Includes e.g. keyboard-type switches for computer keyboards or telephone key pads. See also V03-C01A3 for constructional details, T04-F01 codes for keyboards details and W01-C01B8 codes for keyboards/keypads details.

Keyboard, keypad

## V03-C01A2A [1992]

# Membrane switch with at least two operating members

Includes mechanical contact based membrane switches with two or more operating members. Includes details of the circuit printed on a polyethylene terephthalate (PET) or indium tin oxide (ITO) layer. For electronic membrane switches e.g. detecting a change in resistance caused by depression of the switch, see U21-B codes instead.

PET layer, ITO layer, control panel for microwave, air conditioner, etc.

#### V03-C01A3

## **Constructional details**

Includes cases, housings, covers, casings, driving mechanisms, key structures (for keypads or keyboards), etc. for switches adapted for actuation in one direction only.

Case, housing, cover, casing, driving mechanism, coil spring, blade spring, disk spring, keystroke, key cap

## V03-C01B

## Adapted for actuation in opposite directions

Includes constructional details and driving arrangements for slide switches.

Slide switches

#### V03-C02

## **Rotary switches**

#### V03-C02A

## Unlimited or unspecified angle

Includes constructional details and driving arrangements for switches operated by turn-knob. *Turn-knob* 

#### V03-C02B

### Restricted angle only

Includes constructional details and driving arrangements for lever- or handle-operated switches, toggle switches, knife switches, etc.

Toggle, lever, handle, knife switch

#### V03-C03

## Operating part adapted for pulling or compound movement

Includes cord or chain operated switches. Cord, chain, pull switch

#### V03-C03A

#### [1992]

#### **Compound movement**

Includes constructional details and driving arrangements for switches having operating part movable angularly in more than one plane, e.g. joystick, and movable both angularly and rectilinearly.

Joystick

#### V03-C04

#### **Tumbler switches**

Includes constructional details and driving arrangements for tumbler and rocker switches. Rocker switch

#### V03-C05

### Lockable switches

Includes key, plug or plate type.

#### V03-C06

## Switches actuated by change of physical condition

#### V03-C06A

## Magnetic or electric field

Includes switch actuated by movement of a float carrying a magnet e.g. level detector.

Reed switch, magnetic switch, electromagnetic switch

## V03-C06B

## Thermal conditions

Includes constructional details and driving arrangements for switches triggered by a change of temperature. See V03-C06B1 for thermally sensitive members per se. See V03-D05D only for electrothermal relays.

Electro-thermal, temperature, thermostat

## V03-C06B1

## Thermally sensitive members

Includes bimetal thermostats.

Bimetallic member

#### V03-C06B9

### Other thermal switches

Includes details of bellows, diaphragm, Bourdon tube, etc.

#### V03-C06C

## Position, speed, acceleration

Includes switches operated by change of inclination or orientation, centrifugal action, shock or vibration, inertia.

Impact switches, tilt switches

#### V03-C06D

## Fluid pressure or flow

Includes switches actuated by bellows, diaphragm, Bourdon tube, vane, piston and cylinder.

#### V03-C06X

# Other physical condition responsive switches

Includes switches operated by a change of liquid level, humidity or liquid density.

Float switch

#### V03-C07

# Switch manufacture; Testing; Monitoring

For contact manufacture and testing see V03-A08. Includes all other manufacturing and testing aspects of switches.

## V03-C07A [2005]

# Micromachining process, method or apparatus

See also U11-C and U12-B03F codes.

MEMS, microswitch, nanoswitch, silicon-machining, micromachining

### V03-C08 [1983]

#### Time (-programme) switches

Includes time or time programme switches operated by rotary or non-rotary parts, thermal action, electrolytic processes or chemical processes. See also S04-C01.

#### V03-C09

## Other switches

Includes liquid contact switches, explosion switches, piezoelectric switches, mercury switches, etc.

Liquid, wet

## V03-C10 [1997]

#### Microswitches; Nanoswitches

Covers details of small-size switches that act by the movement of small levers and used where rapid precise movements are required, especially in keyboards and automatic control devices. For manufacturing details of microswitches or nanoswitches, see also V03-C07A.

Micromachining, MEMS

## V03-C10A [2002]

#### **Nanoswitches**

For manufacturing details (micromachining), see also V03-C07A.

## V03-C15 [1997]

## **Hybrid switches**

Includes combined principle type switches e.g. combined contactless (semiconductor) and contact-type switches.

#### V03-D

#### Relays

#### V03-D01

# Circuits and mechanical arrangements modifying relay operation

Includes arrangements for modifying the operation of the relay, e.g. for holding armature in attracted position, for biasing the electromagnet, for introducing delay, etc.

Operation delay arrangement

#### V03-D02

# **Energising-current supply circuits**

Includes relay coil or coils forming part of a bridge circuit, and EM drive circuit specifically for relay operation.

## V03-D03

# Magnetic circuits, windings, contacts and driving arrangements

## V03-D03A [1983]

#### **Magnetic circuits**

Electromagnetic details forming part of relay are also in V02-E02A2.

Armatures, electromagnets, yokes, magnets, cores, poles

#### V03-D03B [1983]

#### Windings

Includes magnetic coils or windings, including short-circuited conducting sleeves, bands or discs. *Coils, coil formers, bobbins* 

#### V03-D03C [1983]

## **Contact arrangements**

Includes contact spring sets.

## V03-D03D [1983]

## Magnetic circuit to contact drive

Includes driving arrangements between movable part of magnetic circuit and contact with e.g. lost or snap action, etc. Also includes mechanical arrangements for producing a desired natural frequency using e.g. reed or blade spring, diaphragm, etc.

#### V03-D04

**Electromagnetic relays** 

#### V03-D04A

Polarised and sealed relays

### V03-D04A1 [1983]

## **Polarised relays**

Includes polarised relays with or without intermediate neutral position of rest.

# V03-D04A5 [1983]

## Sealed relays

Includes reed relays. For telephony see W01-B.

#### V03-D04X

## Other electromagnetic relays

Includes non-polarised relays, frequency relays, mechanically-tuned relays, self-interrupters, etc.

#### V03-D05

# Non-electromagnetic relays

### V03-D05A [1987]

#### Piezoelectric relays

Includes electrostrictive and piezoelectric relays.

Bimorph elements

## V03-D05B [1997]

Magnetostrictive relays

# V03-D05C [1997]

## **Electrostatic relays**

Includes electrostatic and electro-adhesion relays.

#### V03-D05D [1997]

### **Electrothermal relays**

Includes heating arrangements using direct or indirect heat, and self-interrupters. Details of induction or resistance heating per se are also covered under X25-B codes.

Glow discharge, induction or resistance heating, self-interrupters

## V03-D05E [1997]

#### **Dynamo-electric relays**

Includes electrodynamic relays, ferrodynamic relays, magnetodynamic relays and induction relays.

Electrodynamic, ferrodynamic, magnetodynamic, induction relays

#### V03-D06

# Constructional details; Manufacture; Testing

#### V03-D06A [1983]

# Cases, indicators, shielding, cooling, terminals

Includes bases, casings, covers, indicators, distinguishing marks, electromagnetic or electrostatic shielding, ventilating/cooling of relays and terminal arrangements.

Covers, seals, bases, housing, relay holder

# V03-D06B [1983]

## Manufacture and testing

Includes materials salvaging, apparatus, methods and testing.

## V03-D06B1 [2005]

# Micromachining process, method or apparatus

See also U11-C and U12-B03F codes.

MEMS, microrelay, nanorelay, silicon-machining, micromachining

#### V03-D06C [1987]

#### Arc control

Includes arrangements for extinguishing or preventing arc between current-carrying parts, for preventing discharge to non-current-carrying parts, and for detecting the presence of an arc or discharge.

## V03-D10 [1997]

#### Microrelays; Nanorelays

For manufacturing details of microrelays or nanorelays, see also V03-D06B1.

Micromachining

#### V03-D10A [2002]

Nanorelays

# V03-D15 [1997]

## **Hybrid relays**

Includes combined principle type relays e.g. combined semiconductor and electromagnetic relays.

## V03-D20 [1997]

#### **Smart relays**

Includes smart or intelligent relays.

#### V03-E

#### Selectors

Includes electrically operated, step-by-step wiper motion switches. For telephony see W01-B.

# V03-U [2002]

# Switches/relays characterised by applications

### V03-U01 [2002]

#### **Domestic**

Includes switches for domestic appliances, such as curling irons, ovens, hair dryers, food blenders, washing machines, vacuum cleaners, irons, etc. For switches on personal items, see V03-U02. See also X27 codes for domestic appliances.

#### V03-U02 [2002]

#### Personal

Includes switches for personal items, such as toothbrushes, footwear, clothes, razors, etc. For switches on domestic items, see V03-U01. See also X27 codes for personal appliances.

## V03-U03 [2002]

## **Vehicles**

Includes switches for unspecified vehicles. If the type of vehicle is specified, see V03-U03A, V03-U03B, V03-U03C, V03-U03D or V03-U03E for land vehicles, avionics, shipping, military or railway vehicles respectively.

## V03-U03A [2005]

#### Land vehicles

Includes switches for land vehicles, such as cars, motor bikes, trucks, tractors, vans, utility vehicles, excavators, etc. See also X22 codes.

## V03-U03B [2005]

#### **Avionics**

Includes switches for air vehicles, such as planes, helicopters, gliders, etc. See also W06 codes.

## V03-U03C [2005]

#### Shipping

Includes switches for sea vehicles, such as boats, ferries, submarines, yachts, etc. See also W06 codes.

## V03-U03D [2005]

#### Military

Includes switches for military vehicles, such as rockets, tanks, etc. See also W07 codes.

## V03-U03E [2010]

#### **Railways**

Includes switches for railway vehicles, such as locomotives, carriages, etc. used for passengers, in mines, etc.

## V03-U04 [2002]

# Information equipment

Includes switches for computers, laptops and notebooks, keyboards, keypads, touchscreens, printers, scanners, copiers, facsimiles, graph plotters, personal digital assistants (PDA), calculators, etc.

See also V03-C01A2 for details of switches, and V03-C01A3 for constructional details. Keypads for mobile phones are coded under V03-U05 only. Also includes switches used in stationary and business equipment, e.g. shredder, etc.

See also T01 codes for computer details, T04 codes for keyboard and plotter details, S06-D to S06-K codes for copier, printer and facsimile details, and X27-A02C for electrical aspects of stationary and business equipment.

## V03-U05 [2002]

#### Telecommunication and broadcasting

Includes switches for phones, mobile phones, pagers, televisions, receivers, set-top boxes, radios, remote controllers for television, etc., RF communication, etc. See also W01 and W02 codes for mobile phones, pagers, phones, etc, and W03 codes for TV receivers, remote controllers for television, set-top boxes, etc.

## V03-U06 [2002]

#### **Machine tools**

Includes switches for machine tools such as presses, rolling, milling, drilling, turning, polishing, grinding, boring, cutting, abrading and burnishing machines. See also X25 codes.

## V03-U07 [2002]

#### Industrial

Includes switches used in the industrial field, such as on conveyors, excavators (see also V03-U03A for land vehicles), in the mining industry, on packing, bottling, and sorting devices, cranes, incinerators, engraving systems, in manufacturing and assembly plants, etc. Switches especially for machine tools are coded under V03-U06 only. See also X25 codes.

## V03-U08 [2002]

## **Toys; Games; Sports**

Includes switches on toys, dolls, fitness and exercises machines, sport equipment, arcade games such as Pachinko or fruit machines, video consoles, handheld game consoles, musical instruments such as electric guitars, keyboards, etc. See also W04 codes.

Toys, sport equipment, arcade games, game consoles, guitars, keyboards

## V03-U09 [2002]

## Audio/video equipment

Includes switches on projectors, video recorders (VCR), DVD recorders, Hi-Fi systems, etc. Switches for cameras are coded under V03-U12 only. See also W04 codes.

## V03-U10 [2002]

#### Medical

Includes switches on medical devices, such as pacemakers, hearing aids, defibrillators, diagnostic equipment, life support machines, etc., and on hospital, veterinary, and dentistry equipment, etc. See also S05 codes.

# V03-U11 [2002]

# Lighting

Includes novel slide switches (V03-C01B) used in flashlights, wall-mounted rocker switches (V03-C04) for controlling house lighting, foot-operated switches (V03-B01B) for controlling floor lamps, and inertia responsive switches (V03-C06C) for automatically applying motor vehicle hazard lights after an accident (see also V03-U03A, X22-N and X22-B02X). See also X26 codes for illumination arrangements per se.

## V03-U12 [2002]

#### **Cameras**

Includes switches for digital still cameras, film-based cameras and video cameras. For other A/V equipment, see V03-U09 only. See also W04 codes for digital and video cameras, and S06-B codes for film-based cameras.

Digital camera, film camera, 35 mm camera, SLR camera, CCD camera, camcorder, video camera

#### V03-U13 [2005]

#### Instrumentation

Includes switches on electrical instruments, engineering and scientific instrumentation. See also S01 to S03 codes.

## V03-U14 [2005]

#### **Robotics**

Includes switches on robots used in assembly lines (see also V03-U07 for industrial and X25), during surgery (see also V03-U10 for medical and S05), in home automation (see also V03-U01 for domestic and X27), welding robots (see also V03-U07 for industrial and X24), etc.

#### V03-U15 [2005]

## **Alarms; Signalling**

Includes switches used to e.g. activate silent alarm used to covertly alert police during robbery, indicate unauthorised opening of window in house (see also V03-U18 and X25-U01), or to remotely signal to owner that parked vehicle is being tampered with (see also X22-N and X22-D03C). See also W05-B codes for novel details of alarms per se.

## V03-U16 [2005]

## **Monitoring; Control**

Includes e.g. key sheets used in television remote control units (see also V03-U09 and W03-A02C), pedestrian traffic light control pushbuttons (see also T07-B05A and T07-C03), wall-mounted switches for remotely controlling lighting (see also V03-U11, X26-C03C an W05-D codes) and switches for monitoring whether patient gets out of bed (see also V03-U10 and S05-G02B2 codes).

## V03-U17 [2005]

## **HVAC**; Refrigeration

Includes switches used in heating, ventilating and air conditioning systems, and refrigeration system. See also X27-E and X27-F codes.

## V03-U18 [2005]

#### **Doors and windows**

Includes switches using on doors, gates and windows. For alarms systems, see also V03-U15 and W05 codes. See also X25 codes.

#### **V04: Printed Circuits and Connectors**

NOTES

- (1) Includes low power electronics and domestic mains type connectors.
- (2) High power connectors for power distribution are in X12-G.
- (3) Thick and thin film circuits and hybrid circuits are in U14-H, although aspects relevant to printed circuits are in V04-Q and V04-R.
- (4) For batteries search V04 and X16, and for telephony V04 and W01 together.
- (5) Indeterminate type connectors are in V04 and  $\times 12$
- (6) Direct connections used for 2-part connector terminations are in V04-A and the relevant connector e.g. IDC termination for a 3-pin mains plug is in V04-A03, V04-F, V04-M02 and V04-M07.

#### V04-A

#### **Direct connections**

Relates to electrically conductive connections for two or more conductive members which are in direct contact

#### V04-A01

## Soldered, welded, riveted

See X24 for general soldering, welding and riveting. Manufacture of such connections is covered by V04-P codes.

#### V04-A02

# Twisted, wrapped, bent, crimped

Crimping sleeve, ferrule

#### V04-A03

# With insulation penetrating/displacement member

See also V04-M07.

Insulation displacement connector (IDC), needle point, prong

## V04-A04

### Clamped or spring

#### V04-A04A

Using clamping member acted on by screw or nut

## V04-A04B

Using screw or nut clamping member

## V04-A04C

Using spring, clip, or resilient member

#### V04-A04X

#### Other

Includes connections using cams, wedges, cones or balls to maintain contact.

[1992]

#### V04-A05

#### To earth

Grounding electrode, earthing connector

# V04-A06

#### Conductive adhesive

# V04-A07 [1992]

#### 'Zebra' connector

(V04-A09)

Includes block of insulating material with alternative conductive areas.

Elastomer block

## V04-A08 [1992]

## Insulating connections

(V04-A09)

Includes end caps, sleeves etc.

#### V04-A09

#### Other

Includes connections using shape memory contact, etc.

#### V04-A10 [1992]

## **Superconducting wires connection**

For high power superconducting wire connectors, see X12-G02G.

#### V04-A11 [1992]

## **Anisotropic connector**

(V04-A09)

#### V04-B

# Terminal strips and blocks; Terminals mounted on base

Connectors or connecting arrangements of this type provide a number of mutually insulated connections.

## V04-B01

#### For printed circuits

Includes bed-of-nails connector, see also V04-M05. For semiconductor device holders see also V04-K02, and U11-D01Q codes.

IC socket, holder

## V04-B02 [1987]

#### For flat cables

(V04-B09)

See also V04-M04.

Ribbon cable connector

## V04-B03 [1992]

#### For coaxial cables

(V04-B09)

See also V04-M03.

High frequency, data communication

#### V04-B04 [1992]

## **End pieces for multiconductor cables**

(V04-B09)

## V04-B05 [1992]

# Terminals or binding posts, terminal strips, terminal blocks, terminal boards

(V04-B09)

Includes fastening of connecting parts to base or case.

Distributor block

### V04-B05A [1992]

# Clip-on terminal blocks for mounting on rail or strip

(V04-B09)

#### V04-B09

Other

## V04-C

# End pieces for wires or cables; 2 or more spaced connecting locations

# V04-C01 [1992]

## **End pieces**

Includes end pieces supported by wire or cable and for connection to another wire, terminal or conductive member. For multiconductor cables, see V04-B04.

Clamps, battery post, eye-, fork-, hook-terminals, crocodile clips, spade terminals, probes, needle points, spring clip, ferrule, sleeve, screw, nut

## V04-C05 [1992]

# Two or more connecting locations

Includes connectors for conductive members providing two or more spaced connecting locations which are thereby interconnected.

#### V04-D

#### Connector details

Details only of connectors of the type covered by H01R-015-033 are included here.

#### V04-D01

#### **Contact members**

Includes composition of contacts; hermaphroditic contacts; etc. Conductive materials in general are covered by X12-D01 codes.

Machined, stamped, formed, single beam, dual leaf, crimp-, wire wrap-, angled solder-, straight solder-pin termination

#### V04-D01A [1983]

## Pins, blades, or prongs

Male, termination

# V04-D01B [1983]

## Sockets or receptacle contacts

Tongues, termination, female, twin cantilever

#### V04-D02

#### Securing contact members to base

#### V04-D03

#### Bases: cases: covers

For insulating materials in general see X12-E codes. Housing, body, seals, dust cap, moulding, hood, potting boot

#### V04-D03A [1992]

#### Material

Includes materials for all types of connectors.

## V04-D04

#### Fastenings; Guides

Includes means for enabling engagement or disengagement of coupling parts with ease or for holding them in engagement using bolt or threaded ferrule.

Latches, locks, securing, coupling nut or ring, bayonet, ZIF connector, zero insertion force, screw, locking lever

#### V04-D04A [1983]

#### **Snap-action fastenings**

#### V04-D05

# Structural association with electrical component

Includes built-in fuse, switch, light bulbs, filter capacitors (see also V04-M08), etc. Details of electrical components are in relevant classes e.g. fuses in X13.

#### V04-D06

## **Protective and screening arrangements**

Safety arrangements

#### V04-D06A [1983]

## Preventing access to live parts

Involves use of shutters or cover plates, insulating terminals, lockable dummy plug.

#### V04-D06B [1983]

# **Earthing; Shielding**

Screening, grounding

#### V04-D06C [1992]

# Preventing incorrect coupling

Polarisation

## V04-D06D [1992]

#### **Cable strain-relief**

Clamp

#### V04-D06X [1983]

Other

## V04-D09

# Other

Includes mounting of coupling parts to apparatus e.g. wall or panel, lockable housing for plug not in use, etc.

#### V04-E

#### Single-pole two-part connectors

## V04-F

#### Two-pole two-part connectors

Includes coaxial connectors. Communication type connectors are in section W e.g. for cable TV see W02-F codes.

#### V04-G

## Three or more-pole two-part connectors

#### V04-G01

### With parallel sliding contacts

Includes D-type-, rectangular- and trapezoidal-shaped connectors.

#### V04-G02

## For printed circuits

See also V04-M05. PCB connector

#### V04-G02A

**Edge connectors** 

#### V04-G02B

Surface connectors

#### V04-G09

#### Other

Includes jacks e.g. for telephone. See W01-C, W01-D codes also.

#### V04-G15 [2002]

#### **USB** connectors

Universal serial bus

# V04-H

# (Multiway) adaptors, including plug standards converters

Includes coupling parts adapted for simultaneous co-operation with two or more identical counterparts e.g. twin socket for distributing energy to two or more circuits. Also includes coupling parts adapted for co-operation with two or more dissimilar parts, coupling parts for co-operation with counterparts of different voltages.

## V04-H01 [1992]

#### Rails or bus-bars

Includes arrangements allowing counterpart to be mounted either at any point or at discrete locations.

Low power

#### V04-J

# **Coupling supported connectors**

Includes an intermediate part linking two coupling parts e.g. two male coupling parts interconnected by an intermediate part with two female parts; intermediate parts distributing energy to two or more parallel circuits. Also includes bridging contacts in a counter-part.

Shunt connector, three-part coupling

#### V04-K

#### Connectors with holders

#### V04-K01

## **Lamp holders**

See also X26-F. *Lamp socket* 

# V04-K02 [1983]

## For semiconductor devices

(V04-K09)

See also U11-D01Q, and V04-B01 if holder is for PCB mounting.

LED holder, IC socket

#### V04-K03 [1983]

## **Fuse holders**

(V04-K09)

See also X13-D01B.

Fuse clip

#### V04-K09

#### Other

Includes CRT sockets, valve holders. See also V05-D codes.

#### **V04-L**

# Rotary current collectors, distributors, interrupters

## V04-L01

#### Commutators, slip-rings, contact brushes

For electric machine application, see also V06-M12 or X11-J03.

V04-L01A [1983]

Commutators, slip-rings

V04-L01B [1983]

**Brush arrangements** 

#### V04-L09

#### Other

Includes distributors and interrupters. For vehicles see also X22-A01C.

Distributor caps

#### **V04-M**

#### **Connectors for specific applications**

Normally used in conjunction with above types, as relevant.

#### V04-M01

## High frequency and high speed connectors

Cable TV distribution, coaxial, antenna, RF, computer data, data communications

#### V04-M02

#### **Mains connectors**

Under-carpet cable connection

V04-M03 [1983]

Coaxial cables connectors

V04-M04 [1983]

#### Flat or ribbon cables connectors

Under-carpet flat cable connector

V04-M05 [1983]

**Printed circuits connector** 

V04-M06 [1983]

Adverse environments (dusty, wet, hot)

connector

V04-M07 [1987]

Insulation displacing connectors

IDC

V04-M08 [1987]

**Filter connectors** 

V04-M09 [1992]

#### Hybrid or mixed signal connectors

Includes combination of e.g. optical and electrical signals, power and data signals.

V04-M10 [1992]

**Crimped connectors** 

V04-M11 [1997]

Smart connectors

V04-M12 [1997]

Combination connectors; Stackable

connectors

V04-M15 [2002]

Hot plug connectors

V04-M16 [2005]

**ZIF** connectors

V04-M17 [2006]

# **Cable-connector combination**

Includes a combination of cable and connector where neither is, or both are, novel. See X12-D03Q also.

V04-M20 [2002]

Microconnectors

V04-M30 [1992]

# Characterised by application to specific industry

These codes are used together, if necessary, with other V04-M codes e.g. HF connector for communications is coded in V04-M01 and V04-M30G.

V04-M30A [1992]

Avionics/military/shipping

V04-M30C [1992]

**Land vehicles** 

V04-M30E [1992]

**Data processing** 

V04-M30G [1992]

**Telecommunications** 

V04-M30J [1992]

Oil/petrochemical

V04-M30L [1992]

**Consumer electronics** 

V04-M30M [1997]

Medical

V04-M30N [1992]

**Domestic** 

Includes connectors for irons, fridges, etc. Ordinary mains connectors are in V04-M02.

V04-M30P [1997]

**Personal hygiene** 

V04-M30Q [2002]

Instrumentation

V04-M30R [2002]

**Machine tools: Robotics** 

V04-M30S [2005]

Industrial machines

#### V04-N

# Flexible/turnable/swivel connectors; Nonrotary current collectors

Also includes flat cable arrangement for movable element, e.g. vehicle steering wheel. See also X22-C05, X22-X01.

#### V04-P

# Apparatus and processes for connector manufacture, assembly, testing, repair

Used in conjunction with V04-M. For testing of printed circuit board see V04-R06 instead. For general electric testing also see S01-G codes.

## V04-P01

For crimping, wire wrapping, etc.

V04-P01A [1992]

## Crimping

See also X12-G01E for heavy crimping tools.

V04-P01C [1992]

Wire wrapping

#### V04-P02

#### For commutators, slip-rings, brushes

See also V06-M11A or X11-J08A for application to electric machines.

V04-P03 [1992]

#### Wire stripping

(V04-P09)

See also X12-G01B for heavy power cables.

V04-P04 [1992]

# **Plating**

(V04-P09)

V04-P05 [1992]

Connecting terminal to housing or moulding

(V04-P09)

V04-P06 [1992]

Contact

(V04-P09)

V04-P07 [1992]

Housing (V04-P09)

V04-P08 [1992]

Soldering, riveting, welding

(V04-P09) See also X24.

V04-P09

Other

Metal recovery

V04-P10 [1992]

Connecting superconducting wires

(V04-P09)

See also X12-G01X, X12-D06.

V04-P11 [1992]

Terminating cable

(V04-P09)

V04-P12 [2006]

**Testing** 

V04-Q

**Printed circuits** 

V04-Q01

Printed connections to printed circuit boards

Includes printed elements for providing electric connections to or between printed circuits (See also V04-M05).

V04-Q02

Printed circuits structurally associated with other circuits or non-printed components

Includes printed circuits/boards structurally associated with electronic, electric and 'mechanical' components.

Universal interface board

V04-Q02A [1992]

Association with other non-printed components

V04-Q02A1 [1992]

Switch

V04-Q02A2 [1992]

**Multichip modules** 

See also U11-D01A6 and/or U14-H03A4 and U14-H03C3 codes. MCMs based on silicon substrates are in U11 and U14 only. Indeterminate substrate type MCMs are in sections U and V.

V04-Q02A3 [1992]

**Smart cards** 

See also T01-H, T04-K, and U11-D01A codes for IC card packages. See also U14 codes if thin film aspects are relevant. Connectors for smart cards are coded according to claimed aspects e.g. V04-G02, V04-M05.

V04-Q02A3A [2002]

**Contactless cards** 

V04-Q02A3B [2002]

**Contact cards** 

V04-Q02A3C [2002]

Hybrid/twin cards

V04-Q02A4 [2005]

Non-electrical components

Includes structural association of PCB with nonelectrical components, e.g. heat sink clamps, and optical components, such as lens holders, etc.

V04-Q02A5 [2005]

RFI/EMI (non-tracks) shields

Includes individual modules and whole PCB shielding cans/boxes. See also V04-U codes.

V04-Q02A6 [2005]

**Buried (non-printed) components** 

Includes association with components such as capacitors, resistors or inductors buried within layers or under encapsulant. See V04-R03 for PCB encapsulation per se.

V04-Q02A7 [2005]

Semiconductor device association with PCB

V04-Q02A2 and V04-Q02A3 take precedence.

## V04-Q02A9 [2006]

## Other associated electrical components

Includes PCB association with other electrical components e.g. mountable type antenna.

V04-Q02B [1992]

Association with other circuits

V04-Q02B1 [1992]

Mother/daughter boards

See also V04-T02.

V04-Q02B1A [1992]

**Hierarchical Interconnection Technology** 

See also V04-T02.

HIT

V04-Q03 [1992]

**Hybrid circuits** 

(V04-Q02, V04-Q09)

Includes hybrid circuits per se. Manufacturing is in V04-R05G and relevant processes being claimed e.g. metallisation in V04-R02. All aspects of hybrid circuits are not covered here. For example, packaging and terminals are covered more fully in section U. See also U14-H03 and U14-H04 codes.

V04-Q04 [1992]

Printed resistor, capacitor, or inductor

(V04-Q09)

See also V01-A02, V01-B03, V02-F01 codes.

V04-Q04A [2006]

**Printed resistor** 

V04-Q04B [2006]

**Printed capacitor** 

V04-Q04C [2006]

**Printed inductors; Printed coils** 

Also includes printed coils for transformers (see also V02-F/V02-G codes) and electric motors (see also V06-M08A1).

V04-Q04D [2006]

## **Composite printed components**

Includes printed RC, RL, RLC or LC component combinations. Passive frequency-selective networks using structurally-associated components are also assigned U25-E02A.

V04-Q05 [1992]

Printed circuits per se

(V04-Q09)

Includes track layout, general description of PCB and its components. V04-Q02A takes precedence for specific component association with PCB.

V04-Q05A [2005]

Track layout design for EMI/RFI shielding or ESD protection

See V04-U codes for general EMI/RFI shielding.

V04-Q06 [2002]

**Printed antenna** 

V04-Q08 [2005]

#### **Probe cards**

Use this code together with other V04-Q and V04-R codes if appropriate, e.g. V04-Q02A for novel structural association with electronic components, V04-Q02B for structural association with other PCBs within probe card assembly or test fixture, or V04-R codes for novel manufacturing aspects. See also V04-Q30Q, S01-G, S01-H and U11-F codes. V04-B01/M05 codes may be applied for highlighting novel features of terminals, pins, blades mounted on PCB.

V04-Q08A [2005]

Horizontal probe card

V04-Q08B [2005]

Vertical probe card

V04-Q09

Other

V04-Q30 [2005]

Characterised by application to specific industry or equipment

V04-Q30A [2005]

Avionics/military/shipping

V04-Q30B [2005]

**Land vehicles** 

V04-Q30C [2005]

Computers

V04-Q30D [2005]

Displays; projectors

V04-Q30E [2005]

**Data storage** 

V04-Q30F [2005]

Printers; Scanners; Photocopiers; Fax

machines

V04-Q30G [2005]

Telecommunication and broadcasting

V04-Q30H [2005]

Audio/video equipment

V04-Q30J [2005]

Cameras

V04-Q30K [2005]

**Toys; Games; Sports** 

V04-Q30L [2005]

**Power supplies** 

V04-Q30M [2005]

**Medical equipment** 

V04-Q30N [2005]

**Domestic appliances** 

V04-Q30P [2005]

**Personal articles** 

V04-Q30Q [2005]

Instrumentation

V04-Q30R [2005]

**Machine tools: Robotics** 

V04-Q30S [2005]

**Industrial machines** 

V04-Q30T [2005]

**Alarms; Signalling; Telecontrol** 

V04-Q30U [2010]

**Lighting; Lamps** 

Includes printed circuits used in illumination applications such as street lamps, table lamps and LED lamps.

V04-Q30X [2010]

Other

Includes oil/petroleum application and chemical industry.

V04-R

Printed circuit manufacture

V04-R01

Removing conductive material; resists

V04-R01A [1983]

Resist

Includes photoresist for use as solder mask. See also V04-R03, V04-R04A2.

V04-R01A1 [1992]

Material

V04-R01A2 [1992]

Stripping

V04-R01A3 [1992]

**Protector** 

V04-R01A4 [1992]

Liquid

V04-R01A5 [1992]

Dry

V04-R01A5A [1992]

Laminating

V04-R01A6 [1992]

Developing

V04-R01B [1992]

**Phototool** 

Includes all etching resist exposure methods and apparatus. For all other types of PCB exposure methods and apparatus see V04-R12.

Photomask

V04-R01C [1992]

Metal removal

V04-R01C1 [1992]

**Chemical etching** 

V04-R01C5 [1992]

Mechanical removal

Includes metal removal using e.g. laser.

#### V04-R02

## **Applying conductive material**

Includes wire embedded onto substrate or encapsulated PCB (see also V04-T01), processes to improve adhesion between substrate and metal layer (see also V04-R07), bonding metal foil to substrate is in V04-R07P1.

Conductive ink, circuit pattern production, metallising, masking tape

V04-R02A [1987]

# **Electroless plating**

Catalysts, chemical plating

V04-R02B [1987]

## **Electroplating**

Includes electrolytic plating methods or baths. See X25-R04 also.

V04-R02C [1987]

# Through-hole or via plating

Through-vias, blind vias, buried vias

V04-R02D [1992]

Sputtering

For general sputtering apparatus, see X25-A04.

V04-R02E [1992]

**Evaporation** 

V04-R02F [1992]

**Screen printing** 

V04-R02G [2005]

## Adhesion aids

Includes arrangements or materials for improving adhesion between a conductor track and substrate. Materials related to additives incorporated within the conductive material (see also V04-R02P) and additives incorporated within a substrate material (see also V04-R07L). If the adhesion aid is particularly for either a track or metal foil/layer use either this code or V04-R07P5, respectively. For general cases, use both codes.

V04-R02P [1992]

## **Conductive materials**

Conductive materials in general are covered by X12-D01 codes.

V04-R02Q [1992]

**Baking conductor tracks** 

V04-R02R [1992]

**Plating resists** 

V04-R02S [2006]

## **Ink-jet printing**

Includes the forming of conductive tracks by using an ink-jet printer (see S06-G codes for printer details).

#### V04-R03

#### Secondary treatment

Includes polishing etc.

V04-R03A [1992]

Repairing conductive pattern faults

V04-R03C [1992]

Cleaning

Includes chemical and mechanical cleaning.

Defluxing

V04-R03C1 [1992]

**Brush cleaning** 

V04-R03C2 [1992]

Vapour degreasing

V04-R03C3 [1992]

Wave cleaning

V04-R03C4 [1992]

Ultrasonic

V04-R03C9 [1992]

**CFC-free cleaner** 

V04-R03E [1992]

#### **Protective coatings**

Includes also solder mask left on PCB for protection.

Conformal coatings

V04-R03E1 [1992]

**Applying coatings** 

V04-R03G [1992]

**Drill smear removal** 

V04-R03J [1992]

# **Correcting soldering defects**

Includes de-soldering, resoldering components, removing excess solder. etc.

V04-R03L [1992]

**Drying** 

#### V04-R04

## **Assembling with components**

Includes mounting of electric, electronic and mechanical components. Includes also component removal. V04-R04 codes are used in conjunction with each other as appropriate. For example, surface mounted components and their soldering is in V04-R04B and V04-R04A codes.

# V04-R04A [1983]

## Soldering

Details of soldering methods and apparatus are also in X24-A. Unsoldering of components is also included here if precise method is not indicated.

V04-R04A1 [1987]

Wave soldering

Soldering baths

V04-R04A2 [1987]

Solder mask and its application

See also V04-R03. Solder resist

V04-R04A2A [1992]

**Permanent** 

Screen printing, photoprint, thermal-, UV-curing

V04-R04A2F [1992]

**Temporary** 

Solvent, peelable, aqueous

V04-R04A3 [1992]

**Reflow soldering** 

V04-R04A3A [1992]

Infrared

V04-R04A3C [1992]

Laser

V04-R04A3G [1992]

Thermal conduction

V04-R04A3J [1992]

Hot gas

Includes vapour phase soldering also.

V04-R04A3L [1992]

Soldering iron

Prior to 1992 soldering irons were coded in V04-V09. This is now discontinued.

Desoldering

V04-R04A4 [2010]

**Ultrasonic soldering** 

See also X24-A02X for general ultrasonic soldering.

V04-R04A5 [1992]

Flux/solder material

V04-R04A5A [1992]

Flux, solder paste/cream application

Screen printer, stencil printer, pressure dispensing

V04-R04A5C [1992]

'Clean flux': Fluxless soldering

Includes materials which need no secondary cleaning step.

V04-R04A7 [1992]

Inspecting solder joint

See also V04-R06D3.

V04-R04B [1987]

**Surface mounting** 

Component onserters

V04-R04B1 [1992]

Adhesive application, drying and curing

V04-R04B2 [1997]

Adhesive materials

V04-R04C [1987]

Wiring

See also V04-V02 for records prior to 1992. From 1992 onwards, see V04-V02 only for general circuitry manufacture.

V04-R04D [1992]

Leaded component mounting
V04-R04D1 [1992]

Lead clinching, cutting, shaping, etc.

(V04-R04, V04-V01)

V04-R04F [1992]

Component placement machine

(V04-R04, V04-R04B, V04-V01)

Used in conjunction with V04-R04B or V04-R04D.

V04-R04F1 [1992]

Robot

V04-R04F3 [1992]

Pick-and-place

# V04-R04G [1992]

## Component feeding, orienting

(V04-R04, V04-R01)

See also V04-V01 for records prior to 1992. From 1992 onwards, see V04-V01 only for general circuit manufacture. For component handling within placement machine see only V04-R04F.

Positioning

## V04-R04G1 [1992]

# Component magazine or bandolier per se and its handling

(V04-R04, V04-V01A)

See also V04-V01A for records prior to 1992. From 1992 onwards see V04-V01A only for general circuit manufacture. See also U11-F codes.

## V04-R04J [1992]

# Checking for correct mounting and presence of component

See also V04-R06D5.

#### V04-R05

# **Types of PCB**

This code is used in conjunction with other codes relating to PCBs/hybrids and their manufacture except in those cases where the type of PCB is evident from other claimed features e.g. multilayer substrate material is in V04-R07A and V04-R07L.

V04-R05A Multilayer	[1992]
V04-R05A1 Ceramic	[1992]
V04-R05B Double-sided (V04-R05)	[1992]
V04-R05C Rigid	[1992]
V04-R05D Flexible	[1992]
V04-R05E Three-dimensional	[1992]
<b>V04-R05G Hybrid</b> (V04-Q09)	[1992]

V04-R05H [2005]

Flex-rigid

V04-R06 [1983]

# Testing

(V04-R09)

See also S01-G, S02-A, S03-E, T01-J, T04-D codes. The V04-R06 codes are used in conjunction with each other as appropriate e.g. method for conductivity testing of a bare board by using bed-of-nails contact probe is coded in V04-R06A3 and V04-R06G1A.

Detecting defects, inspecting, shorts, pinholes, open circuit, specks

V04-R06A [1992]

**Bare board** 

V04-R06A1 [1992]

## Isolation

Includes testing of spacing between conductor tracks, short circuit between tracks etc.

## V04-R06A3 [1992]

#### Conductivity

Includes testing of open circuit in conductor tracks.

V04-R06D [1992]

# Loaded board

(V04-R06, V04-V09)

In-circuit

V04-R06D1 [1992]

**Functional** 

V04-R06D3 [1992]

Soldering

V04-R06D5 [1992]

**Correct component position** 

V04-R06G [1992]

**Test fixtures** 

V04-R06G1 [1992]

### **Contact probes**

See S01-H and appropriate V04 codes also. Spring-loaded probes

V04-R06G1A [1992]

**Bed-of-nails** 

V04-R06G1B [2002]

**Flying-probes** 

V04-R06G1C [2002]

**Generic probes** 

V04-R06G2 [2005]

Non-contact probes

V04-R06G3 [1992]

**Automatic Test Equipment** 

V04-R06G4 [2005]

Wireless fixture

Includes fixture having wires replaced by PCB.

V04-R06G5 [2005]

**MEMS-based probes** 

V04-R06J [1992]

Techniques/types

V04-R06J1 [1992]

**Optical** 

V04-R06J1A [1992]

**Visual inspection** 

V04-R06J1C [1992]

Image processing

Includes electronic imaging using CCTV, pattern recognition. See also T01-J, T04-D, W02-F codes.

V04-R06J2 [1997]

X-rays

V04-R06J3 [2006]

Mechanical or thermal tests

Includes e.g. vibration, structural, mechanical or thermal testing.

V04-R06J9 [2006]

Other testing techniques

V04-R06M [1992]

Artwork

Includes checking of traces, position of lands, photomasks/phototool, etc.

V04-R07 [1983]

Substrates

(V04-R09)

Includes measures to improve adhesion of metal to substrates. See also V04-R02.

V04-R07A [1992]

Multilayer

V04-R07A1 [1992]

**Ceramic** 

V04-R07B [1992]

Metal-cored

V04-R07C [1992]

Flexible

Polyimide film, polyester film

V04-R07D [1992]

Hybrid

V04-R07E [2005]

Metal-clad

V04-R07E1 [2005]

Single-sided

V04-R07E2 [2005]

**Double-sided** 

V04-R07F [2005]

**Constructional details** 

V04-R07L [1992]

Material

Insulating materials per se are covered by X12-E codes.

LC polymer, epoxy glass laminate, thermoplastic resin, poly/aryl) ether, ceramic, epoxy resin, phenol resin, alumina, berrylia, glass-coated alumina, unsaturated polyester resin and glass or synthetic fiber, steel, steatite, aluminium nitride sintered

V04-R07P [1992]

Manufacturing

V04-R07P1 [1992]

#### Laminating metal foil to substrate

Selective lamination of metal to form tracks is in V04-R02. See V04-R07P5 for adhesion aids such as materials or arrangements for improving adhesion between a copper foil/layer and the substrate. See note for V04-R02G.

# V04-R07P1A [1992]

## **Applying protective coatings**

Includes for e.g. treatment to prevent oxidation of metal foils.

# V04-R07P2 [2005]

## Manufacturing metal foil

Includes manufacture of metal foil which will subsequently be laminated on insulating substrate.

## V04-R07P3 [1992]

# Laminating layers of multilayer PCB

# V04-R07P4 [2005]

## Depositing (un-patterned) metal layer

Includes depositing (un-patterned) metal layer directly onto substrate.

## V04-R07P5 [2005]

#### Adhesion aids

Includes arrangements or materials for improving adhesion between a conductor foil or layer and substrate. Materials related to additives incorporated within the conductive material (see also V04-R02P) and additives incorporated within a substrate material (see also V04-R07L). If the adhesion aid is particularly for either a track or metal foil/layer use either this code or V04-R02G, respectively. For general cases, use both codes.

# V04-R07P6 [2007]

## **Insulating layers of multilayer PCB**

Includes application of insulating layers in manufacture of multilayer substrates.

# V04-R08 [1987]

#### **Drilling holes or vias**

(V04-R09)

Drilling, punching, through-holes, through-vias, blind vias, buried vias

# V04-R09

## Other

Includes static electricity neutralising, PCB holder/support etc.

## V04-R10 [1987]

### **Mask registration**

(V04-R09)

#### V04-R11 [1992]

# CAD of wiring layout, component placement, etc.

(V04-R09)

See also T01-J15A2. Also includes general layout design.

## V04-R12 [1992]

# **PCB** exposure

(V04-R09)

Includes all non-etching resist exposure methods and apparatus. See V04-R01B for etching resist exposure. For lamp details see X26 codes.

# V04-R13 [1992]

# Blanking, shearing, and cutting

(V04-R09)

## V04-R14 [1992]

# **Multistep processes**

(V04-R09)

This code is used when several well-defined steps are claimed.

#### V04-R15 [1992]

Materials recovery; Recycling

# V04-R15A [1992]

**Etchant** 

(V04-R01)

# V04-R15B [1992]

#### **Conductive material**

(V04-R02)

## V04-R16 [1992]

#### **Decontamination of wastes; Disposal**

(V04-R09)

# V04-R17 [1992]

# Board conveying and handling between processing stages

See X12-H01E8 for holding board in optimized position for non-contact power transfer. (V04-R09)

## V04-R19 [2005]

# **EMI/RFI** shielding tracks manufacture

Covers RFI/EMI shielding tracks manufacture. See V04-U for general shielding.

## V04-R20 [2007]

#### **Overstress indicators**

(V04-R09)

Includes arrangements used to highlight areas of PCB with dangerously high stress levels. See also S02-F codes for mechanical stress and S03-B codes for thermal stress measurements.

## V04-S

# Electronic equipment casing/cabinet, and drawers

Includes casings for electronic equipment like computers, A-V apparatus, etc. Electrical equipment such as microwave ovens, etc are not included here. For insulating materials (see X12-E codes, too) designated for general electronic equipment or apparatus, see V04-S codes for records prior to 1997. From 1997 onwards, see V04-X01B codes.

Housing, cases, covers, bases, panels, castors, handle, lifting eye, adjustable feet, ventilation slots, louvres

#### V04-S01

# Metal and hermetically sealed casings

## V04-S01A [1987]

#### Hermetically sealed casings

Encapsulation of PCBs is in V04-R03 only and component encapsulation is coded in relevant code for the component e.g. resistors in V01. *Encapsulants, seals, epoxy resin* 

# V04-S01C [2005]

Metal casing with insulative coating

V04-S02 [1987]

## Insulating material casing

(V04-S09)

Polyphenylene oxide flame retardant, ABS, plastics

V04-S02A [1992]

Sealed or encapsulated

V04-S02B [2005]

Insulating casing with conductive coating

V04-S03 [1992]

Battery holder/compartment associated with electrical/electronic equipment

(V04-S09)

See also X16-F06.

V04-S04 [2005]

#### Conductive (non-metallic) material casing

#### V04-S09

#### Other

Includes casings of indeterminate material.

Brackets, clips, vibration dampers, nameplate details

V04-S10 [2002]

Manufacture

V04-S15 [2002]

**Materials** 

V04-S20 [2005]

**Transparent casing** 

V04-S22 [2005]

Fire-proof and explosion-proof casing

V04-S23 [2017]

# Water-proof casing

Includes casings which are waterproof.

V04-S24 [2020]

## **Dust-proof casing**

Includes dust proof casing for all electronic devices.

#### V04-S30 [2007]

#### **Mechanical details**

Includes inserts, hinges, handles and locks.

## V04-T

# General constructional details of electronic apparatus

This code is used only for electronic equipment such as computers, A-V apparatus, etc. Electrical equipment such as microwave ovens are not included here.

### V04-T01

#### Arrangements of components and wiring

See also V04-V02 for wiring harnesses. Termination of wire harnesses is in V04-P11.

Panel mounting, breadboards

## V04-T01A [1992]

#### Wiring

Grommets, wire harness, ties, cable sleeve/marker, wire embedding, wire tie tools, cable trough, duct, trunking, busbar

V04-T01C [1992]

**Components** 

Component (de)mounting tool

V04-T01C1 [2002]

**Modular components** 

V04-T02

Mounting supporting structure in casing or on rack: rack construction

See also V04-Q02 for PCB in association with other components, W01-B20 for telephone distribution frame.

Circuit modules, frames, supports, PCB (de)mounting tools, PCB or panel spacer elements, back panel interconnections, mother/daughter board arrangements, card ejector, divider, guides, chassis runner, locating strip

V04-T03

Cooling; Heating; Air filtering/cleaning; Dehumidifiers

Includes cooling of electronic apparatus, systems and devices. Individual component cooling is also coded in relevant classes, e.g. for ICs, see U11-D02 codes.

V04-T03A [1983]

Heat sinks, radiative cooling

Heat conducting plates

V04-T03B [1983]

Forced cooling

V04-T03B1 [2002]

**Using fans** 

V04-T03B2 [2002]

Using pumps/compressors; Refrigeration

V04-T03B3 [2002]

**Cryogenic cooling** 

V04-T03C [2002]

Thermoelectric cooling

Peltier, heat pumps, cooling, electrocaloric effect, thin film perovskite PZT

V04-T03F [2005]

MEMS-based cooling

V04-T03G [2005]

**Hybrid cooling** 

V04-T03H [2002]

**Heat pipes** 

V04-T03J [2002]

**Heating arrangements** 

V04-T03K [2002]

Air filtering/cleaning

V04-T03L [2002]

**Dehumidifiers** 

V04-T03P [2002]

**Materials** 

Includes thermal materials and adhesives.

V04-T03Q [2002]

Manufacture; Testing; Monitoring

V04-T03X [2007]

Other cooling aspects

Includes cooling aspects not covered elsewhere e.g. involving the use of electro-caloric effects, heat sink mounts, etc.

V04-T04 [1992]

Hybrid electrical/optical board arrangements

V04-U

**Electric and magnetic screening** 

Normally includes screening arrangements for an individual equipment and the room containing the equipment. See S01-G08B5 also for screened rooms for electrical equipment testing. For individual measuring instrument screening, see S01-J02 also. For suppressing the emission of interference from an equipment by means of a specific constructional feature of the equipment, see also W02-H01E.

EM shielding, EMI, RFI

V04-U01 [1992]

Material

V04-U01A [1992]

Superconducting materials

See also X12-D06B and U14-F01 for superconducting materials per se.

V04-U02 [1992]

Faraday cage

Includes arrangements for a room, or whole apparatus.

V04-U03 [1992]

# **EMI-proof casings**

See also V04-S codes.

V04-U04 [2007]

### **EMI-proofing elements**

Includes elements such as gaskets, panels (see V04-U03 too, if the panel is part of a casing), etc.

V04-U15 [2002]

Manufacture

V04-U20 [2002]

**EMC** testing

V04-U21 [2010]

## **Electrostatic protection casing**

Includes electronic device protection from electrostatic effect.

#### V04-V

#### General circuit manufacture

- (1) Excludes PCB and its manufacturing from 1992 onwards. Please search relevant V04-R codes.
- (2) Includes general assemblages of electric components and their monitoring.
- (3) Prior to 1992, please search V04-V codes also for PCB component mounting, PCB loaded board testing and (de)soldering irons.
- (4) From 1992 onwards, all PCB testing is covered by V04-R06 codes; V04-V09 is still valid for general circuit testing.

#### V04-V01

# Feeding, orienting, mounting components

Robot assembler, automatic component insertion, positioning components, pick-and-place machine

V04-V01A [1987]

## Component magazine or bandolier

For ICs, see also U11-F.

Cassettes, carrier tapes

### V04-V02

#### Wiring

Includes manual and machine wiring. See also V04-T01

Harness manufacture, automatic wiring, looms, wire tie tools

V04-V02A [1983]

# Shaping component leads, cutting

(V04-V09)

Bending-, trimming-, clinching-, forming-leads

## V04-V09

#### Other

Includes component value changing tool and general circuit testing.

Testing circuit, monitoring

#### V04-X

#### Miscellaneous

Component marking

V04-X01 [1997]

General electronic components packaging, materials, cleaning, manufacture and disposal

V04-X01A [1997]

### Containers, packaging

Storage, shipping, transportation

V04-X01B [1997]

#### **Materials**

For insulating materials (see also X12-E codes) designated for general electronic equipment or apparatus, prior to 1997 see V04-S codes.

# V04-X01B1 [2005]

## **Nanomaterials**

Includes nanomaterials or nanoparticles for general electronic applications.

V04-X01C [1997]

#### Materials recovery and recycling

Includes material recovery and recycling of general electronic components.

V04-X01D [1997]

Cleaning

V04-X01E [2002]

Drying

V04-X01F [2005]

#### Manufacture and testing

Includes general electronic components manufacture and testing.

# V04-X01G [2005]

# Waste decontamination and disposal

Includes decontamination and disposal of general electronic components.

## V05: Valves, Discharge Tubes and CRTs

#### Notes

- (1) All aspects of discharge tubes for lighting (including manufacture) are covered by X26 and are not included in V05.
- (2) Manufacturing aspects of devices are normally only coded in V05-L. However, where important novelty or increased information can be conveyed by inclusion in device codes also, this is done.
- (3) In sections where separate codes for tube details are not included or are insufficient, codes from the general section (V05-M) should be used in conjunction with a device code.
- (4) From 1992 onwards, new codes were introduced to represent tube types which can be used whether the whole tube or just a component part is claimed. These codes can be applied if the particular tube type is specified and thus should be regarded as a means of limiting a search only, since the precise nature of a tube may be unspecified or unimportant in cases of wider application.

#### V05-A

#### **Gas-filled tubes**

Does not include plasma processing tubes - see V05-F05 codes. Prior to 1992, use V05-M in conjunction with V05-A codes for full coverage.

#### V05-A01

#### Plasma display panels and tubes

V05-A01A codes are used to describe the display type in conjunction with codes from V05-A01B to V05-A01G, which describe novel features.

#### Examples:

- (1) A novel barrier rib arrangement of a nonspecific plasma display panel type, use V05-A01A3 and V05-A01D3 together.
- (2) A novel drive circuit for a plasma-addressed LCD would be coded in V05-A01A7 and V05-A01G, as well as U14 and relevant T04/W03 codes.

Flat panel, matrix, seven-segment, plasma, vessel, housing, electrodes, filling

## V05-A01A [1992]

## Characterised by type of display

#### V05-A01A1 [1992]

### Segment type display tube

Prior to 2005, tubes limited to displaying characters only in matrix form were covered by V05-A01A3C.

## V05-A01A3 [1992]

## Plasma display panels

Includes display panels that directly emit the colour of the plasma discharge, as well as panels that use UV emission in order to excite a phosphor. Also includes plasma display panels of unspecified driving voltage type.

## V05-A01A3A [1992]

# **DC** display

Includes Self-scan® display panel with sequential discharge transfer.

## V05-A01A3B [1992]

**AC** display

## V05-A01A3C\* [1992-2004]

## For character display only

\*This code is now discontinued but covered display panels for alphanumeric data only, i.e. where not all points on screen can be addressed. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

## V05-A01A3D\* [1992-2004]

## For character and graphics display

\*This code is now discontinued. Covers display with all points addressable. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

#### V05-A01A5\* [1992-2004]

### **Multicolour display**

\*This code is now discontinued. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

## V05-A01A5A\* [1992-2004]

## **Full colour display**

\*This code is now discontinued. Covers display capable of full colour range with primary colours. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

#### V05-A01A7 [1992]

# Combined technology displays e.g. Plasma Addressed LCD

Covers displays where gas discharge is not the sole display mechanism, for example in combination with electroluminescent elements, LCD addressing, FED pixels etc. See also U14-K01A2C for plasma addressed LCD.

## V05-A01A7A\* [1992-2004]

# Using phosphor directly excited by discharge

\*This code is now discontinued. It is assumed that almost all plasma display panels operate using UV emission from the gas discharge in order to excite a phosphor, and thus are just coded in appropriate V05-A01A3 codes.

V05-A01A7B [1992]

Using plasma as source of electrons

V05-A01A9 [1992]

Other types of plasma display

V05-A01B [1992]

Light emitting arrangements; Phosphors

V05-A01B1 [1992]

**Gas filling** 

V05-A01B1A [1992]

## **Gas filling additives**

Includes additives to modify display colour or prolong life.

V05-A01B1C [1992]

## With several separate gases

Covers display with gas filling differing between cells, e.g. to display different colours.

V05-A01B3 [2005]

## **Phosphor Compositions**

(V05-M01A)

Includes manufacture of phosphor compositions. For coating of phosphors in plasma displays, see V05-L02 codes. Prior to 2005, coded in V05-M01A.

V05-A01B5 [2005]

### **Phosphor arrangements**

(V05-A01B)

Prior to 2005 coded in V05-A01B.

V05-A01C [1992]

#### **Electrode assemblies**

Covers details of electrode construction including materials, supports, insulating coatings, and layout. Lead-in conductors are covered by V05-A01D5.

V05-A01C1 [1992]

**Anodes** 

V05-A01C2 [1992]

# Discharge triggering and maintaining electrodes

From 2002 the scope of this code is expanded to allow the inclusion of discharge maintaining or holding electrodes.

Control electrode, bus/address electrodes

V05-A01C2A [2002]

# Discharge triggering electrodes

Covers electrodes specifically intended to initiate gas discharge.

V05-A01C2C [2002]

## Discharge maintaining electrodes

Covers electrodes specifically intended to maintain an existing gas discharge.

Holding electrode

V05-A01C3 [1992]

**Cathodes** 

V05-A01C3A [1992]

**Heated cathode** 

Hot cathode

V05-A01C4 [1992]

## Microfabricated electrodes

Covers electrodes produced by semiconductor device manufacturing techniques, (not screen printing).

V05-A01C5 [1992]

**Electrode supports** 

V05-A01C7 [1992]

## Dielectric coatings

Includes protective overcoats for electrode insulating layers.

V05-A01D [1992]

## Vessels, spacers, cell construction

Includes novel shape or size of cells. Screens and filters not forming part of the vessel are covered by V05-A01F codes.

V05-A01D1 [1992]

#### Vessels per se

Covers materials and construction of front and back panels and sealing arrangements.

Casing, housing, front plate, back plate, glass

## V05-A01D1A [1992]

#### **Seals**

Covers seals for main body of vessel and for leadins. Internal seals are covered by V05-A01D3A.

Frit

## V05-A01D1C [1992]

## Conductive coating

Covers coating e.g. for screening purposes. Electrodes are covered by V05-A01C codes.

#### V05-A01D1E [1992]

## **Optical coatings**

Includes anti-glare coating. External filters (i.e. as part of a display module) are covered by V05-A01F1.

## V05-A01D3 [1992]

## Internal spacing elements and seals

Includes rib structures.

Cell spacers

## V05-A01D3A [1992]

#### Internal seals

Covers seals between separate parts of vessel. Main vessel seals are covered by V05-A01D1A.

#### V05-A01D5 [1992]

Lead-in conductors

# V05-A01D7 [1992]

#### Mounting of integral drive circuitry

Covers circuitry structurally associated with display. Actual circuit details are covered by V05-A01G and, in general, W03-A08D.

## V05-A01E [1992]

# Complete novel display device

This code is used when a complete novel display device is claimed without specific reference to a particular feature.

## V05-A01F [1992]

## **Module aspects**

Includes display device per se (not necessarily novel), with e.g. external filters, housing, and drive electronics. (Circuitry per se is covered by V05-A01G codes). Filters formed as coatings on the discharge vessel are covered by V05-A01D1 codes.

#### V05-A01F1 [1992]

## **Optical filter**

## V05-A01F3 [1992]

## Housing, screening

Includes shielding.

## V05-A01F5 [1992]

### **Drive circuitry PCB mounting; Connectors**

Mounting of circuitry integral with display itself is covered by V05-A01D7.

## V05-A01G [1992]

## **Drive circuitry (circuit details)**

Includes circuitry which may be either integral with the display or external to it. Also includes driving methods. See also T04-H03 codes.

## V05-A01G1 [1992]

Integral with display

# V05-A01H [2006]

## **Tube cooling**

Note that this only applies to cooling systems used to remove heat from the tube envelope. Drive circuitry cooling is not included per se, but may be included in V05-A01F3 or V05-A01F5 codes where relevant housing or PCB mounting details are required. Prior to 2006, coded in V05-M07 codes.

## V05-A03 [1992]

#### Gas filled switching tubes

(V05-A09)

Details of switching tubes are covered by V05-A07 codes. See X13-A04H also for power switching tubes. Electronic switching in general is covered by U21-B codes.

Thyratron, cold cathode tube, TR tube

# V05-A05 [1992]

# Gas filled circuit protection devices

(V05-A09)

For device details see V05-A07 codes. Covers devices designed to limit excess voltage. See also U24-F02 and X13-C03 for low and high power over-voltage limiting in general, and also under application e.g. W01-C08A for telephone systems protection.

# V05-A07 [1992]

### **Details of gas-filled tubes**

(V05-M)

Codes in this section relate to devices in V05-A03, V05-A05, and V05-A09 codes.

V05-A07A Electrodes	[1992]	V05-B01A1 Diode	[1992]	
(V05-M03) <b>V05-A07A1</b>	[1992]	V05-B01A3 Triode	[1992]	
Anodes	[]	Iriode		
V05-A07A3	[4002]	V05-B01A5	[1992]	
Cathodes	[1992]	Tetrode		
		V05-B01A7	[1992]	
V05-A07A3A	[1992]	Pentode		
Heated cathodes  Hot, thermionic	<b>5</b>	V05-B01A9	[1992]	
,		Other thermionic tu	be	
V05-A07A5	[1992]	V05-B01B	[1992]	
Grids, control ele	ectrodes	Tube details (novel)		
Trigger		(V05-M)		
V05-A07B	[1992]	V05-B01B1	[1992]	
Vessels, seals, le	ad-ins	Cathodes	[1772]	
(V05-M05)		(V05-M02)		
V05-A07C	[1992]	, ,	[4000]	
Gas filling		V05-B01B1A	[1992]	
(V05-M09)		Heater elements (V05-M02)		
V05-A07G	[1992]			
Complete novel device  This code is used when the complete device as a whole is claimed, without specific reference to a particular feature.		V05-B01B3	[1992]	
		<b>Grids</b> (V05-M03)		
V05-A09		V05-B01B3A	[1992]	
Other gas discharge tubes		Control grid		
		(V05-M03)		
V05-B		V05-B01B5	[1992]	
Classical and cold cathode vacuum tubes		Anodes	Anodes	
V05-B01	[1992]	(V05-M03)		
	onic vacuum tubes	V05-B01B6	[1992]	
	covered by V05-A codes,	Cooling		
transit time tubes by V05-C codes. See X13-A04H also for power types. V05-B01A codes are used to indicate the type of device without regard to novelty, which is indicated by V05-B01B codes.		(V05-M09)		
		V05-B01B6A	[1992]	
		Forced air		
V05-B01A	[1992]	(V05-M09)		
Tube type		V05-B01B6B	[1992]	
		Liquid		
		(V05-M09)		

V05-B01B6C [1992]

Vapour (V05-M09)

V05-B01B7 [1992]

Vessels, lead in conductors

(V05-M05)

V05-B01B8 [1992]

**Complete novel tube** 

V05-B01B9 [1992]

Other thermionic tube details

V05-B03 [1992]

Cold cathode tubes

Covers tubes of similar construction to those of V05-B01. Microminiature cold cathode devices are covered by V05-B05 codes.

V05-B03B [1992]

Tube details (novel)

(V05-M)

V05-B03B1 [1992]

**Cathodes** 

V05-B03B1A [1997]

**Current limiting arrangements** 

(V05-B03B1)

V05-B03B3 [1992]

Grids

V05-B03B5 [1992]

**Anodes** 

V05-B03B7 [1992]

Vessels, lead in conductors

V05-B03B8 [1992]

Complete novel tube

V05-B03B9 [1992]

Other cold cathode tube details

V05-B05 [1992]

Microminiature cold cathode devices

Codes in this section cover devices with analogous operation to those in V05-B03 but formed using semiconductor device fabrication techniques. See U11 codes for manufacture aspects (in addition to V05-L codes) and U12-B03D also for devices per se. Field emission electrodes using semiconductor fabrication techniques of general application and not forming part of a complete microfabricated device are coded in V05-M03A1. Microfabricated field emitters for cathode ray tubes are coded in V05-D05C5 codes, and for plasma display panels, in V05-A01C4.

V05-B05A [1992]

Characterised by nature of device

Codes in this section describe the nature of the device and do not necessarily indicate novel features, which are represented by the additional use of V05-B05B codes (see note in V05 class notes).

V05-B05A1 [1992]

**Characterised by number of electrodes** 

V05-B05A1A [1992]

Diode

V05-B05A1B [1992]

Triode

Three-electrode, three terminal, controlled device

V05-B05A1X [1992]

Other number of electrodes

V05-B05A3 [1992]

Characterised by configuration

Codes in this section are used alone or in combination as appropriate.

V05-B05A3A [1992]

Single device

V05-B05A3B [1992]

**Array of devices** 

V05-B05A3C [1992]

For integration with solid state semiconductor device

Covers incorporation with e.g. monolithic or film-type integrated circuit.

V05-B05A3E [1992]

For combination with other vacuum conduction devices

V05-B05A3X [1992]

## Other configurations

Includes cold cathode heat pumps and analogous devices.

V05-B05A5 [1992]

## Characterised by emitting element

Also coded in V05-B05B3 when emitting element per se is novel.

Field emission

V05-B05A5A [1992]

## pn junction

Includes 'hot electron' emitting device, i.e. element imparting acceleration to electrons before field emission process.

V05-B05A5B [1992]

Film electrode

V05-B05A5C [2006]

**Carbon nanotube** 

CNT, nanohorn

V05-B05A5X [1992]

Other emitting elements

V05-B05A8 [1992]

# Characterised by semiconductor or other substrate

Codes in this section are applied to describe the type of substrate only. When the substrate is the novel aspect V05-B05B1 is also assigned. For inventions with unspecified semiconductor substrate V05-B05A8 is assigned. If the substrate is stated to be of dielectric material V05-B05A8X is assigned. For cases where no details of the substrate are disclosed, V05-B05A8 codes are not assigned.

V05-B05A8A [1992]

III - V compounds

Gallium arsenide

V05-B05A8C [1992]

II - VI compounds

V05-B05A8E [1992]

Characterised by silicon substrate

V05-B05A8X [1992]

Other substrate

Includes dielectric material substrates.

V05-B05B [1992]

#### **Device details (novel)**

Codes in this section are only applied to indicate novel features.

V05-B05B1 [1992]

**Substrate** 

Use with V05-B05A8 codes to discriminate type of substrate.

V05-B05B3 [1992]

### **Emitting element i.e. cold cathode**

Use with V05-B05A5 codes to discriminate type of emitter.

V05-B05B5 [1992]

## Other electrodes (non-emitting electrodes)

Emitting electrodes are covered by V05-B05B3.

V05-B05B5A [1992]

**Control electrodes** 

Covers 'grid' control electrodes.

V05-B05B5B [1992]

Collector electrode

Covers 'anode' electrodes.

V05-B05B5X [1992]

Other non-emitting electrodes

V05-B05B7 [1992]

Housing, interconnections, integral circuitry

circuitiy

V05-B05B7A [1992]

Housing, encapsulation

V05-B05B7B [1992]

Interconnections

V05-B05B7C [1992]

**Connections to external circuitry** 

V05-B05B7D [1992]

Integral circuitry

Covers circuitry for driving, interfacing etc.

## V05-B05B8 [1992]

#### Complete novel device

This code takes precedence over other V05-B05B (i.e. novel feature) codes and is used in conjunction with V05-B05A codes to describe device type when the complete device is claimed as novel.

## V05-B05B9 [1992]

## Other novel details

## V05-C

#### **Transit-time tubes**

## V05-C01

## **Tube types**

Codes in this section e.g. V05-C01A are used when the tube as a complete device is claimed, otherwise the subdivision 'details' codes e.g. V05-C01A1 (introduced from 1992) are assigned together with appropriate codes from the 'details' (V05-C02) section. Prior to 1992, V05-C02 codes were used alone if only details of a tube were claimed.

Examples:

- (1) Novel magnetron: V05-C01A
- (2) Novel anode for magnetron: V05-C01A1 and V05-C02A1
- (3) Novel anode for any type of transit time tube: V05-C02A1.

## V05-C01A [1983]

#### Magnetrons

Does not cover apparatus for magnetron sputtering or other workpiece processing, which is covered by V05-F05 codes, especially V05-F05C3A.

Multi-cavity

## V05-C01A1 [1992]

#### **Tube details**

Search with V05-C02 codes for novel details of tube

## V05-C01B [1983]

# **Travelling-wave tubes**

TWT, crossed-field tube, forward wave, backward wave, parametric, BWO

## V05-C01B1 [1992]

#### **Tube details**

Search with V05-C02 codes for novel details of tube.

## V05-C01C [1987]

## **Klystrons**

(V05-C01X)

Reflex, interaction, beam, stream

## V05-C01C1 [1992]

#### **Tube details**

Search with V05-C02 codes for novel details of tube.

#### V05-C01D [1992]

## Gyrotron

(V05-C01X)

For quasi optical types see V08-B also. Includes gyro-klystron devices.

## V05-C01D1 [1992]

#### **Tube details**

Search with V05-C02 codes for novel details of tube.

## V05-C01E [2006]

## **Inductive output tubes**

Prior to 2006, coded in V05-C01X *IOT* 

#### V05-C01E1 [2006]

## **Tube details**

Search with V05-C02 codes for novel details of tube.

# V05-C01X [1983]

#### Other tube types

Multipactor

#### V05-C02

#### **General constructional details**

To link to a particular type of tube use appropriate 'tube details' code from V05-C01 section.

#### V05-C02A [1983]

# Electrodes, screens, magnetic control

#### V05-C02A1 [1992]

#### **Anodes**

See V05-C02C1 codes also when combined function as anode and resonator is significant. Note that slow-wave structures per se are treated as a distributed element, but for manufacture, as an electrode. (See note for V05-C02C3A).

Collector

V05-C02A3 [1992]

**Cathodes** 

Thermionic, dispenser

V05-C02A3A [1992]

Heaters

V05-C02A5 [1992]

**Electron guns** 

Includes grid electrodes, and electrostatic focusing and beam path control. (Use V05-C02A7 codes for magnetic control of these functions).

V05-C02A7 [1992]

**Magnetic control** 

Magnet, electromagnet, coil, winding, solenoid

V05-C02A7A [1992]

Focusing

Focusing by electrodes is covered by V05-C02A5.

V05-C02A7C [1992]

Influencing beam path

Magnetron

V05-C02A9 [1992]

Other electrodes, screens

Includes screens.

V05-C02B [1983]

Vessels, lead-ins, seals, RFI suppression

Suppression of RFI other than by lead filtering is covered by V05-C02C codes. V05-C02B codes include cooling and coupling arrangements. Housing, heat sink, window, filter, RFI suppressor

V05-C02B1 [1992]

**Vessels** 

V05-C02B1A [1992]

Seals

V05-C02B1C [1992]

**Coupling windows** 

Covers part of vessel enabling transfer of RF energy. See V05-C02C5 for waveguide coupling arrangement.

V05-C02B3 [1992]

Lead-ins

V05-C02B3A [1992]

**Lead-in filters** 

Includes filter devices preventing radiation of RF energy from e.g. heater power supply terminals, also assigned W02-H01 (RFI suppression at source in general). See U25-E02 codes also for details of filters per se. RFI suppression by internal means is covered by V05-C02C7.

Radio frequency interference, choke, feedthrough, capacitor, condenser

V05-C02B5 [1992]

Cooling

See V05-M07 codes for cooling of tubes in general. Heatsink, radiate, air, fan, blower, pump, fluid, liquid, vapour

V05-C02C [1983]

**Distributed elements** 

Includes resonators, delays, etc. See W02-A codes for distributed-constant elements not forming part of tube. (These elements are not assigned W02-A codes when part of a tube, unless wider application is suggested).

V05-C02C1 [1992]

Resonator structures

Cavity

V05-C02C1A [1992]

Single resonator

V05-C02C1B [1992]

Multiple resonator

Interconnection, multicavity

V05-C02C1C [1992]

**Tunable resonator** 

Includes mechanically- and electrically-tuneable structures.

V05-C02C3 [1992]

**Delay elements** 

V05-C02C3A [1992]

Slow wave structures

Manufacture of slow wave structure is covered by V05-L01B7, i.e. for manufacturing purposes only, it is regarded as an electrode.

Helix

## V05-C02C5 [1992]

## **Distributed coupling**

Includes e.g. waveguide structure for coupling to tube. Window structures forming part of vessel are covered by V05-C02B1C.

### V05-C02C7 [1992]

## **RFI** and harmonic suppression

W02-H01, general code for RFI suppression at source, is not applied for arrangements internal to the tube per se. External filtering of lead-ins is covered by V05-C02B3A.

Damping

## V05-C03 [1992]

## Circuitry specific to transit time tubes

Codes in this section are only used for specific circuitry taking into account device characteristics, and where provision does not exist elsewhere. In general, see under application, e.g. W02-G01 codes for transmitters, U23-A02 for oscillators, U24-G04D for amplifiers, etc.

#### V05-C03A [1992]

## **Power supplies**

HT, LT, anode supply, heater supply

## V05-C03C [1992]

# **Control of tube operation**

Output control, oscillation, pulse, magnet current

#### V05-D

## Cathode-ray tubes; Electron beam tubes

This section relates to CRTs and similar tubes, chiefly for displays or for imaging purposes - video cameras for example. Tubes for beam processing of workpieces, electron microscopes etc. are not included and are covered by V05-F codes.

V05-D codes are divided into those relating to particular tube types (V05-D01 to V05-D04) and those for details of tubes and associated devices (V05-D05 to V05-D10).

Within V05-D, manufacture of all tube and device types is covered by V05-L codes only. Codes for the device per se are not used unless that aspect is also claimed. Prior to 1992 tube type codes were only assigned when the tube was presented as a complete novel device. From 1992 onwards, distinction is made between complete novel tubes and codes describing tube type and/or indicating novel details of the tube.

Note that novel display drive circuitry for CRTs is not included in V05 at all, as generally this is not part of the vacuum tube assembly itself and is instead covered by relevant W03 and T04 codes. However, Field Emission Display drive circuitry

(V05-D10) is included as often it is integral to the display substrate, as well as being covered by relevant W03 and T04 codes. Operating circuitry for image converters and intensifiers is also included in V05-D03H.

#### Examples

- (1) Completely novel beam penetration CRT: V05-D01A and V05-D01B1C.
- (2) Novel cold cathode for field emission display: V05-D01C3 and V05-D05C5.

#### V05-D01

## Image display tubes

TV, VDU, VDT, video terminal, projection

## V05-D01A

[1992]

# Complete novel tube

This code is used with other V05-D01 codes indicating type.

## V05-D01B [1992]

#### Cathode ray tubes

Includes unspecified CRT display types.

Braun tube

# V05-D01B1 [1992]

Single electron gun tubes

## V05-D01B1A [1992]

**Monochrome tubes** 

# V05-D01B1C [1992]

**Beam penetration tubes** 

## V05-D01B1D [1992]

# Single gun multibeam tubes

Includes tubes analogous to Trinitron® capable of colour display.

Aperture grill

# V05-D01B1E [1992]

## Flood gun tubes

Includes tube with e.g. three primary colour areas on screen usable as multicolour pixel in large display.

## V05-D01B3 [1992]

### Multiple electron gun tubes

This code is used if 'shadow mask CRT' specified with no indication of gun type.

# V05-D01B3A [1992]

## In-line gun tubes

# V05-D01B3B [1992]

#### Delta gun tubes

Triad

#### V05-D01B3C [1992]

## Matrix configuration multiple gun tubes

Covers tube with large number of electron beams, e.g. 'matrix drive with deflection' type. Prior to 2005 included field emission display matrices, now coded in V05-D06A codes.

## V05-D01B3D [1992]

#### 'Composite' tube with separate tube necks

Covers tube with e.g. three separate neck sections each with gun system, e.g. for large display area.

# V05-D01B5 [1992]

#### Flat CRT

Includes tubes with electron gun not perpendicular to screen surface. Does not cover flat panel matrix-gun tubes, which are covered by V05-D01B3C.

## V05-D01B6 [1992]

**Beam index colour CRT** 

V05-D01B9 [1992]

Other CRT type

V05-D01C [1992]

Vacuum fluorescent display tubes

# V05-D01C1 [1992]

#### For displaying character only

Includes seven segment type display.

# V05-D01C3 [2002]

## **Field Emission Displays**

Includes displays with field emission cathodes. For novel details of cold cathodes per se, see also V05-D05C5 codes. For novel emitter arrangements, see also V05-D06A codes.

Prior to 2002 field emission displays can be found in V05-D01C5 with V05-M03A to signify cathode type (if cathode is not novel) or in V05-D05C5 is cathode is novel.

Cold cathode, surface emission, surface emission electron conduction display, SED, FED

# V05-D01C5 [1992]

#### Dot matrix displays

#### V05-D02

#### Image pick-up tubes

TV camera tube, vidicon, plumbicon

## V05-D02A [1992]

Complete novel tube

#### V05-D02B [1992]

#### **Tube details**

Use with V05-D05 to V05-D09 codes as appropriate.

#### V05-D03

## Image converters and intensifiers

Tubes for night vision equipment are assigned W07-G codes also.

Streak tube, x-ray imaging tube, infrared imaging tube

## V05-D03A [1992]

#### Complete novel tube

For cases where particular detail of tube is the novel aspect, this code is not used. Search V05-D03B to V05-D03E with V05-D05 to V05-D09 codes as appropriate.

## V05-D03B [1992]

## **Tubes with optical output**

Covers tubes acting as both converters and intensifiers, which may be viewed directly, photographed, or used to generate visible image for another image pick-up device.

#### V05-D03B1 [1992]

#### **Tube with non-light input**

Includes image converters.

## V05-D03B1A [1992]

For X-rays

Radiography

#### V05-D03B3 [1992]

## Tubes with non-visible light input

Includes tube converting IR image to visible light output. Video cameras sensitive to IR are coded in W04-M01E1 codes.

Thermal imaging camera

## V05-D03B5 [1992]

## Tube with low level visible light input

Includes image intensifier.

## V05-D03C [1992]

## **Tubes with electrical output**

Covers camera tubes sensitive to radiation other than visible light. (Electrical output/visible light input tubes are covered by V05-D02 codes).

Note: does not include photomultiplier tubes, see V05-G and K codes as appropriate.

# V05-D03E [1992]

# **Tubes for scientific analysis**

Includes streak tube. See also appropriate codes in S02 or S03, e.g. S02-H, S03-A codes etc.

#### V05-D03H [1992]

## **Operating circuitry**

Includes e.g. power supplies for scanning and nonvideo arrangements. See W04-M01 codes for video camera circuitry and W07-G codes for night vision equipment.

#### V05-D04

Other tubes (Including tubes for data storage, phase shifting)

V05-D04A [1992]

Complete novel tube

V05-D04B [1992]

#### **Tube details**

Use with V05-D05 to V05-D09 codes as appropriate.

#### V05-D05

**Electrodes, screens** 

## V05-D05A

## Photoelectric and charge-storage screens

Target, photoconductive screen, photovoltaic screen

V05-D05A1 [1992]

#### Photoelectric screen

Photocathode

V05-D05A3 [2005]

#### Semiconductor diode arrays

(V05-D05A5A)

Includes e.g. Laser diode CRT screens. Prior to 2005, coded in V05-D05A5A.

Laser CRT

V05-D05A5 [1992]

#### Charge storage screen

## V05-D05A5A\* [1992-2004]

## Screen with array of semiconductor diodes

\*This code is now discontinued. See V05-D05A3.

#### V05-D05B

#### **Luminescent screens**

See V05-M01 also for compositions.

Phosphor screen, fluorescent material, aluminium coating, black matrix, dot, triad, stripe

## V05-D05B1 [1992]

# Phosphor compositions

Includes manufacture of phosphor materials per se. Also coded in V05-M01A if suitable for screens in general. (Prior to 1992, search V05-D05B and V05-M01).

Activator, host, killer, phosphorous, oxide, persistence

# V05-D05B3 [1992]

### Single phosphor screen

Monochrome

## V05-D05B5 [1992]

## Multiple phosphor screen

Covers screens for display of more than one colour. *RGB, red, green, blue* 

#### V05-D05B5A [1992]

With phosphor arranged in dots of different colours

#### V05-D05B5B [1992]

With phosphors arranged in stripes of different colour

## V05-D05B5C [1992]

#### With overlaid different colour phosphors

Includes screen for beam penetration type CRT. Also coded in V05-D01B1C.

## V05-D05B7 [1992]

#### Non-phosphor aspects of screen

Covers non-luminous components of screen. Binder, vehicle, black matrix

# V05-D05B7A [1992]

# **Protective metallic coatings**

Covers metallic coatings applied over screen phosphors for protection.

Aluminum

V05-D05C [1987]

**Cathodes** 

Coating, emission

V05-D05C1 [1992]

#### Thermionic cathodes

See V05-M02 codes for thermionic cathodes in general.

## V05-D05C1A [1992]

#### Thermionic cathode composition

Includes composition of coatings.

Barium, scandium, strontium, thorium

V05-D05C1C [1992]

#### **Heater element**

Tungsten

V05-D05C5 [1992]

#### Cold cathodes

For field emission cathode arrays search with V05-D01B3C.

Field emission, FED, SED

## V05-D05C5A [1992]

#### Microminiature cold cathodes

Covers e.g. carbon nanotube emitters. Also covers cold cathodes formed on semiconductor substrate. See V05-M03A1 and U12-B03D for such structures in general, and V05-B05 codes for complete microminiature devices.

V05-D05C5C [1997]

## **Current limiting arrangements**

(V05-D05C5)

Includes ballast resistors.

V05-D05D [1987]

# Shadow masks

Colour selection electrode, aperture mask, slot mask, foil mask, tensed-steel mask

V05-D05D1 [1992]

**Mask construction** 

V05-D05D1A [1992]

**Details of apertures** 

V05-D05D1C [1992]

# Shape of mask

This code is used to describe novel shape of the mask as a whole and not apertures, which are covered by V05-D05D1A.

V05-D05D3 [1992]

#### Mask material

Covers material compositions of mask per se and also coatings.

Nickel, steel

V05-D05D5 [1992]

#### Mask mounting details

Also coded in V05-D07A3 if vessel aspects involved.

Frame

V05-D05D5A [1992]

# For removal and alignment during exposure

Actual exposure process using colour selection electrode as a lithographic mask is covered by V05-L02E3.

V05-D05E [1992]

Internal shield

V05-D05E1 [1992]

Magnetic shield

V05-D05F [1992]

# Fluorescent or field emission display screen electrodes

Includes field emission display screen anodes. Also includes beam index electrodes (search with V05-D01B6) and fluorescent screen tube anodes.

# V05-D05X

# Other electrode or screen details

## V05-D06

# Beam generating and controlling arrangements

Electron-optical arrangements in general are covered by V05-M04 codes.

## V05-D06A

# Electron guns, controlling beam crosssection or aberration, focusing arrangements

Grid, anode, electrode assembly, electrode supports, colour purity, convergence adjustment, electron lens, apertured disc

V05-D06A1 [1992]

**Electron gun type** 

V05-D06A1A [1992]

Single gun

Also coded in appropriate V05-D01B1 code.

V05-D06A1B [1992]

In-line multiple gun

Also coded in V05-D01B3A.

V05-D06A1C [1992]

Delta multiple gun

Also coded in V05-D01B3B.

V05-D06A1E [1992]

Matrix of electron guns or field emission devices

See also V05-D01B3C for CRT matrices. See V05-D01C3 for FED matrices. Prior to 2005, coded in V05-D01B3C.

Matrix drive with deflection

V05-D06A1F [2005]

Field emission device

Includes novel complete emitter, gate and anode structure.

V05-D06A2 [1992]

**Beam intensity control** 

Includes grid/gate electrodes stimulating field emission.

Acceleration electrode

V05-D06A3 [1992]

Focusing

Lens electrodes, quadrupole

V05-D06A5 [1992]

Beam cross-section and aberration correction

Halo correction

V05-D06A7 [1992]

Components associated with electron gun

Includes resistive potential divider structurally associated with gun. Current limiting arrangements associated with field emission cathodes are coded in V05-D05C5C only.

V05-D06B

Beam deflection arrangements

See also V02-F01A for inductive deflection components, and T04-H01 or W03-A08A1 codes as appropriate.

Horizontal, vertical, coil assembly

V05-D06B1 [1992]

**Electromagnetic deflection** 

Includes convergence coils, also coded in W03-A08A5A.

V05-D06B1A [1992]

**Deflection yoke assembly** 

Includes manufacture of deflection yokes. Also coded in V02-F01A and W03-A08A1B unless TV receiver displays are specifically excluded. Note, convergence coils are covered by V05-D06B1.

V05-D06B5 [1992]

**Electrostatic deflection** 

X-plates, Y-plates

V05-D06B5A [1992]

With electrodes on tube surface

Also coded in V05-D07B3A. Includes e.g. deflection electrodes for image pick-up tube (also coded in V05-D02B).

V05-D06C [1992]

**Post-deflection arrangements** 

Post deflection anode, PDA, post-acceleration

V05-D06E [1992]

**Electron-multiplier arrangements** 

For electron multipliers in general, see V05-K01 codes. See V05-L01A5A for manufacture. (Prior to 1992 search V05-D06X and V05-K).

MCP, microchannel plate

V05-D06X

Other beam generating and controlling arrangements

Afterglow-preventing electron gun blocker, Internal beam reflecting surface

V05-D07 [1987]

Vessels, seals, cooling, combined optical arrangements etc.

V05-D07A [1987]

Vessels, seals, tension band

V05-D07A1 [1992]

**Tension band** 

Includes e.g. attaching mechanism of t-band to envelope.

Anti-implosion band, t-band, reinforcing, adhesive tape

V05-D07A3 [1992]

Internal electrode supports

V05-D07A5 [1992]

Vessel per se

Glass panel, funnel, neck

V05-D07A5A [1992]

Shape

Covers novel shape or contour e.g. for particular aspect ratio display.

V05-D07A5C [1992]

Composition

V05-D07A5E [1997]

**Spacers** 

(V05-D07A5)

Covers internal spacers used to support vessel against atmospheric pressure. See V05-L03A1 for spacer manufacture.

V05-D07A7 [1992]

**Seals for vessel** 

V05-D07A7A [1992]

**Vessel seal compositions** 

V05-D07B [1987]

Lead-ins, screening and antistatic coatings

V05-D07B1 [1992]

**Lead-in conductors** 

Connecting pins

V05-D07B3 [1992]

Antistatic, magnetic and EM shielding coatings

Includes conductive coatings in general, where coating function or location (internal/external) is not disclosed or is irrelevant.

Discharge preventing coating, conductive coating, touchscreen, front panel RFI filter

V05-D07B3A [1992]

Internal coating

V05-D07B3C [1992]

**External coating** 

V05-D07B3E [2005]

**EM shielding coatings** 

(V05-D07B3) *X-ray, EMI* 

V05-D07B3M [2005]

**Magnetic coatings** 

(V05-D07B3)

V05-D07B3S [2005]

**Antistatic coatings** 

(V05-D07B3)

V05-D07B5 [1992]

Separate screening device

Includes detachable radiation screen placed over tube faceplate, for e.g. EM radiation prevention. For detachable optical filters see V05-D07C5E. V05-D07B3 takes precedence over this code if 'screening device' is mentioned without further detail.

V05-D07C

Cooling, optical arrangements structurally combined with vessel

V05-D07C1 [1992]

**Tube cooling** 

For projection TV tube use W04-Q01A also. Liquid, fluid, faceplate, conduct

V05-D07C3 [1992]

Optical layer on tube surface

Includes filters for e.g. antireflective purposes. For detachable types see V05-D07C5E which takes precedence if 'filter' only is mentioned.

Antiglare, faceplate

V05-D07C3A [1997]

Internal optical layer

(V05-D07C3)

V05-D07C3C [1997]

**External optical layer** 

(V05-D07C3)

V05-D07C5 [1992]

**Associated optics** 

Codes in this section cover optical arrangements which are not part of the tube per se.

## V05-D07C5A [1992]

#### Lens

Includes lens assembly for e.g. projection TV (also coded in W04-Q01A and W04-Q01E).

## V05-D07C5C [1992]

#### **Fiber optics**

OFT, FOT, optical fiber tube

# V05-D07C5E [1992]

## **Detachable optical filter**

Includes anti-reflective filters. This code takes precedence over V05-D07C3 (filter layer on tube surface) if 'optical filter' only is mentioned without further detail.

V05-D07E [1992]

Getters

V05-D08 [1992]

## Associated devices and circuitry

Codes in this section deal with ancillary apparatus but not detachable conductive and optical filters which are coded in V05-D07B5 and V05-D07C5E respectively. See also relevant equipment codes in e.g. T04 or W03.

## V05-D08A [1992]

#### **Degaussing system**

Degaussing/demagnetising in general is covered by V02-D, which is also assigned here. Covers cancelling arrangements for terrestrial magnetism.

## V05-D08A1 [1992]

#### Circuitry

Includes power supply, current control, etc. For use of thermistors to cause current decay search with V01-A02A7C.

V05-D08A5 [1992]

Coil

V05-D08B [1992]

## **Radiation preventing coil**

Covers arrangements to cancel radiated fields from e.g. deflection system.

V05-D08C [1992]

**Connectors** 

See also appropriate code in V04.

V05-D08C1 [1992]

For final anode

EHT connection, anode cap, HV, anode button

## V05-D08C5 [1992]

#### For tube base

Also coded in V04-K.

CRT Rose

# V05-D08E [1992]

#### **External shield enclosure for CRT**

Includes external shields which can protect against effects either leaving or entering the body of the CRT other than through the faceplate. Shielding for electrical equipment in general is covered by V04-U codes.

#### V05-D09

# Other details of cathode-ray tube; Electron beam tube

Includes ion traps.

# V05-D10 [2005]

# Field Emission and Fluorescent Display Drive Circuitry

Includes drive circuitry integral with vacuum tube. Note that drive circuitry for Cathode Ray Tubes is not included in V05, and should be searched in appropriate T04/W03 classes.

#### **V05-E**

# X-ray/Extreme UV tubes and techniques (general); Ion beam tubes

Ion beam tubes for processing workpieces are not included -see V05-F05 codes, e.g. V05-F05A7C.

### V05-E01

# Electron beam target-impact X-ray tubes and generators

Covers X-ray generators where operation is by impingement of electron beam on target. See V05-L05E for X-ray tube manufacture.

Medical therapy/diagnostic source, lithography/materials processing source

### V05-E01A [1992]

## Anode electrode per se

See V05-L01B3 for manufacture.

V05-E01A1 [1992]

Material composition

V05-E01A1A [1992]

Of separate active target part

V05-E01A3 [1992]

Shape and construction

V05-E01A3A [1992]

Of separate target section

V05-E01B [1992]

#### Rotary anode system

Does not include details of anode electrode per se, which are covered by V05-E01A codes.

V05-E01B1 [1992]

Bearings, support shaft

V05-E01B1A [1992]

**Bearings** 

V05-E01B3 [1992]

Rotary drive system

V05-E01B3A [1992]

With separate motor drive

V05-E01B3C [1992]

With anode assembly forming part of

.......

V05-E01B5 [1992]

#### Anode cooling system

For non-rotary anode cooling see V05-E01F.

V05-E01C [1992]

**Cathodes** 

Includes cathode supports.

V05-E01C1 [1992]

Heater

V05-E01C5 [1992]

### Separate heating arrangement

Includes use of e.g. laser beam to heat thermionic cathode.

V05-E01C7 [2006]

#### Cold cathode

Note that prior to 2006, cold cathode electron emitters for X-ray generators were coded in V05-E01C combined with V05-M03A codes.

Field emission, FE

V05-E01C7A [2006]

#### Carbon nanotube based

Includes all microminiature semiconductor or nanotechnology-based field emitters. Prior to 2006, coded in V05-E01C and V05-M03A1.

CNT, nanotube, carbon nanofiber

V05-E01D [1992]

**Electron guns and other electrodes** 

V05-E01D1 [1992]

**Electron gun** 

Includes all X-ray tube electron-optical systems.

V05-E01E [1992]

Vessels, lead-ins, seals

V05-E01E1 [1992]

**Vessel construction** 

V05-E01E1A [1992]

X-ray windows

V05-E01E3 [1992]

Seals

V05-E01E5 [1992]

Lead-in conductors

V05-E01F [1992]

**Cooling system** 

See V05-E01B5 for cooling of rotary anode.

V05-E01H [1992]

#### X-ray tube type

Codes in this section are used to indicate the type of tube only, irrespective of novel features which are indicated by other V05-E01 codes.

**V05-E01H1** [1992]

Rotary anode tube

V05-E01H1A [2006]

Multiple rotary anode tube

V05-E01H3 [1992]

Fixed anode tube

V05-E01H5 [1992]

**Tube employing electron gun** 

V05-E01H5A [1992]

With circular electron beam path

Synchrotron X-ray generators are not included - see V05-E03A.

V05-E01H7 [1992]

Tube for 'flash' operation

Pulse operation

# V05-E01H9 [1992]

# Other target-impact type tube

Includes liquid metal target-impact tubes. For non-electron beam target-impact tubes (e.g. laser T-I), see V05-E03.

Gallium

# V05-E01X [1992]

#### Other X-ray tube details

#### V05-E02

### Controlling or protecting X-ray apparatus

See also S05-A03 and S05-D02A for medical therapy and diagnostic apparatus respectively.

#### V05-E02A [1992]

# Power supply for X-ray equipment

See U24-D and X12-J codes for power supplies in general.

#### V05-E02C [1992]

# **Output control; Tube protection**

Includes setting desired current/time exposure.

Exposure time control, dose control, measurement, monitoring

#### V05-E02C1 [1992]

### For flash operation

Pulse operation

# V05-E02C5 [1992]

#### Incorporating protection features

# V05-E02C5A [1992]

# Protection of tube per se

Includes monitoring excess current or temperature.

Measurement, monitoring

#### V05-E02C5C [1992]

# **Limiting output level**

Includes control based on e.g. radiation dosage. See also S05-A03 and S05-D02A3 codes for medical applications.

Dose control

#### V05-E03 [1992]

# Non-standard X-ray generators

For tube details, see also V05-M codes.

#### V05-E03A [1992]

#### **Synchrotron**

See also X14-G02.

#### V05-E03B [2006]

#### Laser target impact sources

Prior to 2006, coded in V05-E03.

# V05-E03C [2006]

#### X-ray laser sources

Includes tubes which produce coherent, monochromatic X-ray radiation. See also V08-B02. Prior to 2006, coded in V05-E03.

# V05-E04 [2005]

### Laser plasma X-ray/EUV sources

For application to lithography systems, see also V05-F08C1 and V05-F05 codes. See also relevant V05-M codes for novelty not included below. Prior to 2005, coded in V05-E03. In 2005, V05-E04 covered all details of non-standard X-ray generators, but from 2006 V05-E04 specifically covers details of Laser plasma X-ray/EUV sources used in non-standard X-ray generators. Other details of non-standard X-ray generators are coded in V05-E03.

#### V05-E04A [2005]

#### Gas filling

Includes gas compositions.

#### V05-E04B [2005]

### **lonising arrangements**

# V05-E05 [1992]

### Ion beam tubes and devices

Tubes for processing objects are covered by V05-F codes.

Penning ion source, plasma imploding device, surface ionisation, photo-ionisation tube

# V05-E05A [1992]

#### For propulsive effect

Includes ion thruster for e.g. satellite (also coded in W06-B03A).

Gas bottle, orient, pitch, yaw, turn, spacecraft

#### V05-E06 [2005]

#### **Neutron sources and devices**

(V05-E09

Prior to 2005 neutron sources were coded in V05-E09.

#### V05-E08 [1992]

#### X-ray 'optical' elements

Includes EUV and X-ray lithography masks. See also U11-C04H2 and V05-F05 codes.

# V05-E08A [2005]

# 'Optical' manipulation of X-rays

This code is intended to be used with X-ray optical elements that use wave effects or similar to alter e.g. the focus or direction of the radiation.

Molybdenum layered mirror, capillary optics, Kumakhov lens

# V05-E08C [2005]

# Absorption, blocking or anti-scatter X-ray optics

E.g. anti-scatter apparatus, grids and passive (i.e. non-"optical") collimators.

#### V05-E09

# Other X-ray tubes and techniques

# V05-E10 [2006]

# Complete novel tube

See also V05-E01, E03, E04, E05 or E06 for individual tube/source where relevant.

#### V05-F

# **Tubes for processing/examining objects**

This section deals with tubes and analogous devices for processing workpieces (including semiconductor devices) and for examining objects. From 1992, V05-F02 and V05-F03 codes are no longer used and the subject matter previously coded there has been reallocated. V05-F is divided into four main sections.

V05-F01 codes dealing with analysis devices such as electron microscopes, microanalysers, etc. and, from 1992 including X-ray microscopes. V05-F05 codes dealing with equipment for processing workpieces e.g. by beam or plasma treatment. V05-F04 codes dealing with novel details of both analysis and processing equipment. V05-F08 codes dealing with the actual operation performed by the equipment and enabling a secondary function to be indicated.

# Assignment of codes:

Codes from the V05-F01 or V05-F05 sections are assigned to describe apparatus type and to broadly indicate the novel aspect, e.g. details of the apparatus, complete novel apparatus, control circuitry, etc. V05-F04 codes are used to further highlight novel details e.g. electrodes, vessels, etc., and V05-F08 codes are routinely assigned to indicate the function of the equipment.

#### **EXAMPLES**

- (1) Novel field emission electrode for scanning electron microscope: V05-F01A1B, V05-F01B3 and V05-F04A3
- (2) Control circuit for SEM measuring dimensions V05-F01A1B, V05-F01B5A and V05-F08B (S02-A05A will also be assigned)

(3) Any novel aspect of plasma etching equipment using magnetron effect V05-F05C3A and V05-F08E1.

#### V05-F01

# Microscopes and other analysing tubes

See S03-E06B1 also for microscopes. (Optical microscopes per se are coded in S02-J04B1, and see S03-E04R for microscopy).

Photon microscope, Transmission/scanning electron microscope, SEM, secondary emission detection, focusing deflection, electron/ion-optical system

V05-F01A [1992]

Device type

V05-F01A1 [1992]

# **Electron microscope**

Includes electron diffraction tube.

V05-F01A1A [1992]

**Transmission** 

TEM

V05-F01A1B [1992]

Scanning

**SEM** 

V05-F01A1C [1992]

# **Combined transmission and scanning**

STEM

V05-F01A2 [1992]

# Ion microscope

Includes ion diffraction tube.

V05-F01A3 [1992]

# X-ray microscope

(V05-E09, V05-F09)

X-ray source details are covered by V05-E01 or V05-E03 codes and not V05-F04 codes.

# V05-F01A4 [1992]

# Microanalysers

(V05-F09)

Spot analyser

# V05-F01A5 [1992]

# **Tunnel current and analogous devices**

Includes tunnel current microscopes and similar devices, e.g. atomic, magnetic force microscopes. For materials investigation see also S03-E02F codes and V05-F08B. For image-producing analysis search with S03-E02F codes and V05-F08A.

Prior to 2005, included processing and recording. After 2005, see V05-F05D, as well as relevant V05-F08C codes.

V05-F01A6 [2011]

X-ray spectrometer

V05-F01A9 [1992]

Other devices

V05-F01B [1992]

**Novel details** 

V05-F01B1 [1992]

### **Complete device**

This code is only used if the analysis device is presented as a completely novel piece of equipment. For cases where actual novelty can not be determined, V05-F01B codes will not be assigned.

V05-F01B3 [1992]

# **Device details**

For specific features see also V05-F04 codes.

V05-F01B5 [1992]

# Circuitry and operation of device

Includes power supplies (see appropriate U24 or X12 codes for power supplies in general).

V05-F01B5A [1992]

Control

V05-F01B9 [1992]

### Other novel details

Includes cleaning and maintenance of analysing equipment.

# V05-F02\* [1980-1991]

# Electron- or ion-beam tubes for localised treatment of object

\*This code is now discontinued and from 1992 this subject matter is transferred to V05-F05A codes (device details now covered by V05-F04 codes). V05-F02 remains valid and searchable for records prior to 1992.

Electron beam cutting/welding/lithography patterning/inscribing/marking/focusing, deflection, electron/ion-optical system

# V05-F03\* [1980-1991]

# **Arrangements of electrodes**

\*This code is now discontinued and from 1992 this subject matter is transferred to V05-F04B codes and appropriate codes from V05-F04A and V05-F04C sections. V05-F03 remains valid and searchable for records prior to 1992.

Accelerating system, electron gun, electrostatic beam position/cross-section/intensity control electrodes

#### V05-F04 [1992]

### Analysis and processing device details

Codes in this section are used with V05-F01 or V05-F05 codes as appropriate, for details of analysis and processing devices respectively.

# V05-F04A [1992]

#### **Emission source**

Codes in this section relate to electron or ion sources. X-ray sources (including those for X-ray microscopes) are coded in V05-E01 or V05-E03 codes.

# V05-F04A1 [1992]

# Thermionic emitter

Cathode, oxide, coated

V05-F04A1A [1992]

#### Heated by non-electric means

Includes laser heating

# V05-F04A3 [1992]

# Field emission electrodes

Cold cathode

# V05-F04A3A [1992]

# Microfabricated field emission electrodes

Includes electrodes produced by semiconductor manufacturing techniques. See V05-M03A1 for microfabricated electrodes in general, and V05-B05 codes for complete microfabricated vacuum conduction devices.

V05-F04A3C [1997]

**Current limiting arrangements** 

(V05-F04A3)

V05-F04A5 [1992]

Ion source

V05-F04A5A [1992]

With gas supply

V05-F04A9 [1992]

Other emission sources

V05-F04B [1992]

**Electrodes and electrode systems** 

(V05-F03)

Covers all non-emitting electrodes. Electrodes are also assigned V05-F04C codes when electron/ion optical aspect is significant.

Electron gun

V05-F04B1 [1992]

For beam modulation

Grid, blanking

V05-F04B1A [1997]

**Apertures** 

(V05-F04B1)

Etching mask, electron beam lithography

V05-F04B3 [1992]

For beam scanning

Only includes beam scanning arrangements inside e.g. electron gun structure. For post gun scanning/deflection arrangements see V05-F04C5.

X-Y, raster, deflection

V05-F04B5 [1992]

For gas discharge type apparatus

Use with V05-F05C codes. *Etching, coating, sputtering* 

V05-F04B5A [1992]

**Anodes** 

V05-F04B5C [1992]

**Cathodes**Sputtering target

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V05-F04B6 [1992]

**Probe electrodes** 

V05-F04B6A [1997]

Tunnel device probe or cantilever

(V05-F04B6)

See also S03-E02F codes and V05-F01A5.

Tunnel current, AFM, SPM, STM

V05-F04B8 [1992]

**Electrode positioning** 

V05-F04B8A [1992]

Dynamic positioning system

Includes X-Y positioning system and scanning arrangement for tunnel current device.

AFM, SPM, STM

V05-F04B9 [1992]

Other electrode details

V05-F04C [1992]

Electron/ion-optical systems

(V05-F03, V05-M04)

Where electron gun electrodes are significant V05-F04B1 or V05-F04B3 codes are also applied.

V05-F04C1 [1992]

Characterised by type of system

V05-F04C1A [1992]

Magnetic, electromagnetic

See appropriate V02 codes for details of permanent magnets, electromagnets, coils, etc.

ΕM

V05-F04C1C [1992]

Combined electromagnetic and electrostatic

EM-ES

V05-F04C1E [1992]

**Electrostatic** 

ES

V05-F04C3 [1992]

For focusing

Includes arrangements to correct for beam aberrations such as coma, astigmatism etc.

V05-F04C5 [1992]

For deflection

X-Y, raster

# V05-F04C7 [1992]

# For particle selection

Includes selection of desired ion species. Particle spectrometers are coded in V05-J.

V05-F04C8 [2005]

For confinement

V05-F04D [1992]

Vessels, seals, vacuum locks

(V05-F09, V05-M05)

V05-F04D1 [1992]

#### Vessels and seals

(V05-F09)

Includes material compositions of vessels and seals, vessel shape, etc.

#### V05-F04D3 [1992]

# Vacuum locks, specimen/workpiece introduction

(V05-F09, V05-M05)

Includes evacuation apparatus.

#### V05-F04D3A [1992]

# Arrangements for introducing specimen or workpiece

(V05-F09, V05-M05)

Includes e.g. carriage arrangements introducing specimen or workpiece into analysis or processing chamber. Actual holder is covered by V05-F04G. For semiconductor wafer applications search with U11-F02A1 also.

Window, viewport

# V05-F04E [1992]

#### Gas filling

(V05-F09)

Includes compositions. (Chiefly for gas fillings used in plasma apparatus and similar, also coded in V05-F05 codes).

# V05-F04G [1992]

#### Specimen/workpiece holder

Covers holder per se. For semiconductor wafer application search with U11-F02A2. Carriage and drive arrangements for introducing specimen or workpiece into equipment are covered by V05-F04D3A.

# V05-F04H [1992]

#### **Detectors**

Includes optical types, secondary electron detectors, etc. (Systems forming an image are covered by V05-F04J). Also includes detectors used to monitor progress of an operation, e.g. etching (with V05-F08E1).

#### V05-F04H1 [2005]

# Scanning probe or cantilever displacement detection system

Includes detectors for all tunnel current and analogous scanning probe type microscopy techniques. See also S02-A03 for optical techniques, and S03 codes.

#### V05-F04J [1992]

#### Imaging and display systems

Includes photographic, stimulable sheet recording, video systems and any other novel aspect of analysis equipment image presentation.

Microscope, microanalyser, screen, CRT, raster, scan, synchronise

# V05-F04K [1992]

#### Cooling

(V05-F09, V05-M09)

Includes cooling for the apparatus itself, and also for specimens and workpieces.

# V05-F04L [1997]

#### Antennae and waveguides

(V05-F04X)

E.g. for ICP reactor (See also V05-F05C1 codes).

#### V05-F04M [2006]

Vibration reduction, control and compensation

#### V05-F04X [1992]

#### Other process/analysis device details

Includes device heating and shielding. Heater, deposition-limiting shield

# V05-F05 [1992]

#### **Tubes and devices for processing**

(V05-F02, V05-F09)

Processing tubes and devices are also assigned codes based on application. For example, search with U11-C codes for relevance to semiconductor device fabrication, X25-A04 for cathodic sputtering, X25-Q02 for surface treatment in metallurgy, etc.

# V05-F05A [1992]

#### **Using beams**

Prior to 1992 the code for localised treatment by beam equipment (V05-F02) was only used for focused beams. Flood effect devices were coded in V05-F09.

# V05-F05A1 [1992]

#### With focused beam

(V05-F02)

Scan, raster, X-Y, focus, local

# V05-F05A3 [2005]

#### With multiple beams

Includes e.g. field emission arrays for one-shot electron beam lithography or atomic resolution storage.

# V05-F05A5 [1992]

#### With flood effect beam

(V05-F09)

# V05-F05A7 [1992]

#### Characterised by beam type

(V05-F02, V05-F09)

Codes in this section are applied as appropriate either in conjunction with other V05-F05A codes, or alone.

**Electron beam** 

V05-F05A7C [1992]

Ion beam

V05-F05A7X [1992]

#### Other beam type

Includes use of X-ray and Extreme UV (EUV). X-ray/EUV sources per se are not coded in the V05-F04A section and are covered by V05-E01 or V05-E03 codes.

EUV

# V05-F05C [1992]

# Using plasma, gas-filled tubes

(V05-F09)

See X14-F codes also for general aspects of plasma technique.

Discharge, arc, glow

# V05-F05C1 [1992]

# With externally-applied ionising energy

(V05-F09)

Includes all ionising arrangements located outside tube envelope. For conductive RF coupling internal to the tube, see V05-F05C2.

# V05-F05C1A [1992]

#### Microwave

(V05-F09)

RF, feed, waveguide, port, matching, stub, impedance

# V05-F05C1C [1992]

# **Optical**

(V05-F09)

Laser, UV, lamp, irradiate

# V05-F05C1E [1997]

# Inductively coupled

(V05-F05C1)

#### V05-F05C1G [1997]

### Capacitively coupled

(V05-F05C1)

#### V05-F05C2 [2006]

# With internally applied ionising energy

Includes e.g. conductive RF coupling. Prior to 2006, coded in V05-F05C.

RF, discharge, arc

### V05-F05C3 [1992]

# With confinement or manipulation of plasma

(V05-F09)

Includes electromagnetic and other confinement systems.

ECR, electron cyclotron resonance

# V05-F05C3A [1992]

# With magnetron effect

(V05-F09)

Equipment using magnetron discharge effect is not coded in V05-C01A.

# V05-F05D [2005]

# Using scanning probe/tunnelling effects

(V05-F01A5)

Includes all analogous techniques, e.g. AFM. See V05-F08C codes for lithography or recording techniques.

Does not include microscopy, see V05-F01A5. Prior to 2005, processing using scanning probe/tunnelling effects was coded in V05-F01A5 in combination with V05-F08C and V05-F05E codes. See U11-C11 for application to semiconductor wafer processing, or T03-C05 for recording or data storage applications.

# V05-F05E [1992]

# Novel details of processing devices

Codes in this section describe in a general sense the novel aspects of equipment covered by V05-F05A and V05-F05C codes.

#### V05-F05E1 [1992]

# **Complete device**

(V05-F09)

This code is only assigned if the complete device is presented as novel. In cases where the precise novel aspect cannot be determined, no V05-F05E code will be assigned.

#### V05-F05E3 [1992]

#### **Device details**

For detailed information on novel aspects search with V05-F04 codes.

#### V05-F05E5 [1992]

#### Circuitry and operation of device

Includes power supplies. See also U24 and X12 codes for low and high power supplies respectively.

# V05-F05E5A [1992]

#### **Control and monitoring**

Includes control circuits to determine completion of e.g. etching or coating. (Search with V05-F08D1 or V05-F08E1 respectively).

# V05-F05E9 [1992]

# Other novel details

Includes all cleaning and maintenance of equipment.

# V05-F05X [1992]

# Other processing tubes

# V05-F08 [1992]

#### **Equipment function**

These codes relate to the actual function of the inventive equipment, and not necessarily its primary function. Thus an electron microscope arrangement to measure voltage would be assigned V05-F08B and not V05-F08A (V05-F01A1 codes and S01-D01D7 would also be assigned).

#### V05-F08A [1992]

# **Imaging**

In general, S03-E06B codes are also assigned for this aspect.

# V05-F08B [1992]

#### Measurement

Includes measurement of voltage (see also e.g. S01-D01D7), dimensions (see also S02-A05A), and properties of materials (see also e.g. S03-E06 codes).

# V05-F08C [1992]

Recording, storage

#### V05-F08C1 [1992]

#### Lithography

Also assigned U11-C04 codes where application is to semiconductor device lithography.

Semiconductor, wafer, image, pattern

#### V05-F08C3 [1992]

### Recording

Memory, store, high density

### V05-F08D [1992]

# Coating, implanting ions, surface treatment

# V05-F08D1 [1992]

#### Coating

Surface, layer, coat, deposition

# V05-F08D1A [1992]

#### Sputtering

Cathodic, magnetron

#### V05-F08D3 [1992]

# Ion implantation

Also assigned U11-C02B codes where application is to semiconductor device manufacture.

Doping

# V05-F08D5 [1992]

#### Surface treatment

Hardening, nitriding

#### V05-F08E [1992]

# Removing material, cutting, machining and cleaning

Includes cleaning of specimen/workpiece, or e.g. resist ashing.

Ashing, stripping

# V05-F08E1 [1992]

# **Etching**

See also U11-C07 codes for application to semiconductor device fabrication.

#### V05-F08E3 [1992]

# Cutting

Includes welding - also coded in X24-D02.

# V05-F08E5 [1992]

Machining/milling

#### V05-F08F [2005]

# Molecular decomposition and fluid processing

Includes fuel processing, e.g. Plasmatron™.

# V05-F08G [2005]

# **Powder synthesis**

Includes e.g. nanoparticulate production.

#### V05-F08X [1992]

#### Other equipment function

# V05-F09

Other

#### V05-G

# Photoelectric discharge tubes not involving gas ionisation; Photomultiplier tube

See also V05-K01 codes where electron multiplier arrangements of PMT are novel.

PMT, PM, photomultiplier

# V05-G01 [2005]

# **Photocathodes**

Includes all novel photocathode materials, constructions etc. See also V05-D02/D03 codes for application to camera tubes/image converters or intensifiers.

#### V05-H

#### **Radiation and particle detectors**

Includes only radiation or particle detectors where incident radiation causes gas ionisation detected via breakdown voltage. See also S03-G codes.

Geiger-muller tube, Geiger counter, proportional counter tube, multi-wire proportional counters

#### V05-J

# Particle spectrometer or separator tubes; Lenard tubes

See S03-E10A codes for more details of mass spectrometers.

Mass analyser, mass spectrometry, mass spectroscopy, static, dynamic, time-of-flight, energy spectrometer

#### V05-J01 [1992]

# Particle spectrometer/separator tubes

V05-M codes are also assigned where aspect not covered in V05-J.

# V05-J01A [1992]

# Spectrometer type

Static, dynamic, quadrupole, time-of-flight, TOF

#### V05-J01A1 [1992]

# **Mass spectrometers**

Secondary ion mass spectrometer, SIMS

# V05-J01A5 [1992]

#### **Energy spectrometers**

# V05-J01C [1992]

# Sample introduction arrangement

Includes sample carriers. For vacuum locks search with V05-M05D codes.

Chamber, pressure, atomising, sample injection

# V05-J01E [1992]

#### **lonising arrangement**

Ionisation chamber, ion gun

# V05-J01G [1992]

### Ion-optical system

V05-M04 codes are also assigned.

Electrode, electromagnetic, solenoid, current, deflection, beam, path

#### V05-J01J [1992]

# **Detection system**

# V05-J01K [1992]

### Interface with other equipment

Includes combination with e.g. chromatography apparatus, for which S03-E09C codes are also assigned.

V05-J01M [1992]

# **Control and monitoring**

Includes operation of device.

V05-J01X [1992]

Other details of particle spectrometer/separator tubes

V05-J05 [1992]

#### Lenard tubes

Covers tubes emitting electrons or ions through the vessel. For details of window structures search with V05-M05E.

### V05-K

Thermionic generators; Secondaryemission tubes; Electron multipliers; Ion pumps; Pressure measuring tubes

V05-K01 [1992]

#### **Electron multiplier**

For image intensifier application see V05-D03 codes also. Night vision equipment in general is coded in W07-G.

PMT, PM, photomultiplier

V05-K01A [1997]

Microchannel plates

(V05-K01)

V05-K01C [1997]

**Dynodes** (V05-K01)

V05-K01X [1997]

Other electron multipliers

(V05-K01)

V05-K03 [1997]

# **Ionisation pressure gauges**

(V05-K)

For novel aspects of gauges (e.g. cathodes), see V05-M codes. Pressure gauges in general are coded in S02-F04D1.

Penning

#### V05-L

#### Discharge tube manufacture

See note (1) of V05 class descriptor.

From 1992, codes from the V05-L05 section relating to the type of tube or device being manufactured are always assigned, except where the device is also claimed, resulting in the assignment of the code for that device also.

Manufacture of certain auxiliary devices for tubes, e.g. CRT deflection coils, are not regarded as manufacture of the tube per se, and hence not coded in V05-L. See also the appropriate codes for the auxiliary device and any relevant manufacturing codes in other sections, e.g. V02-H01 codes.

Also, novel manufacture of phosphor compositions is treated as a novel phosphor per se, and is coded under V05-M01 or other relevant V05 sections.

#### V05-L01

**Electrodes** 

V05-L01A [1992]

#### **Emitting electrodes**

Electrodes, emission

V05-L01A1 [1992]

#### Thermionic cathodes

Tungsten, thorium, oxide, carbide, carburising, hydrocarbon, heating, cylinder, mesh, grille, grid

V05-L01A1A [1992]

**Heaters** 

Indirectly heated cathode

V05-L01A3 [1992]

**Cold cathodes** 

Field emission electrode

V05-L01A3A [1992]

# Micro-fabricated cold cathodes

Also coded in V05-L05B5 when application is to complete vacuum conduction device. Includes use of semiconductor manufacturing techniques, see U11-C18B also for semiconductor manufacturing details.

V05-L01A5 [1992]

Secondary emission electrodes

V05-L01A5A [1992]

**Electron multiplier** 

Also coded in V05-L05K.

V05-L01A5B [1992]

**Photoelectric** 

V05-L01A5X [1992]

Other radiation-induced emission

V05-L01A9 [1992]

Other emitting electrodes

V05-L01B [1992]

Non-emitting electrodes

V05-L01B1 [1992]

Grids

Includes FED gate electrodes.

V05-L01B2 [1997]

# Tunnelling device probe manufacture

(V05-L01B9)

See also V05-F04B6A. For tunnel current device manufacture, see V05-L05F1A. For novel device see V05-F01A5.

Cantilever

V05-L01B3 [1992]

#### **Anodes**

Includes FED screen electrodes. For FED gate electrodes, see V05-L01B1.

V05-L01B4 [1992]

# Electron guns, electron-optical systems

Includes assembly of the electrode system. Mounting of assembly in vessel is covered by V05-L03C1.

V05-L01B4A [1992]

For deflection

V05-L01B5 [1992]

**Shadow masks** 

Also coded in V05-L05D1.

V05-L01B6 [2005]

Plasma display panel electrodes

V05-L01B6A [2006]

# **Dielectric coatings**

Includes manufacture of protective coatings for electrode insulating layers.

V05-L01B7 [1992]

#### Slow wave devices

Also coded in V05-L05C. (Slow wave devices per se are coded as transit time tube distributed elements).

# V05-L01B8 [1992]

#### Screen electrode

Covers e.g. beam index CRT screen electrodes. For FED screen anodes, see only V05-L01B3. Manufacture of image screens is covered by V05-L02 codes.

V05-L01B9 [1992]

Other non-emitting electrodes

#### V05-L02

#### Screens

Codes in this section cover the manufacture of screens for producing an image from, e.g. electron impact, and for converting an optical image into an electrical signal.

Image, pick-up, latent, electrostatic, discharge, scan, target, photoconductive, photovoltaic, display, light, fluorescent, phosphor, persistence

#### V05-L02A [1992]

# Screen type

Codes indicating screen type are only used where a code cannot be assigned from the V05-L05 section or from the codes relating to the screen application tube per se. For example, if application to a specific tube type is not mentioned, or if the screen is stated to be applicable to several types of tube.

V05-L02A1 [1992]

Radiation-sensitive screen

V05-L02A5 [1992]

Radiation-emitting screen

V05-L02B [1992]

# **Substrate preparation**

Includes washing, acid rinsing etc.

V05-L02C [1992]

# **Coating processes**

See X25 codes for electrical aspects of coating processes.

V05-L02C1 [1992]

Liquid deposition by e.g. spraying

Spin coating

V05-L02C5 [1992]

Electrical method e.g. electrophoresis

# V05-L02C7\* [1992-2004]

# **Material deposited**

\*This code is now discontinued. See V05-L02M codes for general screen material types.

V05-L02C7 codes are used to describe the material being deposited in conjunction with a code relating to the actual deposition process. Codes in this section are not used if the material is unspecified or a complete manufacturing process is described.

# V05-L02C7A\* [1992-2004]

# Visible radiation emitting material

\*This code is now discontinued but prior to 2005 included e.g. use of phosphor in the case of a display tube, such as CRT. From 2005 see V05-L02M1.

Luminescent

# V05-L02C7B\* [1992-2004]

#### **Radiation-sensitive material**

\*This code is now discontinued. From 2005 see V05-L02M2.

#### V05-L02C7C\* [1992-2004]

# **Auxiliary materials**

\*This code is now discontinued. From 2005 see V05-L02M3.

Includes deposition of specific materials. Black matrix

V05-L02D [2005]

**Baking processes** 

V05-L02E [1992]

**Exposure and development** 

V05-L02E1 [1992]

**Exposure processes** 

V05-L02E1A [1992]

# Multistep sequence of exposure and development

This code takes precedence over separate codes for exposure and development stages of screen manufacturing process.

# V05-L02E3 [1992]

# Using tube component as mask

Includes use of CRT shadow mask. For details of shadow mask per se see V05-D05D codes.

V05-L02E5 [1992]

Exposure apparatus e.g. lighthouse

# V05-L02E5A [1992]

# **Optical system**

Includes lenses, filters, etc.

#### V05-L02E5C [1992]

#### **Light source**

See X26 codes for details of novel lamps etc. Bulb, discharge lamp, UV

#### V05-L02E7 [1992]

# **Development**

V05-L02E1A takes precedence for combined exposure and development.

# V05-L02E8 [1992]

# Control of exposure method or apparatus

Includes general control aspects and also control of light source, sequential operation, etc.

Monitor, check, registration, time, duration

#### V05-L02F [1992]

# Application of protective or other layers

Includes metallisation of screen internal surface.

Antireflective, aluminium

# V05-L02H [1992]

# **Testing and inspection of screen**

Testing of manufacturing process/apparatus in general is covered by V05-L07E codes. See appropriate codes in S03, e.g. S03-E04F2, for optical inspection of manufactured screen. *Pattern, defect, flaw, reject* 

# V05-L02H1 [1992]

**During manufacture** 

V05-L02H5 [1992]

Finished screen

V05-L02M [2005]

Screen material being processed

V05-L02M1 [2005]

Visible radiation emitting material

E.g. phosphor.

V05-L02M2 [2005]

**Radiation sensitive materials** 

# V05-L02M3 [2005]

# **Auxiliary materials**

Includes e.g. black matrix.

#### V05-L03

Vessels, lead-ins, exhausting, filling

V05-L03A [1992]

Manufacture of vessels, spacers, ribs, leadins etc.

V05-L03A1 [1992]

Manufacture of internal ribs and spacing elements

Spacer

V05-L03A3 [1992]

Manufacture of electrode supports

V05-L03A5 [1992]

Manufacture of lead-in conductors

V05-L03A7 [2005]

Manufacturing of vessel per se

(V05-L03A)

Includes glass moulding, baking, toughening etc.

V05-L03B [1992]

**Applying coatings or markings** 

Manufacturing of coating materials per se is not treated as tube manufacture; see appropriate devices codes where relevant.

Reflection prevention

V05-L03B1 [1992]

**Conductive** 

Antistatic, graphite

V05-L03B3 [1992]

**Optical** 

This code does not relate to screen manufacture, which is covered by V05-L02 codes, but to coatings acting as e.g. filters.

Anti-reflective, anti-glare

V05-L03B5 [1992]

Marking

Covers application of manufacturer's and product name etc., and also markings such as bar codes used for inventory or control purposes.

V05-L03C [1992]

**Assembly** 

Covers assembly of tube from individual components and joining vessel parts.

V05-L03C1 [1992]

Inserting electrode system

Electron gun, support, spacing, mounting, shadow mask

V05-L03C1A [1992]

**Inserting CRT gun** 

(V05-L03C1)

See also V05-D01B for CRT "per se" and V05-L05D1B for CRT manufacture.

V05-L03C3 [1992]

**Pre-treatment of vessel surfaces** 

Cleaning, polishing, etching, machining

V05-L03C3A [1992]

To improve seal

Actual process of sealing is covered by V05-L03C5A.

V05-L03C5 [1992]

Joining vessel parts, sealing, evacuating, filling, alignment

V05-L03C5A [1992]

Sealing

V05-L03C5C [1992]

**Evacuating** 

Includes methods and apparatus, e.g. vacuum pumps specifically for evacuating vessels. For electrical aspects of pumps see X25-L03A. Vacuum gauges in general are coded in S02-F04D1 and specifically ionisation-type gauges are additionally coded in V05-K03.

V05-L03C5E [1992]

**Fillina** 

Covers methods and apparatus for filling tubes with desired gas composition of mixture.

V05-L03C5G [2006]

**Alignment** 

V05-L03C7 [1992]

Post sealing treatment

Washing

V05-L03C7A [1992]

To improve operation or lifetime

Includes e.g. getter flashing. (Getters per se are coded in V05-D07E, getter manufacture in V05-L06).

V05-L03C7C [1992]

#### To improve structural strength

Includes e.g. tension band fitting. Manufacture of band per se is covered by V05-L03D.

T-band

V05-L03D [1992]

**Tension band manufacture** 

T-band

V05-L05 [1992]

# Type of tube being manufactured

Codes in this section are only used for device-specific manufacturing details and generally follow the 'device' codes V05-A to V05-K. For further indication of scope, see the definitions accompanying those codes. For inventions involving significant aspects of a tube itself, as well as its manufacture, V05-A to V05-K codes take precedence to indicate tube type and are assigned instead of V05-L05 codes.

V05-L05A [1992]

**Gas discharge** 

V05-L05A1 [1992]

Plasma display panel/segment type

display

V05-L05A1A [2006]

**DC Displays** 

V05-L05A1B [2006]

**AC Displays** 

V05-L05A3 [2006]

**Gas-filled switching/protection devices** 

Prior to 2006, coded in V05-L05A.

V05-L05B [2005]

Classical and cold cathode vacuum tubes

V05-L05B1 [1992]

Thermionic tube

V05-L05B3 [2005]

**Cold cathode devices** 

V05-L05B5 [1992]

Micro cold cathode devices

V05-L05C [1992]

Transit time tube

V05-L05D [1992]

Cathode ray tubes; Electron beam tubes

V05-L05D1 [1992]

**Display tubes** 

V05-L05D1A [2002]

Field emission display tubes

V05-L05D1B [1992]

Cathode ray display tubes

V05-L05D1C [1992]

Fluorescent display

V05-L05D2 [1992]

**Camera tubes** 

V05-L05D3 [1992]

Image intensifiers and converters

V05-L05E [1992]

X-ray/EUV generators; Ion tubes

V05-L05F [1992]

**Analysis and process tubes** 

V05-L05F1 [1992]

**Analysis tubes** 

V05-L05F1A [1997]

**Tunnel current devices** 

(V05-L05F1)

See V05-L01B2 for probe manufacture. See also

V05-F01A5. STM, SPM, AFM

V05-L05F5 [1992]

**Processing tubes** 

V05-L05G [1992]

Photoelectric tube

V05-L05H [1992]

**Radiation detector** 

V05-L05J [1992]

**Spectrometer tubes** 

V05-L05K [1992]

**Electron multiplier** 

V05-L05X [2005]

Other

Includes e.g. manufacture of radiation image storage screens.

V05-L06 [1992]

**Getter manufacture** 

(V05-L09)

Getter flashing is covered by V05-L03C7A.

V05-L07 [1992]

**General aspects of manufacture** 

(V05-L09)

Codes in this section may be used alone, or with other V05-L codes.

V05-L07A [1992]

Multistep process for manufacturing whole device

(V05-L09)

V05-L07B [2005]

Workpiece holder

V05-L07C [1992]

Transport equipment moving between processing stages

(V05-L09)

V05-L07D [2005]

Workpiece positioning

Covers positioning of workpiece with relation to manufacturing equipment.

V05-L07E [1992]

Testing, salvage and other general aspects of manufacture

(V05-L09)

V05-L07E1 [1992]

**Testing** 

(V05-L09)

Where electrical characteristics are being measured relating to the tube per se, S01-G02A is also assigned.

V05-L07E1A [1992]

Of partially complete device

(V05-L09)

V05-L07E1B [1992]

Of manufacturing process or apparatus

(V05-L09)

This code is used for monitoring the manufacturing process or apparatus only. For testing of tubes per se V05-L07E1A or V05-L07E1C are used.

V05-L07E1C [1992]

Of complete device

V05-L07E3 [1992]

Ageing, soak testing, life testing

(V05-L09)

Burn-in, oven, high temperature, accelerate

V05-L07E5 [1992]

Adjustment, rectification

(V05-L09)

Correct, repair, re-gun, spot-knocking

V05-L07E6 [1992]

Salvage

(V05-L09)

Covers salvage of materials or tube parts for re-use or other purpose. This code is used with other V05-L codes as appropriate.

V05-L07E7 [1992]

Packing, shipping

(V05-L09)

V05-L07E9 [1992]

Other general manufacturing aspects

(V05-L09)

Includes protection arrangement for tube to avoid damage during manufacture, e.g. dummy protective tube base.

V05-L09

Other details of discharge tube manufacture

V05-M

**General details** 

Codes in this section are used to describe details of tubes for cases of very general (or unstated) application, or in conjunction with tube type codes not having the appropriate subdivisions.

#### V05-M01

# Image screens; Luminescent coatings

Radiation converting screens not necessarily part of a tube are included in V05-M01C codes.

Luminescent screen, fluorescent screen, radiation imaging screen

# V05-M01A [1992]

# **Light emitting compositions**

Phosphor, rare earth

#### V05-M01C [1992]

# Separate screen not part of tube

Conversion screen, radiography, medical diagnosis

# V05-M01C1 [1992]

# **Radiation image storage screen**

Includes e.g. stimulable phosphor. Recording and reproducing equipment for use with stimulable phosphors is coded in S06-K99G and other S06-K codes as appropriate.

#### V05-M02

#### Solid thermionic cathodes

Coating, impregnated cathode, dispenser cathode, heater, filament, directly-heated

#### V05-M02A [1992]

#### Solid thermionic cathode compositions

# V05-M03

# **Electrode assemblies: Other electrodes**

Includes unspecified emitting electrode types. *Electrode support, mountings* 

#### V05-M03A [1992]

# Emitting electrodes, i.e. cold cathodes

Field emitters, field emission, FE

#### V05-M03A1 [1992]

#### Micro-fabricated cold cathode

Includes carbon nanotube based field emitters.

Also covers cathode (or other electrode in conjunction with it) formed using semiconductor manufacturing techniques on e.g. silicon substrate. CNT, carbon nanofiber, nano-emitter

# V05-M03A3 [1997]

# **Current limiting arrangements**

(V05-M03A)

V05-M03C [1992]

Grids

Control, modulation, intensity, screen, suppressor

V05-M03E [1992]

**Anodes** 

V05-M03G [1992]

#### Electron/ion guns

Also coded in V05-M04A as an electron/ion optical arrangement.

Lens, focus, correct, beam

# V05-M03X [1992]

#### Other electrodes

#### V05-M04

# **Electron- or ion-optical arrangements**

Electron gun, lens, focusing, deflection, deflection coil, winding

#### V05-M04A [1992]

#### Electrostatic

Novel electron guns are also coded in V05-M03G. *ES* 

#### V05-M04B [1992]

#### Electromagnetic

ЕМ

#### V05-M05

#### Vessels; Lead-in conductors; Seals

Insulator, support pins, conductive coatings

### V05-M05A [1992]

#### Vessel

Glass composition, shape, form, housing, container

V05-M05B [1992]

Lead-ins

Pin, base, contact

V05-M05C [1992]

**Seal** Frit

V05-M05D [1992]

Vacuum locks

V05-M05D1 [1992]

Sample/specimen introducing

arrangement

# V05-M05E [1992]

# **Vessel windows**

Covers arrangement enabling emission or introduction of e.g. ions or electrons from the vessel. X-ray windows are covered by V05-E01E1A.

# V05-M05F [1992]

#### Coatings applied to vessel

Includes optical or conductive coatings.

V05-M06 [1992]

Getters

V05-M07 [1992]

# **Tube cooling**

(V05-M09)

Cooling of electronic equipment in general is covered by V04-T03 codes.

# V05-M07A [1992]

# Heat sink, radiative

(V05-M09)

Fin, extrusion, radiator

# V05-M07B [1992]

#### **Forced circulation**

(V05-M09)

Liquid, vapour, gas, pump, heat exchanger, tank, reservoir, fan, blower, air

#### V05-M09

# Other general tubes details (Including gas filling compositions)

Includes gas filling compositions. Compositions for gas-filled tubes covered by V05-A codes are assigned the appropriate subdivision code in that section.

# V06: Electromechanical Transducers and Small Machines

# V06-A\*

[1980-2006]

#### Loudspeakers

\*This code is now discontinued and has been transferred to V06-V04A1 from 200701. It remains searchable for records prior to 2007.

#### V06-A01\*

[1980-2006]

#### **Transducers**

\*This code is now discontinued and has been transferred to V06-V01 and V06-V04A1 from 200701. It remains searchable for records prior to 2007.

All loudspeaker transducers are also coded in V06-E.

Voice-coils, drivers, piezoelectric, moving coil

#### V06-A02\*

[1980-2006]

# Cones/diaphragms

\*This code is now discontinued and has been transferred to V06-V02A and V06-V04A1 from 200701. It remains searchable for records prior to 2007.

General use cones/diaphragms are in V06-F only. *Membranes, vibration plates* 

#### V06-B\*

[1983-2006]

#### Pick-ups, cutters, microphones; Sonar/ultrasonic transducers

\*This code is now discontinued and has been transferred to V06-V from 200701. It remains searchable for records prior to 2007.

#### V06-B01\*

[1983-2006]

### **Gramophone pick-ups and cutters**

\*This code is now discontinued and has been transferred to V06-V04A3 from 200701. It remains searchable for records prior to 2007.

See also W04-A.

Stylus, Cartridges, Diamond, groove, mechanical recording

# V06-B02\*

[1983-2006]

#### Microphones

\*This code is now discontinued and has been transferred to V06-V04A2 from 200701. It remains searchable for records prior to 2007.

All microphone transducers are also coded in the relevant V06-E code.

Piezoelectric, electroacoustic, electret, condenser, diaphragms

#### V06-B03\*

[1983-2006]

#### Sonar/ultrasonic transducers

\*This code is now discontinued and has been transferred to V06-V01N from 200701. It remains searchable for records prior to 2007.

For hydrophones and sonar systems, see also W02-C07 and W06-A05 codes.

Piezoelectric, underwater acoustic transducers

#### V06-C\*

[1980-2006]

#### **Headphones; Telephone handsets**

\*This code is now discontinued and has been transferred to V06-V04A4 and V06-V04B1 from 200701. It remains searchable for records prior to 2007.

Telephone transducers per se are coded in W01-C01M also, and mounting details in W01-C01A3.

Earphones, earpieces, receivers, transmitters, mouthpieces

#### V06-D\*

[1980-2006]

### Vibration generators for performing mechanical work

\*This code is now discontinued and has been transferred to V06-V04C from 200701. It remains searchable for records prior to 2007.

Includes shock wave generators for e.g. lithotripsy which are also coded in S05-B02. For industrial scale vibration generators see X25-L.

Coil, electromechanical

# V06-E\*

[1980-2006]

### **Transducers**

\*This code is now discontinued and has been transferred to V06-V01 from 200701. It remains searchable for records prior to 2007.

This code is in general only used for audio or communication-type transducers.

#### V06-E01\*

[1980-2006]

# Moving coil/strip/wire

\*This code is now discontinued and has been transferred to V06-V01A1 and V06-V04A3 from 200701. It remains searchable for records prior to 2007.

Ribbon

### V06-E01A\*

[1987-2006]

# Moving coil

\*This code is now discontinued and has been transferred to V06-V01A1 from 200701. It remains searchable for records prior to 2007.

Bobbins, voice coils

# V06-E02\* [1980-2006]

#### Piezoelectric: Electrostrictive

\*This code is now discontinued and has been transferred to V06-V01B from 200701. It remains searchable for records prior to 2007.

Acoustic, ceramic, ultrasonic, quartz, piezo-ceramic

#### V06-E03\*

[1980-2006]

# **Electrostatic**

\*This code is now discontinued and has been transferred to V06-V01C from 200701. It remains searchable for records prior to 2007.

Includes electrets and other capacitive-effect transducers.

Condenser

#### V06-E04\*

[1997-2006]

# **Digital transducers**

\*This code is now discontinued and has been transferred to V06-V01L from 200701. It remains searchable for records prior to 2007.

#### V06-E05\*

[1997-2006]

#### Wireless transducers

\*This code is now discontinued and has been transferred to V06-V01M from 200701. It remains searchable for records prior to 2007.

### V06-E06\*

[1997-2006]

# Microtransducers: Nanotransducers

\*This code is now discontinued and has been transferred to V06-V01K from 200701. It remains searchable for records prior to 2007.

Micromachining, micromechanical, microelectromechanical, micromechanism

#### V06-E06A\*

[2002-2006]

# **Nanotransducers**

\*This code is now discontinued and has been transferred to V06-V01K2 from 200701. It remains searchable for records prior to 2007.

#### V06-E07\*

[2005-2006]

#### Ultrasonic transducer

\*This code is now discontinued and has been transferred to V06-V01N from 200701. It remains searchable for records prior to 2007.

Includes audio/communication type ultrasonic transducers.

#### V06-E08\*

[2005-2006]

#### Bone conduction transducer

\*This code is now discontinued and has been transferred to V06-V01P from 200701. It remains searchable for records prior to 2007.

# V06-E09\* [1980-2006]

#### Other

\*This code is now discontinued and has been transferred to V06-V01A2, V06-V01D, and V06-V01X from 200701. It remains searchable for records prior to 2007.

Includes moving armature, magnetostrictive and combined-principle transducers.

# V06-F\*

[1980-2006]

# Diaphragms; cones

\*This code is now discontinued and has been transferred to V06-V02A from 200701. It remains searchable for records prior to 2007.

Membranes, vibration plates

# V06-G\*

[1980-2006]

#### **Transducer details**

\*This code is now discontinued and has been transferred to V06-V02 from 200701. It remains searchable for records prior to 2007.

#### V06-G01\*

[1980-2006]

# Casings; Cabinets, mountings

\*This code is now discontinued and has been transferred to V06-V02E and V06-V02F from 200701. It remains searchable for records prior to 2007.

Includes structural association of transducers with electric circuitry; throat mountings for microphones; lead-throughs for earphones; supports for music pick-ups. See also W04-S. *Enclosure, housings, chambers, holders* 

#### V06-G02\*

[1980-2006]

# Obtaining desired frequency or directional characteristics

\*This code is now discontinued and has been transferred to V06-V02G from 200701. It remains searchable for records prior to 2007.

Includes structural combinations and spatial arrangements of separate transducers responsive to two or more frequency ranges; enclosures modified by mechanical or acoustic dampers; use of horns; use of several identical transducers.

Dampers

# V06-G09\*

[1980-2006]

#### Other

\*This code is now discontinued and has been transferred to V06-V02H, V06-V02J and V06-V02X from 200701. It remains searchable for records prior to 2007.

Leads, mouthpieces, earpieces, sanitary devices

# V06-H\* [1980-2006]

#### Circuits for transducers

\*This code is now discontinued and has been transferred to V06-V02S from 200701. It remains searchable for records prior to 2007.

Includes circuits for preventing acoustic reaction or correcting frequency response; cross-over networks for loudspeakers. Does not include volume control circuits. See W04-T also.

Frequency/amplitude control, delay circuits

### V06-J\*

[1980-2006]

# Transducer manufacture, testing, monitoring

\*This code is now discontinued and has been transferred to V06-V03 from 200701. It remains searchable for records prior to 2007.

# V06-J01\*

[1992-2006]

#### Manufacture

\*This code is now discontinued and has been transferred to V06-V03A from 200701. It remains searchable for records prior to 2007.

#### V06-J01A\*

[1992-2006]

# Diaphragm

\*This code is now discontinued and has been transferred to V06-V03A1 from 200701. It remains searchable for records prior to 2007.

# V06-J02\*

[1992-2006]

#### Testing, monitoring

\*This code is now discontinued and has been transferred to V06-V03B from 200701. It remains searchable for records prior to 2007.

#### V06-J03\*

[2005-2006]

# Micromachining process, method or apparatus

\*This code is now discontinued and has been transferred to V06-V03A7 from 200701. It remains searchable for records prior to 2007.

See also U11-C and U12-B03F codes.

MEMS, microtransducer, nanotransducer, siliconmachining, micromachining

# V06-K\*

[1980-2006]

# Electromechanical resonators and delay lines

\*This code is now discontinued and has been transferred to V06-V01E and V06-V04D2 from 200701. It remains searchable for records prior to 2007

For networks using resonators see U25-B codes also.

#### V06-K01\*

[1980-2006]

#### **Delay lines**

\*This code is now discontinued and has been transferred to V06-V04D2 from 200701. It remains searchable for records prior to 2007.

#### V06-K02\*

[1980-2006]

# Piezoelectric, electrostrictive and magnetostrictive resonators

\*This code is now discontinued and has been transferred to V06-V01B, V06-V01D and V06-V01E from 200701. It remains searchable for records prior to 2007.

Includes crystal tuning forks.

Oscillator

#### V06-K03\*

[1980-2006]

# Holders, electrodes, coils

\*This code is now discontinued and has been transferred to V06-V02B, V06-V02C and V06-V02F from 200701. It remains searchable for records prior to 2007.

Mounts, seals, bases, housing, supports

#### V06-K03A\*

[1987-2006]

#### **Electrodes**

\*This code is now discontinued and has been transferred to V06-V02B from 200701. It remains searchable for records prior to 2007.

Electrode arrays, forks, comb electrodes, interdigitated electrodes

#### V06-K04\*

[1987-2006]

#### **Filters**

(V06-K09)

\*This code is now discontinued and has been transferred to V06-V04D1 from 200701. It remains searchable for records prior to 2007.

See U25-B also.

#### V06-K05\*

[1997-2006]

#### **SAW** resonators

\*This code is now discontinued and has been transferred to V06-V01E1 and V06-V01E2 from 200701. It remains searchable for records prior to 2007.

See U14-G also.

Surface acoustic wave

#### V06-K06\*

[1997-2006]

#### MSW resonators

\*This code is now discontinued and has been transferred to V06-V01E3 from 200701. It remains searchable for records prior to 2007.

Magnetostatic, surface wave, MSSW, forward volume, MSFVW, backward volume, MSBVW

#### V06-K07\*

[1997-2006]

#### **Microresonators: Nanoresonators**

\*This code is now discontinued and has been transferred to V06-V01E and V06-V01K from 200701. It remains searchable for records prior to 2007.

Micromachining, micromechanical, microelectromechanical, micromechanism

#### V06-K07A\*

[2002-2006]

#### **Nanoresonators**

\*This code is now discontinued and has been transferred to V06-V01E and V06-V01K2 from 200701. It remains searchable for records prior to 2007.

# V06-K08\*

[1992-2006]

# Manufacture and testing

(V06-K09)

\*This code is now discontinued and has been transferred to V06-V03A and V06-V03B from 200701. It remains searchable for records prior to 2007.

#### V06-K08A\*

[2005-2006]

# Micromachining process, method or apparatus

\*This code is now discontinued and has been transferred to V06-V03A7 from 200701. It remains searchable for records prior to 2007.

See also U11-C and U12-B03F codes.

MEMS, microresonator, nanoresonator, siliconmachining, micromachining

#### V06-K09\*

[1980-2006]

#### Other

\*This code is now discontinued and has been transferred to V06-V01E and V06-V02S from 200701. It remains searchable for records prior to 2007.

Includes circuits; resonators not covered by previous codes.

#### V06-K10\*

[2005-2006]

#### Ultrasonic resonator

\*This code is now discontinued and has been transferred to V06-V01E and V06-V01N from 200701. It remains searchable for records prior to 2007.

Includes ultrasonic delay lines and resonators.

#### V06-L\*

[1980-2006]

# Measuring or general use type piezoelectric, electrostrictive, magnetostrictive or electromagnetic transducers

\*This code is now discontinued and has been transferred to V06-V01A, V06-V01B, V06-V01D, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

See V06-M, V06-N and V06-U codes for motors and actuators. Vibration generators for performing mechanical work are in V06-V04C.

# V06-L01\*

[1980-2006]

# Piezoelectric, electrostrictive, magnetostrictive

\*This code is now discontinued and has been transferred to V06-V01B, V06-V01D, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Materials are also in U11-A02.

Ultrasonic, acoustic, magnetostrictive, electrostrictive

#### V06-L01A\*

[1987-2006]

#### **Piezoelectric**

\*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Piezoelectric composition, ceramic, ultrasonic, crystal, igniter, switch, micromechanism, sensor, buzzer

# V06-L01A1\* [1987-2006]

# **Medical applications**

\*This code is now discontinued and has been transferred to V06-V01B, V06-V02, V06-V04G and V06-V04K from 200701. It remains searchable for records prior to 2007.

See also S05-D.

Ultrasonic probes, acoustic transducers, ultrasonic diagnostics transducers

# V06-L01A2\* [1980-2006]

#### **General measurements**

\*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

See also relevant S02, S03 codes.

Vibration, pressure, force

# V06-L01A3\* [1997-2006]

#### Piezoelectric transformers

\*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04F from 200701. It remains searchable for records prior to 2007.

# V06-L01A3A\* [2002-2006]

#### Multilayer

\*This code is now discontinued and has been transferred to V06-V01B1, V06-V02 and V06-V04F from 200701. It remains searchable for records prior to 2007.

# V06-L01A3B\* [2002-2006]

# Rosen type

\*This code is now discontinued and has been transferred to V06-V01B2, V06-V02 and V06-V04F from 200701. It remains searchable for records prior to 2007.

#### V06-L01A4\* [1997-2006]

#### Piezoelectric (contactless) switches

\*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04E from 200701. It remains searchable for records prior to 2007.

# V06-L01B\* [1997-2006]

#### Magnetostrictive

(V06-L01)

\*This code is now discontinued and has been transferred to V06-V01D, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

# V06-L02\* [1980-2006]

#### Manufacture, testing

\*This code is now discontinued and has been transferred to V06-V01, V06-V03A and V06-V03B from 200701. It remains searchable for records prior to 2007.

Polarising, polymerising, coating, process, assembling

### V06-L02A\* [2005-2006]

# Micromachining process, method or apparatus

\*This code is now discontinued and has been transferred to V06-V01 and V06-V03A7 from 200701. It remains searchable for records prior to 2007.

See also U11-C and U12-B03F codes.

MEMS, microsensor, nanosensor, silicon-machining, micromachining

#### V06-L03\* [1997-2006]

#### Microsensors; Nanosensors

\*This code is now discontinued and has been transferred to V06-V01K, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Micromachining, micromechanical, microelectromechanical, micromechanism

# V06-L03A\* [2002-2006]

#### Nanosensors

\*This code is now discontinued and has been transferred to V06-V01K2, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

# V06-L04\* [1997-2006]

#### **Smart sensors**

\*This code is now discontinued and has been transferred to V06-V01Q, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Intelligent

# V06-L05\* [1992-2006]

# **Electromagnetic sensors**

\*This code is now discontinued and has been transferred to V06-V01A, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

# V06-L06\* [2005-2006]

#### Ultrasonic sensor

\*This code is now discontinued and has been transferred to V06-V01N, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Includes measurement type ultrasonic sensors.

# V06-L10\* [2002-2006]

### **Resonant sensors**

\*This code is now discontinued and has been transferred to V06-V02 and V06-V04G2 from 200701. It remains searchable for records prior to 2007.

#### V06-M

#### **Small electric machines**

Includes low power electric machines. Medium and large size machines and their controllers are in X11 and X13, respectively. Indeterminate size machines are in both V06 and X11 classes.

#### V06-M01

#### **Synchronous machines**

Motors, generators

#### V06-M01A

With permanent magnet

# V06-M01A1 [2008]

Interior permanent magnet

IPM

#### V06-M01B

Without permanent magnet

# V06-M01C [1997]

#### **Hybrid synchronous machines**

Includes combined permanent magnet and wound rotor type synchronous machines.

# V06-M02

### DC and induction machines

Includes universal machines.

# V06-M02A [1987]

#### **DC** machines

Motors, generators, commutator motors, shunt motors

# V06-M02B [1987]

#### **AC** machines

Induction-, squirrel cage-, asynchronous-, capacitorstart, split-phase-, AC commutator-machine

#### V06-M03

#### Non-mechanical commutator machines

Includes both AC and DC type brushless motors. Brushless, electronic commutator

# V06-M03A [1997]

# **Permanent magnet**

PM DC/AC brushless

V06-M03B [1997]

#### Switched reluctance

SR DC/AC brushless

# V06-M03C [1997]

# Sensorless

BEMF

#### V06-M04

#### Machines with vibrating armatures or coils

Includes voice-coil type motors, solenoidal motors, vibration motors.

Reciprocating/oscillating magnet, polarisedarmature, vibration motor

# V06-M04A [1997]

**Voice coil motors** 

V06-M05

**Stepping motors** 

V06-M05A [1987]

Variable reluctance

V06-M05B [1987]

Permanent magnet

V06-M05C [1997]

Hybrid

#### V06-M06

#### Other electric machines

Includes 'perpetual motion' motors, torque motors. Electrodynamic-clutches, -brakes, -gears V06-M06A [1987]

Synchros and selsyns

AC position motors

V06-M06B [1987]

**Linear motors** 

V06-M06B1 [1997]

**Asynchronous** *Induction, AC, LIM* 

V06-M06B2 [1997]

Synchronous

AC, LSM

V06-M06B3 [1997]

**Direct current** 

DC, linear

V06-M06B7 [1997]

Piezoelectric or electrostrictive

(V06-M06D)

V06-M06B8 [1997]

**Electrostatic** 

(V06-M06F)

V06-M06B9 [1997]

Magnetostrictive

(V06-M06)

V06-M06C [1987]

**Tachogenerators** 

Includes AC and DC type speed or rpm counters. See S02-G codes also.

V06-M06D [1987]

Piezoelectric or electrostrictive motors, actuators; Piezoelectric generators

Includes piezoelectric elements placed in printheads of inkjet printers (see also S06-G codes for inkjet printers). Also includes surface acoustic wave actuators for which U14-G is also assigned.

Bimorph actuators, SAW actuators

V06-M06D1 [1992]

**Ultrasonic motors** 

V06-M06D2 [1997]

Generators

V06-M06D3 [2002]

Laminated type

V06-M06D4 [2002]

**Bimorph type** 

V06-M06E [1987]

Servomotors

V06-M06F [1992]

Electrostatic motors, actuators, generators

Also includes triboelectric motors or generators.

Triboelectric effect

V06-M06G [1992]

Micromotors/microactuators; Nanomotors/nanoactuators

See also U12-B03F. For mfg. see V06-M11 and

U11-C18C codes.

Micromachine, micromachining, micromechanical, microelectromechanical, micromechanism

V06-M06G1 [1992]

**Electrostatic excitation** 

V06-M06G1A [2002]

**Comb motors** 

V06-M06G1B [2002]

**Wobble motors** 

V06-M06G2 [1992]

Magnetic excitation

V06-M06G3 [2007]

**Electro-thermal effect** 

For non-MEMS type electro-thermal actuator see V06-M06M.

V06-M06G8 [2005]

Microgenerators; Nanogenerators

V06-M06G8A [2005]

**Nanogenerators** 

V06-M06G9 [2002]

Nanomotors/nanoactuators

V06-M06H [1997]

Magnetostrictive motors, actuators;

Generators

(V06-M06)

Includes magnetostrictive motors, actuators and generators

V06-M06H1 [2005]

**Motors**; Actuators

V06-M06H2 [2005]

Generators

V06-M06J [1997]

**Corona motors** 

(V06-M06)

V06-M06K [1997]

# Magnetic-fluid motors, actuators

(V06-M06)

Includes electromagnetic pumps used for moving liquid metal or some other magnetic fluid using electromagnetic force. Electromagnetic pumps for high power applications are coded under X11-H03B only.

V06-M06M [1997]

**Shape-memory alloy motors** 

(V06-M06)

V06-M06N [1997]

**Printed-circuit or pancake motors** 

(V06-M06)

V06-M06P [1997]

Multidimensional motors

(V06-M06)

V06-M06Q [2002]

**MHD** generators

See X11-H03B for medium/high power machines.

Magneto-hydro-dynamics

V06-M06R [2005]

**Ultrasonic motors** 

Includes non-piezoelectric type ultrasonic motors. See V06-M06D1 for piezoelectric ultrasonic motors.

V06-M06S [2007]

# **Electro-active polymer motors**

Includes actuators/motors and generators having, for example, an electro-active polymer for electrical to mechanical, and vice-versa, energy conversion. See V06-M06D codes for piezoelectric actuators or motors. The actuator may have either a liquid or solid electrolyte.

EAP

V06-M06T [2008]

#### **External rotor type motor**

Includes motor with an outer or external rotor construction.

V06-M07

### **Magnetic circuits**

Magnets, magnetic poles, cores, yokes, tooth, slots, laminations

V06-M07A [1987]

Stator

Includes insulation details of stator.

V06-M07B [1987]

Rotor

Includes insulation details of rotor.

V06-M08

Windings

Slot-closures, wedges, ties, fastening windings

V06-M08A [1987]

Conductor shape, form, construction or layout

Coils, disc, flat

V06-M08A1 [2002]

Printed coils/windings

V06-M08B [1987]

Insulation; Shielding; Protection

Corona protection

V06-M09

#### **Casings; Supports**

Includes enclosures, casings, bearing and brush supports, bearing shields or end plates. Also includes lubrication and insulation details of bearings, etc.

Housing, machine mountings, seals, explosionproofing, vibration-damping, brush holders

V06-M09A [2002]

**Connectors; Terminal boxes** 

V06-M10

# Arrangements for handling mechanical energy

Shaft, clutches, brakes, gears, pulleys, mechanical starting, loads, flywheels, balancing arrangements, bearings, couplings

V06-M10A [2002]

Microgears; Microtransmission

V06-M11

# Manufacture, testing, repair and maintenance

Includes recycling details (see also X25-W04).

V06-M11A

[1983]

# Commutators, slip-rings, brushes

Includes wear indicators. See also V04-P02 for manufacture of general commutators, brushes, etc.

V06-M11B

[1983]

#### Windings

Coiling, inserting wires, winding jigs, laying conductors, conductor bending

V06-M11C

[1987]

# Insulation, balancing, centering

Includes impregnating, insulating, heating or drying of windings, rotors or machines. Also includes centering/balancing details of motor. *Taping* 

V06-M11D [1987]

Core

For rotor or stator bodies.

Magnetic poles, casting, moulding, laminating, slotting, magnetic circuits

V06-M11E

**Casings and supports** 

Housing, enclosure

V06-M11G

[2005]

[1997]

[2016]

# Micromachining process, method or apparatus

See also U11-C and U12-B03F codes.

MEMS, micromotor, microactuator, nanomachine, nanoactuator, silicon-machining, micromachining

V06-M11M

#### Testing, repair and maintenance

Includes analysis, diagnosis, monitoring, fault detection. This code can be used in conjunction with other V06-M11 codes, e.g. together with V06-M11A, V06 M11B, V06-M11C and V06-M11D for testing of brushes, windings, insulation and cores, respectively.

V06-M11P [1997]

Characterised by use of microprocessors

V06-M12 [1983]

### Commutators, slip-rings, brushes

Includes connections with windings, commutation improving arrangements. See also V04-L01.

Commutator segments, current collectors

V06-M13 [1992]

# Cooling, ventilation

This code covers cooling and/or ventilation of e.g. the motor itself, and **not** when the motor is part of the cooling/ventilation system for cooling another device.

V06-M14 [1992]

# Structural association with electric component

Includes measuring and protecting electronic components e.g. resistors, switches or RFI suppressors.

Position/rotation/direction detectors

V06-M15 [2002]

**Materials** 

V06-M15A [2002]

#### **Conductive materials**

Includes details of materials for thermal or electrical conduction.

V06-M15B [2002]

**Magnetic materials** 

V06-M15C [2002]

#### **Insulative materials**

Includes details of materials for electrical insulation.

V06-M16 [2008]

# Non-electrodynamic motor details

Includes details, such as electrodes, for piezoelectric, electrostatic, etc motors.

#### V06-M20

### Other details

This code includes details of model illustrating / demonstrating how an electric motor works. See also W04-W07C for demonstration of process or effect. Also includes machine simulation/design. Includes motor cable details.

Motor simulation, generator simulation, electric machine simulation, motor design, generator design, electric machine design V06-N [1983] **Controlling small electric machines** Includes control of low power motors, actuators and generators. Protective circuits for low power motors are coded by U24-F codes. V06-N01 [1983] **Stepping motors** Translation circuit, stepper, step-by-step motor V06-N01A [2005] Variable reluctance V06-N01B [2005] **Permanent magnet** V06-N01C [2005] Hybrid V06-N02 [1983] **DC** mechanical commutator motors Shunt motor V06-N03 [1983] **AC** motors V06-N03A [1997] **Asynchronous** Induction V06-N03B [1997] **Synchronous** V06-N03B1 [2006] With permanent magnet V06-N03B2 [2006] Without permanent magnet V06-N04 [1987] **DC** brushless motors V06-N04A [1997] **Permanent magnet** PM DC brushless

[1997]

V06-N04B

**Switched reluctance** *SR DC brushless* 

V06-N04C [1997] Sensorless BEMF V06-N05 [1987] Starting V06-N06 [1987] **Braking**; Stopping Reversing, resistive-, regenerative-braking V06-N07 [1992] Piezoelectric or electrostrictive motors. actuators Ultrasonic **V06-N08** [1997] **Electrostatic motors, actuators** V06-N09 [1997] Magnetostrictive motors, actuators V06-N10 [1997] **Servomotors** V06-N11 [1997] **Linear motors** V06-N11A [1997] **Asynchronous** Induction, AC, LIM V06-N11B [1997] **Synchronous** AC, LSM V06-N11C [1997] **Direct current** DC, linear V06-N11D [1997] Piezoelectric or electrostrictive V06-N11E [1997] Magnetostrictive V06-N11F [1997] **Electrostatic** 

V06-N12 [1997]

Voice coil motors

V06-N13 [1997]

**Corona motors** 

V06-N14 [1997]

Magnetic-fluid motors, actuators

(V06-N)

V06-N16 [1997]

**Shape-memory alloy motors** 

(V06-N)

V06-N18 [1997]

**Printed-circuit or pancake motors** 

(V06-N)

V06-N20 [1997]

**Multidimensional motors** 

(V06-N)

V06-N21 [2018]

Machines with vibrating armatures or coils

Control of ultrasonic motors are coded under V06-N36 only.

Vibration motor

V06-N22 [1997]

Micromotors/microactuators; Nanomotors/nanoactuators

Micromachine, micromachining, micromechanical, microelectromechanical, micromechanism

V06-N22A [2002]

Nanomotors/nanoactuators

V06-N24 [1997]

**Smartpower IC controllers** 

Integrated circuit controller, integrated smart power circuit

V06-N26 [1997]

**Microprocessor control** 

Includes DSP, ECU, PLC.

V06-N30 [1997]

**Multimotor control** 

V06-N35 [2002]

Remote motor control

V06-N36 [2005]

**Ultrasonic motors** 

Use this code together with other V06-N codes if required for highlighting the type of motor being controlled.

V06-N37 [2005]

**Vector control** 

Field-oriented, flux-vector, direct-torque, control, regulation

V06-N40 [2005]

Low power generators

For records prior to 2005, see X13-G02 codes. Medium and high power generator control is in X13-G02.

V06-N40A [2005]

**Synchronous generators** 

V06-N40B [2005]

**DC** generators

V06-N40C [2005]

Induction generators

V06-N40D [2005]

Piezoelectric generators

V06-N40E [2005]

Magnetostrictive generators

V06-N40F [2005]

**Electrostatic generators** 

V06-N40G [2005]

**MHD** generators

V06-N40H [2005]

**Microgenerators; Nanogenerators** 

V06-N40H1 [2005]

**Nanogenerators** 

V06-N45 [2005]

Speed control or regulation of electrical machines characterized by specific switching or control device

V06-N45A [2005]

Characterized by diodes

V06-N45B [2005]

Characterized by bipolar transistors

V06-N45C [2005]

**Characterized by FETs** 

V06-N45D [2005]

**Characterized by IGBTs** 

V06-N45E [2005]

Characterized by combination of switching devices

V06-N45F [2005]

Characterized by AC-to-DC converter

V06-N45G [2005]

Characterized by DC-to-AC converter

V06-N45H [2005]

Characterized by AC-to-AC converter

V06-N45J [2005]

Characterized by DC-to-DC converter

V06-P [2007]

#### Power generation plant

Covers only very low power generation. Medium to large scale power generation is covered in X11, X14 and X15.

V06-P01 [2007]

#### MEMS or chip-scale power plant

Includes the implementation of whole power plants on a MEM device or chip. Covers microcombustion of fuels to drive a micro steam- or gasor other- turbine, which drives a micro-generator. Individual MEMS generators are in V06-M06G. See also U12-B03F codes.

Micro power generator

V06-P02 [2007]

# **Small scale power plant**

Includes low wattage power plants typically used for powering small electronic equipment.

V06-U [1997]

Electric machines characterised by applications

V06-U01 [1997]

#### **Domestic**

Includes motors used in domestic and household equipment such as washing machines, dishwashers, vacuum cleaners, office paper shredder etc. Personal items, such as toothbrushes, razors, etc, are coded under V06-U02 only. Domestic and household equipment are also coded under X27.

Household

V06-U02 [1997]

#### Personal

Includes motors used in personal items such as toothbrushes, razors, hair dryers, etc. Domestic items are also coded under X27.

Toothbrush, razor, hair dryer

V06-U03 [1997]

**Vehicles** 

V06-U04 [1997]

Information equipment

V06-U04A [1997]

**Disk drives; Tape drives** 

V06-U04B [1997]

Printers; Graph plotters; Scanners;

**Photocopiers** 

V06-U04C [1997]

Facsimile machines

V06-U04D [1997]

#### **Ventilation; Cooling**

Also includes motor for cooling of electronic equipments, printed circuits etc.

V06-U04E [2002]

# **Telecommunication**

Includes mobile telephones.

V06-U05 [1997]

**Robotics** 

V06-U06 [1997]

Machine tools

# V06-U07 [1997]

# **Dispensing / vending machines**

See T05-H codes for details of vending machines, and X25-F03B for details of dispenser, including food/drink dispensers.

ATM machine

V06-U08 [1997]

**Toys; Games; Sports** 

Includes exercise machines.

V06-U09 [1997]

# Audio, video equipment

Includes motors for projectors, video recorders (VCR), DVD recorders and players, Hi-Fi systems, etc. Also includes motors for digital cameras, including cameras for mobile phones, laptops, etc. Non-digital cameras, or film cameras, are only coded under V06-U13. See also W04 codes for audio / video equipment.

CCD camera, digital camera, VCR, DVD player

V06-U10 [1997]

Medical

V06-U11 [1997]

# **Electronic equipment manufacture**

Includes semiconductor manufacturing equipment.

# V06-U12 [1997]

#### Instrumentation

Includes details of timepieces, e.g. chronograph timepiece.

# V06-U13 [2002]

#### Non-digital / film cameras

Includes motor details for non-digital cameras, such as silver halide film cameras, 35 mm cameras, etc. Digital cameras are only coded under V06-U09. All video cameras are coded under V06-U09 only. See also S06-B for electrical details of film cameras.

Silver halide, 35 mm camera

V06-U14 [2002]

**Optical switches** 

V06-U15 [2002]

#### **Industrial machines/components**

Includes industrial vehicles e.g. cranes, concrete mixing lorry, fork lift truck etc.

V06-U99 [2006]

#### Other electric machine applications

# V06-V [2007]

#### **Electromechanical transducers**

This section covers all electromechanical transducers for audio/communication, resonators, sensors, vibrators (mechanical work) and general transducers not covered elsewhere.

For records prior to 2007, see V06-A to V06-J codes for audio/communication type transducers and vibrators (mechanical work), V06-K codes for resonators and V06-L codes for sensors, and general transducers not covered elsewhere.

See V06-M, V06-N and V06-U codes for small motors/actuators construction, manufacture, testing, monitoring, maintenance, control and applications. See U12-B01B for magnetoresistors, U12-B03E for piezoresistors.

# V06-V01 [2007]

# Transducers characterised by mode, principle, scale or type

These codes are used to highlight a specific transducer aspect such as mode (ultrasonic), principle (electrostriction), scale (micro) and type (moving coil). V06-V01 codes are used in conjunction with other relevant codes such as V06-V02 for details, V06-V03 for manufacture and V06-V04 for applications. For example, a novel electrode of a piezoelectric resonator for a delay line would be coded in V06-V01B, V06-V01E, V06-V02B and V06-V04D2.

# V06-V01A [2007]

# **Electromagnetic induction**

(V06-E01, V06-E09 and V06-L05)

See also V02-G01E for linear variable displacement transducers or transformers (LVDT)

#### V06-V01A1 [2007]

#### Moving coil

(V06-E01A)

Voice coil, bobbins

#### V06-V01A2 [2007]

#### Moving armature, core or magnet

(V06-E09)

LVDT

#### V06-V01A3

[2007]

# Moving wire or strip

(V06-E01) Ribbon

# V06-V01B [2007]

#### Piezoelectric: Electrostrictive

(V06-E02, V06-K02, V06-L01A)

Details of piezoelectric or electrostrictive materials are covered by both V06-V01B and V06-V02R ('Materials').

Piezoceramic, quartz, ceramic, crystal resonator

V06-V01B1 [2007]

Multilayer

(V06-L01A3A)

V06-V01B2 [2007]

Rosen type (V06-L01A3B)

V06-V01C [2007]

**Electrostatic** 

(V06-E03)

Includes electrets and other capacitive-effect transducers (see also V01-B02 codes).

Condenser

V06-V01D [2007]

Magnetostrictive

(V06-E09, V06-L01B)

V06-V01E [2007]

# Resonators

(V06-K02)

Includes electromechanical resonators. For networks using resonators, see U25-B codes also. *Oscillators, crystal resonators, elastic wave* 

resonators

V06-V01E1 [2007]

Surface acoustic wave

(V06-K05)

SAW

V06-V01E2 [2007]

**Bulk acoustic wave** 

(V06-K05) BAW

V06-V01E3 [2007]

# Magnetostatic acoustic wave

(V06-K06)

Magnetostatic surface wave, MSSW, magnetostatic forward volume wave, MSFVW, magnetostatic backward volume wave, MSBVW

V06-V01K [2007]

Microtransducers; Nanotransducers

V06-V01K1 [2007]

#### Microtransducers

(V06-E06, V06-K07, V06-L03)

MEMS, micromechanical, microelectromechanical, micromechanism

V06-V01K2 [2007]

#### **Nanotransducers**

(V06-E06A, V06-K07A, V06-L03A)

NEMS, nanomechanical, nanoelectromechanical, nanomechanism, (piezoelectric) nano-wire

V06-V01L [2007]

**Digital transducers** 

(V06-E04)

V06-V01M [2007]

#### Wireless transducers

(V06-E05)

Bluetooth transducer

V06-V01N [2007]

#### **Ultrasonic transducers**

(V06-B03, V06-E07, V06-K10, V06-L06)

Includes details of supersonic transducers and ultrasonic/megasonic cleaning. Ultrasonic cleaning is also covered by V06-V04C and X25-H09A.

V06-V01P [2007]

# **Bone conduction transducers**

(V06-E08)

Includes details of bone anchored hearing aids (BAHA). Hearing aids are also coded under V06-V04K for medical applications, and under W04-Y. If the hearing aid is implanted, see also S05-F01. Hearing aid, bone anchored hearing aids, BAHA, bone conduction transducers

V06-V01Q [2007]

# **Smart transducers**

(V06-L04)

Includes details of the processing unit and the communication interface.

IEEE1451, SensorML, TransducerML, Transducer Markup-Language

V06-V01X [2007]

#### Other transducers

(V06-E09, V06-K09, V06-L)

Includes electro-optical(audio), combined-principle and infrasonic transducers.

# V06-V02 [2007]

#### Transducer details, circuits, materials

These codes are used in conjunction with other V06-V codes as appropriate. For example, a novel coil construction of a moving coil type transducer for a loudspeaker in a PA system is coded in V06-V01A1, V06-V02C, V06-V04A1 and V06-V04A5.

# V06-V02A [2007]

# **Diaphragms; Cones**

(V06-A02, V06-F)

Membranes, vibration plates

#### V06-V02B [2007]

#### **Electrodes; Terminals**

(V06-G09, V06-K03A)

# V06-V02C [2007]

# Coils; (electro)magnets

(V06-K03)

# V06-V02D [2007]

**Substrates; Layers** 

# V06-V02E [2007]

# **Casings**

(V06-G01, V06-K03)

Includes individual transducer housings. Also includes shield element to protect individual transducer. If the shield element is part of the cabinet, V06-V02F should be applied instead.

#### V06-V02F [2007]

# **Cabinets; Mountings; Supports**

(V06-G01, V06-K03)

Includes cabinets, mountings, supports for the transducer(s) within a cabinet. Also includes mountings of circuit board.

Enclosure, chambers, holders

# V06-V02G [2007]

# Obtaining desired frequency or directional characteristics

(V06-G02)

Includes structural combinations and spatial arrangements of separate transducers responsive to two or more frequency ranges, enclosures modified by mechanical or acoustic dampers, use of horns, use of several identical transducers.

# V06-V02H [2007]

#### Leads, connectors

(V06-G09)

Includes earphone jacks, cables for headphone/earphone, etc. Details of cables are also coded under X12-D.

#### V06-V02J [2007]

# **Sanitary devices**

(V06-G09)

Includes details of waterproof filter protecting the mouthpiece of a microphone, etc.

# V06-V02R [2007]

#### **Materials**

(V06-L01)

Manufacturing details of materials are covered by both V06-V02R and V06-V03A9 ('Other transducer manufacture'). Details of piezoelectric or electrostrictive materials are covered by V06-V02R and V06-V01B ('Piezoelectric; electrostrictive').

# V06-V02S [2007]

#### Circuits

(V06-H, V06-K09)

Includes circuits for preventing acoustic reaction or correcting frequency response; cross-over networks for loudspeakers. Does not include volume control circuits. See W04-T also.

# V06-V02X [2007]

### Other transducer details

(V06-G09)

Includes transducer details not covered elsewhere. Also includes details of model illustrating / demonstrating how a transducer works. See also W04-W07C for demonstration of process or effect.

#### V06-V03 [2007]

# Transducer manufacture, testing, monitoring

These codes are used in conjunction with other V06-V codes as appropriate. For example, a novel coil manufacture of a moving coil type transducer for a loudspeaker in a PA system is coded in V06-V01A1, V06-V03A3, V06-V04A1 and V06-V04A5.

#### V06-V03A [2007]

# Manufacture

(V06-J01, V06-K08, V06-L02)

# V06-V03A1 [2007]

#### Diaphragms; cones

(V06-J01A)

# V06-V03A2 [2007]

**Electrodes; terminals** 

(V06-J01, V06-K08, V06-L02)

### V06-V03A3 [2007]

Coils; (electro)magnets

(V06-J01, V06-K08 and V06-L02)

V06-V03A4 [2007]

Substrates; Layers

(V06-J01, V06-K08, V06-L02)

V06-V03A5 [2007]

**Casings** 

(V06-J01, V06-K08, V06-L02)

V06-V03A6 [2007]

**Cabinets; Mountings; Supports** 

(V06-J01, V06-K08, V06-L02)

#### V06-V03A7 [2007]

# Micromachining process, method or apparatus

(V06-J03, V06-K08A, V06-L02A)

Includes manufacture of MEMS and NEMS. See also U11-C and U12-B03F codes.

Micromechanical, microelectromechanical, micromechanism, microtransducer, nanomechanical, nanoelectromechanical, nanomechanism, nanotransducer

#### V06-V03A9 [2007]

#### Other transducer manufacture

(V06-J01, V06-K08, V06-L02)

Includes manufacture of transducer details not covered by the above codes. Includes manufacturing details of materials (see also V06-V02R).

# V06-V03B [2007]

# Testing, monitoring and calibration of transducers

(V06-J02, V06-L02, V06-K08)

This code includes testing and monitoring details of transducers, and not when the transducers are used as testing or sensing transducers, e.g. when the transducer is used to detect the tire pressure. Sensing, testing and imaging-type transducers are coded under V06-V04G.

# V06-V04 [2007]

# **Transducer applications**

These codes are used in conjunction with other V06-V codes as appropriate. For example, a novel coil of a moving coil type transducer for a loudspeaker in a PA system is coded in V06-V01A1, V06-V02C, V06-V04A1 and V06-V04A5. For applications in the communications and audio/video fields, see also W01, W02, W03 and W04 classes. For applications in the instrumentation and medical fields, see also S01, S02, S03 and S05 classes.

# V06-V04A [2007]

#### Audio/video equipment

Includes details of microphone (V06-V04A2) and/or speaker arrangements (V06-V04A4) for non-implanted hearing aids. Bone anchored or implanted hearing aids are only coded under V06-V04K and V06-V01P. Hearing aids are also coded under W04-Y. Also includes musical instruments, such as electronic trumpet, and cameras. Details of digital cameras are also included by W04-M01 codes

# V06-V04A1 [2007]

#### Loudspeakers

(V06-A)

See also W04-S codes.

# V06-V04A2 [2007]

#### Microphones

(V06-B02)

Pick-ups for musical instruments are coded in V06-V04A3. For microphones used for measurement purposes, see V06-V04G3.

#### V06-V04A3 [2007]

#### Pick-ups

(V06-B01)

Includes pick-ups for gramophones and musical instruments. General audio microphones are in V06-V04A2.

Stylus, cartridges, groove, mechanical recording, needle

# V06-V04A4 [2007]

#### **Headphones**; Earphones

(V06-C)

Also includes hands-free kits, hearing aids. For hearing aids, also apply V06-V04K.

Earphones, earpieces, mouthpieces, hearing aids

# V06-V04A5 [2007]

# **Public address systems**

Includes equipment used in sound broadcasting during concerts, in public places such as train or underground stations, exhibition halls, etc. Includes details of long-line public address systems. Details of microphones and loudspeakers are coded under V04-V06A1 and V06-V04A2, respectively. See also W04-S codes.

PA system, loudhailer, concert, exhibition, conference, megaphone, LLPA

# V06-V04B [2007]

# **Communication equipment**

Also includes hydrophones used for audio/voice communications. For hydrophones used in instrumentation, see V06-V04G1. For sonar systems, see also W02-C07 and W06-A05 codes.

# V06-V04B1 [2007]

# Telephone handsets

(V06-C)

Telephone transducers, per se, are also coded in W01-C01M, and mounting details in W01-C01A3. *Receivers, transmitters* 

### V06-V04B2 [2007]

**Radio communication** 

#### V06-V04C [2007]

#### Vibrators (mechanical work)

(V06-D)

Includes transducers for performing mechanical work e.g. shock wave generator for lithotripsy. For industrial-scale vibration generators see X25-L codes. See V06-M codes for motors and actuators. *Buzzers, ultrasonic cleaning* 

V06-V04D [2007]

Filters; Delay lines

V06-V04D1 [2007]

Filters (V06-K04)

V06-V04D2 [2007]

**Delay lines** (V06-K01)

V06-V04E [2007]

Switching (contactless)

(V06-L01A4)

V06-V04F [2007]

#### **Transformers**

(V06-L01A3)

V06-V04G [2007]

#### Instrumentation

(V06-L01A2)

Includes sensing, detecting and imaging type transducers. Also includes transducers described as sensors. See also S02 and S03 codes for transducers used for general instrumentation.

#### V06-V04G1 [2007]

#### Sonar

(V06-B03, V06-E, V06-L)

Includes hydrophones for e.g. ranging. For audio/voice communications, see V06-V04B.

#### V06-V04G2 [2007]

#### **Resonant sensor**

(V06-L10)

# V06-V04G3 [2007]

# **Measurement microphone**

(V06-B02

For audio/communication-type microphones, see V06-V04A2.

# V06-V04H [2007]

#### **Vehicles**

Includes land, sea and air vehicles.

# V06-V04J [2007]

# Military

See also W07 codes for military applications of transducers.

# V06-V04K [2007]

# Medical

(V06-L01A1)

Includes details of transducers for hearing aids, including bone anchored or implanted hearing aids. Details of the bone conducting transducers are also coded under V06-V01P, and details of the microphone and/or speaker arrangements are also coded under V06-A04A codes. Hearing aids are also coded under W04-Y. See also S05 codes for transducers used in medical devices.

Hearing aid, veterinary, RIC (Receiver In Canal), inear canals

# V06-V04L [2007]

#### Industrial

Includes machine tools, manipulators, etc. *Drilling, cutting, turning, lathe, robotics* 

# V06-V04M [2008]

#### Information equipment

Includes details of transducers for computers, and computer peripheral devices e.g. mouse, disk drives, etc.

V06-V04N [2008]

**Alarms; Signalling** 

V06-V04P [2008]

**Personal** 

V06-V04Q [2008]

**Displays** 

V06-V04R [2008]

**Toys; Games; Sports** 

See also W04 codes.

Exercise machines, karaoke systems

V06-V04S [2008]

**Domestic** 

V06-V04T [2013]

# **Purification; Sterilization**

Includes details of transducers for purifying/sterilizing air in buildings, rooms, etc. Details of these air cleaners are also coded under X27-E01B2.

# V06-V04X [2007]

# Other transducer applications

Includes applications not covered elsewhere, e.g. igniters, vending machines, etc.

# **V07: Fiber-Optics and Light Control**

The codes in this class were introduced at the start of 1983 and used to backlog code all basic abstracts to update 198018. Coverage is restricted to components for coupling, guiding, or performing operations - e.g. multiplexing - on IR, visible, or UV radiation. Individual radiation sources and receivers per se are not included, and are coded in U12 and V08. See W02-C04 codes for optical communications systems in general.

V07-F [1983]

**Optical elements** 

V07-F01 [1983]

**Light guides** 

V07-F01A [1983]

# **Guiding structures**

Includes guiding structures e.g. rods, rectangular core waveguides. From 1992 for optical fiber bundles see V07-F01A1B.

# V07-F01A1 [1983]

# **Optical fibers**

Includes individual glass, plastics and high power air-clad optical fibers; core and cladding structures providing desired refractive index profile, e.g. concentric guiding structure; doping.

Matched, raised cladding, single mode, step-index, graded-index

#### V07-F01A1A [1992]

# Light guides with polarisation-maintaining effect

(V07-F01A1)

# V07-F01A1B [1992]

# **Optical fiber bundles**

(V07-F01A)

Includes image transmission using fiber-optic face plates and imaging bundles, i.e. guides with same relative position of fibers at both ends.

Image inverters

#### V07-F01A1C [1997]

#### **Optical fiber arrays**

(V07-F01A1B)

Prior to 1997 coded in V07-F01A1B.

#### V07-F01A1D [1997]

# **Optical fiber tapes**

(V07-F01A1B)

Prior to 1997, coded in V07-F01A1B. See V07-F01B4 for optical fiber cables.

Ribbon

#### V07-F01A1E [2007]

# **Dispersion compensation optical fibers**

# V07-F01A1F [2007]

#### **Graded Index Fibers**

(V07-F01A1B)

As opposed to step index fiber. Refractive index with quadratic profile. Graded index fibers are always multimode fibers

Graduated index, Graded index, Multimode

# V07-F01A1X [2005]

#### Other novel optical fibers

Includes holey fibers, photonic fibers and micro/nano structured fibers. Dispersion compensating and slope compensating fibers may also be coded here. U13-B03F and V06 codes may also be added for micro/nano structured aspects. See V07-K10C for photonic materials, V07-F01A4 for photonic waveguides, and from 2006 see V07-F02D for all other photonic optical elements.

# V07-F01A2 [1987]

#### **Optical preform**

Includes structure, with manufacture in V07-F01A3A. Also includes similar structures for other optical elements, e.g. GRIN lens, tapered waveguide.

Soot

#### V07-F01A3 [1987]

# Manufacture, materials for optical fibers

#### V07-F01A3A [1992]

# Manufacturing methods for optical fibers and waveguides

From year 2002, manufacturing equipment for optical fibers is coded in V07-F01A3C

#### V07-F01A3B [1992]

# Materials for optical fibers and waveguides

For non-linear optical and electro-optical materials see V07-K10 codes. Details of materials for optical cables are coded under V07-F01B4C only.

Silica

# V07-F01A3C [2002]

#### Manufacturing equipment

Covers equipment for the manufacture of optical fibers. Equipment for preparing fibers goes in V07-G01, and for light guides/cables go in V07-H01.

#### V07-F01A4 [2005]

#### Slab and Planar waveguides

Prior to 2005 see V07-F01A. Includes photonic waveguides with novel structure. For photonic materials see V07-K10C, for photonic fibers see V07-F01A1X, and from 2006 see V07-F02D for all other photonic optical elements.

# V07-F01A5 [1983]

# Integrated optical waveguides

Includes thin film waveguide and its manufacture. Connections, switches and modulators integrated onto waveguide are also included, but see also V07-G or V07-K codes. Thin film optical element e.g. filter or lens is additionally coded in V07-F02. Semiconductor waveguides are also coded in U12-A or U13-D04A but waveguides for lasers are not included.

Substrate, integrated optics

# V07-F01A5A [1997]

# Characterised by integrated optical waveguide manufacture

(V07-F01A5)

Includes film deposition, substitution of dopant atoms, etching, using polymerisation.

# V07-F01A5S [2002]

#### Integrated optical waveguide sensors

Includes multilayered optical filters.

Fiber gratings, smart skin, smart structure

#### V07-F01A6 [1997]

Polarisation-independent light guides

### V07-F01B [1983]

Light guide protection; Repair and maintenance; Optical cables

# V07-F01B1 [1987]

# **Light guide protection**

Includes materials, manufacture of covering layers (i.e. non-optical layers) coated on fiber after extrusion e.g. radiation curable layers and metal coatings.

Sheath

# V07-F01B1A [2002]

#### **Dust-proof and water-tight structures**

Includes drainage and protection system for relay points of optical cables, communication able terminations, and enclosures for protecting optical fiber connections from dust and humidity.

Dust-proofing, weather-proofing, environmental protection

### V07-F01B2 [2005]

# Optical fiber repair and maintenance methods and equipment

# V07-F01B4 [1987]

#### **Optical cable**

Includes composite electrical and optical fibers cable for transmission line signalling and optical repeaters.

# V07-F01B4A [1992]

# Characterised by optical cable structure

Helical/S-Z winding, spacers

# V07-F01B4B [1992]

# Characterised by optical cable manufacture

Includes method and equipment for manufacturing optical cables.

#### V07-F01B4C [2023]

# Characterised by optical cable materials

Includes optical cable materials. Details of materials for optical fibers and waveguides are coded under V07-F01A3B only.

Plastic, silica, glass

#### V07-F02 [1983]

# Lenses, reflectors, other optical elements

Includes in general passive optical components associated with optical fibers and waveguides e.g. for coupling waveguides, sources and receivers; beam profile correction, etc. Also includes components manufactured from optical fiber e.g. filter, attenuator. For lens formed on fiber end, see V07-G04. Electro- and magneto-optic components are coded in V07-K.

#### V07-F02A [1987]

#### Lenses; Reflectors; Refractors

Includes prism; mirror (for scanning, see also V07-K05; incorporating electro-optic light shutter, see V07-K01A and for vehicle rear view/anti-dazzle mirror, see X22-J04).

# V07-F02B [1987]

#### **Gratings; Filters; Polarisers**

Includes light retardation film, light diffusion film. *Diffraction* 

# V07-F02C [1987]

#### **Holograms**

Excludes materials for holograms. For holograms used as optical components e.g. holographic diffraction grating, see also V07-F02B. Holography is in V07-M.

# V07-F02D [2006]

#### **Photonic optical elements**

For waveguides see V07-F01A4. For fibers see V07-F01A1X. For novel band gap aspects of photonic materials, and novel photonic materials, see V07-K10C.

### V07-F03 [1992]

#### Mode selectors/converters

(V07-F01A1) Multi-mode

# V07-G [1983]

# **Coupling light guides**

Codes V07-G01 to V07-G04 are used in conjunction with V07-G10 to V07-G12.

# V07-G01 [1983]

### **Preparing fiber**

Includes cutting, polishing, stripping protective coating (see also V07-H01). Hand tools are also in V07-H01.

Cleaving, scoring

#### V07-G02 [1983]

#### Aligning with fiber or source

Includes alignment using e.g. ferrules or by injecting light into fiber and measuring maximum transmission.

# V07-G02A [2005]

#### **Optical ferrules**

Includes all aspects of ferrule structure, manufacture, molding, methods and equipment

# V07-G03 [1983]

# Fixing separation, fastening

Includes plugs, screw-ins, lever locking, retainment against pulling force, spring-biasing, strain relief (see also V07-H codes), fixing gap between fiber ends, optical cement, etc.

# V07-G04 [1983]

#### Beam shaping and focusing

Includes expanding of beam with lens, forming of e.g. elliptical lens on fiber, heating to alter refractive index distribution, mode, phase, and beam profile matching, anti-reflection coating.

#### V07-G05 [2005]

# Optical components other than beam shaping and focusing

Includes filters, polarisers, gratings, mirrors etc. for coupling structures. Filters for beam shaping or lensing are covered in V07-G04, otherwise covered here. For novel optical element aspects see V07-F02 codes.

# V07-G10 [1983]

# 2- port connections

Includes coaxial connections, e.g. simplex, duplex, ribbon cable to ribbon cable, bundle to bundle, fiber termination, coupling fiber to thin film waveguide, and connections on thin film waveguide (see also V07-F01A5). V07-G10 is used if it is unclear whether connection is detachable or permanent. When this code is used in combination with V07-F02 it indicates that connection has other optical function, e.g. as attenuator.

#### V07-G10A [1983]

#### **Detachable connectors**

Includes connections intended for repeated connection/disconnection e.g. plug type.

# V07-G10B [1983]

#### Permanent connections

Includes splicing by fusing fiber ends or using heat shrinkable sleeve or using index matching adhesive.

#### V07-G10C [1983]

# Coupling guide end to active source/detector

Includes connections to LED, laser diode, lamp, or photodiode, bi-directional coupling to source/detector. In general, use also V07-G10A if connection is detachable but not V07-G10B, if permanent. Also includes bare fiber inserted into source module package, e.g. as pigtail (see also U12-A01C).

# V07-G10D [1987]

# **Optical coupling**

Includes coupling between fibers using e.g. lens, fiber-thin film coupling.

# V07-G10E [2002]

# Orthogonal intersection of parallel fiber optic threads

Includes intersection of parallel woven fiber optic threads, orthogonal to another fiber optic thread. Fabric panel, display, energy beam, internal reflection, light generating pixels

# V07-G11 [1983]

#### 3- or more port couplers

Includes coupling e.g. by splitting light path or removing cladding, (de)multiplexing (see also V07-K04); circulators, evanescent coupling, star couplers, bi-directional coupling using beam splitter, mode selector/converter (see also V07-F03).

Branching

# V07-G12 [1983]

# **Rotary couplers**

Slip-ring

# V07-G13 [2005]

# Optical fiber component packages/modules for optical communications

Includes optical line cards, optical backplanes and other passive optical component modules. Does not include electro-optical packages, which are coded in W02. Includes manufacture.

### V07-G15 [1983]

#### **Optical switching**

Includes mechanical, electromechanical, electro/magneto-optic or thin film switches. Electromechanical or electro/magneto-optic switching is also in V07-K01. Rotary switches are also in V07-G12.

Shutter, fiber displacement

# V07-H [1983]

#### Light guide installation

Covers installations analogous to W01-D, X12-G.

#### V07-H01 [1992]

# Methods and equipment for installing light quides/cables

Includes hand tools for use in-field (see also V07-G01), stripping coating or cladding, dispensers, air blowing, pulling of guide through duct, splicing, cable marking.

Joining, terminating

# V07-H02 [1992]

# Fittings for optical guides/cables

Includes splice cases, distribution boxes, strain relief, heat shrinkable covers, clamps etc. For installation tools used with these fittings see also V07-H01.

#### V07-H03 [1992]

# Installations for optical guides/cables

Includes details of optical fibers in underwater/underground/overhead power distribution network. For installation tools used on site see also V07-H01.

Conduit, ducting, feed-throughs, bushings

# V07-H04 [2005]

# **Optical fiber excess management**

Includes optical cable reels, trays, cable guides and supports for excess cable management, surface inlaid fiber optic installations and pre-assembled fiber-optic installation panels. From 2006 see V07-H04A for excess fiber management for fiber in use, and V07-H04B for excess fiber management for fiber not in use. See also X12-G04A1 for reels for composite optical and electrical cables. Prior to 2005 see V07-H09.

Reels

#### V07-H04A [2006]

# Optical fiber excess handling and management

Includes optical cable reels, trays, cable guides and supports for excess cable management, surface inlaid fiber optic installations and pre-assembled fiber-optic installation panels for fiber-optics connected to communications/light transmitting system. Also includes protection of buried fiber optic nodes.

# V07-H04B [2006]

# Optical fiber storage and transporting aspects

Includes optical cable reels, trays, cable guides and supports for excess cable management, surface inlaid fiber optic installations and pre-assembled fiber-optic installation panels for excess/spare fiber not connected to anything, e.g. for storage in warehouse/ storage cabinet. Also includes storage space for jacketed fiber.

### V07-H09 [1992]

# Other aspects of light guide installations

Includes all other aspects of cable installation not covered anywhere else. From 2005 see V07-H04 codes for reels.

# V07-J [1983]

### Measuring optical element parameters

For measurements during waveguide manufacture, see also V07-F01A3A. Includes measuring/testing guide characteristics e.g. loss, dispersion (see also S02-J04A1); fault location/monitoring of transmission system e.g. breakage (see W02-C codes also). Excludes optical sensors i.e. measuring of non-optical parameter using optical fibers: these are coded in V07-K and in the relevant S01/S02/S03 codes.

Attenuation, intensity, optical time domain reflectometry, OTDR

# V07-K [1983]

#### **Controlling light**

In general, includes modification of optical properties of medium electrically, magnetically, acoustically, and physically (i.e. force, stress, etc.), and by using light (i.e. non-linear optics). Also includes light switching and electro- or magnetooptic materials. For spatial light modulation, prior to 1997, see V07-K01 and V07-K05; from 1997 spatial light modulators are covered in V07-K01A2. For spatial phase correction, prior to 199701 see V07-K02 and V07-K05; from 1997 spatial phase correction is covered by V07-K02 and V07-K01A2. Excludes anti-dazzle electro-optic vehicle mirror (see X22-J), electro-optic spectacles (see X27-A02D), constructional details of electro-optic display (e.g. for liquid crystal, electrochromic displays, see U14-K codes).

# V07-K01 [1983]

#### Light intensity control, modulation

Includes physically modifying fiber e.g. by stretching, bending; using acousto- or magneto-optic effects. Also covers optically activated liquid crystal devices.

# V07-K01A [1987]

# Light intensity control/modulation using electro-optical devices

Includes control using liquid crystal devices; semiconductor light in-light out devices (see also U12-A02C3); MQWs (see also U12-E01B2). From 1992 for optical logic devices see V07-K06.

Multi-quantum well, Kerr, Pockells, Stark

# V07-K01A1 [1997]

#### Single optical beam modulation

(V07-K01A)

# V07-K01A2 [1997]

#### Area modulation

(V07-K01, V07-K05)

Prior to 1997 spatial modulation is covered by V07-K01 and V07-K05. For magneto-optic spatial modulation see also V07-K03.

Light valves, spatial, Spatial light Modulation (SLM), 3D Projecting light displays

[1987]

#### V07-K01B

# **Light control using shutters**

Includes e.g. electromechanical chopper, ferromagnetic fluid.

# V07-K01C [1992]

# **Optical amplification**

(V07-K01, V07-K01A, V08-A04X) Repeater

# V07-K01C1 [1992]

# Semiconductor optical amplifiers

(V07-K01A)

Includes amplifiers derived from conventional laser diodes. See also U12-A02B1, U12-A02C3 or V08-A04A.

#### V07-K01C2 [1992]

#### **Optical fiber amplifiers**

(V07-F01A1, V08-A4X)

Includes fiber doped with rare earth metal (e.g. erbium) amplifier.

# V07-K02 [1983]

# **Phase**

Includes pulse shaping.

Sagnac, interferometer, delay, refractive index

# V07-K03 [1983]

#### **Polarisation**

Includes magneto-optic effect, and materials which exhibit this effect. For magnetometers using rotation of polarised light, see also S01-E01.

Faraday effect/rotator, Kerr, optical isolator, circulator

# V07-K04 [1983]

# Frequency, colour

Includes (de)multiplexing, heterodyning, frequency shifter e.g. using non-linear optics (for materials see V07-K10 codes), wave mixing or mode shifting in optical fiber and 3- or more pole multiplexing connectors (see also V07-G11).

Up/down converter, frequency doubling, second harmonic generation, SHG, optical harmonic generators

# V07-K05 [1983]

#### Position or direction

Includes deflection, scanning using e.g. rotating mirror or acousto-optic devices. Scanners are also coded in S06-D and E, or W04-M01E depending on application, respectively, to copier, printer, facsimile, or opto-mechanical TV systems. Mirrors per se are coded in V07-F02A.

# V07-K06 [1992]

# **Optical logic**

(V07-K01A)

Includes bistable devices, optical computer elements, optical ADC. See also relevant codes in U12-A01, U12-E01, U14-A02, T01-E05A, T02-A03, U21-A03G, U21-C01G.

Self-electro-optic effect, SEED, binary optics

#### V07-K10 [1992]

#### Materials used for controlling light

(\/07-K)

For materials with magneto-optic effect see V07-K03.

#### V07-K10A [1992]

# **Liquid crystals**

See also U11-A03A.

# V07-K10B [1992]

# Nonlinear optical and electro-optical materials

Second harmonic generation, SHG

#### V07-K10B1 [1992]

# Inorganic non-linear optical and electrooptical materials

Includes lithium niobate, potassium titanyl phosphate (KTP), beta-barium borate (BBO), ceramics e.g. lead lanthanum zirconium titanate (PLZT).

#### V07-K10B2 [1992]

# Organic non-linear optical and electrooptical materials

Includes Langmuir-Blodgett thin films, polymers. Steroidal ketone, organopolysiloxane

#### V07-K10C [2005]

# Novel photonic crystals and materials

Covers all novel photonic materials, including e.g. new band-gap technology/arrangements. For photonic fibers see V07-F01A1X, for photonic waveguides see V07-F01A4, and from 2006 see V07-F02D for all other photonic optical elements.

# V07-L [2006]

# Manufacture, materials, equipment for optical elements other than optical fibers and waveguides

All manufacturing aspects of optical fibers and waveguides are coded in V07-F01A3 codes. Prior to 2006 all manufacturing aspects were coded under the relevant device. Post 2006 see both relevant device code and V07-L code to indicate the manufacturing aspect of the device in question.

# V07-L01 [2006]

Manufacturing methods for optical elements other than optical fibers and waveguides

# V07-L02 [2006]

Materials for manufacturing optical elements other than optical fibers and waveguides

For non-linear and electro-optical materials see V07-K10 codes.

#### V07-L03 [2006]

Equipment for manufacturing optical elements other than optical fibers and waveguides

# V07-M [1983]

# Holography

All aspects are included. Holograms per se are in V07-F02C.

Record, image, rainbow

# V07-N [1987]

# **Applications of optical fibers**

Applications other than those in V07-N01 to V07-N03 are coded in V07-N e.g. fiber-optic lasers using Raman/Stimulated Brillouin Scattering (see also V08-A codes). If fiber-optic laser is used as amplifier see V07-K01C2.

SBS

# V07-N01 [1987]

# Gyroscopes, interferometers, sensors

Sensing using optical fibers. If novelty covers control of light, see also V07-K. Semiconductor laser light source for gyroscopes are also coded in U12-A01B1 and V08-A04A. Gyroscopes are also coded in S02-B07 and W06-A07; for interferometers see also S02-A03

Rotating, angular, loop, Sagnac

# V07-N02 [1987]

#### **Endoscopes, fiberscopes**

Medical and industrial endoscopes are also coded respectively in S05-D04 and S02-J04.

Camera, imaging

# V07-N03 [1987]

#### Illumination

See X26-G also. Includes transmission of solar radiation from outside to interior of building, Christmas tree lighting, microscope slide illumination, use of lamp at one end of fiber for lighting.

# V07-X [1983]

# Miscellaneous aspects of light guides

Includes (chemical) optrodes, sacrificial/consumable non-waveguide sensors, etc.

#### V08: Lasers and Masers

Includes details of sources and amplifiers of coherent optical (i.e. IR, visible light and UV) and other EM waves.

#### V08-A

#### Lasers

For aspects directly involved with construction, operation, parameter control and monitoring of laser; and also for equipment, e.g. safety goggles, required for working with laser. For electrical aspects of laser used with weaponry and in laser surgery see W07, according to application, and S05-B01 codes respectively. For lidar see W06-A06 codes. For optical amplifier used in optical communication see also V07-K01C codes.

#### V08-A01

# Construction/shape of optical resonators or active medium

From 1992 details of active medium are covered by V08-A01D.

# V08-A01A [1983]

#### **Optical resonators**

Includes reflector details e.g. mirror, which is also coded in V08-A08 if it is unclear whether it forms part of resonator. Also includes external mirror for semiconductor laser.

# V08-A01A1 [1992]

# **Ring lasers**

(V08-A01A)

For gyroscopes see also S02-B07B and W06-A07.

#### V08-A01A2 [1992]

# With passive optical components to control e.g. laser frequency

(V08-A01A, V08-A03)

Includes prism, diffraction grating, birefringent, non-linear materials placed inside optical resonator. For controlling laser parameters see also V08-A03 codes.

#### V08-A01A3 [1997]

# **External optical resonator**

(V08-A01A)

External cavity, folded cavities

# V08-A01B [1992]

# Characterised by electrode details of laser

(V08-A01, V08-A02)

Includes material, structure of electrodes. See also V08-A04B code for arrangement of electrodes passing through discharge tube of gas laser.

#### V08-A01C [1992]

# Gas management systems of laser

(V08-A01, V08-A04B) Gettering, replenishing

# V08-A01D [1992]

# Characterised by active medium material of laser

This code is used in conjunction with V08-A04 codes to identify type of laser for which the active material is used. For semiconductor laser see also U12-A01B6 code for e.g. blue and green light emitting lasers.

### V08-A01D1 [2002]

#### Preparation of active material

(V08-A01D)

Includes crystal growth and doping aspects. Does not include semiconductor laser formation (see U11/U12-A01B codes).

# V08-A02

#### Pumping of active medium within laser

Includes thermal, chemical and electron beam pumping; expansion shock (e.g. compressed argon/xenon) excitation system; etc.

Excitation, population inversion

#### V08-A02A [1987]

#### Semiconductor laser drive circuit

Semiconductor laser drive circuits, are also coded in U12-A01B4. Control of drive circuit for stabilisation of laser is also in V08-A03A1 for amplitude stabilisation, or V08-A03C2 for frequency stabilisation.

#### V08-A02B [1987]

#### **Optical pumping of laser**

Includes flash-lamps, shining light on semiconductor laser.

#### V08-A02C [1992]

#### **Pumping of gas laser**

Includes pre-ionisation, gas discharge, capacitive or inductive excitation. Covers pumping by electrical discharge in gas laser, pulse drives.

Discharge electrode

#### V08-A03

### **Control of laser parameters**

Includes control of beam parameters e.g. phase, frequency, mode. For use of feedback to monitor laser output and correct pumping conditions see also V08-A06A. Also includes varying position of optical components inside laser cavity. For control of components outside resonant cavity see also V08-A08, V07-F02, V07-K codes or under application. For stabilisation using temp. control involving cooling see also V08-A05. Also applied for laser using electro-optical device exhibiting Pockells- or Kerr- effect, etc.

Mirror positioning, direction, polarisation, nonlinear optics, Brillouin/Raman scattering

#### V08-A03A [1987]

# **Control of laser intensity**

Power

V08-A03A1 [1992]

**Amplitude stabilisation of laser output** 

V08-A03B [1987]

### Control of laser mode

Locking, suppression

V08-A03C [1987]

#### Control of laser frequency

Line width, tuning

### V08-A03C1 [1992]

# Frequency multiplication of laser output

(V08-A03)

See also V08-A01A2 if passive optical component is placed inside optical resonator.

#### V08-A03C2 [1992]

#### Frequency stabilisation of laser output

# V08-A03D [1992]

# Laser Q-switching

(V08-A03)

Includes electro-optic, magneto-optic, acoustooptic modulators, rotating mirror or prism, bleachable dye used for giant-pulse technique. *Q-spoiling* 

# V08-A04

#### Laser types

This code is used in conjunction with other codes as applicable, e.g. gas laser optical resonator is coded in V08-A01A and V08-A04B. For materials or compositions for active medium see also V08-A01D.

#### V08-A04A

#### Semiconductor laser

See also U12-A01B codes for semiconductor laser body, package and manufacturing details. Includes DBR and DFB. For light-in/light-out modulators and logic gates see also V07-K codes and U12-A02C3. For testing of semiconductor laser see U11-F01C5 and V08-A06. For semiconductor laser drive circuits see U12-A01B4 and V08-A02A. For optical amplifier see V07-K01C1. For laser used to read optical disk or CD see also W04-C and T03-B codes.

Active, single-heterostructure, doubleheterostructure, buried, stripe, surface emitting, electrode, distributed Bragg reflection, distributed feedback, current blocking layer, lateral current confinement, quantum well, cleaved-coupled cavity

# V08-A04B [1983]

#### Gas laser

(V08-A04X)

Includes atomic, molecular, ion, excimer, metal vapour and chemical lasers. For controlling gas pressure see V08-A01C. For electrode details see also V08-A01B. For gas laser excitation see V08-A02C.

TEA, carbon dioxide, helium-neon, argon, krypton/fluoride, xenon chloride, oxygeniodine

# V08-A04C [1983]

#### Solid-state laser

(V08-A04X)

Includes doped insulator, crystal, glass, etc. laser. Excludes semiconductor laser.

Rod, slab, neodymium, YAG, ruby, holmium

# V08-A04C1 [1997]

### Laser diode pumped solid state laser

(V08-A04C)

Includes solid state lasers pumped by laser diodes or laser diode arrays. For specific optical pumping details see V08-A02B code also.

#### V08-A04C2 [1997]

#### **Optical fiber laser**

(V08-A04X, V08-A04C)

See also V07 codes. For fiber-optic amplifier see V07-K01C2 only. Details of laser pumping of optical fiber are covered by V08-A02B. Prior to 1997 optical fiber lasers were covered by V08-A04X.

Waveguide laser

# V08-A04D [1983]

#### Liquid or dye laser

(V08-A04X)

Rhodamine, crystal violet, coumarin

# V08-A04E [1987]

#### Free electron laser

FEL, wiggler field

#### V08-A04F [2011]

# Infrared lasers and UV lasers, non-visible light sources

Includes IR and UV lasers emitted from non visible light source, For illumination aspects see also X26-Q01 and X26-Q03

#### V08-A04X

# Other laser types

Includes lasers using scattering effects. From 1997 for optical fiber lasers see V08-A04C2. For X-ray lasers and MASERs see V08-B codes.

Raman, Brillouin

# V08-A05 [1987]

# Cooling/heating aspects of laser

(V08-A09)

Includes cooling as part of gas recirculation system, heat sinks, temperature control and stabilisation. For laser parameter stabilisation and control see also appropriate V08-A03 code. For heat sinks for semiconductor lasers see also U12-A01B3A.

Circulate, coolant, pump, thermostat

#### V08-A06 [1987]

# Measurements and testing of laser

(V08-A09)

Includes monitoring of laser output during operation e.g. arc discharge detection. For photodiode arrangement within laser diode package see also U12-A01B3. For measurements performed on laser beam see also S03-A codes. For testing of semiconductor laser see also U11-F01C5.

# V08-A06A [1997]

# Monitoring for direct active feedback control of laser parameter

(V08-A06)

For monitoring details of automatic laser parameter control using monitored laser output to stabilise parameter or control laser operation. For semiconductor laser diode drive circuit receiving parameter measurement from e.g. photodiode see U12-A01B4 and V08-A02A codes also. See also applicable V08-A03 code.

# V08-A07 [1992]

#### Assemblies of lasers

Prior to 1992 laser diode arrays were coded in U12-A01B, U13-D04, V08-A04A. From 1992 they are covered by this code and U12-A01B1, V08-A04A.

# V08-A07A [1992]

# Injection locking within laser assembly

(V08-A01, V08-A03, V08-A04)

Includes master-slave arrangements for continuous wave lasers and, in case of pulsed laser, Master Oscillator-Power Amplifier configuration.

Seed oscillator, CW, MOPA

#### V08-A08 [1992]

# Correcting laser beam parameters outside resonator

(V08-A09)

Includes components for correcting laser beam parameters e.g. profile/field patterns. See also V07 codes. Also includes homogenisation of beam.

#### V08-A09

# Other laser related aspects

Includes packaging and enclosure details. For packages for semiconductor lasers see U12-A01B3, with semiconductor laser package manufacture covered in U11-D01 and E02 codes.

# V08-A10 [1997]

# Protection equipment for use with laser

Includes passive and active laser protection equipment preventing injury or blinding of person using laser or person upon which laser is operated. For direct active control of laser using parameter measurement feedback see V08-A06A and V08-A03 codes also. For goggles see also X27-A02D. *Goggles* 

# V08-B

#### Other stimulated emission devices

For frequency standard aspects see U23-D codes, e.g. U23-D02, S04-C09. For atomic clock aspects see S04-B02X.

Atomic frequency standard

# V08-B01 [1997]

# Sub-IR frequency emitting device

Used for ultra-low frequency emitting device e.g. MASER

Microwaves

#### V08-B02 [1997]

# X-ray laser

(V08-B)

Prior to 199701 X-ray lasers were covered by V08-B. For ultra-high frequency laser see also V05-E03. For X-ray lithography in semiconductor manufacture see also U11-C04H1.

# **Section W: Communications**

W01: TELEPHONE AND DATA TRANSMISSION SYSTEMS	. 621
W02: Broadcasting, Radio and Line Transmission Systems	. 666
W03: TV and Broadcast Radio Receivers	. 719
W04: Audio/Visual Recording and Systems	. 749
W05: Alarms, Signalling, Telemetry and Telecontrol	. 796
W06: Aviation, Marine and Radar Systems	. 820
W07: ELECTRICAL MILITARY EQUIPMENT AND WEAPONS	. 836

# W01: Telephone and Data Transmission Systems

#### W01-A

# **Digital information transmission**

Codes in this group relate chiefly to novel aspects of digital transmission and to a lesser extent to its applications. Note that some communications or broadcast systems which are inherently digital, such as GSM or DAB, are not routinely coded here but are included for specific novel data communication aspects which can be usefully represented by the assignment of W01-A codes. (For systems aspects of GSM, see W01-B05A1A and W02-C03C1A; for DAB see W02-D05C1). From 2002, it is intended to make a greater distinction between these aspects of novel digital transmission technology and applications which are better dealt with elsewhere. Thus, for example, inventions concerned merely with the use of the internet, such as for e-business purposes, or with software aspects of email, will **not** be included in W01, and are covered in class T01 (digital computing).

# W01-A01

# **Error detection and prevention**

Error correction coding in general is covered by U21-A06 codes.

Monitor, link, check, redundancy, BER

# W01-A01A

#### By diversity, repeating or returning

Diversity radio systems are covered by W02-C03A codes and where an invention is concerned chiefly with radio aspects and data transmission details are not significant, those codes are assigned instead of W01-A01A. However, where radio aspects and data transmission aspects are significant both W01-A01A and W02-C03A codes may be assigned together.

ARQ, retransmission request, MIMO, return channel, Stop-and-wait protocols, Go-Back-N protocols, Selective-repeat protocols

# W01-A01B

#### **Using codes**

Generally-applicable error detection using codes, i.e. not specific to data communications, is covered by U21-A06 codes.

Decode, encode, symbol, Reed, Forward Error Correction (FEC)

# W01-A01B1 [1992]

#### **Block codes**

Covers coding where the final codeword is of fixed, finite length e.g. cyclic block coding.

Parity, cyclic, Hamming distance, BCH

### W01-A01B1A [2005]

#### Using parity

Includes the use of odd and even checking bits.

# W01-A01B1C [2002]

#### **Reed Solomon coding**

Note: Reed Solomon coding was incorrectly treated as a convolutional code from 2002 to 2004 and coded as W01-A01B2C. That code has now been deleted and the records to which it was assigned have been recoded as W01-A01B1C to place them in the correct block code hierarchy.

### W01-A01B1E [2021]

#### **Low Density Parity Check**

Includes channel coding in a 5G system for which W02-C03C1L is also assigned.

LDPC

# W01-A01B1G [2021]

#### Polar codes

Includes channel coding for control channels in 5G system for which W02-C03C1L is also assigned.

#### W01-A01B2 [1992]

#### **Convolutional codes**

Covers generation of a digit sequence from the informational digits in which no finite group of digits can be ascribed to one informational codeword. Includes max - likelihood or sequential algorithm for e.g. Viterbi, Fano, ZJ algorithms.

Trellis, punctured code

# W01-A01B2A [2002]

Viterbi coding

#### W01-A01B2E [2002]

# **Turbo coding**

Parallel concatenated convolutional codes

#### W01-A01B2G\* [2002-2005]

# **Combined convolutional coding scheme**

\*This code is now discontinued. W01-A01B2G remains valid and searchable for records between 2002 and 2005 for combined convolutional coding schemes. From 2006, all aspects of hybrid or combined error correction coding schemes are covered in W01-A01B4.

# W01-A01B2S

[2002]

### Novel algorithm or software aspects

Codes from class T01 are normally assigned for these aspects also, e.g. from the T01-S group.

#### W01-A01B2X [2002]

# Other aspects of error correction based on convolutional codes

#### W01-A01B3

[1992]

#### **Using format**

Includes checking the format of received data for detection of errors, for example, system for checking complementary nature of received signals when complement of signal is also transmitted.

# W01-A01B4

[2006]

# **Hybrid coding scheme**

(W01-A01B2G)

This code covers error correction using either a combination of block and convolution codes or multiple block or convolutional codes. Other W01-A01B codes are assigned as appropriate to highlight the coding types being used. Prior to 2006, combined error correction coding using convolutional codes only was indicated by assignment of W01-A01B2G.

Concatenated, outer-inner coding

# W01-A01B4A

[2021]

# **Hybrid Automatic Repeat Request**

This code indicates the use of HARQ in a 4G or 5G communication system for which W02-C03C1H or W02-C03C1L are also assigned.

HARQ

## W01-A01B5 [2005]

#### Interleaving

Covers reduction in burst errors by re-organising data structure before transmission.

### W01-A01C

[1992]

# Signal quality detection/testing correct operation

See also S01 and W02 codes. Includes jitter monitoring, using pseudo-errors and comparing transmitted test signals with locally generated replica.

Link quality estimation (LQE), jitter

#### W01-A01C1

[2002]

# Signal quality detection based on measurement of bit error rate

This code is intended to be used when the emphasis is on BER measurement, for whatever purpose. Systems with the emphasis on overall link quality and testing for correct operation are covered by W01-A01C5. BER measurement for radio receivers is covered by W02-G03J5 codes.

#### W01-A01C1A

[2002]

# Novel hardware or software aspects for BER measurement

Codes from class T01 are normally assigned for software or algorithm-based aspects also, e.g. from the T01-S group.

#### W01-A01C1C

[2002]

# Applications of BER measurement

This code is intended for arrangements which make **use** of a BER measurement which is already available, and not itself the novel aspect. This code may be used with W01-A01C5 when the purpose is the establishment of a link quality value, QoS, etc.

#### W01-A01C5

[2002]

# **Testing correct operation**

This code is intended to be used when the emphasis is on testing satisfactory link operation by investigating signal quality, making use of error detection and possibly involving other parameters also, and includes techniques such as eye pattern measurements. Systems with the emphasis on BER measurement, and novel methods or hardware for this, are covered by W01-A01C1 codes. Fault detection and monitoring of data networks is covered by W01-A06A codes and by W01-A07L for data transmission in general, which may be assigned in conjunction with this, and other W01-A01C codes, as necessary.

Eye diagram

# W01-A01X

[1992]

# Other error correction and detection aspects

#### W01-A02

#### Code conversion

See also W01-A08A1A for synchronous start-stop systems characterised by code and U21-A05 codes for specific coding formats.

Modulation, trellis coding, biphase level, Manchester coding, stochastic, parallel weight, NRZ

# W01-A02A [1997]

#### **Data compression**

See also U21-A05A2 and T01-D02 codes as appropriate.

#### W01-A03

# Multiple use of transmission path

The codes in this section relate to multiple access methods, duplex and multiplex transmission. Multiplex transmission in general is covered by W02-K codes.

Header, data, trailer, fixed-length, variable-length, STM (synch transfer mode), CBX (computerised branch exchange)

# W01-A03A\* [1987-2001]

#### Access control

\*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1 codes. W01-A03A remains valid and searchable for records between 1987 and 2001 and was assigned with W01-A06 codes for network aspects, e.g. with W01-A06B5A for access control in LANs. See also T01 codes, such as T01-H05 and T01-H07codes.

Access right, protocol, arbitration, code division, CDMA, binding

#### W01-A03A1\* [1987-2001]

# Carrier sense multiple access (CSMA/CD and CA)

\*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1A. W01-A03A1 remains valid and searchable for records between 1987 and 2001. During this time W01-A03A1 was combined with W01-A06F to indicate Ethernet. Request handling for interconnection or data transfer in computer systems is covered by T01-H05 codes, e.g. T01-H05B3 for contention avoidance for access to common bus.

Collision detection, dc level shift, heterodyne, Ethernet®, timeout period, random delay, collision avoidance, contention

# W01-A03A2\* [1987-2001]

#### Time division multiple access (TDMA)

\*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1G. W01-A03A2 remains valid and searchable for records between 1987 and 2001. See W02-C03B and W02-K codes, e.g. W02-C03B1D and W02-K02D, for TDMA aspects of satellite radio systems.

Aloha, slotted, synchronous, frame, burst transmission, DQDB (distributed queue dual bus), CRMA (cyclic reservation multiple access)

# W01-A03A3\* [1987-2001]

#### **Token pass**

\*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1E. W01-A03A3 remains valid and searchable for records between 1987 and 2001.

Dynamic logical ring, priority token, address, FDDI

[1992]

#### W01-A03B

# **Packet transmission**

(W01-A06X)

Covers all systems where digital data cells or packets are transmitted to a selected destination by a terminal, computer applications program or other data handling device. The destination can be another data handling or data communication apparatus or system. Includes Packet Assembler/Disassembler (PAD). See W01-A06G2 for store and forward packet switching processors and W02-K03 for packet switching in general, e.g. voice packet switching.

# Virtual circuit, VCI, Virtual path, VPI

# W01-A03B1 [1992]

# Asynchronous Transfer Mode (ATM)

(W01-A06X) Cell, B-ISDN, PTM

# W01-A03C [1992]

#### Time division multiplexing (TDM)

Pulse stuffing

#### W01-A03C1 [2005]

#### **Time Division Multiple Access (TDMA)**

See W01-A06F1G for network aspects of access control scheme and W02-C03B and W02-K codes, e.g. W02-C03B1D and W02-K02D, for TDMA aspects of satellite radio system.

Aloha, slotted, synchronous, frame, burst transmission, DQDB (distributed queue dual bus), CRMA (cyclic reservation multiple access)

# W01-A03D [1992]

# Duplex

Includes half and full duplex systems.

W01-A03D1 [2002]

Half duplex

W01-A03D5 [2002]

**Full duplex** 

W01-A03E [2002]

WDM and FDM

# W01-A03E1

#### **WDM**

WDM in general is assigned W02-C04B4B and W02-K04. General aspects of optical data transmission are covered by W01-A07E, and those specific to data networks by W01-A06C1 (optical fiber-based) and W01-A06C3 (free-space transmission). Optical communication in general is covered by W02-C04 codes. Novel optical components are covered in V07, especially V07-K04.

[2002]

#### W01-A03E5 [2002]

#### **FDM**

FDM in general is assigned W02-K01 codes.

#### W01-A04

# Synchronising receiver with transmitter

See also W02-K02A codes for general aspects of synchronising in TDM and W02-K05B7 for synchronising in spread spectrum communications. Digital synchronising circuits in general are assigned U22-H and PLL circuits are covered by U23-D01 codes.

Clock, phase, synchronous, frame delay, lock, recover regenerate, bit stuffing

#### W01-A04A

#### Using synchronisation signals

# W01-A04A1

# Using properties of error detecting/correcting codes or special codes

Includes parity, correlators, PN codes. (Data transmission with error detection/correction codes in general is covered by W01-A01B codes). *Pseudonoise* 

[1992]

# W01-A04A2 [1992]

# Using cyclic recurring signals

See also W01-A01C for jitter monitoring and W01-B02X for clock distribution.  $\label{eq:w01-A01C}$ 

Clock generation

# W01-A04A9 [1992]

### Other systems using synchronising signals

Includes pulse stuffing. Search with W01-A03C for this aspect in TDM data transmission. See W02-K02A3 for pulse stuffing in TDM systems in general.

# W01-A04B [1992]

# Signals containing no special synchronisation information

(W01-A04X)

#### W01-A04B1 [1992]

# Tracking or using signal transitions

(W01-A04X)

Includes use of equaliser output; tap values; decision values or transmission code rule.

PLL

#### W01-A04B2 [1992]

# **Extraction of synchronisation/clock signal** from spectrum

(W01-A04X)

Includes using resonant or bandpass circuit with squaring loop or Costas loop. (See U23-D01C1 for Costas loop demodulation in general.)

#### W01-A04X

# Other data synchronising aspects

Pattern

#### W01-A05

#### Secret communication

These codes are intended for secret and secure data transmission systems, including aspects such as authentication (covered in W01-A05B). From 2002, inventions involving the **application only** of these techniques are excluded when specific codes exist elsewhere, such as in T01 (e.g. T01-D01A, T01-J12C).

Secrecy or scrambling systems for digitised speech or video (e.g. with bit order rearrangement) are assigned W01-A05 codes for novel data transmission aspects, but are chiefly covered by W02-L05 for audio and W02-F05A or W02-F10N codes for video systems.

Algorithm, RSA

# W01-A05A [1992]

# Blockwise coding using registers and memories

Includes DES (Data encryption standard) and AES (Advance encryption standard) systems, and key distribution.

Cryptographic communication, public key, private key

# W01-A05A1 [2005]

#### Wireless

Includes WEP (Wired equivalent privacy) and WPA (Wi-Fi protected access) systems. Prior to 2005, this topic was coded as W01-A05A and W01-A06C4X. From 2005 W01-A06 codes are only assigned for significant network aspects.

WEP, WPA-PSK, WPA-802.1x, WPA2

# W01-A05B [1992]

# Identity verification/access control

This code covers authentication and identity verification in which data encryption is involved in some way. Verifying entitlement to access data networks is covered by W01-A06E1C, and is not assigned W01-A05B also unless some encryption aspect exists. Applications such as password checking for computer access are not included, and are covered by T01-J12C codes for computer security in general, and from 2002, by T01-N02B1B. Confidential mail password

# W01-A05E [2006]

# **Quantum cryptography**

This code covers the use of quantum physics to provide inherent detection of eavesdropping or interception of data communications. Where optical communications are involved, e.g. single-photon systems, W01-A07E, W01-A06C1, or W02-C04 codes are also assigned as appropriate. *Polarisation, filter* 

# W01-A05L [2007]

# Data interception and prevention of interception

This code covers the interception of data communications using any medium. Secret and secure data transmissions using either cryptographic encryption or quantum cryptography are covered by W01-A05A and W01-A05E respectively. Interception and prevention of interception of analogue communication system are covered by W02-L07 codes.

W01-A05L1 [2007]

**Data interception** 

W01-A05L5 [2007]

# **Prevention of interception**

Includes data concealment Masking, steganography

W01-A05X [1992]

Other secret data communication

# W01-A06

# Exchanges, connections between exchanges, data networks and network switching

Subject matter covered here has considerable overlap with class T01, especially in the case of computer communication aspects. Searching appropriate T01 codes, e.g. T01-H05, T01-H07, or T01-N codes, in conjunction with W01-A06 codes enables these topics to be further discriminated. In

general, a 'network' is regarded here as an interconnection for data transfer of at least three stations, so that inventions involving data communication between only two stations are assigned W01-A07 codes instead. (Although note that W01-A07 codes may be used with W01-A06 codes to highlight a specific aspect, e.g. a power supply for a LAN is represented by W01-A06B5A and W01-A07K).

Note: As stated at the start of the W01-A code group, since 2002 inventions concerned purely with applications of data networks such as the internet, have not been covered in W01-A06 codes where specific T01 codes exist. Similarly, since 2002 electronic mail has been covered in T01-N01C only, unless specific novel data communications aspects are involved which require assignment of W01-A codes. (Prior to 2002 W01-A06E1, W01-A06G2, and W01-A06X, were routinely used, depending on details).

Due to convergence between wireless network and mobile telephone technologies analogous codes should also be considered in these areas when searching particular topics. For example, W01-A06C4 codes denoting wireless networks and W01-B05A1 codes for cellular phone systems may cover overlapping areas. From 2012 W01-E codes have been introduced for mobility-related aspects such as roaming and registration in wireless data networks and mobile phone networks. Prior to 2012 inventions concerned with roaming where the emphasis is on wireless data network access were assigned W01-A06E1R or W01-A06E1S (respectively roaming between same-standard and between different-standard networks) whilst roaming with emphasis on cellular mobile telephone systems was assigned W01-B05A1R. (These codes are now discontinued and replaced by W01-E01 codes).

Mode, outstations, gateway

#### W01-A06A

**Testing and monitoring** 

W01-A06A1 [1992]

### Failsafe and standby systems

Includes standby and back-up systems.

#### W01-A06A1A [1992]

# Standby switching to powered up equipment

Includes hot standby systems. See W01-C02A1C for hot standby systems in telephone exchanges, W02-C01D3A for their use in general line communication and W02-G08A for application to radio equipment.

# W01-A06A2 [1992]

#### Fault detection, isolation

Covers routines, equipment and isolation as part of fault location. Bridging/disconnecting arrangements for faulty equipment are covered in W01-A06A1 codes. See also S01 for measurement of specific electrical parameters. Fault detection in telephone exchanges is covered by W01-C02A1 codes. Communications system fault detection in general is covered by W02-C01D codes for line transmission, W02-C04C1 codes for optical transmission systems, and by W02-C05 codes in general.

# W01-A06A2A [2012]

#### **Network apparatus testing**

This code covers testing of apparatus that is being used in a network with other codes assigned as appropriate, e.g. router testing is denoted by assignment of W01-A06A2A and W01-A06G5E. Testing of data communications hardware in a 'non-network' sense, i.e. 'bench testing' or otherwise testing the equipment in isolation, is covered by W01-A07L codes, which are also used for fault detection or testing of data communications equipment for general or unspecified application.

### W01-A06A3 [2005]

#### Network usage and operation monitoring

Includes measurement of network activity and quality of service, and detection of overload/blocking condition. See T01-N02B2 for computer network aspects of monitoring. Analogous arrangements in telephone switching are covered by W01-C02A1A. Prior to 2012 this code was assigned with W01-A06E to indicate resource allocation in data networks. From 2012 the topic of network resource allocation is covered by W01-A06E1L but W01-A06A3 will still be assigned also when measurement of network performance is a significant part of an invention. From 2010 resource allocation in radio communication has been covered by W02-C03G1 and cognitive radio systems are covered by W02-C03G5 with W01-A06A3, W01-A06E codes and wireless network codes assigned as appropriate. Load measuring, network forensics, QoS

#### W01-A06B [1987]

#### Characterised by structure

Structural codes are used where novelty exists and are also used with other W01-A06 codes as additional detail or a more general description, for example, W01-A06B2, W01-A06B5A and W01-A06E1 can be used to describe a ring LAN with a novel access or routing system.

Topology

W01-A06B1 [1987]

Bus

Linear network, daisy chain, DQDB

W01-A06B2 [1987]

Loop

Ring, FDDI, Cambridge loop

W01-A06B3 [1987]

Star

Dedicated link, hub, cluster, PBX

W01-A06B4 [1992]

#### Tree and mesh

From 2005, the title of this code is expanded to reflect the inclusion of mesh configuration networks, and subdivided.

W01-A06B4A [2005]

Tree

W01-A06B4C [2005]

Mesh

W01-A06B5 [1992]

#### **Networks**

These codes are intended to define the network by size, scale, or usage.

#### W01-A06B5A [1992]

#### Small scale (LAN)

VAN, vehicle area network, CAN, controller area network

W01-A06B5B [1992]

#### Large scale (WAN)

Public data networks, MAN

W01-A06B5C [1992]

#### ISDN

This code is intended to focus on data network aspects of ISDN. See also W01-C05B7 codes, which are assigned for all aspects.

# W01-A06B7 [1997]

#### Internet and intranet

(W01-A06B9)

From 2002 this code has been subdivided to separately cover internet and intranet systems, and in the case of internet, for novel details and for applications. However, note that the applications code (W01-A06B7C) is only used when no other code is available elsewhere (e.g. in T01). In general, inventions concerned purely with the **use** of the internet without any communications novelty will not be covered in W01 from 2002.

#### W01-A06B7A [2002]

# **Novel internet system details**

This code is used for novel aspects of internet systems, and may involve computing aspects represented by T01 codes, e.g. T01-N or T01-M02A codes. **Applications** of the internet are coded in W01-A06B7C when specific codes elsewhere are not appropriate.

# W01-A06B7C [2002]

# **Applications of internet**

This code is intended for applications which cannot be represented by codes elsewhere. Thus, it will not normally be used for inventions involving the application of the internet to e.g. email, ecommerce, chatrooms, etc., for which T01-N01 codes are assigned.

#### W01-A06B7E [2002]

**Intranet system** 

#### W01-A06B7G [2005]

# Virtual networks, including virtual private networks

The title of this code has been expanded to reflect its coverage of virtual networks in general as well as those with the emphasis on restricted access, such as private data networks that make use of public telecommunications infrastructure, e.g. maintaining privacy through the use of tunnelling protocol (see also W01-A06F7C for this aspect) and security procedures (for which W01-A06E1C is also assigned as appropriate). Virtual private telephone networks are covered by W01-C03A.

VPN, VLAN (virtual local area network)

#### W01-A06B8 [2005]

# Data network operation and logical structure

Includes networks operating with a client/server or client/client relationship.

# W01-A06B8A [2005]

#### Client-server network

See T01-N02A2C for computer communication using a client/server relationship.

#### W01-A06B8C [2005]

### Peer-to-peer network

Prior to 2005, all aspects of peer-to-peer network were covered in W01-A06G3. See also T01-N02A2E for computer network aspects of peer-to-peer network.

P2P

# W01-A06B8E [2007]

#### Ad-hoc network

Includes dynamic network where the device are part of the network only for the duration of a communication session or, in close proximity to the rest of the network. Computer aspects of Ad-hoc network are covered by T01-N02A1B.

MANET, Mobile Ad-hoc Network

# W01-A06B9 [1992]

# Other data network types

#### W01-A06C [1987]

#### Data networks characterised by medium

Radio link, free space, optical link, multi-media network, broadband system

#### W01-A06C1 [1987]

#### **Optical fiber**

Non-networked optical communication is covered by W01-A07E. Optical communication in general is covered by W02-C04 codes, optical fiber CATV networks are covered by W02-F03A3 and optical components are covered by V07 codes.

Fiber-optic network, optical coupler, optical modulator, FDDI (fiber distributed data interface), SONET

# W01-A06C2 [1987]

# Coaxial cable, twisted pair

See W02-F03A1 also for LAN using CATV system. Includes dedicated twisted pair system only - see W01-C05B3 codes for shared telephonic and data communication.

#### W01-A06C2A [1992]

#### **Coaxial cable**

Coaxial cables per se are covered by X12-D05, coaxial waveguides by W02-A01A2.

#### W01-A06C2B [1992]

# **Twisted pair**

# W01-A06C3 [1992]

# Free-space optical link

Free-space optical interfaces not specifically for network communication between several stations are covered by W01-A07H3.

#### W01-A06C4 [1992]

#### Radio link

See W02-C03 codes for details of radio systems and W02-G codes for radio equipment itself. Short range systems e.g. Bluetooth®, are assigned W01-A06B5A (to denote LAN) as well. Interfaces of this kind not specifically for network communication between several stations are covered by W01-A07H2 codes. Specific aspects of protocol peculiar to the network types listed below are covered by additional assignment of W01-A06F codes, the intention of the W01-A06C4 codes being to characterize the network link from the radio viewpoint. From 2012 W01-E codes are introduced to cover mobility-related aspects such as roaming and registration in wireless data networks (and mobile phone networks) and these codes will be assigned in preference to W01-A06C4 codes for these specific topics unless the use of W01-A06 codes is required to indicate other significant aspects of an invention, in which case W01-A06C4 codes will also be assigned.

#### W01-A06C4A [2002]

# IEEE 802.15 radio link, including Bluetooth\*

Radio systems for remote measurement and control are covered by W05-D codes, e.g. W05-D06A1A and W05-D08C1. Sensor networks are covered by W05-D06F and W05-D08E. W01-A06C4A is assigned when the wireless network aspect is significant.

ZigBee, WPAN, 802.15x

# W01-A06C4C [2002]

#### **DECT-based radio link**

DECT systems for actual telephone usage are assigned W01-B05A1B and W02-C03C3 codes, with handsets covered by W01-C01D1 codes.

# W01-A06C4E [2005]

#### IEEE 802.11 radio link

Includes systems using 802.11x standards e.g. 802.11p that uses 5.9 GHz frequency for communication between vehicles (Dedicated Short-Range Communications). See also X21-K. *DSRC* 

# W01-A06C4G [2006]

#### IEEE 802.16 radio link

This code covers long-range data communications by radio, including wireless MAN, etc. WiMAX, WMAN, 802.16x

# W01-A06C4K [2005]

#### **UWB** and impulse radio link

Covers carrier-free and carrier-based links using time hopping and similar techniques. Novel details of ultra-wideband systems are covered by W02-K05 codes, especially W02-K05A9 codes.

# W01-A06C4L [2021]

#### Millimetre radio link

This code covers the use of millimetre waves, typically operating between 3GHz to 300GHz for communication e.g. in a 5G system for which W02-C03C1L is also assigned.

# W01-A06C4N [2021]

# Terahertz radio link

This code covers the use of electromagnetic waves with band of frequencies operating between 300GHz to 3THz.

# W01-A06C4P [2021]

# Long range radio link

For communication systems which operate in frequencies below 1GHz, possibly for long range and low power consumption.

LoRa, LPWAN, LoRa Gateway, LoRaWAN

#### W01-A06C4X [2002]

#### Other radio link for networks

#### W01-A06C6 [2006]

#### Power line data network

Covers network using power line carrier as the medium for data transmission, and not systems for supplying power via data network conductors, which are coded according to network type and in U24-H codes. Novel aspects of power line communication are covered in W02-C01A3. See also under application e.g. W05-D06P for remote control aspects and X12-H03E codes for power line carrier systems.

# W01-A06C9 [1992]

# Other transmission media for networks

# W01-A06D [1992]

# **Network modelling**

(W01-A06X)

Includes use of CAD (computer aided design) to design and test networks. Search with T01-J15A4 also.

#### W01-A06E [1992]

#### **Network control and software**

(W01-A06X)

Includes hardware and software for control of transmission and reception of messages and/or data across a network. See also T01-N02B1A code for network management software. Prior to 2012 this code was assigned with W01-A06A3 for network resource allocation, but from 2012 this topic is covered by W01-A06E1L. (W01-A06A3 is also assigned as necessary where actual network performance measurement is part of an invention).

#### W01-A06E1 [1992]

#### **Access and routing**

From 2024, network addressing is coded under W01-A06E1N. Network addressing as opposed to routing (i.e. for determining destination of packets, and not the route that they will travel) is covered in T01-N02A1A. From 2006, all aspects of routing are covered by W01-A06E1J and since 2002, routers per se have been covered by W01-A06G5E.

#### W01-A06E1A [1997]

# Data conferencing and broadcasting

Includes transmission of messages to all users on a LAN, for example (with W01-A06B5A). Electronic mail in general is covered by T01-N01C. See W01-C02B1 for telephone conferencing system and W02-F08A codes for video conferencing system. *Message broadcasting, multi-casting* 

# W01-A06E1C [2005]

# User privileges/password system

Includes systems for granting or denying access to a network. (See T01-N02B1B for computer aspects of user privileges/password systems).

Security, login, permissions, access control list

# W01-A06E1E [2005]

#### Metering and billing aspects

Covers billing and usage aspects of data network services. Analogous systems for telephone usage charging are covered by W01-C06 codes. Internet-café, public wireless access point

# W01-A06E1G [2005]

#### **Graded service**

This code covers the provision of different level/quality of service based on entitlement/agreement in a network context. Analogous arrangements for telephone service are covered by W01-C02B6 codes.

# W01-A06E1J [2006]

# Routing

(W01-A06E1)

This code covers determination of the appropriate path by which data should travel between two places.

# W01-A06E1L [2012]

#### **Data network resource allocation**

Prior to 2012 this topic was covered by W01-A06A3 and W01-A06E. Where measurement of network performance is a significant part of an invention W01-A06A3 will also be assigned. From 2010 resource allocation in radio communication has been covered by W02-C03G1 and cognitive radio systems are covered by W02-C03G5 with W01-A06A3, W01-A06E codes and wireless network codes assigned as appropriate.

# W01-A06E1N [2024]

#### **Network addressing**

Includes all addressing details in a network, like address mapping, address translation etc.

Media Access Control, MAC

# W01-A06E1P [2024]

### **Network proxy**

This code covers the use of proxy servers for accessing a website.

#### W01-A06E1R\* [2006-2011]

# Roaming between same-standard networks

\*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01A1. W01-A06E1R remains valid and searchable for records between 2006 and 2011 when it was used for roaming between networks, e.g. wireless LANs for which W01-A06B5A and W01-A06C4 codes were also assigned, it being assumed that the networks are operating on the same transmission standards. Roaming between different-standard networks was covered by W01-A06E1S, which took precedence over W01-A06E1R.

#### W01-A06E1S\*

[2006-2011]

# Roaming between networks operating on different standards

\*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01A3. W01-A06E1S remains valid and searchable for records between 2006 and 2011 when it covered roaming between networks operating on different transmission standards, including switching between wireless data networks and mobile telephone networks when W01-B05A1R was also assigned. When used, W01-A06E1S took precedence over W01-A06E1R, which covered same-network type roaming.

#### W01-A06E2

[1992]

# Network control characterised by mode

#### W01-A06E2A [1992]

#### **Centralised control**

Covers networks where the host exercises control over the tributary stations all of which are connected to it. The host may also act as a message-switching device between remote sites. See W01-A06G1 also for network circuit switching. Prior to 2002 W01-A06E2A was used to denote polling, with W01-A06F also assigned for significant protocol aspects. From 2002, the topic of polling will be covered by W01-A06F1C, with W01-A06E2A only assigned for specific 'centralised control' aspects.

# W01-A06E2B [1992]

# **Decentralised control**

Includes hierarchical and distributed systems. Covers networks where each station may be connected to several others in the network; giving the possibility to share resources and to distribute the database to the systems which access the data most frequently.

Random access

# W01-A06F [1992]

#### **Network protocol**

(W01-A07G)

W01-A06F codes are assigned to highlight the protocol in use in a network without this being necessarily novel. When some aspect of protocol is novel, W01-A06F5 is also assigned. From 2002 access control topics previously covered by W01-A03A codes are transferred to these codes which will cover all the types of protocols. W01-A06F codes take precedence over W01-A07G codes which cover protocol aspects in a general or nonnetwork sense.

CODEC, DQDB, OSI layer, bi-sync, SDLC, HDLC, SDH, PDH

#### W01-A06F1

[2002]

#### Access control

Search with W01-A06 codes for network aspects, e.g. with W01-A06B5A for access control in LANs. See also T01 codes, such as T01-H07B and T01-N02 codes

Access right, protocol, arbitration, code division, CDMA, binding

# W01-A06F1A [2002]

#### **Contention protocols**

(W01-A03A1, W01-A06F)

Includes Carrier Sense Multiple Access/Collision Detect (CSMA/CD and CA) and Ethernet®. Request handling for interconnection or data transfer in computer systems is covered by T01-H05 codes, e.g. T01-H05B3 for contention avoidance for access to common bus. W01-A06F1A is also used for network access aspects of cognitive radio (with W01-A06C4 codes) based on channel state sensing in which case W02-C03G5 is also assigned from 2010. Resource allocation in data networks in general is covered by W01-A06E1L. (From 2005 to 2012 resource allocation was covered by W01-A06A3 and W01-A06E).

Back-off, channel occupancy, collision avoidance, collision detection, contention, DC level shift, Ethernet®, heterodyne, random delay, timeout period

#### W01-A06F1C

[2002]

#### Polling protocols

(W01-A06E2A, W01-A06F)

Includes hub and roll call polling. Prior to 2002 polling was covered by W01-A06E2A with W01-A06F for protocol aspects.

# W01-A06F1E [2002]

#### **Token pass protocols**

(W01-A03A3)

Token pass protocols for ring networks are also coded in W01-A06B2, and in W01-A06B1 for bus

Dynamic logical ring, priority token, address, FDDI

### W01-A06F1G

[2002]

# Time Division Multiple Access (TDMA)

(W01-A03A2)

See W01-A03C1 for non-network aspects of TDMA in data transmission and W02-C03B and W02-K codes, e.g. W02-C03B1D and W02-K02D, for TDMA aspects of satellite radio system.

Aloha, slotted, synchronous, frame, burst transmission, DQDB (distributed queue dual bus), CRMA (cyclic reservation multiple access) W01-A06F2 [2002]

# **Network layer protocols**

Routing, IP multicast

W01-A06F2A [2002]

IΡ

(W01-A06B7, W01-A06F) Mobile IP

W01-A06F2C [2002]

TCP/IP

W01-A06F3 [2002]

# **Application layer protocols**

DNS/BIND, FTP, HTTP, Telnet, MIME, MQTT, Network File System, NNTP, SMTP, SNMP, POP, RTP, UDP, URI

W01-A06F5 [2002]

# **Novel protocol**

This code is used with other W01-A06F codes as appropriate to denote that some aspect of the protocol itself is novel.

W01-A06F7 [2005]

# Network protocol conversion, encapsulation, and tunnelling

(W01-A06F9)

This code covers arrangements for handling different protocols within a network, the topic previously being covered in W01-A06F9.

W01-A06F7A [2005]

**Network protocol conversion** 

W01-A06F7C [2005]

# Network protocol encapsulation and tunnelling

For protocol tunnelling in connection with VPNs search with W01-A06B7G.

W01-A06F9 [2002]

Other network protocol aspects

W01-A06G [1992]

**Network switching/connection** 

(W01-A06X)

# W01-A06G1 [1992]

# **Circuit switching**

Covers centralised switching method, with one branch exchange (PBX), calls are centralised and switched and distributed switching method with hierarchical network, having a number of DSN's (Distributed Switching Nodes) controlled so that the entire system operates as one exchange. See also W01-A06E2 for centralised and decentralised network control. Includes stored program control and use of time division.

Clos network, fat tree, folded Clos network, fourth generation PBX

# W01-A06G2 [1992]

#### Stored and forward switching

Includes packet routing (with W01-A03B codes), using radio channel (with W01-A06C4), flow control, bandwidth control and message switching systems. For facsimile systems see S06-K07C2B also.

# W01-A06G3 [1992]

#### **Network inter-connection**

(W01-A06X)

Covers communication conducted between a number of LANs using a MAC (media access control) to connect them through a bridge apparatus. Includes source routing and non-source routing; bridging of networks; and interconnect programs. See W01-A06E and T01 codes for network software in general. Also includes network interfacing. From 2005, all aspects of peer-to-peer network are covered in W01-A06B8C.

MAU (medium attachment units), BBN (backbone network)

# W01-A06G5 [2002]

# Network switching and interconnecting devices

These codes are intended to highlight particular devices used in networks for connection, switching, routing and repeating purposes. The codes may be used alone if of general application or in conjunction with other W01-A06 codes as appropriate.

W01-A06G5A [2002]

**Cross-connect switch** 

W01-A06G5C [2002]

#### **Gateway or bridge**

Includes wireless access points (normally with W01-A06C4E), previously coded in W01-A06G5 or W01-A06G5E, depending on specific aspects, and in W01-A06C4X.

# W01-A06G5E

#### Router

Routers were previously coded in W01-A06E1, which is still assigned for significant control aspects.

[2002]

#### W01-A06G5G [2002]

#### **Network repeaters**

This code is intended to be used as a single reference for repeaters for data transmission in general, and replaces W01-A08A2 and W01-A08B1 (repeaters for baseband data transmission), which are discontinued from 2002. Network repeaters for which the baseband aspect is significant will from now on be assigned W01-A06G5G and an appropriate W01-A08 code, while for cases where broadband transmission is significant, W01-A09 codes will be used with W01-A06C5G. Repeaters for line communication in general are covered by W02-C01E codes, for radio by W02-G05C and W02-C03B codes, and for optical communication in general by W02-C04A5.

#### W01-A06G5X [2002]

# Other network switching and interconnecting devices

Includes devices providing simple interconnection without any switching necessarily taking place, e.g. hubs.

# W01-A06G9 [1992]

Other switching/connection of networks

#### W01-A06X

Other data exchange and network aspects

#### W01-A07

# Standard code systems and general data transmission systems or equipment

W01-A07 codes are intended for inventions in the field of data transmission of a generally applicable nature. Although W01-A07 codes may be used with W01-A06 (network) codes to highlight a specific aspect, (e.g. a power supply for a LAN is represented by W01-A06B5A and W01-A07K), in general, inventions involving data communication between only two stations are assigned W01-A07 codes whilst those involving data transfer between three or more stations are regarded as networks and are assigned W01-A06 codes.

Signalling format, text

#### W01-A07A

#### **Dot-and-dash code systems**

Morse code, telegraphy, telegraph operator, training, mark, space

#### W01-A07B

# **Equal-length code element systems**

Includes telex and analogous systems, also coded in W01-C05B3D.

Teleprinter

W01-A07C

[1992]

**Transmitter apparatus or circuits** 

W01-A07D

[1992]

Receiver apparatus or circuits

W01-A07E

[1992]

#### **Optical communications**

Prior to 2006 this code was used with W01-A07H1 to indicate optical fiber interfaces, now covered by W01-A07H4 alone. Data networks using fiber-optic and free-space optical links are respectively covered by W01-A06C1 or W01-A06C3. W02-C04 codes cover optical communication in general and are also assigned for novel details such as light source drive circuitry, photodiode current amplifiers, etc.

#### W01-A07F

[1992]

# Communication control and processing

Line termination

#### W01-A07F1

[1992]

For a number of communication lines

### W01-A07G

[1992]

# **Communication protocol**

This code and its subdivision are intended for novel or significant aspects of data communication protocols in a general or non-network context. W01-A06F codes are assigned **instead** of W01-A07G codes for protocol aspects specific to networks. Computer communication protocols are covered by T01-N02A1.

#### W01-A07G1

[1992]

# Transmission control procedure

Includes data link level control.

Time out detection, contention type

#### W01-A07G9

[1992]

Other general protocol aspects

W01-A07H

[1992]

Characterised by interface or data terminal

# W01-A07H1 [1997]

#### Wired interface

This code is intended for transmission of data through a wired medium, including serial and parallel interfaces. Prior to 2006 this code included optical fiber interfaces when used with W01-A07E. From 2006 interfaces of that type are covered by W01-A07H4.

C-type, Centronics®, Firewire®, IEEE1394, i-link®, parallel port, RS-232, RS-485, serial port, universal serial bus. USB

#### W01-A07H2 [1997]

#### Radio and near-field interface

From 2010 the title of this code has been changed to reflect the previous inclusion of near-field interfaces, now covered by W01-A07H2N. Prior to 2010 search W01-A07H2\* with W02-C02 codes or with the terms 'near-field' or 'NFC' for interfaces based on near-field communication. See W02-C02 codes for novel details of near-field systems, W02-C03 codes for details of radio systems and W02-G codes for radio equipment itself. Specific aspects of protocol peculiar to the interface types listed below are covered by additional assignment of W01-A07G codes, the intention of the W01-A07H2 codes being to characterise the interface from the radio viewpoint. Radio links specifically for network communication between several stations (i.e. more than two) are covered by W01-A06C4 codes.

# W01-A07H2A [2002]

#### Bluetooth\* and ZigBee\* radio interface

From 2010 the title of this code is changed to reflect the previous inclusion of ZigBee-based radio interfaces. Wireless network aspects of Bluetooth and ZigBee systems (i.e. more than two stations communicating using IEEE 802.15 standard) are covered by W01-A06C4A. Novel aspects of the frequency-hopping system are also assigned W02-K05A6 and other W02-K05 codes as appropriate.

# W01-A07H2C [2002]

### **DECT-based radio interface**

DECT systems for actual telephone usage are assigned W01-B05A1B and W02-C03C3 codes, with handsets covered by W01-C01D1 codes.

# W01-A07H2K [2005]

#### **UWB** and impulse radio link

Covers carrier-free and carrier-based links using time hopping and similar techniques. Novel details of ultra-wideband systems are covered by W02-K05 codes, especially W02-K05A9 codes. UWB wireless links between three or more stations (regarded as a network) are covered by W01-A06C4K.

# W01-A07H2N [2010]

#### **Near-field interface**

This code covers interfaces for transfer of digital data using near-field communication (NFC) systems based on inductive loops and magnetic or electric fields, and also those using antennas with deliberately enhanced near-field or suppressed farfield characteristics, including those operating at microwave frequencies. Interfaces using normal farfield radio communication are not included and are covered by other W01-A07H2 codes. Novel aspects of the near-field system are also assigned W02-C02 and W02-G codes as appropriate. Nearfield interfaces for mobile phones are also assigned W01-C01D3C and W01-C01R codes. Use of a mobile phone as an electronic ticket or similar is covered by W01-C01D3C and W01-C01P9. Coil, coupler, NFC interface, TransferJet™

# W01-A07H2X [2002]

### Other radio interface

#### W01-A07H3 [1997]

#### Free space optical interface

Free space optical communication specifically for data networks is covered by W01-A06C3, and in general by W02-C04B2 codes. *IrDA* 

# W01-A07H4 [2006]

#### **Optical fiber interface**

Prior to 2006 this topic was covered by W01-A07E and W01-A07H1. Novel details of optical communications equipment are also assigned W02-C04 codes and those relating to novel fiberoptic technology are also assigned V07 codes.

## W01-A07J [1997]

# **General construction details**

See also V04-S or V04-T codes.

# W01-A07K [1997]

# **Power supply**

See also U24 codes, e.g. U24-D and U24-E for further details of power supplies.

#### W01-A07L [1997]

# Fault detection and apparatus testing

From 2012 the title of this code has been changed to clarify its coverage of fault detection and testing of equipment for data communications in a general or 'non-network' application. Fault detection in a network environment, i.e. while the equipment is connected in the network, is covered by W01-A06A2 and from 2012 W01-A06A2A has been introduced specifically for network apparatus testing.

# W01-A07L1

[2012]

# Data communications equipment fault detection and apparatus testing

Fault detection in data networks is covered by W01-A06A2.

#### W01-A07L5

[2012]

# **Data communications equipment testing**

Testing of equipment while it is connected in a network is covered by W01-A06A2A.

#### W01-A07X

[1992]

# Other general data transmission aspects

#### W01-A08

# Baseband and DC data transmission systems

From 2002 the title of this code is expanded to better reflect its coverage of baseband data transmission systems. The codes is this section are used for any aspect of data transmission in which a DC or baseband aspect is significant, e.g. they may be applied to the post demodulation processing in a radio receiver. Data transmission in which **broadband**, modulated carrier, aspects are significant, are covered by W01-A09 codes. *Direct coupled* 

#### W01-A08A

# Synchronous or start-stop systems

# W01-A08A1

[1992]

#### Transmitting circuits/Receiving circuits

Distributors, repeaters

# W01-A08A1A

[1992]

# Characterised by code

Includes predistortion, insertion, idle bit, using 3 or more amplitude levels, transition code and correlative code. See W01-A02 for data transmission characterised by use of code conversion, and U21-A05 codes for specific coding formats.

HDB3 code, Baudot code

# W01-A08A1B

[1992]

# With storage before transmission or reception

#### W01-A08A2\*

[1992-2001]

### Repeater, relay circuits

\*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06G5G. W01-A08A2 remains valid and searchable for records between 1992 and 2001. During this time W01-A08B1 was regarded as the general code for baseband data transmission repeaters.

#### W01-A08B

# Shaping networks; Repeater and relay circuits

From 2002 data transmission repeaters are covered by W01-A06G5G.

#### W01-A08B1\*

[1992-2001]

#### Repeater and relay circuits

\*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06G5G. W01-A08B1 remains valid and searchable for records between 1992 and 2001. During this time W01-A08B1 was regarded as the general code for baseband data transmission repeaters and W01-A08A2 was assigned for repeaters specific to synchronous or start-stop systems. From 2002, repeaters specific to baseband data transmission will be indicated by W01-A06G5G and a W01-A08 code as appropriate. Regenerator, single to double current, semiconductor, optical sensing, modulation

#### W01-A08B2

[1992]

# **Shaping networks**

Includes decision feedback and transversal equalisers, and passive shaping networks. See W02-C01B2B for general line transmission equalisers and W02-C03E1B for radio receiver equalisers, also assigned W02-G03 codes, e.g. W02-G03B6.

Adaptive, DFE, coefficient, weighting, tap

#### W01-A08C

[1992]

# Non-synchronous systems

(W01-A08X)

Includes using 3 of more different amplitudes e.g. cable code.

Asynchronous

#### W01-A08D

[2007]

#### Differential data transmission

This code covers differential data transmission and is assigned with other W01-A08 codes as appropriate. Novel logic circuits intended for use in differential serial bus systems are covered by U21-C02D1.

LVDS

# W01-A08E [2007]

# DC offset suppression or adjustment

This code covers the suppression or removal of DC offsets and the clamping of a signal to a desired DC level, primarily in baseband signals. Novel circuits for clamping the level of pulse signals in general to a desired DC level are covered by U22-D01A1A.

#### W01-A08X

# Other baseband and DC data transmission aspects

Interface, coupling

#### W01-A09

#### **Broadband and modulated carrier systems**

From 2002 the title of this code has been changed (formerly 'AC systems') to better reflect its coverage of broadband data transmission systems, generally employing modulated carriers. Data transmission systems in which baseband data is directly transmitted ('DC systems') are covered by W01-A08 codes. Codes are generally assigned to highlight a particular mode of transmission, e.g. OOK, FSK, QAM, and where appropriate to focus on particular novel aspects of modulators or demodulators (W01-A09E codes).

Modulate, modem, demodulate, carrier systems, broadband systems, multilevel

#### W01-A09A

# Amplitude and frequency modulated carrier systems

# W01-A09A1 [1992]

#### **AM carrier systems**

On-off keying (OOK), single side band (SSB), vestigial side band (VSB), superheterodyne, carrier recovery

#### W01-A09A2 [1992]

#### FM carrier systems

FSK, TFM, using filters, oscillators, quadrature

# W01-A09B [1987]

### PSK

Includes suppressed carrier product modulation methods by means of a digital signal.

Phase shift keying, binary phase-shift keying (BPSK), differential phase shift keying (DPSK), Gaussian minimum shift keying (GMSK), minimum shift keying (MSK), quadrature phase-shift keying (QPSK)

#### W01-A09C [1987]

# **QAM** and other hybrid modulation

Quadrature amplitude modulation, 16-QAM, constellation, signal points

W01-A09C1 [2005]

QAM

W01-A09C5 [2005]

Layered modulation

W01-A09D [1992]

#### Using multi-frequency codes

(W01-A09X)

Covers simultaneous transmission of different frequencies each representing one code element and systems where each code element is represented by a combination of frequencies. Multifrequency signalling for telephony is coded in W01-B09 only.

#### W01-A09E [1992]

# Modems, modulators and demodulators

(W01-A09)

Search with other W01-A09 codes for specific modulation type. Telephone line modems are also assigned W01-C05B3A and novel modulator or demodulator circuitry is also assigned U23-P01J codes.

Frequency-multiplexing, microwave, QPSK, CPSK, DPSK

# W01-A09E1 [1992]

#### **Modulator circuits**

Search with U23 codes e.g. U23-P01J1 for digital aspects and U23-D01C codes for PLL aspects.

#### W01-A09E2 [1992]

#### **Demodulator circuits**

Search with U23 codes e.g. U23-P01J3 for digital aspects and U23-D01C codes for PLL aspects.

Carrier recovery, PLL, Costas loop

# W01-A09E3 [1997]

#### Voice over data transmission

Includes modem, modulation or demodulation aspects only. Covers switching between voice and data transmission, compression, and out of band transmission. Search with U23 codes for modulation aspects as appropriate. Search W01-C05B3G for combination with telephone system or T01 codes for combination with computing system. Voice-over-IP telephone communication is covered by W01-C05B4C from 2002. (Prior to 2002, W01-A06B7, W01-A06F, and W01-C05B3 were used, in addition to T01-H07C5E).

SVD, voice span®, VoiceView®

#### W01-A09X

# Other broadband data transmission aspects

# W01-A20

### Other data transmission aspects

#### W01-B

#### Selecting

Includes selection (i.e. switching), for telephony (W01-C) and other signal applications. Mechanical switches per se are covered by V03, and electronic switching by U21-B codes.

#### W01-B01

#### **Direct selection**

#### W01-B02

#### Indirect selection

This code is used for novel signal switches per se, including optical switching. See also V03 codes or U21-B codes as appropriate, e.g. U21-B05E. RF waveguide technology switches are covered by W02-A4A code.

Space switching, optical switching, relay, electronic, switch, matrix

#### W01-B02A

#### Common control by centralised logic

Processor control

# W01-B02A1 [1992]

#### Stored program control

See also T01 codes.

SPC, microprocessor, microprogram, microcomputer, computer

#### W01-B02X

#### Other indirect selection

Clock signal distribution, distributed control

#### W01-B03

# Connecting to satellite or sub-exchange; Distribution; Caller identification

Inter-exchange link, concentrator, stacking

#### W01-B03A [1992]

# Connecting to satellite or sub-exchange, distribution

(W01-B03)

# W01-B03C [1992]

### **Caller identification**

From 2002, transmission of caller ID, and its inhibition, as special subscriber services in an exchange are covered by W01-C02B3C and W01-C02B3E respectively. Prior to then, W01-B03C was assigned for these topics with W01-C02B9. From 2002 W01-B03C is used only for novel aspects of determining caller ID.

Call tracing

#### W01-B04

#### Party line selection

#### W01-B05

# Connecting via radio, inductive or freespace optical links

The codes in this subgroup deal with connections that do not involve use of cables or optical fibers, the essential feature being a 'wireless' aspect. Further details are specified by co-assignment of 'transmission system' codes in the W02-C group as appropriate, e.g. W02-C03C codes when mobile radio is involved.

Selective calling, cellular radiotelephone, cordless telephone, paging

#### W01-B05A [1992]

#### Radio

This section relates to both base station apparatus and to overall radio systems, and should be used with W02-C03 and W02-G codes as appropriate for these aspects.

#### W01-B05A1 [1992]

# For mobile radio telephone system

See W01-C01D codes for subscriber equipment. Includes multi-handset cordless telephones, see also W01-C01D1.

# W01-B05A1A [1992]

#### Cellular

This code is normally assigned to indicate layout or design of a cellular telephone system, the arrangement of cells and base stations, or novel methods of operating the network involving signalling, paging, and the like. (Note that dedicated 'paging systems' are not coded here, being covered by W01-B05A5 for selective calling aspects). Novel base station details are also included, for which W02-C03C1B is also assigned. In general, other W02-C03C1 'cellular radio' codes are also assigned with W01-B05A1A as necessary when mobile radio system aspects are significant. When emphasis is on 'telephone exchange' and 'switching' aspects of cellular mobile phone systems W01-B05A1C is assigned instead of W01-

B05A1A. From 2012 W01-E codes are introduced to cover mobility-related aspects such as roaming and registration in mobile phone networks (and wireless data networks) and these codes will be assigned in preference to W01-B05A1 codes for these specific topics. If the use of W01-B05A1A is required to indicate other significant aspects of an invention the code will be assigned in addition to W01-E codes.

Microcellular, macrocellular, GSM, PCN, NADC, JDC, Qualcomm®, CDMA

#### W01-B05A1B [1992]

# **Cordless call-point phone system**

Cordless telephones per se are covered by W01-C01D1 codes. Non-cellular mobile radio system aspects are indicated by use of W02-C03C3 codes. CT2, CT3, DECT, PHS

#### W01-B05A1C [1992]

# **Exchange details**

This code is normally used instead of W01-B05A1A when focus is on 'telephone exchange' and 'switching' aspects of cellular mobile phone systems. W02-C03C1 codes are not normally required, but may be assigned when specifically relevant. From 2012 W01-E codes are introduced to cover mobility-related aspects such as roaming and registration in mobile phone networks (and wireless data networks) and these codes will be assigned in preference to W01-B05A1C for these specific topics. If the use of W01-B05A1C is required to indicate other significant aspects of an invention the code will be assigned in addition to W01-E codes.

# W01-B05A1D [1997]

# Direct mode connection between telephones

Search with other W01-B codes for dual mode operation,e.g. W01-B05A1A or W01-B05A1B for switching between cellular or cordless call point systems and direct mode. Also includes Sidelink communications (connection between the devices without requiring the base station) used in 4G and 5G systems. Search with W02-C03R2 for resource selection by the terminal.

Digital short range radio system (DSRRS), Sidelink communication

# W01-B05A1E [1997]

# Satellite telephone connection

W02-C03B1 codes are assigned to indicate aspects of satellite radio relay systems. For the purpose of highlighting the 'mobile radio' aspect, satellite telephone systems are regarded as being of cellular type, i.e. W02-C03C1 codes are also assigned. Satellite telephone sets themselves are assigned W01-C01D3E, and other W01-C01 codes as appropriate.

TFTS, aeroplane telephone

# W01-B05A1F [1997]

#### Short messaging service

This code covers exchange and 'system' aspects specific to mobile telephone networks. Prior to 2009 these aspects of MMS were also covered here (now assigned W01-B05A1H). 'Special subscriber service' aspects of SMS - i.e. aspects of the system as it appears to subscribers in terms of features offered by the service provider - are covered by W01-C02B7D instead. SMS telephones themselves are assigned W01-C01G6A (and W01-C01D3C when a mobile phone is involved).

#### W01-B05A1G [1997]

#### **Fixed location radio telephone access**

W02-C03D codes are also assigned to indicate the 'point-to-point' nature of the radio link.

#### W01-B05A1H [2009]

# Multimedia messaging service

(W01-B05A1F)

This code covers exchange and 'system' aspects specific to mobile telephone networks. Prior to 2009 these aspects of MMS were assigned W01-B05A1F. 'Special subscriber service' aspects of MMS - i.e. aspects of the system as it appears to subscribers in terms of features offered by the service provider - are covered by W01-C02B7F instead. MMS telephones themselves are assigned W01-C01G6B (and W01-C01D3C when a mobile phone is involved).

# W01-B05A1M [2006]

# **Network broadcasting**

This code is intended for network broadcast messages for system management and information, and other broadcasting aspects, e.g. involving entertainment aspects with W01-C05 codes assigned as appropriate.

#### W01-B05A1N\*

[2006-2011]

### Registration of mobile subscriber

\*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01C3. W01-B05A1N remains valid and searchable for records between 2006 and 2011 when it covered registration of mobile subscribers in mobile telephone networks.

#### W01-B05A1Q\*

[2006-2011]

# Location register details

\*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01C1. W01-B05A1Q remains valid and searchable for records between 2006 and 2012 when it covered location register aspects of mobile telephone networks.

HLR. VLR

#### W01-B05A1R\*

[2006-2011]

#### Subscriber roaming aspects

\*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01A codes. W01-B05A1R remains valid and searchable for records between 2006 and 2011 when it covered roaming in mobile telephone networks and when assigned with W01-A06E1S, switching between wireless data networks and mobile telephone networks.

#### W01-B05A3

[1992]

# Inter-exchange connection

See also W01-C03 for telephone system and W02-C03B codes for radio relay systems.

Trunked radio, TETRA

#### W01-B05A3A

[1992]

#### **Terrestrial**

See also W02-C03B codes for radio relay systems and W02-C03D codes for point-to-point radio links.

#### W01-B05A3B

[1992]

#### **Satellite**

See also W02-C03B codes.

#### W01-B05A5

[1992]

### Paging system

This code covers selective calling aspects of traditional paging systems i.e. those normally operating over a dedicated mobile radio network in which text messages and the like are transmitted to dedicated portable receivers, frequently operating independently of mobile telephone systems. All aspects of paging systems and equipment are covered by W05-A05C codes and novel mobile radio system details by W02-C03C codes. Note that 'paging' in the sense of a base station transmitting a message to a mobile phone to set-up a call in a cellular telephone system is not included, being covered by W01-B05A1A. ERMES, FLEX, ReFLEX, POCSAG, code, address

# W01-B05A7

[1992]

# For non-telephone mobile radio

Includes selective calling for private mobile radio. Multichannel access, MCA, PMR

#### W01-B05A9

[1992]

# Other radio link selection aspects

#### W01-B05B

[1992]

#### Inductive

See W02-C02 codes for near field inductive systems also.

# W01-B05C

[1992]

### **Optical**

See W02-C04 codes for optical transmission systems also.

# W01-B05X

[1992]

# Other wireless telephone connection

#### W01-B06\*

[1980-2011]

# Telecontrol and telemetry systems

\*This code is now discontinued and from 2012 this subject matter will be covered by W05-D02 codes. W01-B06 remains valid and searchable for records between 1980 and 2011 when it was used for selection aspects only of telemetry and telecontrol, and was not regarded as the main code for this topic. All aspects of general-purpose telemetry or telecontrol are covered by W05-D codes which should be searched with application as appropriate. Exceptions to this are: general audio/video remote control, coded in W03-G05A codes; remote control for TV receivers coded in W03-A02C codes; remote control for recording equipment coded in W04-E04A; remote control for TV camera coded in W04-M01D1A.

#### W01-B07

### **Selection for multiplex systems**

See W02-K codes for multiplex systems in general. Time switch, time division multiplexing (TDM), frequency division multiplexing (FDM)

#### W01-B08

#### **Testing equipment**

This code is used either on its own or in conjunction with other codes from the W01-B group to indicate the type of switching system under test. W01-B08 is intended for testing of selection apparatus only, and **not** for testing of a whole exchange, which is covered by either W01-A06A or W01-C02A codes depending upon the exchange type.

Selection equipment test/maintenance

#### W01-B09

# Signalling

See also appropriate codes for oscillators and tone generators, e.g. U23-F02.

Multi frequency, DTMF signalling, pushbutton dial signalling, MF, dual tone, PB

#### W01-B20

#### Other

Includes distribution frames, circuit card mountings and other constructional aspects. See V04-T02 for rack construction in general.

#### W01-C

# **Telephony**

#### W01-C01

#### Subscriber equipment

Includes analogous equipment when used in conjunction with appropriate code.

# W01-C01A

# Construction (incl. cradle switch mechanical aspects)

Electroacoustic aspects of telephone handsets are assigned V06-V04B1 also.

Mechanical hook switch, mechanical telephone lock, hygiene attachment, disinfecting, cleaning

#### W01-C01A1 [1992]

#### Internal construction e.g. PCB Mounting

# W01-C01A2 [1997]

# **Display**

This code is intended for constructional aspects arising from the inclusion of a display and does not cover novel display devices such as LCDs themselves, which are covered by W01-C01B3E. Arrangements for display of incoming call number are covered by W01-C01F3. Constructional aspects relating to touch screens are also assigned W01-C01B8H.

#### W01-C01A2A [2002]

# Back or edge lighting for telephone display

From 2007, these topics in general are covered by X26-U04A codes (now the main codes for backlighting and edge lighting) which are also assigned and in U14-K01A4C, assuming LCD. Prior to 2006, W05-E05B codes (now discontinued) were assigned in this role. During 2006 W05-E05B codes were also assigned when wider applications were stated but were not used with W01-C01A2A for cases specific to telephone displays alone.

# W01-C01A2C [2006]

#### Multiple display aspects

Covers the use of more than one display and arrangements for viewing a display from e.g. both sides of a handset.

# W01-C01A3 [1992]

#### Casing and hand set construction

Telephone handsets as casings for electroacoustic transducers are coded in V06-C also. To link the features represented by the following codes with portable mobile phones search with W01-C01D3C.

# W01-C01A3A [2002]

# Handset with movable portion

Includes 'folding' or 'flip' aspects, e.g. for mobile phones.

#### W01-C01A3C [2002]

# Handset or casing with detachable fascia or similar portion

This code is intended for fascias and similar parts which can be changed by the user, e.g. for customising mobile phones.

#### W01-C01A3E [2002]

# Handset or casing with novel shape or appearance

This code is intended for telephone sets or casings with unconventional shape, e.g. with some novelty or amusement aspect.

# W01-C01A3G [2006]

# Telephone set incorporated into clothing

Includes telephones, usually of portable type and hence also assigned W01-C01D3C, forming a permanent part of headgear or other clothing. Mountings for telephones which are **detachable** from clothing are covered by W01-C01A5. X27-A02B1 codes are also assigned in either case.

# W01-C01A4 [1997]

# **Radiation exposure protection features**

This code covers constructional arrangements, especially shielding and screening, for protecting the user of a mobile phone from RF radiation and is normally used with W01-C01D3C (for cellular handsets). See also V04-U, S05-A03 and W02 codes, especially W02-B08B5 when antenna details are relevant.

Radio telephone, handset, portable, SAR, specific absorption rate

# W01-C01A5 [1992]

# Support, mounting bracket

Includes arrangements for e.g. wall mounting, or vehicle dashboard installation (with W01-C01D3B) or attaching to belt etc.

# W01-C01A6 [1997]

#### **Telephone cover**

This code is intended for hard or soft carrying cases for telephone sets, especially hand-held mobile phones for which W01-C01D3C is also assigned. Detachable covers in the form of coloured fascias which can be changed by the user are not included in W01-C01A6 and are assigned W01-C01A3C. *Mobile, radio, portable, case* 

#### W01-C01A7 [1992]

#### **Acoustic constructional details**

Includes loudspeaker enclosures external to telephone set per se, e.g. for loudspeaker, conference or car telephone. See W01-C01A1 or W01-C01A3 for mounting of loudspeaker or microphone in telephone. (Also assigned V06-V codes and W04-S01 codes).

# W01-C01A8 [2009]

# **Telephone set cooling**

(W01-C08X)

This code is intended for novel aspects of cooling for subscriber telephones and related equipment. Other codes are assigned as appropriate, e.g. battery cooling in a mobile phone is represented by W01-C01A8, W01-C01D3C and W01-C01E5B. Cooling of the transmitter part of a mobile phone is also coded as W02-G01H (e.g. with W02-C03C1C, assuming a cellphone). Cooling of telephone equipment in general is covered by W01-C08X. In all cases V04-T03 codes (for cooling electronic equipment in general) are assigned as appropriate.

### W01-C01A9 [1992]

#### Other constructional details

Includes hygiene arrangements, (see also V06 codes) and mechanical locks (also assigned W01-C01B5D when designed to prevent dialling). Telephone cable connected to subscriber equipment is not included, being covered by W01-C01X.

#### W01-C01B

#### Subscriber calling devices

See W01-B09 also for MF tone generator. Rotary dial, pushbutton, key, select, call

#### W01-C01B1 [1987]

# Autodialers, repertory dialling

Number memory, card storage, last number re-dial, automatic dialler, alarm autodialer, modem autodialer

## W01-C01B1A [1992]

Number storage, repertory

#### W01-C01B1B [1992]

# Voice dialling, hands free dialling

See also W04-V codes, e.g. W04-V04A, for voice analysis details. For loudspeaker telephone search with W01-C01G2.

#### W01-C01B1C [1992]

#### With bar code, OCR input

Novel aspects of optical bar code readers are coded in T04-A03B1 also. Character and pattern recognition aspects are also assigned T04-D codes.

#### W01-C01B1D [1992]

#### With external module

Includes unit usable with any MF dialling telephone, e.g. by acoustic coupling to microphone.

Promotional, free gift, accessory, pager

# W01-C01B1E [1997]

# Reply dialling

(W01-C01B1, W01-C01F3)
See W01-C02B5A for exchange based system.

# W01-C01B1F [2002]

#### **Redialers**

This code is intended for external boxes redirecting certain calls to secure more favourable tariff, and may be assigned with W01-C01B4 (for least cost routing aspects) depending on the novelty.

#### W01-C01B1X [1992]

#### Other automatic dialling

#### W01-C01B2 [1992]

# **Dial signal generator**

(W01-B09, W01-C01B)

#### W01-C01B2A [1992]

# **Producing dial pulses**

(W01-C01B) DP

# W01-C01B2C [1992]

# Producing tones (includes MF tone generator)

(W01-B09, W01-C01B)

From 9201, tone generator per se is coded (in W01) as W01-C01B2C only. See also appropriate codes in e.g. U23-F.

Dual tone multifrequency, DTMF

# W01-C01B3 [1992]

# Dial and user interface display

The title of this code has been expanded from 2002 to better reflect its coverage of novel details of display circuitry and the typical additional uses of displays on telephone sets. Constructional details of displays are covered by W01-C01A2 and the display of caller ID by W01-C01F3.

Dial display

# W01-C01B3A [2002]

#### **Drive circuitry**

Circuitry aspects specific to touch screen operation are covered by W01-C01B8H, which takes precedence over this code.

# W01-C01B3C [2002]

# **Back lighting circuitry and control**

Physical aspects of telephone display back- or edge-lighting, such as light sources, diffusers, etc. are covered by W01-C01A2A, and of displays in general by X26-U04A codes from 2007 (previouslyW05-E05B codes).

# W01-C01B3E [2002]

# Novel display for dialling and user interface

This code is intended to highlight telephone set applications for displays the novel details of which are coded elsewhere, e.g. U14-K01 codes in the case of LCDs.

# W01-C01B4 [1997]

# Least cost routing

(W01-C01B9)

See W01-C02A7 and W01-C06A for LCR system based at exchange.

LCR

# W01-C01B5 [1987]

#### Security, restricted dialling

Codes in this section cover the use of both electronic and mechanical safeguards against unauthorised use.

#### W01-C01B5A [1992]

# Security based on input code or card

Password, access code, enter, key, card reader

#### W01-C01B5B [1992]

#### Security based on voice recognition/input

Voice or other biometrics-based control of access to the phone as a whole is covered by W01-C01Q8C. W04-V codes, e.g. W04-V04A3, are also assigned for speech recognition aspects.

Designated user, voice print, voice pattern, speakerdependent

#### W01-C01B5C [1992]

# Preventing dialling of predetermined numbers

Long-distance dialling detector, leading-zero detector

# W01-C01B5D [1992]

#### Using mechanical lock

See W01-C01A9 also.

W01-C01B5X

[1992]

# Other secure dialling arrangements

#### W01-C01B7

[1992]

#### **Dial format detection**

Covers circuitry automatically selecting appropriate dial signal generator to suit format of exchange.

DP, dial pulse, MF, DTMF, dual tone multifrequency

# W01-C01B8

[1992]

# Keyboard and other manual input arrangements

This code covers details of keyboards, pushbuttons, switches and other manual input arrangements for controlling a telephone. W01-C01B8 and its subdivisions are used with V03 codes if the novel aspect is an electromechanical switch or with U21-B codes for electronic switching.

### W01-C01B8A

[1992]

# Layout of keyboard

Includes configuration of keys, provision of special function keys, etc. Special function keys themselves are covered by W01-C01B8K from 2002.

Braille

#### W01-C01B8C

[1992]

#### Construction of keyboard per se

# W01-C01B8E

[1992]

#### Key switching element

This code is used for novel switching elements per se. For novel electronic switch details, U21-B codes are also assigned.

#### W01-C01B8G

[1992]

# **Keyboard illumination**

#### W01-C01B8H

[2002]

# Manual input devices based on absolute position, including touch screen

Covers devices such as touch pads and touchscreens. Prior to 2006 touch pads and similar 'absolute position' input arrangements not involving displays were covered by W01-C01B8K. Constructional aspects of touchscreens are also assigned W01-C01A2. This code takes precedence over W01-C01B3A (display drive circuitry). Touch screens in general are covered by T04-F02A2. Stylus, tablet

#### W01-C01B8K

[2002]

### Special function keys per se

Details relating to the layout of keyboards on which special function keys or analogous controls are provided which are not themselves the novel aspect, are covered by W01-C01B8A. From 2006, trackballs, joysticks and the like are covered by W01-C01B8L.

#### W01-C01B8L

[2006]

# Manual input devices based on relative position

Covers trackball, joystick, or analogous arrangements for data input (previously coded in W01-C01B8K). See T04-F codes for further details. *Mouse, track pad, joystick, track ball* 

#### W01-C01B8M

[2007]

# Key circuitry and coding

See also U21-A05D codes for key coding aspects, e.g. U21-A05D1 for coding arrangements for handling different language character sets.

#### W01-C01B8N

[2009]

# **External keyboard arrangements**

This code is intended for arrangements for using an external keyboard with telephone equipment, including novel keyboards themselves and arrangements for connecting or interfacing them with e.g. a telephone set. Novel digital interfacing aspects of telephones are covered by W01-C01R, with W01-A07H codes assigned as appropriate to indicate the technology used.

#### W01-C01B9

[1992]

#### Other subscriber calling device details

# W01-C01C

Automatic answering, speech amplifiers, anti-side-tone circuits

#### W01-C01C1

[1992]

# Speech amplifier details

Amplifiers in general are coded in U24-G.

# W01-C01C1A

[1992]

#### For microphone

Microphone transducers per se are coded in W01-C01M and, in general, in V06-B02.

# W01-C01C1B

[1992]

#### For earphone or loudspeaker

Transducers per se are coded in W01-C01M. For loudspeaker telephone search with W01-C01G2A.

# W01-C01C1C [1992]

#### **Gain control**

U24-C codes are also assigned for novel circuitry. Control of gain dependent on dominant transmission direction is covered by W01-C01C3A.

#### W01-C01C1D [1997]

# **Muting circuit**

(U24-C05C, W01-C01C1C)

Includes muting on hold. See W01-C02B2A for exchange details of call holding.

Mute, hold

W01-C01C1X [1992]

Other speech amplifier details

W01-C01C3 [1992]

Anti-sidetone, noise and feedback suppression

# W01-C01C3A [1992]

#### Control of transmit-receive gain

Includes gain control based on dominant transmission direction, e.g. for loudspeaker telephone, also coded in W01-C01G2A. Speech amplifier gain control in general is covered by W01-C01C1C.

#### W01-C01C3C [1992]

# Local noise cancelling arrangements

Includes arrangement of transducers and/or circuitry to achieve cancellation or reduction of ambient noise level.

# W01-C01C3E [1997]

# Sidetone or feedback suppression

Includes echo suppression for speakerphone, also coded in W01-C01G2A. See also W01-C08E.

# W01-C01C5 [1992]

### **Automatic answering**

Centralised answering systems based within a telephone exchange are covered by W01-C02B4 codes.

# W01-C01C5A [1992]

#### Using dynamic recording

See also T03/W04 for e.g. tape deck details.

# W01-C01C5B [1992]

### Using static recording (RAM etc.)

For storage of audio signals in general using solidstate memory, see W04-G01B codes.

# W01-C01C5C [1992]

#### Date/time recording

Covers arrangements recording time at which message is received.

#### W01-C01C5D [1992]

# Remote control of playback

#### W01-C01C5E [1992]

# **Outgoing message transmission**

Includes automatic sending of pre-recorded message at preset time. See also W01-C01B1 codes for automatic dialling aspects.

OGM

#### W01-C01C5F [1997]

#### **Privacy function**

Includes password protection for message retrieval in shared device.

Password, PIN, ID

#### W01-C01C5G [1997]

# Caller telephone number recording

(W01-C015X, W01-C01F3, W01-C01F9) See W01-C01B1E for reply dialling.

# W01-C01C5X [1992]

Other automatic answering details

# W01-C01C7 [1992]

### Digital speech processing

See U21-A and W04-V05 codes for specific processing and coding details.

# W01-C01C7A [2002]

**Comfort noise generation** 

#### W01-C01C7C [2002]

**Novel coding scheme** 

#### W01-C01C7E [2002]

# **Novel speech coders and decoders**

# W01-C01C7L [2002]

# Scrambling and speech coding for security

This code is intended for scrambling aspects within the telephone itself. Overall systems aspects of security are covered by W01-C08F1 codes.

Scrambling for speech communication in general is covered by W02-L05, and secrecy aspects of data transmission by W01-A05 codes.

#### W01-C01C7X [2002]

# Other digital speech processing aspects

Includes significant **novel** aspects of speech synthesis or recognition circuitry, e.g. used for voice dialling (W01-C01B1B or W01-C01B5B also assigned depending on purpose), or overall security (W01-C01Q8C). W04-V codes are also assigned.

#### W01-C01C9 [1992]

# Other speech circuitry and systems

#### W01-C01D [1987]

#### Cordless, mobile radio telephone

(W01-C01X)

Use with other W01-C codes as appropriate. Cordless and mobile radio telephones are also coded in the appropriate section of W02 for radio equipment (e.g. W02-G02 for transceivers) if any RF aspect is involved. Inventions concerned purely with the telephone aspect are assigned W01-C01 codes only. Mobile radio telephone systems are assigned W01-B05 and W02-C03C codes.

Portable telephone

# W01-C01D1 [1992]

# **Cordless telephone**

Includes home-use, multi-user and call-point systems. Search with other W01-C01D codes for telephone which is capable of switching between operating systems e.g. DECT and cellular. DECT

# W01-C01D1A [1992]

#### Portable unit details

This code covers cordless telephone usable with one or multiple base stations at the subscriber location.

### W01-C01D1B [1992]

# **Base unit details**

See W01-C01E5A also for battery charging and mains power unit details.

### W01-C01D1D [1992]

# Security, ID

See also T04-K codes for SIM card aspects. Personal identification number, PIN, subscriber identification module, SIM, ID

#### W01-C01D1E [1992]

### Call-point cordless telephone

Covers personal cordless telephone usable with one or multiple distributed callpoints, solely provided by the service provider. See W01-C01D1A for cordless telephone handsets used with a base station at the subscriber location.

CT2, CT3, JCT, PHS, Personal handyphone

# W01-C01D2 [1997]

#### Direct mode communication telephone

Search with other W01-C01D codes for dual mode operating telephones e.g. with W01-C01D3 for telephone that switches from cellular communication to direct mode when possible.

Digital short range radio system (DSRRS)

# W01-C01D3 [1992]

#### Mobile radio telephone

From 1997 all mobile telephones are considered as cellular. For RF aspects of non-cellular mobile telephones search with W02-C03C3 codes. Search with other W01-C01D codes for telephone which is able to switch between communication systems, e.g. DECT and cellular.

GSM, PCN, NADC, JDC, Qualcomm®

#### W01-C01D3A\* [1992-1996]

#### Cellular

\*This code is now discontinued and since 1997 all mobile telephones have been considered to be cellular. This code is therefore no longer assigned, but remains valid and searchable for records prior to 1997.

# W01-C01D3B [1992]

## Vehicle telephone

The title of this code has been changed (from 2017) to clarify its previous coverage of mobile phones permanently-installed in a land, marine or air vehicle, and also hand-held phones (for which W01-C01D3C is also assigned) having some adaptation such as connection to an external antenna or vehicle interface, mounting cradles, and the like.

Airplane, aeroplane, automobile, bicycle, boat, car, GSM-R, helicopter, lorry, motorcycle, railway, scooter, train, van

# W01-C01D3C [1992]

#### Portable: Hand-held

This code is assigned as a general reference for 'mobile phone', i.e. the terminology is assumed to refer to a hand-held phone unless there is evidence to the contrary. With the convergence of mobile telephone networks and wireless data networks, W01-C01D3C is also assigned for inventions relating to a 'portable terminal', unless there can clearly be no telephone aspect, with 'wireless network' codes (e.g. W01-A06C4 codes and other W01-A codes) being also assigned when appropriate.

# W01-C01D3D [1992]

# **Telephone identification**

From 2009 the title of this code is changed (formerly 'Security, ID') to reflect its main focus on identification aspects within the telephone itself. It includes use of e.g. International Mobile Equipment Identity (IMEI) number, and also Subscriber Identity Module (SIM) cards and the like, in the case of mobile phones for which W01-C01D3C is normally also assigned. (T04-K codes are also assigned for smart card aspects). Use of two or more cards is covered from 2010 by W01-C01D3K, which takes precedence over this code. Arrangements to transmit ID data for security and billing purposes which involve some novelty in the phone itself are included here, but novel telephone system aspects of checking ID and entitlement to access e.g. a mobile telephone network are covered by W01-C02B6A (with W01-B05A1A) and are not assigned W01-C01D3D. Subscriber registration (by the telephone network) is covered by W01-B05A1N. General aspects of telephone security such as preventing access, theft alarms and dialling restriction are not included here, being covered by W01-C01Q8 and W01-C01B5 codes respectively. ID, IMEI, IMSI, MEID, PIN, SIM, USIM, USIMID

# W01-C01D3E [1997]

# Satellite telephone

RF details of satellite phones are covered by W02-C03B1C and W02-C03C1C (i.e. they are regarded as cellular mobile satellite ground stations), with W02-G codes assigned as appropriate.

Satphone

### W01-C01D3G [2002]

#### 'Third generation' mobile phone

This code is assigned for so-called third generation mobile phones, intended to operate in a UMTS system, and for analogous types based on similar multiple access schemes, i.e. other than TDMA alone. For inventions involving some RF novelty W02 codes are also assigned, e.g. W02-C03C1C and W02-C03C1G, along with W02-G codes. Where the novelty resides in the spread-spectrum

aspect, W02-K05 codes are also assigned, e.g. W02-K05A7, as appropriate. Systems based on OFDM are assigned W02-K07C as well as W01 and W02 telephone and 'mobile radio' codes. Other W01-C01 codes are assigned with W01-C01D3G as appropriate, depending on the aspect, e.g. W01-C01G6E for connecting to the internet on a 3G phone.

Universal mobile telephone system, 3G, fourth generation, 4G

#### W01-C01D3J [2002]

# **Dual or multi-band mobile phone**

This code is assigned for phones capable of operating in two or more cellular bands, e.g. 900 and 1900 MHz. As such, it is likely to involve RF details and corresponding assignment of W02 codes. Prior to 2010 W01-C01D3J was assigned to indicate multiple SIM card aspects of mobile phones with W01-C01D3C and W01-C01D3D. From 2010, W01-C01D3K specifically covers the use of multiple SIM cards and W01-C01D3J will only be assigned for genuine multi-band aspects. *GSM. PCS* 

# W01-C01D3K [2010]

# **Dual or multiple SIM-card mobile phone**

This code takes precedence over W01-C01D3D and is assigned for phones capable of operating with two or more SIM cards or analogous devices, e.g. enabling use of different identities or different service providers. Dual or multi-band mobile phones are covered by W01-C01D3J which is also assigned as appropriate. Prior to 2010 W01-C01D3J was assigned for this topic with W01-C01D3D.

Dual SIM, Multi SIM

# W01-C01D4 [1997]

#### **Fixed location radiotelephone**

This code is broader in scope than other W01-C01D codes and covers the whole subscriber installation, including antennas and 'outdoor units'. Novel aspects of these are highlighted using codes from W02-B (antennas) and W02-G (radio equipment details) groups, and also W02-C03D codes to highlight the 'point-to-point' radio link aspect. Base station or 'exchange-end' aspects are **not** assigned W01-C01D4, but are covered by W01-B05A1G and W02 codes as above.

Remote location, roadside emergency (radio), radio-in-the-loop, wireless local loop, WLL

# W01-C01E [1992]

# **Power supply**

(W01-C01X, W01-C07B)

Low-power power supplies in general are covered by U24 codes, which are also assigned as necessary to highlight novel aspects.

W01-C01E1 [1992]

**Derived from subscriber line** 

W01-C01E5 [1992]

Power supply at subscriber location

W01-C01E5A [1992]

# From mains including battery charging

See also X16-G01 for battery charger per se. Charging from e.g. a vehicle battery, is covered by W01-C01E5C.

W01-C01E5B [1992]

Battery per se, battery saving, battery supply

See X16 for novel battery detail.

W01-C01E5C [1997]

# Charging from battery, or solar source

(W01-C01E5A)

E.g. charging from vehicle battery. See also X16-G02 codes for charger circuit per se.

#### W01-C01E5D [2005]

# From generator including battery charging

Includes the use of mechanical generator, e.g. hand-operated types, for battery charging or short-term powering of a telephone. See V06 for novel generators per se and X16-G, e.g. X16-G02C for battery charging using generators.

# W01-C01E5E [2017]

# Non-contact charging

Includes wireless mobile phone charging. Noncontact battery charging in general is covered by X16-G03. Wireless transmission of electrical power in general is covered by U24-H02 for low-power systems and X12-H01E for higher power levels.

Non-contact, wireless charging, remote charging

W01-C01F [1992]

Ringing, call screening, call handling, identification of caller

(W01-C01X)

W01-C01F1 [1992]

Ringing

# W01-C01F1A [1992]

#### Transducer per se

See also V06 codes for transducer details. Transducers for microphone or earphone use are **not** included. See W01-C01M.

#### W01-C01F1B [1992]

# Volume setting, muting, drive circuitry

From 1997, volume control based on sensed ambient lighting is coded in W01-C01F1D only. For disconnection determined by actual time of day, see W01-C01F1C.

W01-C01F1C [1992]

Timed disconnection of ringer

W01-C01F1D [1997]

# Disconnection or volume reduction based on ambient lighting

(W01-C01F1B, W01-C01F1C)

#### W01-C01F1E [1992]

# **Accessory ringer**

(W01-C01X)

Includes unit which can be plugged into telephone socket to warn of incoming call only. Prior to 1992 search W01-C05A and W01-C01X.

W01-C01F1F [1997]

#### Mechanical ringer

Vibrating, silent alert

W01-C01F1G [1997]

**Optical ringer** 

W01-C01F1K [2002]

# Automatic switching between different ringer types

This code is intended for arrangements switching between different types of ringer, e.g. switching from mechanical to acoustic ringing if a call is not acknowledged. Arrangements for signalling different types of incoming call, e.g. by means of different tones or tone sequences, are covered by W01-C01F1M. Facilities for inputting ringing tone sounds or musical extracts to be stored as ringing tones are covered by W01-C01F1P.

# W01-C01F1M [2002]

# Signalling different incoming call types

Covers arrangements for signalling different types of incoming call, e.g. voice calls and text messages, by means of different tones or tone sequences. For aspects specific to SMS and similar telephones, search with W01-C01G6 codes.

# W01-C01F1P [2002]

# Memory storage input for ring tone generation

Covers arrangements for inputting, including downloading, of ringing tone sounds or musical extracts to be stored as ringing tones. Search with W01-C01Q2 codes for storage of ringing tones in memory. Sampling in electronic musical instruments is covered by W04-U01C1, and sequencer arrangements in W04-U06, these codes being assigned also as appropriate for genuine novel aspects. Waveform storage for tone generation in general is covered by U23-F codes.

#### W01-C01F3 [1992]

# Display of caller number

Covers display of **incoming** calls originating number only. Display of dialled numbers is covered by W01-C01B3 codes.

# W01-C01F5 [1992]

# Call screening, password systems

(W01-C01X)

Includes automatic arrangements requiring receipt of additional code signal to actuate ringer, for example. Arrangements displaying calling subscriber's number enabling choice of answering only, are coded in W01-C01F3.

#### W01-C01F6 [1997]

# Controlling built-in and external equipment in response to incoming call

(W01-C01F9, W01-C05B5A, W03-G05)

From 2006 the scope of this code has been expanded and subdivided to allow highlighting of control, e.g. muting or pausing, of built-in audio, video, or other equipment in response to an incoming call, in addition to the previous usage for transmitting control signals to external equipment.

#### W01-C01F6A [2006]

# Controlling internal equipment in response to incoming call

This code covers the control of additional equipment built-in to a telephone, such as audio or video players, in response to an incoming call. W01-C01P6 codes are also assigned as appropriate.

# W01-C01F6C [2006]

# Controlling external equipment in response to incoming call

This code covers the control of equipment external to a telephone, such as audio or video players, in response to an incoming call.

# W01-C01F8 [2005]

#### **Call handling**

Covers arrangements for call handling using a variety of methods, e.g. text message, ringing, voice message, etc. Exchange-based call handling systems are covered by W01-C02B codes, especially W01-C02B2 codes.

# W01-C01F8A [2005]

#### **Based on Caller ID**

Covers handling of incoming calls based on CLI information, e.g. activating ringer for priority numbers, sending a voice or text message for others.

# W01-C01F8C [2005]

# Based on profile, e.g. Presence-Enhanced Contacts profile

Provides a dynamic profile of the user, visible to others, the user's availability, whereabouts and suitable methods of communication. System aspects of telephone call handling are covered by W01-C02B2N.

#### W01-C01F9 [1992]

# Other incoming call alerting aspects

# W01-C01G [1992]

#### **Equipment type**

Codes in this section do not necessarily indicate novel aspects and are assigned with other W01-C01 codes as appropriate. Cordless and mobile radio telephones are **not** coded here - see W01-C01D codes.

# W01-C01G1 [1992]

# Intercom

(W01-C01, W01-C04)

This code is used for an otherwise standard telephone with an intercom facility, and **not** an intercom of e.g. apartment block security type with no telephone aspect, which is coded in W01-C04. See W01-C01D2 for direct communication between radio telephones.

# W01-C01G2 [1992]

#### Loudspeaker and hands-free telephone

(W01-C01, W01-C04)

The title of this code has been expanded from 2002 to better reflect its coverage of loudspeaker telephone and hands free telephone.

# W01-C01G2A [2002]

#### Loudspeaker telephone

#### W01-C01G2C [2002]

# **Headset telephone**

(W01-C01G9)

Includes 'hands-free kit' mobile phone, for which W01-C01D3C is also assigned. Telephone headset aspects were previously coded in W01-C01G9.

Hands free

#### W01-C01G3 [1992]

#### Pushbutton/key telephone

Prior to 1992, pushbutton and key telephone systems were coded in W01-B03, W01-C01X and W01-C02X. From 1992 see W01-C02G5C.

#### W01-C01G4 [1992]

# Video telephone

(W01-C01X, W01-C05B1, W02-F09)

Also coded in W02-F08B3. For complete video telephone system see W01-C05B1 codes and W02-F08B1.

#### W01-C01G5 [1992]

# **Conference telephone**

(W01-C01, W01-C04)

See W01-C02B1 for exchange details. For video conference telephone search with W01-C01G4. Prior to 1992 search W01-C05B1, W02-F09 and W01-C01X.

#### W01-C01G6 [1992]

# Screen text and internet communication telephone

The title of this code has been expanded from 2002 to better reflect coverage of SMS, email and internet communication. Telephone network aspects of text-based communication in general are covered by W01-C05B1A.

#### W01-C01G6A [2002]

#### **SMS**

This code is intended for 'text messaging', primarily in mobile phones, for which W01-C01D3C is also assigned.

Short message service

#### W01-C01G6B [2005]

#### **MMS**

This code is intended for "multimedia messaging". primarily in mobile phones, for which W01-C01D3C is also assigned.

Multimedia messaging service, picture messaging, MMS

#### W01-C01G6C [2002]

#### **Email**

Email in general is covered by T01-N01C, which is also assigned here.

#### W01-C01G6E [2002]

#### Internet communication

This code is assigned with W01-C01D3 codes for WAP phone aspects, e.g. W01-C01D3G for '3G' or '4G' handsets, and with W01-C01P1 for multimedia aspects. W01-C01G6E includes telephone sets equipped for placing calls over the internet, e.g. using VoIP. (Systems aspects of VoIP are covered by W01-C05B4C). Phones using push to talk over packet network technology are covered by W01-C01G6H.

i-mode

#### W01-C01G6F [2005]

#### Instant messaging

This code covers phones with the provision of real time mobile communication using instant messaging.

#### W01-C01G6G [2002]

# Data streaming and packet handling

This code is intended for telephones capable of data streaming and packet handling, e.g. for GPRS when used with W01-C01D3 codes.

GPRS, EDGE, packet

#### W01-C01G6H [2005]

#### Push to talk over packet network

This code covers phones providing direct one-toone or one-to-many voice communication using 'push to talk' Voice over IP (VoIP) communication over packet-based networks. Telephone systems aspects are covered by W01-C05B4G. Phones using VoIP technology other than push to talk are covered by W01-C01G6E.

PoC

#### W01-C01G8 [1992]

#### Feature telephone and smartphone

Covers telephone set with several features, e.g. operated by special keys or additional software modules, including smart phones which from 2016 are covered by W01-C01G8S. (Prior to 2016 W01-C01G8 codes were assigned as appropriate for this topic together with W01-C01P2 for PDA aspects and W01-C01D3C to denote hand-held mobile phones). For program control and software aspects search with W01-C01Q3 codes, T01-F codes and T01-S codes.

# W01-C01G8A [2002]

# User interface management/menu-driven telephone set

Covers telephone, especially of mobile type (W01-C01D3 codes also assigned in that case), in which particular features are accessible via a menu system or via a special user interface, e.g. using a reduced number of keys. Special function keys themselves are covered by W01-C01B8K. Control circuitry in general for telephones is covered by W01-C01Q codes, which may also be assigned depending on novelty. GUI aspects are also covered by T01 codes, e.g. T01-J12 codes.

UI, pull down menu, window, split screen, icons

#### W01-C01G8C [2002]

#### **Automatic selection of functions**

Covers telephones, especially of mobile type (W01-C01D3 codes also assigned in that case), in which particular features are selected without direct action by the user, based on sensed conditions or environment.

# W01-C01G8E [2007]

#### Haptic feedback control

This code covers sense of touch feedback control, including force and vibrating feedback. Signal processing aspects of feedback control are covered by W01-C01Q6E.

## W01-C01G8S [2016]

# **Smartphone**

This code is intended to represent phones (normally mobile for which W01-C01D3C is also assigned) having computing capability using a dedicated or adapted operating system with the ability to run application software that may be downloaded by the user. While it is recognized that the majority of mobile phones now fall into this category the code is intended as a search reference for this topic which prior to 2016 was represented by W01-C01G8 codes with W01-C01D3C and W01-C01P2 as necessary for 'PDA' aspects. For inventions concerned with software and program control aspects such as operating system details or mobile 'apps' search with W01-C01Q3 codes and T01-F codes.

Android®, BlackBerry®, Mozilla Firefox®, OS, iOS, Windows Phone®

# W01-C01G9 [1992]

# Other telephone set type

Prior to 2002, this code was used for telephone headsets which are now covered by W01-C01G2C.

# W01-C01H [1992]

# **External devices switching interface**

(W01-C01X)

This code is used for arrangements to interface with e.g. facsimile equipment (see S06-K07C2B also) and includes automatic switching on detection of type of call.

### W01-C01J [1992]

# Metering at subscriber equip. location

(W01-C01X, W01-C06)

From 1992 subscriber metering is coded in W01-C01J only, and not W01-C06.

#### W01-C01K [1992]

# **Subscriber equipment testing**

This code is intended for testing using external apparatus. from 2002, self testing and monitoring as part of a telephone set control system is covered by W01-C01Q1. See W01-C08C codes for testing in general, which may also be assigned with W01-C01K when specifically relevant.

### W01-C01L [1992]

### **Network interface aspects**

(W01-C01X)

The title of this code has been expanded from 2002 to better reflect its coverage of ADSL aspects in addition to interfaces for ISDN. Connection of telephone sets with external equipment using a digital interface is covered by W01-C01R.

# W01-C01L1 [2002]

#### **ISDN** interface

See W01-C05B7 codes for all aspects of ISDN.

#### W01-C01L3 [2002]

#### **ADSL** interface

ADSL is covered by W01-C05B8A.

#### W01-C01L5 [2002]

Splitter arrangements, e.g. POTS/ISDN splitter

# W01-C01L7 [2002]

**Standard, i.e. POTS line interface** (W01-C01X)

#### W01-C01L9 [2002]

#### Other network interface aspects

# W01-C01M [1992]

# Acoustic transducers (microphones and loudspeakers)

For full details of transducers search with appropriate codes in V06. (Ringing transducers are covered by W01-C01F1 codes only, e.g. W01-C01F1A for acoustic ringing and W01-C01F1F for vibrating types).

## W01-C01N [1992]

# **Extension and line holding arrangements**

Includes automatic arrangement to restore on-hook condition. See W01-C01D1 codes only for cordless telephones.

# W01-C01P [1997]

# Telephone apparatus integrated with other device

(W01-C01X, W01-C05B)

Covers telephone combined with other equipment (in the form of hardware or a software module), forming a single unit. See W01-C05B codes for combination of external devices with telephone equipment and systems.

# W01-C01P1 [1997]

# Multi media apparatus

See also T01-J30 codes and W01-C05B2 for system aspects. Prior to 2011 this code was also assigned for multimedia aspects of DMB receivers. From 2011 these are covered solely by W01-C01P6G and W03-A11G5.

# W01-C01P2 [1997]

### Personal digital assistant

See also T01-M06A1A and W01-C01D codes for mobile telephone aspects.

Personal digital organiser, PDA

#### W01-C01P3 [1997]

# Telephone answering machine

(W01-C01C5)

See W01-C01C5 for answering machine details.

# W01-C01P4 [1997]

#### **Facsimile machine**

See also S06- D to K codes. General telephone systems aspects of facsimile are covered by W01-C05B1C.

#### W01-C01P5 [1997]

#### Modem

General telephone system aspects of modems are covered by W01-C05B3A.

# W01-C01P6 [2005]

# Telephone with built-in entertainment device

Novel details of audio and video equipment are also assigned W03 or W04 codes as appropriate.

### W01-C01P6A [2005]

# Portable audio player/recorder

W04-G01B8 is also assigned for solid-state audio players such as MP3 types, with other W04 codes as necessary for novel aspects.

#### W01-C01P6C [2005]

# **Digital camera**

W04-M01B1 codes are also assigned, and for novel details of digital cameras other W04-M01 codes are applied as necessary. Video phones are covered by W01-C01G4.

Camera phone

### W01-C01P6E [2005]

#### **Broadcast radio receiver**

W03-B codes are also assigned for specific radio receiver aspects.

### W01-C01P6G [2005]

# Broadcast TV receiver and digital multimedia broadcast receiver

From 2011 the title of this code has been changed to reflect the inclusion of DMB receivers for which W03-A11G5 is also assigned, along with other W03-A codes as necessary. Prior to 2011 W01-C01P1 was also assigned to indicate multimedia aspects depending on novelty.

# W01-C01P6J [2005]

# Video player/recorder

From 2009 the title of this code has been expanded to reflect the previous inclusion of video players as well as recorders. Novel details of the video recorder/player are also assigned W04 codes, e.g. W04-P01C8 for solid-state types.

### W01-C01P6L [2005]

# Game player

See W04-X02 codes for gaming aspects in general and T01-J30B and T01-N01B1 for computer gaming.

# W01-C01P6X [2005]

# Other entertainment equipment built into a telephone set

# W01-C01P7 [2005]

#### **Navigational receiver**

Covers telephones with integrated navigational receiver, e.g. a GPS receiver. See W06-A codes also for details of navigational systems, e.g. W06-A03A codes for GPS.

# W01-C01P8 [2007]

# Medical parameter monitoring equipment

This code includes arrangements for monitoring physiological parameters such as vital signs to determine the health status of a person, or in connection with sporting activity (in which case e.g. W04-X01A1 or other W04-X01 code is also assigned), using a built-in phone monitoring device. See also S05 codes, for medical monitoring equipment in general, to highlight specific measurements.

#### W01-C01P9 [1997]

# Other equipment built into a telephone set

Includes 'alarm clock' (also assigned S04-B05), built-in smart card or similar (also assigned T04-K codes) for use with ticket gates (also assigned T05-D01A1), built-in OCR facility (also assigned T04-D codes), built-in torch (also assigned X26-E01 codes) or any other built-in equipment not covered by the above subdivisions.

#### W01-C01Q [2002]

# General control circuitry for telephone sets

These codes are intended to cover general aspects of telephone set control and especially microprocessor-based aspects which are also assigned T01-J08A codes as appropriate. For aspects specific to menu-driven telephone sets, search with W01-C01G8A.

#### W01-C01Q1 [2002]

### Self testing and monitoring

Testing of subscriber telephone using **external** equipment is covered by W01-C01K.

#### W01-C01Q1A [2002]

# **Checking remaining battery capacity**

This code is assigned with W01-C01E5B. Checking battery charge state in general is covered by S01-G06A and X16-H01.

# W01-C01Q2 [2005]

# **Memory storage**

Covers memory storage facilities for data, including application programs, music and video files. See also W01-C01Q3A for software updating and modification and W01-C01B1A with W01-C01D3D (and e.g. W01-C01D3C) for storage of telephone numbers within a mobile phone SIM card.

# W01-C01Q2A [2005]

#### **Internal memory**

Covers memory forming a fixed part of the phone. *RAM, flash memory* 

# W01-C01Q2C [2005]

#### **External memory**

Covers user-changeable memory, e.g. cards. See also T01-H01B3A for memory cards per se. Memory card,  $CF^{\otimes}$ ,  $SD^{TM}$ ,  $miniSD^{TM}$ ,  $MMC^{TM}$ ,  $reduced\ size\ MMC^{TM}$ ,  $memory\ stick^{\otimes}$ ,  $xD\ card^{TM}$ ,  $smartmedia^{TM}$ 

# W01-C01Q3 [2002]

### **Program control aspects**

From 2016 this code is further subdivided to differentiate between program control aspects relating to a phone's operating system (W01-C01Q3C) and those relating to installed or downloaded programs (W01-C01Q3E). Program control in computer and microprocessor systems is covered by T01-F codes, software development by T01-J20 codes and software content by T01-S codes, which are also assigned as appropriate. For application to smartphones search with W01-C01G8S (from 2016).

### W01-C01Q3A [2002]

#### Software updating and modification

Includes arrangements for downloading or otherwise inputting data to modify the control program.

#### W01-C01Q3C [2016]

# Program control aspects and software relating to operation of phone itself

This code covers any novel aspects of the operating system (OS), and also multiple OS phones.

#### W01-C01Q3E [2016]

# Program control aspects and software relating to applications

Includes novel application software ('apps') and their development and also inventions relying on apps, whether pre-installed or downloaded by the user.

#### W01-C01Q4 [2005]

#### Voice activated control

Includes the use of voice to control the operational aspects of the telephone. See also W01-C01B1B for voice dialling per se and W01-C01B5B for restricted dialling based on voice recognition. Control of access to the phone as a whole based on voice or other biometric aspects is covered by W01-C01Q8C. W04-V codes, e.g. W04-V04A, are also assigned for speech recognition aspects. Voice command

#### W01-C01Q5 [2002]

#### Sensing systems

Covers arrangements for determining particular conditions relating to the environment or usage of the telephone. Checking battery charge state is covered by W01-C01Q1A.

#### W01-C01Q5A [2002]

#### Sensing user proximity

Covers arrangements for determining that a telephone or handset is being held by the user, e.g. by proximity sensing, to control parameters such as loudspeaker volume. This relates especially to portable telephones, in which case W01-C01D3C is also assigned. Human presence detection in general is covered by \$03-C06 codes. Arrangements for determining a guiescent state, i.e. non-usage of the telephone, and switching between this and an active state, are covered by W01-C01Q7A.

#### W01-C01Q5B [2007]

#### Sensing other users in the vicinity

This code includes arrangement for sensing/detecting other users in the vicinity. See also W01-C01R and W01-A07H codes for the type of medium being used.

Proximity Mail ®

#### W01-C01Q5C [2002]

### Sensing connection of external devices

This relates to sensing the connection of external headsets, car adapters for portable phones, PCs, and any other equipment whose connection requires some change in the operation of the telephone set.

#### W01-C01Q5G [2014]

# Sensing acceleration, orientation and relative position

Covers arrangements for sensing movement or orientation of a phone, especially a mobile phone for which W01-C01D3C is also assigned, e.g. for auto-rotating display images, coming out of standby mode, or camera shake detection for which W01-C01Q6A, W01-C01Q7A or W01-C01P6C respectively are also assigned as necessary. Novel aspects such as transducers are also assigned S02 codes, e.g. S02-B07 codes for gyro-based sensors or S02-G03 for accelerometers. Sensing of direction or absolute position using e.g. a compass or navigational systems is not included and is covered by W01-C01P7.

Angle, landscape, portrait, rotate, turn

#### W01-C01Q5X [2002]

# Other sensing systems for telephone sets

Includes fingerprint sensors.

#### W01-C01Q6 [2006]

# Multimedia processing aspects

Covers processing aspects of the telephone, including graphics and display, audio, haptic and tactile and any general processing aspects.

Acceleration, rendering, GPU

#### W01-C01Q6A [2007]

# **Graphics and display processing**

(W01-C01B3A, W01-C01Q6)

Previously coded in W01-C01Q6. Includes arrangements for processing graphical and display information that is not part of the display screen hardware. See also T01-C04D for computer display processing. Prior to 2006, all aspects of display/control circuitry were coded in W01-C01B3A.

Acceleration, rendering, GPU

#### W01-C01Q6C [2007]

#### Audio signal processing

Includes arrangements for processing audio signals other than for normal speech processing for communication, which is covered by W01-C01C7 codes. In all cases W04-V codes are also assigned for specific processing and coding details.

MIDI. Wave

# W01-C01Q6E [2007]

# Haptic and tactile processing

This code covers processing necessary for implementation of haptic functions, e.g. in connection with user interface aspects. Novel transducers and drive circuits for haptic features are covered by W01-C01G8E.

# W01-C01Q6X [2007]

# Other multimedia processing

# W01-C01Q7 [2002]

# Standby and related systems

This covers arrangements for disabling parts of a telephone, especially a portable type (with W01-C01D3C) as a power-saving measure.

# W01-C01Q7A [2002]

# **Determining quiescent state**

This covers arrangements for determining a quiescent state based on e.g. non-actuation of keys for a preset period.

# W01-C01Q8 [2002]

# **Security aspects**

This code is used for general security aspects of the telephone control system. SIM card aspects of mobile phones are covered by W01-C01D3D and security aspects involving dialling restrictions are covered by W01-C01B5 codes. From 2010 W01-C01Q8E is introduced for arrangements to prevent access to confidential data stored in a mobile phone.

# W01-C01Q8A [2002]

#### Theft alarms

This code covers alarms warning of the possible theft, or leaving behind, of a telephone set itself, again usually of portable type (with W01-C01D3C). W05-B01 codes for theft alarms are also assigned as appropriate.

# W01-C01Q8C [2005]

### Security based on biometrics identification

Includes control of access to the phone as a whole based on fingerprint, eye or voice recognition. Restricted dialling alone based on voice recognition is covered by W01-C01B5B. W04-V codes, e.g. W04-V04A3, are also assigned for speech recognition aspects and S05-D01C5A for fingerprint and eye recognition aspects.

# W01-C01Q8E [2010]

# Preventing access to confidential data

This code is intended for arrangements with the emphasis on preventing access to confidential data stored in a mobile phone or similar. It includes arrangements for erasing data both locally and remotely (e.g. by the owner or service provider in the case of a stolen device), and also for preventing unauthorised access via a Bluetooth\* or similar link. Aspects involving the digital interface itself are also assigned W01-C01R. Preventing access to, or use of, the phone as a whole is covered by other W01-C01Q8 codes or W01-C01B5 codes.

Anti-hacking, Bloover, bluejacking, bluesnarfing, intrusion, remote erasure

[2002]

### W01-C01Q9

# Other general telephone set control circuitry aspects

# W01-C01R [2006]

# Interfacing systems

(W01-C01X)

This code includes the interfacing of a telephone set (usually mobile, for which W01-C01D3C is also assigned) to a local external device via a digital connection. From 2011 it is subdivided to differentiate between novelty in the interface itself and applications where the **use** of the interface is significant. W01-A07H codes are also assigned to highlight the interface medium used when specific, e.g. W01-A07H2A for a Bluetooth® link. See also T01-C codes for interfacing with a computer. Circuits and components for interfacing with PSTN landlines are not included and covered by W01-C01L codes. 'User interface' aspects such as GUI or menus etc. are **not** included, being covered by W01-C01G8A.

Bluetooth®, Firewire®, IEEE1394, i-link®, infrared data association, IrDA, RS-232, RS-485, serial port, TransferJetTM, USB, universal serial bus

# W01-C01R1 [2011]

#### Novel details of telephone digital interface

This code is intended for novel details of digital interfaces for telephones, including software and also hardware aspects such as connectors and circuitry.

#### W01-C01R5 [2011]

# Applications of telephone digital interface

This code is intended for significant applications of digital interfaces for telephones, e.g. where an invention relies on the use of the interface to connect a phone with an external system or equipment.

# W01-C01V [2017]

# Manufacturing subscriber equipment

Includes manufacturing of home telephones, mobile phones, smartphones, or other subscriber equipment, for which additional W01-C01 codes are assigned as necessary. This code covers assembly of subscriber equipment and also manufacture of items specific to the equipment itself, such as housings, PCBs and the like. Manufacture of bought-in components such as audio transducers, semiconductor devices or displays is not included and for these aspects see codes relating to the component itself, e.g. U14-K01A1J for LCD manufacture.

Assembly, fitting, molding

# W01-C01W [2017]

# **Recycling subscriber equipment**

Includes recycling of all kinds of subscriber apparatus including landline telephones, smartphones, and accessories. Other W01-C codes specific to the equipment being recycled are also assigned, e.g. W01-C01G8S for smartphones. Materials recovery and recycling of electronic components in general is covered by V04-X01C and electrical aspects of recycling in general are covered by X25-W04.

Environmentally-friendly, rare earth, recycle, reprocess, reuse

#### W01-C01W1 [2017]

# Equipment design and components improving recyclability

Covers design features including use of recycled components and materials and selection of components and materials that facilitate the recycling of unwanted telephone equipment. Recyclable

# W01-C01W5 [2017]

# **Equipment and methods of recycling**

Covers equipment and methods used in recycling of subscriber equipment, e.g. for disassembly, recovery of reusable components or valuable materials. Machines dispensing a payment in return for deposited recyclable items in general are covered by T05-H02E which is also assigned as appropriate.

Desoldering, dissolving, heating, kiosk, reversevend, separating, tools

#### W01-C01X

#### Other subscriber equipment

#### W01-C02

### Automatic/semi-automatic exchanges

See W01-B codes for actual selection details. Data exchange e.g. for networks is covered by W01-A06 codes.

#### W01-C02A

#### Supervising, testing, indicating faults

See W01-B08 for selection system testing and W01-C08C codes for general aspects.

# W01-C02A1 [1987]

#### Monitoring/testing exchange

Codes in this section are also used with W01-C08C5 for testing of an exchange from an external maintenance centre.

# W01-C02A1A [1992]

# Statistical metering

(W01-C02A, W01-C06)

Covers detection of overload/blocking condition and general measurements on telephone system usage and performance, including call centre operator call handling (with W01-C02G3 codes)

### W01-C02A1C [1992]

# Fault location, standby systems

Standby systems for data networks are covered by W01-A06A1 code, for line systems in general by W02-C01D3 codes, and for radio equipment by W02-G08 codes.

Redundancy, hot standby, back-up

#### W01-C02A5 [1987]

# Testing external system incl. subscriber loop

Testing for line systems in general is covered by W02-C01D codes.

Continuity test

# W01-C02A5A [1992]

# Discriminating line fault from apparatus fault

Internal/external fault discrimination

# W01-C02A7 [1992]

#### Control of exchange

Includes overall control of operation and functions such as least cost routing (also coded in W01-C06A). Network resource allocation is covered by W01-C02A7 and W01-C02A1A. Radio resource allocation in general is covered by W02-C03E7 and when relating to cellular mobile telephone systems W01-B05A1 and W02-C03C1 codes are also assigned as appropriate.

Stored program, control, SPC, computer, microprocessor, microprogram, LCR

#### W01-C02A7A [1997]

#### Intelligent network

(W01-C02A7, W01-C02B)

See also W01-C02B codes for special features and T01-J08C codes for communication control aspects.

#### W01-C02B

# **Special subscriber services**

Codes in this section deal with services wholly provided by the exchange itself, and also those involving external services (W01-C02B7 codes). *Call interception* 

# W01-C02B1 [1987]

#### **Conference systems**

See W01-C01G5 for subscriber conference equipment. TV conference systems are covered by W02-F08A, combine with W01-C codes as appropriate for any telephone aspects. For example, moving-picture TV conference system using the telephone network is coded as W01-C02B1, W01-C05B1E, W02-F08A1 and W02-F08B1.

Bridge, multiple subscriber connection

# W01-C02B2 [1992]

# Call forwarding, transfer and diversion

For topics below relating to automatic exchange functions W01-C02G5A is normally assigned as well.

# W01-C02B2A [2002]

# **Direct-inward dialling**

This code is intended for systems allowing direct dialling, e.g. by entering additional digits once a connection to an exchange is made.

# W01-C02B2C [2002]

# Simultaneous or successive ringing of extensions

This code is intended for arrangements to ring a number of extensions until a call is answered.

# W01-C02B2E [2002]

#### **Call diversion**

This code is intended for the facility by which a subscriber can set up or cancel call diversion, and specify a number to which calls are to be routed **without** ringing of the subscriber's telephone. Call forwarding based on a call going **unanswered** is covered by W01-C02B2L. Time-dependent operation of this feature is indicated by assignment of W01-C02B2J also. Call barring is covered by W01-C02B2G.

Redial, redirect

# W01-C02B2G [2002]

#### **Call barring**

This code is intended for the facility by which a subscriber can set up or cancel a call barring facility. Time-dependent operation of this feature is indicated by assignment of W01-C02B2J also. Call diversion is covered by W01-C02B2E.

### W01-C02B2J [2002]

#### Time-dependent call handling

This code is intended for the facility by which a subscriber can establish time windows for operation of call handling features. It is used in conjunction with other W01-C02B2 codes as necessary.

# W01-C02B2L [2005]

#### **Call forwarding**

This code is intended for the facility by which a subscriber can set up call forwarding, and specify a number to which unanswered calls are to be forwarded. Call diversion **without** ringing is covered by W01-C02B2E and call barring is covered by W01-C02B2G.

Redial, redirect

# W01-C02B2M [2006]

#### **Call transfer**

This code is primarily intended for manual arrangements for re-directing a received call to another extension. Automatic arrangements for diversion of calls are covered by W01-C02B2E if no ringing of the dialled telephone occurs and W01-C02B2L if the call is forwarded only if unanswered. Redial. redirect

#### W01-C02B2N [2006]

# Based on profile, e.g. Presence-Enhanced Contacts profile

Provides a dynamic profile of the user, visible to others, the user's availability, whereabouts and suitable methods of communication. Subscriber telephone set aspects of profile-based call handling are covered in W01-C01F8C.

W01-C02B2X [2002]

# Other incoming call handling functions

W01-C02B3 [1992]

### Camp-on, call-back and caller ID system.

The title of this code has been expanded from 2002 to better reflect its coverage of caller ID systems. See also W01-B03C for **novel** aspects of caller ID systems and call tracing.

W01-C02B3A [2002]

Camp-on and call-back

W01-C02B3C [2002]

**Caller ID transmission** 

(W01-B03C, W01-C02B9)

W01-C02B3E [2002]

# Inhibiting ongoing transmission of caller ID

(W01-B03C, W01-C02B9)

This code includes the use of digit sequences entered by a calling subscriber before dialling, to inhibit the caller ID feature of the exchange. Withheld Number

W01-C02B4 [1992]

#### Centralised call answering

Automatic answering equipment wholly at the subscriber location is covered by W01-C01C5 codes. Voice mail is covered by W01-C02B7C.

W01-C02B4A [1997]

# **Call holding**

Search with W01-C05B5A for music on hold. Line holding circuits for subscriber telephones are covered by W01-C01N.

Music on hold, call waiting

W01-C02B5 [1992]

### Number storage, centralised autodial

Subscriber-based autodial systems are covered by W01-C01B1 codes.

W01-C02B5A [1997]

### Reply dialling

See W01-C01B1E for reply dialling based at subscriber apparatus only.

W01-C02B6 [1992]

Graded service

#### W01-C02B6A [1992]

#### Determining entitlement to level of service

Includes checking of ID in e.g. cellular telephone network (also coded as W01-B05A1A and W02-C03C1 codes).

W01-C02B6C [2002]

# Denying access to telephone service based on non-entitlement

Includes inhibiting access using e.g. stolen mobile phone. Arrangements for inhibiting any mobile phone in a sensitive area are covered by W01-C08F5.

W01-C02B7 [1992]

# Involving facilities external to exchange

Codes in this section are used with W01-C05 codes as appropriate to the external service provided. The concept of 'external' is intended to denote facilities not involved in the primary function of the exchange.

W01-C02B7A [1992]

# **Paging**

See also W01-C05A and W05-A05C codes. Short messaging service is coded in W01-C02B7D only.

### W01-C02B7B [1992]

# Alarm monitoring systems

Covers exchange monitoring of external alarms, see also W01-C05A and W05-B05 codes. From 2002 alarm systems communicating via the telephone network **without** any novelty in the telephone aspect are covered by W05 codes only.

W01-C02B7C [1992]

#### Voice mail system

See also W01-C05B5E for recording aspects.

W01-C02B7D [1997]

#### Short messaging service

Covers transmission of paging message to radio telephone. See W01-B05A1F for switching details, and W01-C01G6A for SMS telephones themselves. See W01-C02B7A for telephone exchange aspects of paging systems.

W01-C02B7E [2002]

#### Automatic directory enquiry services

(W01-C02B7X, W01-C05B5C)

Automatic directory enquiry services are now only also assigned W01-C05B5C for specific details of the database or similar system, for which T01-J05B codes are likely to be used as well.

# W01-C02B7F [2005]

# Multimedia messaging service (MMS)

Covers transmission of messages to a (usually mobile) telephone including a combination of image, sound and text. Aspects specific to the telephone itself are covered by W01-C01G6B.

Multimedia messaging service, picture messaging, MMS

#### W01-C02B7G [2007]

# Centralised storage of user profile

Includes arrangement of storing user profiles in a central place, and downloading the profile to the phone on power-up when connected to network.

# W01-C02B7H [2007]

# Transfer of personalised ringtone

Includes arrangements for sending a personalised ringtone to the called person.

# W01-C02B7L [2007]

#### Location based service

Includes arrangement of providing a personalised service, based on the location of the mobile terminal. See also other W01-C02B and W01-C05 codes for the type of service being offered.

#### W01-C02B7X [1992]

#### Other external service provision

Prior to 2002, automatic directory enquiry services were coded here as well as in W01-C05B5C. (Now covered by W01-C02B7E)

#### W01-C02B8 [1992]

#### Alarm call systems

Includes 'early-morning-call' type system. *Automatic, select, key, dial* 

# W01-C02B9 [1992]

# Other subscriber services

Includes interactive voice response (IVR) systems for which W04-V04 codes are also assigned. *IVR* 

# W01-C02C [1992]

# Attendant desk, consoles

(W01-C02X)

# W01-C02C1 [1997]

# Automatic call distribution or call centre console

ACD

# W01-C02D [1992]

#### Interfacing with external network

(W01-C02X)

Includes circuits and arrangements for connection to subscriber lines and inter-exchange trunks (also coded in W01-C03).

#### W01-C02D1 [1992]

### Subscriber line interface circuit

See also W01-C08B for hybrid circuit details. *SLIC* 

#### W01-C02D3 [1992]

#### Transmission of ringing signals

Subscriber set ringers are covered by W01-C01F1 codes. See W01-C07B also where current supply aspects are involved.

# W01-C02D5 [1992]

# Reception of ringing signals, line state details

# W01-C02E [1992]

#### **Power supply details**

See also W01-C07B for current supply details. Subscriber set aspects are covered by W01-C01E codes

#### W01-C02G [1992]

#### **Exchange type**

Codes in this section are used to indicate exchange type only and do not necessarily represent novel aspects.

#### W01-C02G1 [1992]

# Central office type

Attendant/operator system

#### W01-C02G3 [1997]

#### Automatic call distribution or call centre

(W01-B03, W01-C02B2)

#### W01-C02G3A [1997]

#### **Automatic call distribution centre**

(W01-B03, W01-C02B2)

ACD

# W01-C02G3B [1997]

#### Call centre

(W01-B03, W01-C02B2)

# W01-C02G5 [1992]

# Private exchange

Search with W01-B05A1 codes for radio private exchange. Search with W01-C03 for centrex.

# W01-C02G5A [1992]

#### Automatic, i.e. PABX

See W01-C02B2 for direct inward dialling details.

# W01-C02G5B [1992]

#### **PBX**

(W01-C02X)

Attendant/operator system

# W01-C02G5C [1992]

### Key telephone system

Prior to 1992, key telephone systems were coded in W01-B03, W01-C01X and W01-C02X. For subscriber set aspects see W01-C01G3.

#### W01-C02X

# Other telephone exchange aspects

From 1992, semi-automatic systems are coded in W01-C02G codes and other W01-C02 codes as appropriate.

# W01-C03

# Interconnection between switching centres

See also W01-B03A when emphasis is on switching aspects. See W01-B05A3 and W02-C03C3G for trunked radio telephone system.

Inter-exchange connection, telephone trunk, leased line

#### W01-C03A [1997]

# Virtual private network

See W01-C02G5 codes for aspects of private networks. VPNs as data network, i.e. not specifically for telephone service, are covered by W01-A06B7G.

VPN

# W01-C04

# Interconnection without centralised switching

Includes party-line systems (see W01-B04 for selection aspects). See W01-B05A1D for direct communication between radio telephones. Prior to 1992 this code was also used for loudspeaker telephones, now coded in W01-C01G2.

Feedback suppression, transmission switching, call signal generator

# W01-C04A [1997]

#### Intercom

Includes aircraft crew or mineshaft intercom. For intercom combined with subscriber apparatus see W01-C01G1.

# W01-C04A1 [1997]

#### **Entryphone**

Search with W02-F01A1 for video entryphone.

#### W01-C05

# Telephonic systems combined with other electrical systems

In general, from 2002 pure **applications** of the telephone network to alarm signalling, telemetry, telecontrol and similar topics are not covered here, the W01 codes being reserved for cases of genuine 'telephone novelty' or where no provision exists elsewhere to highlight the telephone aspect.

### W01-C05A

#### With annunciator or alarm systems

See W05 codes also for application to e.g. selective calling systems or alarms (e.g. W05-B05 codes).

Central station alarm signalling, paging system

## W01-C05A1 [2002]

# **Emergency call location determination** systems

See W01-B03C also for call tracing and caller ID aspects, and W02-C03C1E for mobile location determination in cellular telephone systems.

Enhanced 911, E911, FCC

# W01-C05B

# With telegraphic, entertainment, video, or dictation systems

From 1992, all telephone aspects of ISDN are covered by W01-C05B7 codes. From 1997, multimedia systems are coded in W01-C05B2

### W01-C05B1 [1987]

# With video, incl. facsimile, videophone, screen text

Telephone ordering system for pay-per-view TV and telephone audience research systems are coded in W01-C05B5 codes.

Picture, video telephone, narrowband TV

# W01-C05B1A [1992]

#### Screen text systems

Includes instant messaging system. Telephone line based screen text systems are also coded in W02-F05B1.

# W01-C05B1C [1992]

#### Still-picture systems

Includes facsimile (see S06-D to K codes also) and still-picture video telephone systems (see W02-F08 codes also).

Video telephone

# W01-C05B1E [1992]

# Moving picture systems

Includes video telephone (see W02-F08B codes also). Still-picture types are coded in W01-C05B1C. See W01-C01G4 for apparatus details. Search with W01-C02B1 and W02-F08 codes for video conferencing system.

Narrowband TV, picture phone

### W01-C05B2 [1997]

# Multimedia system

See also T01, W03, W04 codes as appropriate, especially T01-J30 and W04-K10 codes. See W01-C01P1 for telephone subscriber apparatus details.

#### W01-C05B3 [1987]

# Telegraphic telephone line communication

See T01 codes also for computer aspects. Prior to 2002 W01-C05B3 was routinely used to highlight computer telephony integration and internet telephony, now both covered by W01-C05B4 codes, and ADSL which is now covered by W01-C05B8A.

Telecontrol, telemetering, computer access, remote terminals

### W01-C05B3A [1992]

#### Telephone line modem

Covers novel aspects of modem per se. See also W01-A09 codes for modulation/demodulation aspects. See W02-C04B2 or W01-A07H3 for free space optical link or W01-A07H2 or W02-G02 for radio link. See W01-C05B3G for voice over data modem.

#### W01-C05B3B [1992]

# Communication with computer from remote terminal

Novel modems are coded in W01-C05B3A, W01-C05B3G or W01-C05B3H, depending on type. (See also T01 codes).

# W01-C05B3C [1992]

#### **Electronic funds transfer**

Also coded in T05-L02, and T01-N01A1 from 2002. Note that from 2002, EFT and e-commerce inventions are **not** coded here unless some novel PSTN aspect is involved.

# W01-C05B3D [1992]

**Telex** 

# W01-C05B3E [1992]

#### Remote control

See also W05-D06G codes.

# W01-C05B3F [1992]

#### Remote monitoring

See also W05-D06G codes. Search W01-C05A only for monitoring in the context of alarm systems.

# W01-C05B3G [1997]

### Voice over data modem

(W01-C05B3A)

Voice-over-IP telephone communication is covered by W01-C05B4C from 2002. (Prior to 2002, W01-A06B7, W01-A06F, and W01-C05B3 were used, in addition to T01-H07C5E).

VoD

#### W01-C05B3H [1997]

#### Facsimile-modem

(W01-C05B1C, W01-C05B3A) Fax-modem

# W01-C05B3J [1997]

#### **Data streaming**

Telephone sets (as opposed to systems) with data streaming capability are covered by W01-C01G6G from 2002.

GPRS, EDGE, packet, radio

# W01-C05B3L [1997]

#### PCMCIA / PC card

This code is intended for PC type interface cards, e.g. used to interface between a mobile phone and a lap top or palm top computer.

# W01-C05B4 [2002]

# CTI and telephone systems combined with internet system

(W01-C05B3)

Prior to 2002 W01-C05B3 was routinely used to highlight computer telephony integration. Voice over data modem aspects are covered by W01-A09E3, and W01-C05B3G when specifically intended for PSTN usage. Voice over IP transmission is covered by W01-C05B4C from 2002 (previously T01-H07C5E, W01-A06B7, W01-A06F, and W01-C05B3).

#### W01-C05B4A

[2002]

# **CTI - (Computer Telephony Integration)**

(W01-A06, W01-C05B3)

#### W01-C05B4C [2002]

# Telephony via the internet and IP-based telephony

(T01-H07C5E, W01-A06B7, W01-A06F, W01-C05B3).

From 2012 the title of this code has been changed to reflect its existing coverage of IP-based telephony over other networks such as LANs, in addition to the use of the internet as a medium. This code takes precedence over W01-C05B4A and is intended for telephone systems using internet protocol to transfer voice information, over the internet and also private networks. Telephone apparatus equipped for VoIP-based communication is covered by W01-C01G6E, or W01-C01G6H in the case of 'push to talk' technology. Arrangements for access to the internet via the telephone network for general purposes are covered by W01-C05B4E. W01-A06B7A is also assigned where novel aspects of the internet itself are involved. Computer system aspects of the internet are assigned T01-N codes also.

Generic Area Network, GAN, Next Generation Public Switched Telephone Network, NPSTN, Unlicensed Mobile Access, UMA, Voice over internet protocol, VoIP

# W01-C05B4E [2002]

# Internet access via telephone system

This code is intended for arrangements for access, via the telephone system, to the internet for general purposes. Telephone systems using VoIP, i.e. using the internet as a medium for telephone traffic, are covered by W01-C05B4C. W01-A06B7A is also assigned where novel aspects of the internet itself are involved. Computer system aspects of the internet are assigned T01-N codes also.

# W01-C05B4G [2006]

# Push to talk over packet network system

(W01-C02B1, W01-C05B3J)

Providing direct one-to-one or one-to-many voice communication using Voice over IP (VoIP) over cellular packet network. Prior to 2006, this topic was covered in W01-C02B1 and W01-C05B3J. Telephone sets equipped for this mode are assigned W01-C01G6H. Internet telephony systems are covered by W01-C05B4C. Instant messaging systems using the telephone network are covered in W01-C05B1A, and telephone sets equipped for that mode are assigned W01-C01G6F. Telephone chatlines in general are covered by W01-C05B5A but internet chatroom systems are not included, being covered by T01 codes (e.g. T01-N03A1C).

#### W01-C05B5

[1987]

#### **Entertainment, dictation**

Value-added telephone services

# W01-C05B5A [1992]

#### **Entertainment systems**

See also W02-F10 codes for interactive entertainment systems, and W04-X02 codes and W04-X03A3 respectively for games or karaoke aspects.

Subscription/cable TV, pay-per-view communication, karaoke, chatline

#### W01-C05B5C [1992]

### **Educational and information systems**

Time announcement, speaking clock, recorded information, audience research

#### W01-C05B5E

[1992]

### **Recording and storage systems**

See W01-C02B7C for voice mail per se. Centralised recording, voice mail

### W01-C05B5G

[2005]

#### Advertising and marketing

Covers transmission of advertising, promotional and marketing information to telephone users. Visual advertising in general is covered by W05-E03 codes, and advertising based solely on audible information by W05-F (from 2014), which are also assigned as appropriate. See T01-N01A2C for transmission of advertising and marketing information in computer networks.

Promotions, offers, adverts

# W01-C05B6 [2005]

#### Mobile commerce

Covers buying and selling of goods and services e.g. financial and business services through wireless telephone systems. Novel aspects of PSTN electronic funds transfer are covered by W01-C05B3C. See T01-N01A2 for computer e-commerce and T01-N01A1 for on-line banking. *m-commerce, on-line shopping, mobile banking, wallet* 

W01-C05B7 [1992]

**ISDN System** 

Used with other W01-C codes as appropriate.

W01-C05B7A [1992]

**Subscriber apparatus** 

Also assigned W01-C01L1 for interface aspects.

W01-C05B7B [1992]

ISDN exchange

Data exchanges interfacing arrangements with ISDN are also coded in W01-A06B5C.

W01-C05B7C [1992]

Complete system (Architecture), signalling or method of operation

W01-C05B7D [1992]

Control

W01-C05B7E [1992]

**Broadband ISDN (B-ISDN)** 

W01-C05B7X [1992]

Other ISDN aspects

W01-C05B8 [2002]

ADSL and other Digital subscriber line system

(W01-C05B3)

Prior to 2002 ADSL was assigned W01-C05B3.

HDSL, XDSL, SDSL

W01-C05B8A [2002]

**ADSL** 

#### W01-C06

# Metering; Time controlling and indicating

Prior to 1992, use with W01-C01X for meter at subscriber location, (from 1992 covered by W01-C01J only). See W01-C02A for exchange aspects. From 1992, statistical metering is covered by W01-C02A1A. Search with W01-C02A7 for least cost routing at exchange or W01-C01B4 only for system in subscriber apparatus.

Call charge calculation, exchange metering, calllogging system, least cost routing

W01-C06A [2002]

**Least cost routing** 

W01-C06C [2002]

Time control and indication

W01-C06E [2002]

**Billing** 

W01-C06G [2002]

Reduced rate and reverse charge systems

W01-C06G1 [2002]

# Reduced rate charging systems

Includes arrangements for reduced rate charging band on e.g. keying in an access code with a prepaid card. Prepayment telephones in general are covered by W01-C07A codes.

W01-C06G3 [2005]

### Toll free calling

Includes arrangements providing free telephone calls through special dial access.

W01-C06G5 [2002]

Reverse call charging

Collect call

W01-C06J [2005]

#### **Prepaid telephone services**

Covers provision of telephone service without a contract being established with the service provider. See W01-C07A codes for prepayment public telephones.

Pay-as-you-go, pre-pay

W01-C06L [2005]

# Call logging

Covers compilation and storage of telephone usage records, usually for a specific number, e.g. to monitor possible unauthorised calls.

W01-C06X [2002]

Other metering, time controlling and indicating aspects

W01-C07

**Prepayment telephones; Current supplies** 

W01-C07A [1987]

# Prepayment/public telephone

See T05-H05C and other T05-H codes also for coin/card-operated aspects.

Coin-operated, card-operated, telephone booth, kiosk

### W01-C07A1 [1992]

#### **Constructional details**

(W01-C01A, W01-C07A)

See W01-C01A also for construction of telephone set per se as far as analogous to subscriber telephone. From 1992, W01-C07A1 only is assigned for details of telephone kiosk, booth etc.

#### W01-C07A3 [1992]

#### **Anti-fraud measures**

Includes alarms and arrangements to prevent interference with metering etc. Use with W01-C07A5 when coin/card aspects involved.

Security, pin-fraud, antitheft

# W01-C07A5 [1992]

# Coin/card-freed aspects

See also T04-C, T04-K and T05-H codes, especially T05-H05C.

#### W01-C07A5A [1997]

#### **Telephone card**

See T04-C, T04-K and T05-H codes also. *Phone card* 

#### W01-C07A7 [1992]

#### **Control and signalling aspects**

Includes arrangements for metering, indicating faults, full cash-box, etc.

W01-C07A9 [1997]

Other

# W01-C07B [1987]

#### **Current supplies**

Prior to 1992, used with W01-C01X for subscriber set aspects which are now covered by W01-C01E codes.

Power supply, exchange battery, subscriber line feed, ringing current generator

W01-C08 [1987]

# General equipment details/circuits

(W01-C09)

### W01-C08A [1987]

# Protection, e.g. against lightning strike etc.

Protection systems in general are in U24-F and X13-C.

Surge protector, gas discharge tube, varistor, fuse

#### W01-C08B [1987]

# Line hybrid (transformers and circuit equivalents)

See also W02-C01X for general (or non-telephone) application, V02 for inductive components, and U25 for impedance networks, (e.g. U25-C for impedance converters, and U25-D codes for matching, combining, etc.).

Two-wire/four-wire circuit, impedance matching/balancing, differential circuit

# W01-C08C [1987]

# **Test equipment**

Covers portable equipment and apparatus used in remote tests. Testing of subscriber devices using external equipment is covered by W01-C01K, which may be assigned with W01-C08C codes for specific cases where the subscriber equipment itself is being tested.

# W01-C08C1 [1992]

Portable test set

### W01-C08C3 [1992]

# Remotely operated auxiliary test device

Includes device for discriminating line fault and subscriber set fault (see also W01-C01K for subscriber set testing generally and W01-C02A5 for exchange testing of subscriber lines).

# W01-C08C5 [1992]

#### Maintenance centre system

Includes system remotely monitoring telephone installations, e.g. monitoring several exchanges (with W01-C02A1).

# W01-C08E [1992]

# Equalisers, echo cancelling, noise reduction

See also appropriate code in W02-C01B or W02-C01C.

# W01-C08F [1992]

# Security aspects and telephone usage control

The title of this code has been expanded from 2002 to better reflect its coverage of telephone usage control. See also W02-L codes for secrecy aspects. Includes detection of eavesdropping, and scrambling systems.

Secrecy, wire-tap/eavesdropping detector

W01-C08F1 [2002]

Wiretapping and prevention of wiretapping

W01-C08F1A [2002]

Wiretapping

W01-C08F1C [2002]

**Prevention and Detection of wiretapping** 

W01-C08F5 [2002]

# Controlling or preventing use of telephone

This code is primarily intended for systems inhibiting the use of e.g. portable phones in a sensitive area, such as a theatre, hospital etc., e.g. by 'dummy' base stations or jamming techniques. It is assigned with mobile phone system codes as appropriate, e.g. W01-B05A1A and W02-C03C1B for base station aspects. Arrangements for determining entitlement, and denying access, to different levels of telephone service are covered by W01-C02B6A and W01-C02B6C respectively.

### W01-C08G [1997]

#### Telephone line type

These codes are only assigned to highlight the significance of the line type to the particular invention, e.g. W01-C08G1 is **not** assigned for every invention relating to copper twisted pair telephone systems.

W01-C08G1 [1997]

Wire line

Twisted pair

W01-C08G2 [1997]

**Optical fiber** 

(W01-C08X, W02-C04B1)

W01-C08G9 [1997]

Other telephone line type

#### W01-C08H [2005]

# Application of telephone systems and apparatus

This code is generally used without other W01 codes, and is intended for inventions relying on use of the telephone systems or apparatus, while not involving novel aspects. The code is assigned only when the particular application cannot be coded elsewhere.

#### W01-C08X [1987]

# Other general details of telephone equipment

Intermediate amplifier, equipment cooling/environmental control

#### W01-C09

# Other (incl. manual exchanges)

From 1992, see W01-C02G and other W01-C02 codes for semi-automatic systems.

#### W01-D

#### Cable or line installation

W01-D covers novel aspects of cable installations for communications purposes, including telephone, data networks, CATV, alarm systems, and the like. Power line installations are not included and are covered by X12-G codes. See V07-H codes for optical fiber aspects.

# W01-D01

### Methods and equipment

Includes digging of trenches, erection of supporting poles, drilling through walls, drawing of cables through conduits or pipes, or their laying in trunking, cable trays, or the like.

Cable feeder, cable puller, cable locator, tools

#### W01-D02

#### **Fittinas**

Includes devices such as plugs and sockets, junction boxes and splices fitted to the cable, rather than arrangements for supporting it or mounting it which are covered by W01-D03. Novel electrical connector aspects are also assigned V04 codes. Terminal, Mounting, fixing, socket, junction box, connector

#### W01-D03

#### Installations

Includes physical aspects of mounting or positioning cables or cable fittings, rather than electrical connection aspects which are covered by W01-D02. Aspects of installations included are protective hardware such as conduits, grommets, cable trays, cable clamps, or trunking, and arrangements for routing cables through walls, under floors, under the ground, or overhead. Underwater/underground/overhead installation, conduit, ducting

# W01-D09

#### Other

This code covers any specific topic not fitting into the above subdivisions. Examples include cable reels and installations between two relativelymoving points which may be permanent or temporary arrangements such as a retractable telephone extension cable arrangement which can be wound around a reel or similar when not in use, or devices for shortening a long telephone set lead by winding it around a suitable retaining device. Drum, elevator intercom, pressurised cable leak monitor

# W01-E [2012]

# General aspects of wireless data networks and mobile phone networks

This code and its subdivisions are intended to indicate aspects of wireless systems, normally operating on a cellular model, that may be equally applicable to data networks as covered by W01-A06C4 codes and mobile phone networks and systems as covered by W01-B05A1 and W01-C01D codes. The codes are intended for wireless networks in a general sense and may be used alone in general cases or with specific additional wireless network or mobile phone system codes as appropriate to provide more detail. When relevant, W02 codes are also assigned for radio system aspects, e.g. details of cellular mobile radio systems are indicated by assignment of W02-C03C1 codes and novelty in radio equipment by W02-C03C1 codes and W02-G codes, these codes being assigned in addition to W01-E codes as necessary.

# W01-E01 [2012]

# Mobility aspects of wireless data and mobile phone networks

This code and its subdivisions cover aspects arising from the movement of mobile phones or wireless terminals and stations in general, such as roaming and registration.

# W01-E01A [2012]

#### Roaming

This code, or its subdivisions, replace W01-A06E1R, W01-A06E1S and W01-B05A1R and covers arrangements for allowing mobile phones or wireless terminals to move between home and other networks.

### W01-E01A1 [2012]

# Roaming between networks operating on the same standard

This code replaces W01-A06E1R and covers inventions for roaming between e.g. wireless local area networks of the same type, or between same-standard mobile phone networks. For roaming between wireless data networks and mobile phone networks W01-E01A3E is assigned instead of W01-E01A1 codes.

#### W01-E01A1A [2012]

# Roaming between wireless data networks operating on the same standard

This code covers arrangements for roaming between wireless data networks, e.g. wireless LANs, which are operating using the same standards.

#### W01-E01A1C [2012]

# Roaming between mobile telephone networks operating on the same standard.

This code replaces W01-B05A1R and covers inventions for roaming between same-standard mobile phone networks, e.g. between GSM networks.

# W01-E01A3 [2012]

# Roaming between networks operating on different standards

This code replaces W01-A06E1S.

#### W01-E01A3A [2012]

# Roaming between wireless data networks operating on different standards

This code covers arrangements for roaming in which mobiles may obtain communications service with wireless data networks operating on different standards, e.g. IEEE 802.11 AND IEEE 802.16. W01-A06C4 codes denoting wireless network standards are assigned as appropriate.

# W01-E01A3C

#### [2012]

# Roaming between mobile telephone networks operating on different standards

This code covers arrangements for roaming in which mobiles may obtain communications service with mobile phone networks operating on different standards, e.g. GSM, 3G, 4G, 5G.

#### W01-E01A3E

# [2012]

# Roaming between mobile telephone networks and wireless data networks

This code covers roaming arrangements allowing mobiles to obtain communications service with mobile phone networks and wireless data networks depending on availability. This code is assigned in preference to W01-E01A1 codes. Prior to 2012 this topic was indicated by assignment of W01-A06E1S and W01-B05A1R.

#### W01-E01A5

#### [2012]

#### International roaming

This code covers arrangements for allowing mobile phones or wireless terminals to obtain communications services across national boundaries.

### W01-E01C

### [2012]

#### **Registration aspects**

This code, or its subdivisions, replace W01-B05A1N and W01-B05A1Q and covers arrangements for registering mobile phones or wireless terminals with a network.

### W01-E01C1

# [2012]

#### Location register details

Prior to 2012 this topic was represented by W01-B05A1Q.

Home location register, HLR, visitor location register, VLR

# W01-E01C3

#### [2012]

# Registration of mobile user

Prior to 2012 this topic was represented by W01-B05A1N in the case of mobile phone networks.

# W01-E01C5

#### [2012]

#### **Transfer of registration information**

This code covers the transfer of information between access points or base stations during roaming or as part of a hand-off procedure. Hand-off aspects are also assigned W02-C03C1D.

#### W01-E99

### [2012]

Other wireless systems and apparatus common to data networks and mobile phone networks

# W02: Broadcasting, Radio and Line Transmission Systems

#### W02-A

### Waveguide devices

Includes specific devices and techniques for RF waveguide technology. Lumped-constant frequency-dependent circuits are in U25, optical waveguides are in V07.

#### W02-A01

# Transmission lines of the waveguide type

Covers waveguides per se, i.e. shape, materials etc.

W02-A01A [1992]

# **Coplanar lines**

Covers lines with two longitudinal conductors.

W02-A01A1 [1992]

Fin, slot lines

W02-A01A2 [1992]

#### **Coaxial lines**

For coaxial cables in general, see X12-D05, e.g. flexible coaxial cables which are coded in X12-D05 only.

W02-A01A3 [1992]

# **Microstrips; Striplines**

See appropriate U14 codes for microstrip technology relevant to film circuits, e.g. U14-H03C2 codes for analogue circuitry, and V04-Q codes for printed circuit details.

W02-A01A9 [1992]

Other coplanar lines

W02-A01B [1992]

#### Waveguide conductor

Covers waveguides with single solid longitudinal conductor.

W02-A01B1 [1992]

Wire

W02-A01B2 [1992]

**Hollow** 

W02-A01B2A [1992]

Ridged or grooved

W02-A01B2B [1992]

#### Circular

Includes elliptic and parabolic cross-section waveguides.

W02-A01B2C [1992]

**Flexible** 

W02-A01B3 [1992]

#### Dielectric

Covers waveguides without a longitudinal conductor.

W02-A01B4 [1992]

#### With several lavers

Increases operating surface by building-up from several layers e.g. alternate dielectric and conductive layers.

W02-A01C [1992]

**Auxiliary devices** 

W02-A01C1 [1992]

**Bends; Corners; Twists** 

Flange, seal, gasket

W02-A01C2 [1992]

**Fixed joints** 

W02-A01C3 [1992]

#### Movable joints; Rotating joints

Includes hinged and rotary joints.

W02-A01C5 [1997]

#### Waveguide windows

Covers window arrangements, e.g. with dielectric material covering aperture in guide wall (see V05-F04L for such arrangements applied to plasma and similar processing equipment). Couplers in general are covered in W02-A02 codes. Dielectric waveguides are covered by W02-A01B3.

W02-A01D [1992]

#### **Materials**

Covers materials for waveguides per se only. Materials of general application to waveguide devices are covered by W02-A08C codes.

#### W02-A02

### Couplers, combiners, impedance matching

Waveguide windows are covered by W02-A01C5. From 2002, couplers within distributed-constant-type filters, e.g. those providing coupling between resonators, are assigned W02-A05Q codes, and are **not** covered by W02-A02 codes unless of wider application.

Port, input, transition, probe

W02-A02A [1992]

Balanced/unbalanced line coupler; Coupling different types of waveguide

W02-A02A1 [1992]

Waveguide-to-coaxial line

W02-A02A2 [1992]

Waveguide-to-stripline

W02-A02A3 [1997]

Coaxial-to-stripline

W02-A02A5 [2007]

#### Balanced-to-unbalanced converter

See U25-D03 for lumped constant balanced-tounbalanced converters.

W02-A02B [1992]

**Active coupler with several ports** 

W02-A02B1 [1992]

# **Conjugate devices**

Covers devices with at least one port decoupled from one other port. Isolators and circulators are covered by W02-A04E and W02-A04F codes respectively.

# W02-A02B1A [1992]

#### **Directional coupler**

Includes couplers consisting of two coupled guides, being either hollow waveguides or arranged in parallel or being coaxial, stripline or microstrip. See W02-A01 codes for claimed waveguide transmission lines, and V04-Q codes for printed circuit details.

W02-A02B1C [1992]

**Magic-T junction** 

W02-A02B1D [1992]

**Hybrid ring junction** 

W02-A02C [1992]

### Impedance transformation; Matching

Lumped constant impedance matching is covered by U25 codes.

W02-A02D [1992]

Power combiner, divider

W02-A03

**Resonators; Delay lines** 

Electromechanical delay lines are in V06.

W02-A03A [1992]

Resonators

W02-A03A1 [1992]

**Helical**; Spiral

W02-A03A2 [1992]

#### **Lecher**; Coaxial

Coaxial resonators covered here include those comprising concentric electrodes with an air space between (W02-A03A2A) and those in which the space between electrodes is filled by a solid dielectric material (W02-A03A2C). Resonators termed 'dielectric' but having outer and inner electrodes are thus assigned the latter code. Resonators comprising a suitably-dimensioned piece of dielectric material without a pair of electrodes are coded in W02-A03A3C if forming part of a resonant cavity, and in W02-A03A5 otherwise.

W02-A03A2A [1997]

Coaxial resonator without solid dielectric

W02-A03A2C [1997]

Coaxial resonator with solid dielectric

W02-A03A3 [1992]

Cavity

W02-A03A3A [1997]

Without solid dielectric

W02-A03A3C [1997]

With solid dielectric See note for W02-A03A2.

W02-A03A4 [1992]

Stripline; Microstrip

# W02-A03A5 [1992]

#### **Dielectric**

Covers dielectric resonators with magnetic field coupling. Resonators with dielectric filled spaces are coded under W02-A03A2 or W02-A03A3.

#### W02-A03B [1992]

# **Delay lines**

Includes helical and interdigital lines.

#### W02-A04

Attenuators; Terminations; Isolators; Circulators; Switches

W02-A04A [1992]

**Switches** 

W02-A04A1 [1992]

### Ferromagnetic; Mechanical

See also appropriate V03- codes for mechanical type switches.

Ferrite

#### W02-A04A3 [1992]

# Using electrical discharge devices

See appropriate V05- codes also.

# W02-A04A5 [1992]

### **Using semiconductor devices**

See appropriate U21-B codes also for electronic switches, e.g. U21-B01A and U21-B05E.

# W02-A04B [1992]

#### **Absorber**

Absorbers for antenna applications are covered by W02-B03D codes, which are also used as a general place for absorber materials.

# W02-A04C [1992]

#### **Attenuator**

Attenuators using chiefly lumped-constant elements are covered by U25-D07.

W02-A04C1 [1992]

Using ferromagnetic material

W02-A04C5 [1997]

Attenuator using semiconductor devices

W02-A04C9 [1992]

Other distributed-constant attenuators

# W02-A04D [1992]

#### **Terminations**

Includes dissipative terminations e.g. resistive, liquid.

Dummy load, water load

# W02-A04E [1992]

#### Isolator

Includes resonance absorption and field displacement isolators.

#### W02-A04F [1992]

#### Circulator

Covers Y-circulators and hollow waveguide circulators.

# W02-A04F1 [1992]

# Stripline and microstrip circulators

#### W02-A05

#### **Filters**

From 1997, W02-A05K codes have been assigned to indicate filter function in conjunction with other W02-A05 codes. From 2002, coupling arrangements, e.g. between resonators, are covered by W02-A05Q codes, and are no longer assigned W02-A02 codes unless of wider application also.

Band pass, notch, high pass, low pass, adjustable, tunable

#### W02-A05A [1992]

### Transverse electromagnetic filters

#### W02-A05A1 [1992]

#### Coaxial

From 1997, cascaded coaxial cavity filters are included in this category to simplify grouping based on physical structure, and are covered by W02-A05A1E.

W02-A05A1A [1997]

Without solid dielectric

W02-A05A1C [1997]

With solid dielectric

See note for W02-A03A2.

W02-A05A1E [1997]

**Cascaded coaxial cavities** 

W02-A05A2 [1992]

Stripline; Microstrip

# W02-A05A3 [1992]

#### Comb or interdigital

Prior to 1997, this code covered cascaded coaxial cavity filters which are now transferred to W02-A05A1E.

W02-A05B [1992]

Hollow waveguide filters

W02-A05B1 [1992]

Cavity

W02-A05B1A [1997]

Without solid dielectric

W02-A05B1C [1997]

With solid dielectric See note for W02-A03A2.

W02-A05B1E [1997]

#### **Cascaded cavities**

Covers cascaded resonators inside hollow wavequide structure.

W02-A05B2 [1992]

Waffle-iron filters; Corrugated structure

W02-A05C\* [1992-1996]

# Suppressing or attenuating harmonic frequencies

\*This code is now discontinued and from 1997 this subject matter is transferred to W02-A05K6. W02-A05C remains valid and searchable for records prior to 1997.

#### W02-A05D\* [1992-1996]

# Combining or separating several different frequencies

\*This code is now discontinued and from 1997 this subject matter is transferred to W02-A05K7. W02-A05D remains valid and searchable for records prior to 1997.

## W02-A05E [1992]

# Ferromagnetic material; YIG

Prior to 1997, this code included magnetostatic wave elements used as non-linear noise-reducing devices (also assigned V06-V codes), which are now transferred to W02-A06E. W02-G03B9 ('Other radio receiver noise reduction') will continue to be applied in addition to indicate the noise-reduction aspect.

# W02-A05F [1992]

#### **Evanescent mode filter**

# W02-A05G [1992]

# **Active filters with distributed components**

See U25-E01 codes for active filters using lumped circuit elements.

#### W02-A05K [1997]

# Characterised by function and operation

Codes in this section are assigned with other codes relating to filter technology as appropriate.

W02-A05K1 [1997]

**Lowpass filter** 

W02-A05K2 [1997]

**Bandpass filter** 

W02-A05K3 [1997]

**Highpass filter** 

W02-A05K4 [1997]

**Notch filter** 

W02-A05K6 [1997]

# Suppressing or attenuating harmonic frequencies

(W02-A05C)

Coded under W02-A05C prior to 1997.

#### W02-A05K7 [1997]

# Combining or separating several different frequencies

(W02-A05D)

Coded under W02-A05D prior to 1997. This code includes duplexers and diplexers having a frequency band separation aspect based on filtering using waveguide technology. Duplexers for use in radio transceivers are also covered by W02-G02A5B. Frequency combining or separating using lumped-constant elements is covered by U25-E05K.

W02-A05K9 [1997]

Other filter function

W02-A05Q [2002]

### **Novel coupling arrangements for filters**

(W02-A02, W02-A05)

This code is intended to highlight novel arrangements for providing coupling between filter sections, and may be used with other W02-A05 codes denoting filter technology. Novel coupling arrangements in general for waveguide devices are covered by W02-A02 codes, which from 2002 are **not** used for internal filter coupling arrangements unless of wider application also.

# W02-A05Q1 [2002]

# Variable coupling arrangements

This code is intended for filter coupling arrangements in which the coefficient of coupling may be adjusted **in normal use**. Arrangements for trimming or adjusting coupling during manufacture are covered by W02-A07 codes.

#### W02-A06

Mode selectors; Phase shifters; Polarizers

W02-A06A [1992]

**Mode selectors** 

W02-A06A1 [1992]

Absorbing spurious modes of propagation

W02-A06B [1992]

**Polarizer** 

See W02-B03C codes for antenna polarizers.

W02-A06B1 [1992]

Circular polarisation

W02-A06B3 [1992]

**Using Faraday rotators** 

W02-A06C [1992]

Phase shifters

W02-A06C1 [1992]

### **Using active elements**

Includes use of e.g. semiconductor devices.

# W02-A06C2 [1992]

# Using a ferromagnetic device

Includes ferromagnetic device having toroidal shape.

# W02-A06E [1997]

# Nonlinear noise reduction devices

Includes magnetostatic wave devices. See also V06 codes, e.g. V06-V06, and W02-G03B9 for radio receiver noise reduction aspect. Also assigned W03-A01A1 and W03-A01B codes as appropriate if forming part of DBS receiver tuner.

# W02-A07

# Manufacture, testing

See also S01 for measuring, e.g. S01-H05 for high-frequency measurements.

# W02-A07A [1997]

# Manufacture of waveguides and waveguide components

Machining, cutting, welding, coating, plating

#### W02-A07A1

[1997]

# For integrated, hybrid, or film circuits

See U14 codes as appropriate, e.g. U14-H04 codes.

#### W02-A07B

[1997]

# Testing of waveguides and waveguide components

See also S01 codes for specific details of electrical testing, and S02/S03 codes for non-electrical testing, such as measuring dimensions, materials testing, etc.

#### W02-A07B1

[1997]

For integrated, hybrid, or film circuits

W02-A08

[1992]

**General details** 

#### W02-A08A

[1992]

# Compensation of environmental effects

Includes protection against the effects of e.g. moisture, temperature.

#### W02-A08B

[1992]

#### Non-specific circuitry

This code is used for circuitry associated with waveguide devices not catered for elsewhere in section W. See also U23-Q.

#### W02-A08C

[1992]

### **Materials**

Includes materials for waveguide devices in general. Materials for waveguides per se only are covered by W02-A01D.

# W02-A08C1

[1992]

For millimetre wave

W02-A08G

[1997]

**Devices with variable parameters** 

W02-A08G1

[1997]

Adjustable resonant frequency

# W02-A08J [2002]

# Waveguides and waveguide devices using superconducting materials

This code is intended to highlight the **use** of superconducting materials, not novel themselves, necessarily. **Novel** superconducting materials are assigned U14-F and X12-D06 codes.

#### W02-A09

# Other waveguide devices

#### W02-B

#### Aerials

Aerials per se are also coded under application.

#### W02-B01

# Monopoles, dipoles, loop and rhombic aerials, etc.

# W02-B01A [1992]

# Loop

Includes circular loops and also rectangular, delta and similar shapes. Parasitic arrays formed from such elements (I.e. 'quad' or 'box kite' antennas) are covered by W02-B04D5. Folded dipole antennas are covered by B01B1A or W02-B01B2A. Includes loop conductor antennas for smart cards, which are also assigned T04-K01C and V04-Q codes for printed circuit details.

# W02-B01A1 [1992]

With core e.g. ferrite rod

# W02-B01B [1992]

#### Dipole

Yagi-Uda parasitic arrays formed from dipole elements are covered by W02-B04D1. Dipole arrays with separate feed to each element are covered by W02-B05B1, but note that log periodic types themselves are coded in W02-B01D1. Folded dipole

# W02-B01B1 [1992]

## Linear dipole antenna

In 2002 the title of this code was changed to better reflect its actual coverage. Formerly entitled 'Center-fed' (dipoles), the title now refers to the linear arrangement of elements, e.g. as distinct from the ring form covered by W02-B01B2 codes. As before, although centre-fed dipoles constitute the majority of postings for this code, those with an offset feed, e.g. for impedance matching purposes (W02-B08E1 assigned as well) are also included.

# W02-B01B1A [2002]

#### Folded dipole

This code is intended for dipoles which may be regarded as a half-wavelength transmission line pair with shorted ends, or a wavelength-long conductor in the form of a flattened loop. Impedance matching aspects are indicated by additional assignment of W02-B08E1.

# W02-B01B2 [1992]

# Ring dipole

From 2002 the title of this code has been changed to better distinguish it from spiral antennas as covered by W02-B01B3. It is intended for dipoles with the ends brought close together to form a ring.

Halo

# W02-B01B2A [2002]

# Folded ring dipole

This code is intended for folded dipoles with the ends brought into proximity so as to form a ring. Impedance matching aspects are indicated by additional assignment of W02-B08E1.

# W02-B01B3 [1992]

### Spiral dipole

From 2002 the title of this code has been changed to better reflect its intended coverage of spiral dipole antennas, as distinct from those essentially comprising a dipole with the ends brought together in the form of a ring.

### W02-B01C [1992]

Unipole, monopole

W02-B01C1 [1992]

Whip, rod

Prior to 1997, telescopic aerials were excluded from this code, being covered by W02-B01X.

# W02-B01C1A [1997]

### **Telescopic antenna**

(W02-B01X)

Coded as W02-B01X prior to 1997. From 1997 collapsible antennas in general are covered by W02-B08K, and collapsible supports by W02-B07A5. The latter code was used for both types from 1992 to 1997.

#### W02-B01C1C [1997]

#### Whip antenna with loading coil

W02-B01C3 takes precedence for continuously-loaded aerials. See also W02-B08E for antenna impedance matching and tuning.

# W02-B01C1G [2002]

### **Ground plane antenna**

This code is intended for monopole arrangements with a associated groundplane in the form of separate elements or a metallic plate, which is part of the antenna itself and not provided by the surface on which it is mounted. Discone antennas are covered by W02-B01C5 (from 2002, formerly W02-B01C and W02-B01X).

W02-B01C3 [1992]

Helical

W02-B01C3A [2002]

#### **Quadrifilar Helix**

(W02-B01C3, W02-B05B)

This code is intended for antennas in the form of two bifilar helical loop sections. For use with satellite telephones search with W01-C01D3E (W02-C03C1C is also assigned for this application since satellite phone systems are regarded as being of cellular type) and W02-C03B1C for application to ground stations in general in a satellite radio system. Prior to 2002, antennas of this type were assigned W02-B01C3 and W02-B05B.

QFH, spacecraft, weather, satellite, APT, HRPT, GPS

#### W02-B01C5 [2002]

# Discone and conical-skirt monopoles

(W02-B01C, W02-B01X)

This code is intended for antennas in the form of a cone and monopole combination, normally employed for reasons of wideband performance. Arrangements for increasing the bandwidth of antennas in general are covered by W02-B08P3 and multi-band antennas by W02-B08R1 codes. Wideband, multi-octave, VHF, UHF, scanning, monitoring

# W02-B01D [1992]

#### **Electrically-long aerials**

Includes resonant aerials e.g. travelling-wave and non-resonant antennas e.g. rhombic.

# W02-B01D1 [1992]

#### Log-periodic

Arrays made up of several log periodic antennas are covered by W02-B05B5.

# W02-B01F [1997]

# **Inverted-F antenna**

(W02-B01X)

# W02-B01R [2010]

#### **Novel radiating element**

This code is intended to indicate novelty in the radiating element of an antenna, e.g. its shape or configuration, and is used in conjunction with other W02-B01 codes as necessary to highlight novel aspects. Note that W02-B01R is **not** used to denote shape or configuration that is a standard feature of the antenna type, such as a helical antenna which is covered by W02-B01C3 codes alone.

#### W02-B01X [1992]

# Other monopole or dipole antenna aspects

Prior to 1997 telescopic aerials were included. These are now coded under W02-B01C1A.

#### W02-B02

Waveguide and slot aerials

#### W02-B02A [1987]

#### Microstrip/stripline aerials

Printed circuit antennas are covered by W02-B07A3 and V04-Q codes

Conductor pattern, etched, patch, substrate

# W02-B02B [1992]

Waveguide horns

W02-B02C [1992]

**Resonant slot aerial** 

W02-B02C1 [1992]

### Microstrip slot antenna

See also W02-B02A.

# W02-B03

Reflectors, refractors, polarizers, absorbers

#### W02-B03A [1992]

# Refractor, diffractor e.g. lens, prism

Dielectric lens

#### W02-B03B [1992]

#### Reflector

From 1997, for collapsible antenna reflector per se (e.g. for on-station deployment from communications satellite, i.e. 'umbrella' type antenna) search reflector type code with W02-B08K (collapsible antenna). Collapsible supports and mountings for non-collapsible antennas are covered by W02-B07A5, which was used for both aspects from 1992 to 1997.

Circular

# W02-B03B1 [1992]

#### Characterised by shape

Form, contour

### W02-B03B1A [1992]

#### **Parabolic**

Search with W02-B08K for collapsible reflectors per se from 1997. (Previously coded as W02-B03B1A and W02-B07A5).

# W02-B03B1B [1992]

Having plane surface

W02-B03B2 [1992]

**Passive reflectors** 

### W02-B03B2A [1992]

#### Chaff

See also W06-A04E1A, which covers jamming of radar systems.

Window strip

# W02-B03B3 [1992]

# **Having variable properties**

# W02-B03C [1992]

#### **Polarizer**

See W02-A06B codes for (waveguide) polarizers in general.

#### W02-B03C1 [1997]

# Variable polarisation

# W02-B03D [1992]

# Absorber

This code is used for absorbers that are part of an antenna or antenna system and also as a general reference for radio frequency absorbers and absorber materials (in W02-B03D1). This includes the use of absorber materials on unrelated structures such as buildings or aircraft. Search with W06-A04X for radar signature reduction using absorbers. Absorbers that are part of an RF waveguide system are covered by W02-A04B. RF shielding is covered by V04-U codes.

#### W02-B03D1 [1992]

#### **Materials**

Includes e.g. metallic threads, ferrite powders and woven or wound filaments.

Rubber, polymer, binder, carbon

#### W02-B04

# Active elements combined with reflectors, etc.

Reflector, director, boom, parabolic, dish

#### W02-B04A\*

[1992-2001]

# Reducing undesirable effects, e.g. edge scattering, cross-polarisation

\*This code is now discontinued and from 2002 is replaced by W02-B08P5E, with other W02-B04 codes assigned as appropriate.

#### W02-B04B

[1992]

# **Using refractor or diffractor**

# W02-B04C

[1992]

#### Feed or driven element

Use with other W02-B codes as appropriate to discriminate types of feed.

Horn feed, dipole feed

#### W02-B04D

[1992]

#### Yagi and quad antennas

From 2002, the scope of this code is expanded to include 'quad' antennas. Log periodic antennas are covered by W02-B01D1. Arrays in which each element is driven are covered by W02-B05 codes.

Parasitic array

# W02-B04D1

[2002]

#### Yagi antennas

Yagi-Uda

# W02-B04D5 [2002]

# **Quad antenna**

This code is intended for 'quad' or 'box kite' antennas with form analogous to Yagi aerials, i.e. driven element arranged between reflector and one or more director elements, with elements typically approximately one wavelength long in total. Quadrifilar helix (QFH) antennas are covered by W02-B01C3A.

#### W02-B04E

[1997]

# Parabolic reflector antenna

Dish

### W02-B05

#### Aerial arrays

Parasitic arrays such as Yagi antennas are covered by W02-B04D codes, log periodic types by W02-B01D1.

#### W02-B05A [1992]

# **Novel feed system**

Includes stripline, modular, slotted waveguide, etc.

#### W02-B05B [1992]

# Characterised by elements making up array

Where a specific subdivision does not exist W02-B05B is assigned together with a code for the antenna type. For example, prior to 2006, an array of helical antennas was coded as W02-B01C3 and W02-B05B (now covered by W02-B05B6).

W02-B05B1	[1992]
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**Dipole** 

W02-B05B2 [1992]

Horn or slot

W02-B05B3 [1992]

Microstrip, patch

W02-B05B4 [1992]

Yagi

W02-B05B5 [1992]

Log periodic

W02-B05B6 [2006]

Helical antenna

#### W02-B05B8\* [1992-2001]

# Array radiating different polarisation

\*This code is now discontinued and from 2002 this topic is covered by assignment of a suitable W02-B05 code in conjunction with W02-B08R5 which represents antennas with multiple polarisation characteristics in general.

W02-B05C [1992]

**Collinear arrangements** 

W02-B05D [1992]

Phased array

# W02-B06

#### Varying directional pattern

From 2005 W02-B06C is assigned for automatic tracking aspects. Prior to 2005 this topic was covered by assignment of W06-A02A1 with W02-B06 codes as appropriate.

Scanning antenna, direction control system, anti-roll positioning ship, vehicle

#### W02-B06A [1992]

# Using mechanical movement

Rotary support

#### W02-B06A1 [1992]

# Between primary active elements and secondary devices of aerials

Includes arrangement to rotate e.g. reflector only.

#### W02-B06B [1992]

#### Using non-mechanical means

Includes electronic beam steering. Phased array antennas are covered by W02-B05D, which is also assigned as appropriate.

Electronic control

#### W02-B06B1 [1992]

#### Continuous

Includes the use of continuous phase shifters. Phase control

#### W02-B06B5 [1992]

#### Non-continuous

Covers switched arrangement giving discrete variation of radiation diagram.

#### W02-B06C [2005]

# Automatic directional control antenna systems

(W02-B06, W06-A02A1)

Covers use of either mechanical movement or electronic beam steering (with W02-B06A or W02-B06B codes as necessary) to automatically adjust directional characteristics to optimize communication with a particular station, e.g. based on maximum signal strength or minimum BER (W02-G03J codes are also assigned to highlight this aspect, e.g. W02-G03J1A or W02-G03J5A). Prior to 2005, this topic was indicated by the assignment of W06-A02A1 ('Automatic direction finding') in addition to W02-B06 codes. From 2005, W06-A02A1 is no longer assigned unless separate direction finding aspects are emphasized. Directional diversity systems are also assigned W02-C03A4 codes and BDMA or SDMA systems are also assigned W02-K10 (from 2017). MIMO systems are covered by W02-C03A5 codes. Antenna set-up, i.e. installation, based on optimum reception is not included, being covered by W02-B08A5A. For use of antenna beam direction control in '5G' mobile networks search with W02-C03C1L. Angle of arrival, direction of arrival, pilot signal,

RSSI, signal scanning

# W02-B06E [2006]

### Variable polarisation antenna

This code is assigned alone or with W02-B06A or W02-B06B codes as appropriate. Novel antenna polarizers are covered by W02-B03C codes.

#### W02-B07

**Supports; Housings** 

W02-B07A [1992]

Supports

W02-B07A1 [1992]

Fixed e.g. tower, mast, pole, base

# W02-B07A1A [2002]

#### Antenna masts and towers

This code is intended for supporting masts and towers, usually dedicated to the purpose of mounting antennas. For arrangement intended to conceal masts, or make them less conspicuous, search with W02-B08P8G.

# W02-B07A1C [2002]

#### Antenna mounting hardware

This code is intended for mounting hardware such as stub masts, clamps, etc., normally designed for fixing an antenna to an existing structure.

# W02-B07A3 [2002]

# PCB and surface mount antennas

These codes are intended to cover antennas produced using printed circuit techniques and those intended for surface mounting **on** a PCB. Microstrip antennas are covered by W02-B02A, and those fabricated as a PCB **without** a parallel groundplane by W02-B07A3A. Antennas structurally combined with active components are also assigned W02-B08C3, which would be assigned for an antenna formed on the circuit board of a radio transceiver, for example (W02-G02 also). See V04 codes also for PCB details.

Etched circuit board, conductor, laminate, foil

# W02-B07A3A [2002]

#### **PCB** antennas

This code covers antennas produced using PCB techniques, and is introduced to better distinguish between true 'waveguide' antennas such as those in microstrip form, which are covered by W02-B02A, and those fabricated as a PCB without a parallel groundplane, although both codes could be assigned for a PCB antenna operating in a genuine 'waveguide' mode. Surface mounted antennas are assigned W02-B07A3C, which takes precedence over this code. PCB antennas are also assigned V04-Q06.

Printed antenna

# W02-B07A3C [2002]

#### Surface mount antenna

This code is intended for an antenna designed to be surface mounted on a PCB, and takes precedence over W02-B07A3A, the code for antennas actually fabricated using PCB techniques.

# W02-B07A5 [1992]

# **Collapsible**

From 1997 this code has been restricted to collapsible **mountings** for antennas only, and not antennas which are themselves collapsible (now covered by W02-B08K). Prior to 1997, W02-B07A5 was used for all aspects.

W02-B07A7 [1992]

Vibration damping, stabilising

W02-B07B [1992]

**De-icing arrangement** 

W02-B07C [1992]

Radome: Protective cover

W02-B07C1 [1992]

# Forming part of vehicle

Includes e.g. the radome cover as used on an aircraft nose or on a missile. See also the appropriate codes in W06 and W07.

W: Communications

# W02-B07D [1992]

#### Vehicle antenna mount

This code and its subdivisions are used only for novel mounting aspects of the antenna, i.e. generally for mechanical details, and not simply to indicate that an antenna is used on a vehicle. Vehicle applications of antennas are indicated by W02-B08F codes which can be assigned for any antenna aspect and hence they can be used with W02-B07D codes as appropriate to indicate the type of vehicle on which the antenna mounting is employed. (Codes indicating electrical aspects of the vehicles concerned are also assigned, such as W06 or X22 codes for aircraft and ships, or land vehicles respectively). Details of the actual antenna will also be coded as usual in the appropriate W02-B section when useful information can be added.

W02-B07D1 Whip	[1992]
W02-B07D3 Waveguide	[1992]
W02-B07D5 Slot	[1992]
W02-B07D9 Microstrip	[1992]
W02-B08 General details	[1992]

W02-B08A

Measuring; testing

(W02-B09)

W02-B08A codes cover monitoring/testing of antenna performance in a general sense, measurement of specific antenna parameters, and antenna set-up and alignment. 'Electrical instrument' (S01) codes are also assigned as appropriate for testing and measuring aspects, especially S01-G08A5.

[1992]

W02-B08A1 [1992]

Measuring of antenna parameters per se (W02-B09)

W02-B08A1A [1997]

Polar diagrams

W02-B08A1C [1997]

**VSWR** 

W02-B08A1E [1997]

Gain

W02-B08A1X [1997]

Other antenna parameter measurements

W02-B08A5 [1997]

### Antenna set-up and alignment

Covers arrangements for set-up and alignment of antennas and antenna systems. W03-A16A is also assigned for satellite TV receiving antenna set-up aspects. Adjustment of antenna parameters such as directional characteristics during normal operation is not included, and is covered by W02-B06 codes.

# W02-B08A5A [2005]

# Antenna set-up based on optimum reception

Covers mechanical or electronic adjustment of antenna characteristics based on maximum signal strength or analogous indication during set-up. *Calibration* 

#### W02-B08A5C [2005]

# Antenna set-up based on geographical position

This code covers arrangements for antenna set-up and alignment based on known position, e.g. using compasses or inclinometer (also assigned S02-B codes), or GPS information (W06-A03A5E is also assigned).

#### W02-B08A9 [1992]

# Other antenna test or measurement aspects

(W02-B09)

Includes non-electrical tests.

W02-B08B [1992]

Isolation, overvoltage protection arrangements

W02-B08B1 [1992]

#### Lightning protection

See X13-C03 for lightning arrestors.

# W02-B08B3 [1992-2009]

# Isolation between adjacent antennas\*

\*This code is now discontinued and from 2010 arrangements for improving isolation between adjacent antennas are covered by W02-B08P6. W02-B08B3 remains valid and searchable for records prior to 2010.

Separation, shield, repeater, receiver, desensitizing

# W02-B08B5 [1997]

#### **Protection against radiation**

Covers arrangements to reduce irradiation of personnel, and also measures to reduce amount of radiation penetrating head of user of portable telephone (search with W01-C01D codes and W01-C01A4 for telephone applications and with W02-G02A1 for general hand-held transceivers).

# W02-B08C [1992]

# Active and structurally-associated aerials, mast-head and general RF preamplifiers

From 2006 the title of this code has been expanded to reflect the existing inclusion of amplifiers mounted in close proximity to e.g. a receiver, but external to it, covered by W02-B08C5C as a subdivision of the previously-existing code for mast-head amplifiers (W02-B08C5). Prior to 2006 search W02-B08C\* with terms such as 'external amplifier' or 'antenna lead amplifier' for external amplifiers used at the receiver end of an antenna cable.

# W02-B08C1 [1992]

**Active aerials** 

#### W02-B08C3 [1997]

# Aerials structurally associated with active components

This code is intended for arrangements having part of e.g. a receiver structurally associated with the antenna, such as a low-noise block for satellite TV reception (also coded in W03-A16A).

#### W02-B08C5 [1992]

# Mast-head and general RF preamplifiers

From 2006 this code has been expanded in scope to include RF preamplifiers in general, e.g. connected into an antenna cable at the receiver end, as well as amplifiers used at the antenna. RF amplifiers within communications receivers are covered by W02-G03A3.

Booster, preamplifier, LNA, low-noise amplifier

# W02-B08C5A [2006]

# **Mast-head amplifiers**

Covers amplifiers mounted in close proximity to an antenna. Amplifiers used at the receiver end of an antenna cable are covered by W02-B08C5C.

# W02-B08C5C [2006]

# **General RF preamplifiers**

Covers amplifiers mounted in close proximity to a receiver, but external to it. Amplifiers used at the antenna end of an antenna cable, i.e. mast-head amplifiers, are covered by W02-B08C5A.

# W02-B08D [1992]

#### Connections for antenna

From 1997, this code includes antenna switching, previously coded in W02-B08X. See also appropriate codes in U21 and V03 (electronic and electromechanical switches respectively) and in V04 for plugs and sockets, especially V04-M30G.

### W02-B08D1 [1992]

#### Coaxial cable

See also V04-M03.

#### W02-B08D3 [1997]

# Involving inductive, capacitive, or optical coupling

(W02-B08D, W02-B08E)

Prior to 1997 couplings of this type were coded under W02-B08D or W02-B08E. This code includes the use of optical fiber feed arrangements for antennas equipped with the necessary devices and circuitry to convert between optical and electric signals or vice-versa.

# W02-B08D5 [1997]

# Antenna switching arrangements

(W02-B08X)

#### W02-B08E [1992]

### Impedance matching and tuning

See also the appropriate codes for tuning and impedance matching in U25. From 1997 inductive and capacitive couplings are covered by W02-B08D3.

From 1992 to 1997 these were coded under W02-B08D and W02-B08E.

# W02-B08E1 [1997]

#### Impedance matching

See U25-D05 for lumped constant networks, and W02-A02C for distributed component aspects.

#### W02-B08E5 [1997]

Antenna tuning

# W02-B08F [1992]

#### Antenna applications for vehicles

Previously coded as W02-B07, under supports and housings. From 1992 the novel mounting aspects of the antenna will be assigned the appropriate W02-B07D code for antenna type, and W02-B08F for the specific application. For antenna application only, use the appropriate W02-B08F code. From 2002, the title of this code has been expanded to emphasise the fact that the applications covered here are to antennas intended to be used on vehicles

W02-B08F1 [1992]

Land vehicles; Automobiles

W02-B08F1A [1992]

#### Glass-mounted antenna

See X22-X02A3 also and X22-J02A, X25-B01C1C for claimed demister.

W02-B08F1B [1992]

Roof/body mounted

See X22-X02A1 also.

W02-B08F2 [1992]

Marine vehicles e.g. ship

See W06-C01B7 also.

W02-B08F5 [1992]

**Aeroplane** 

See W06-B01B7 also.

W02-B08F6 [2006]

# Missile or other projectile

Includes antennas on missiles, rockets, shells and the like, e.g. for guidance, target-seeking, or proximity fuzes. W06 and W07 codes are also assigned as appropriate.

W02-B08F7 [1992]

Space vehicle

See W06-B03C also.

W02-B08K [1997]

Collapsible antenna

(W02-B07A5)

Collapsible antenna supports are covered by W02-B07A5, which was assigned for all categories prior to 1997.

W02-B08K1 [1997]

**Motor driven** 

W02-B08L [1997]

Antenna manufacture

(W02-B08X, W02-B09)

W02-B08L1 [2014]

#### Antenna design and modeling

Where testing is involved W02-B08A codes are also assigned. Computer-aided design (CAD) aspects are also assigned T01-J15A codes.

Simulation

# W02-B08M [2002]

#### Antenna materials

This code is intended for **novel** materials with applications to antennas. It is assigned with other W02-B codes as appropriate. Antennas using materials with special properties, such as metamaterials, are covered by W02-B08Q codes, with W02-B08M codes also assigned if the materials are novel.

W02-B08P [2002]

#### **Antenna improvements**

These codes are used to highlight some specific stated improvement in an antenna design. They are assigned in conjunction with other W02-B codes as appropriate.

W02-B08P1 [2002]

Increased gain

W02-B08P3 [2002]

#### **Increased bandwidth**

Antenna or antenna systems with multi-band characteristics are covered by W02-B08R1 codes.

W02-B08P5 [2002]

# Improved directivity, scattering reduction, and cross-polarisation immunity

Antenna systems specifically designed for multidirectional or multiple polarisation radiation are covered by W02-B08R codes. Prior to 2002, W02-B04A was assigned for these topics when antennas using reflectors or refractors were concerned. From 2002, this topic is indicated by assignment of a relevant W02-B04 code with a W02-B08P5 code for those antenna types.

W02-B08P5A [2002]

Improved directivity

W02-B08P5C [2002]

Improved cross-polarisation immunity

W02-B08P5E [2002]

Reduced scattering and edge effects

# W02-B08P6 [2010]

# Improved isolation between adjacent antennas

(W02-B08B3)

This code covers arrangements for reducing unwanted interaction between antennas and improving isolation between them. Arrays of antennas designed to operate together are covered by W02-B05 codes.

Blocking, cancellation, desensitizing, phase, screen, separation, shield, receiver, repeater

#### W02-B08P7 [2002]

#### Improved VSWR or impedance matching

See W02-B08E1 for impedance matching arrangements for antennas.

# W02-B08P8 [2002]

# Improved non-electrical properties

These codes are used to highlight some specific stated improvement in an antenna which is not **directly** linked to its RF performance.

W02-B08P8A [2002]

Improved mechanical strength

W02-B08P8C [2002]

Improved durability

W02-B08P8E [2002]

Improved weather resistance

W02-B08P8G [2002]

### Improved appearance

This codes is used to highlight aesthetic aspects of antenna design, including concealment or blending in with surroundings.

W02-B08P8J [2005]

Reduced-size antennas

W02-B08P8L [2005]

# **Reduced-weight antennas**

Includes use of lighter materials, novel aspects of which are covered in W02-B08M also.

W02-B08P9 [2002]

# Other improvements to antenna performance

# W02-B08Q [2012]

# Antennas using materials with special properties

This code covers the use of materials with special-properties, such as those not relying on normal ohmic conductivity or those exhibiting a negative refractive index in terms of EM wave propagation. Where materials themselves are novel W02-B08M (general code for antenna materials) is also assigned.

# W02-B08Q1 [2012]

# Antennas using metamaterials

Includes use of composite RH and LH materials.

#### W02-B08Q5 [2012]

#### **Antennas using superconductors**

Waveguide devices using superconductive materials are assigned W02-A08J. Novel superconductors in general are covered by U14-F codes and X12-D06 codes.

### W02-B08Q9 [2012]

# Antennas using other materials with special properties

#### W02-B08R [2002]

# Antenna or antenna systems with multiband, multi-directional, or multiple polarisation characteristics

Individual antennas for which these characteristics are inherent, e.g. wide bandwidth in the case of discone antennas (W02-B01C5), are not routinely assigned W02-B08R codes.

# W02-B08R1 [2002]

# Antenna or antenna systems with multiband or wideband characteristics

From 2005 the title of this code is expanded to better reflect previous inclusion of wideband antennas, and is subdivided to differentiate between continuous wideband coverage and multiband operation, e.g. in harmonic modes, in several possibly narrow, frequency bands.

# W02-B08R1A [2005]

# Antenna or antenna systems with multiband characteristics

This code is intended to cover antennas operating in several frequency bands, harmonically-related or otherwise, the width of the bands not being the distinguishing aspect. Antennas operating over a continuous wide frequency range are covered by W02-B08R1C.

# W02-B08R1C [2005]

# Antenna or antenna systems with wideband characteristics

This code is intended to cover wideband antennas providing continuous coverage over a relatively wide frequency range. Antennas operating in several discrete frequency segments are covered by W02-B08R1A.

#### W02-B08R3 [2002]

Antenna or antenna systems with multidirectional characteristics

#### W02-B08R5 [2002]

# Antenna or antenna systems with multiple polarisation characteristics

Antenna **arrays** with multiple polarisation radiating characteristics were coded in W02-B05B8 prior to 2002.

# W02-B08X [1992]

Other general antenna details

#### W02-B09

# Other antenna types

Bird repellant, plasma antenna, submerged antenna, subterranean antenna, underground antenna, underwater antenna, warning light

#### W02-B10 [2002]

# Antenna for non-communications application

(W02-B09)

This code is intended to be used with any other W02-B code to indicate that an antenna is being used to launch or intercept RF energy for a purpose other than communications. For example, it is assigned for an antenna coupling RF energy into a discharge space in plasma processing apparatus (also assigned V05-F04L, V05-F05C1 codes, and other V05-F codes as appropriate). In general, codes relating to the specific application should also be included in a search, such as S05-B codes for surgery or X25-B02B codes for microwave heating. Note that any transmission and reception of radio signals is regarded as communication, so that applications such as radar, transponder systems, telemetry and remote control are **not** assigned W02-B10.

Applicator, diathermy, emitter, ISM, microwave heating, process chamber, rectenna, rectifying antenna, RF heating, surgery

#### W02-B12 [2005]

Antenna or antenna systems using existing structure or living body as radiator or radiation enhancer

# W02-B12A [2005]

# Using existing metallic structure or conductor system

This code covers the use of conductors whose primary function is not that of an aerial, e.g. use of power conductors, or a resonant slot antenna formed in the roof of a vehicle (W02-B02C, W02-B08F1, W02-B12A and X22-X02A1).

# W02-B12C [2005]

# Using living body, or part of body

This code includes arrangements for improving radiation in a hand-held transceiver such as a mobile phone (W01-C01D3C also assigned) by arranging for the user's body to serve as a ground plane, or similar, in conjunction with a monopole antenna.

#### W02-C

# Transmission systems (general)

#### W02-C01

#### Line systems

Note: telephone systems are covered by W01-C and are coded in W02-C01 also only for common features e.g. equalising, echo suppression, and 'classical' transmission line measurements.

# W02-C01A

#### Using power lines or wave guides

# W02-C01A1 [1992]

### **Using waveguides**

Waveguides per se are in W02-A

# W02-C01A3 [1992]

# Using power line

See also under application e.g. W05-D06P for remote control aspects, X12-H03 for power line carrier systems and W01-A06C6 for data communication network aspects.

Intercom, local area network, remote measurement, PLCC

#### W02-C01A9 [1992]

#### Other power line or waveguide systems

#### W02-C01B

#### Transmission control; Equalising

Transmit-receive switching, level control, amplitudefrequency compensation, phase frequency compensation, modem, passive network, transversal filter, switched capacitor filter

# W02-C01B1 [1992]

#### **Transmission control**

Includes setting of transmission level, i.e. power control, and control of transmission direction. Systems aspects of power control in radio communication are covered by W02-C03E3.

W02-C01B2 [1992]

**Equalising** 

W02-C01B2A [1992]

**Equalising system** 

W02-C01B2B [1992]

# Apparatus, i.e. equaliser per se

See U22-G03E3C for digital signal processing aspects of equalising.

W02-C01B2C [1992]

**Training** 

Training signal transmission

W02-C01B9 [1992]

Other transmission control or equalising

W02-C01C

#### Reducing echo, cross-talk or interference

Double-talk detector, replica signal generator, decoupling

W02-C01C1 [1992]

**Echo, singing reduction** 

W02-C01C1A [1992]

**Using filters** 

W02-C01C1B [1992]

**Echo canceller** 

This code takes precedence over W02-C01C1A for arrangements using filters in an echo-canceller using a replica of the original signal.

W02-C01C1X [1992]

Other echo reduction aspects

W02-C01C2 [1992]

**Reducing cross-talk** 

See W02-C01C3B for correction of external interference.

W02-C01C2A [1992]

Compensating

W02-C01C2X [1992]

Other cross-talk reduction

W02-C01C3 [1992]

Reducing interference

Shielding

W02-C01C3A [1992]

Caused by currents induced in cable

sheath or armour

W02-C01C3B [1992]

Caused by unbalanced current in normally balanced line

Crosstalk compensation is in W02-C01C2A.

W02-C01C3X [1992]

Other line interference reduction

W02-C01D

**Monitoring; Testing** 

See S01 also for measurement of specific electrical parameters.

W02-C01D1 [1992]

**Fault location** 

W02-C01D3 [1992]

Standby systems and redundancy

networks

W02-C01D3A [1992]

With automatic switching to powered-up backup equipment e.g. hot-standby system

W02-C01D5 [1992]

# Measurement of transmission line parameters

Used when emphasis is on actual line parameters. (For telephone subscriber loop testing see W01-C02A5). Includes RLGC values etc.

Attenuation, phase shift, characteristic impedance, return loss, noise/signal-to-noise ratio measurement, frequency response

W02-C01D9 [1992]

Other line measurement

# W02-C01E [1992]

# Repeater circuits

(W02-C01X)

Radio repeaters are coded in W02-G05C.

Regenerator

# W02-C01E1 [1992]

# **Power supply details**

(W01-C01X)

Includes remote power feeding arrangements. Remote power feed

W02-C01E5

[1992]

# **Amplifier details**

(W01-C01X)

See also U24-G codes.

Line amplifier

#### W02-C01E9 [1992]

#### Other line repeater aspects

(W01-C01X)

# W02-C01F [2005]

# Line hybrids, transformers and impedance matching

V02-F codes are also assigned for novel details of transformers and inductors for communications purposes.

# W02-C01F1 [2005]

#### Line hybrids and transformers

Line hybrids specifically for telephone equipment are covered in W01-C08B, and are not assigned this code.

#### W02-C01F5 [2005]

# Impedance matching

Impedance matching in general is covered by U25-D05 for lumped-constant circuits and by W02-A02C for distributed-constant circuits.

#### W02-C01X

# Other line communication aspects

#### W02-C02

#### **Near-field systems**

Includes transmission over deliberately restricted area using predominately magnetic or electric fields, but not conventional radio systems of very low power. W02-C02A or W02-C02B are assigned to indicate system type and W02-C02G codes are assigned to indicate application. Near-field data interfaces are covered from 2010 by W01-A07H2N with W02-C02 codes only assigned for novel near-field aspects.

NFC

#### W02-C02A [1992]

Radiating/leaky cable

W02-C02B [1992]

**Inductive loop systems** 

W02-C02G [1992]

### **Application**

Used in conjunction with W02-C02A or W02-C02B.

# W02-C02G1 [1992]

In tunnel or mine

## W02-C02G3 [1992]

# Entertainment, educational, and hearing aid systems

From 2002 the title of this code is expanded to recognise the use of W02-C02G3A for general applications of near-field systems to hearing aids. *Auditorium* 

# W02-C02G3A [1992]

#### For operation with hearing aids

See also W04-Y, especially W04-Y03C5.

Across-counter communication aid, hearing-aid loop system

# W02-C02G5 [1992]

# For (selective) calling system

Also assigned W05-A05C codes, but note that conventional radio-based paging is **not** included here (see W02-C03 codes with W05-A05C codes).

#### W02-C02G7 [1997]

#### For smart card data transfer

(W02-C02G9)

See T04-K02 also and T05-H02C5C (card-freed services) as appropriate.

### W02-C02G9 [1992]

#### Other near field system applications

## W02-C02X [1992]

## Other near field systems

#### W02-C03

## **Radio systems**

Prior to 1992 codes in this section were chiefly used to denote 'systems' aspects of radio communication. From 1992, all aspects of radio communications (within the scope of W02) have been coded here, including apparatus which is also assigned W02-G codes.

From 2002, inventions relating to pure **applications** of radio communications in the field of alarm signalling and remote control or remote monitoring, are **not** assigned W02-C03 codes. For these applications the relevant 'transmission medium' codes from class W05 should be used in searching (e.g. W05-B05 or W05-D06 codes). Inventions in these fields for which there **is** some novelty in the radio communications sense will continue to be assigned W02-C03 and W02-G codes as appropriate.

#### W02-C03A

### **Diversity systems**

Diversity aspects of data transmission are covered by W01-A01A, and also assigned W02-C03A codes for significant radio aspects. Radio receiver circuits to counter multipath effects are coded in W02-G03B6 codes also, e.g. W02-G03B6A for rake receiver configurations (from 2002). From 2006 hybrid diversity schemes, (e.g. MIMO and the like), are covered by W02-C03A5.

In general in the following codes, those denoted 'System' relate to a diversity radio system operating method, possibly involving signalling and control aspects in a general sense, or the application of diversity at a network level, **without any novel apparatus being involved.** Codes entitled 'Apparatus' relate to novel circuitry, methods, or software at the **equipment level**, whether involving antennas, receivers or transmitters or some combination of these.

Antenna combiner/switching circuit, phase shifter, phase stripping circuit, fading/noise/interference detector, linked AGC system, dual-antenna mobile installation

W02-C03A1 [1992]

**Space diversity** 

W02-C03A1A [1992]

Space diversity system

W02-C03A1B [1992]

Space diversity apparatus

W02-C03A2 [1992]

**Time diversity** 

W02-C03A2A [1992]

Time diversity system

W02-C03A2B [1992]

#### Time diversity apparatus

Rake receivers are covered by W02-G03B6A, with codes assigned to highlight spread spectrum aspects as necessary, e.g. W02-K05A7 for CDMA.

W02-C03A3 [1992]

Frequency diversity

W02-C03A3A [1992]

Frequency diversity system

W02-C03A3B [1992]

Frequency diversity apparatus

W02-C03A4 [1992]

## Polarisation, direction diversity

Includes directional diversity aspects of BDMA and SDMA, which are covered by W02-K10 (from 2017) with antenna control details assigned W02-B06C.

W02-C03A4A [1992]

Polarisation or directional diversity system

W02-C03A4B [1992]

Polarisation or directional diversity apparatus

W02-C03A5 [2006]

#### **Hybrid diversity schemes**

Includes combined space and frequency diversity and systems, e.g. of MIMO and similar type, making use of propagation effects such as multipath to improve reliability, channel capacity, and the like. Rake receivers are covered by W02-G03B6A.

V-Blast, Alamouti, MIMO, precoding, vector

## W02-C03A5A [2017]

## Massive or large-scale MIMO systems

Covers use of a large number of antennas in a MIMO diversity scheme. For relevance to 5G cellular communications search with W02-C03C1L. Automatic antenna direction control is covered by W02-B06C and BDMA/SDMA systems (from 2017) by W02-K10.

Access point, AP, Argos, base station, beam forming, beam tracking, eNodeB, full-dimension MIMO, hyper MIMO, large-scale antenna systems, millimeter wave, mmWave, MU-MIMO, pilot, very large MIMO

#### W02-C03A5P [2017]

### Precoding aspects of hybrid diversity

This code covers precoding in the sense of equalization. (Equalization in general is covered by W02-C03E1 codes). Coding for error correction and detection is covered by W01-A01 codes.

Channel state information, codebook, CSI, linear, matrix, nonlinear, vector

#### W02-C03A5S [2017]

## Algorithms and software aspects of hybrid diversity

Covers algorithms and software aspects of hybrid diversity systems, especially of MIMO type. T01-S codes are also assigned as necessary.

#### W02-C03A9 [1992]

## Other radio diversity schemes

## W02-C03B

#### **Relay systems**

Covers terrestrial and satellite systems. Satellite TV transmission is covered by W02-F06A, and **not** coded here except for novel 'radio relay' aspects. Repeaters per se are covered by W02-G05C.

Frequency translation, on-frequency system, passive reflector, TDMA satellite communication

### W02-C03B1 [1992]

## Artificial satellite and airborne radio relay system

Covers use of satellites and 'atmospheric' relay systems using aircraft, balloons and the like for which W02-C03B1F is assigned in conjunction with other codes as appropriate for system and apparatus details. Satellite and airborne relay telephone systems are regarded as cellular types and thus W02-C03C1 codes are assigned in addition to W02-C03B1 codes.

#### W02-C03B1A [1992]

## Artificial satellite and airborne radio relay system/operating method

#### W02-C03B1B [1992]

## Satellite and airborne radio relay station details

Covers novel details, including constructional details when linked to the radio function, of satellites and also aircraft, balloons etc., for which W02-C03B1F is also assigned. The following codes may also be required: W02-B codes (especially W02-B08F5 and W02-B08F7) for antenna system details; W02-G codes (especially W02-G05C) for radio equipment; W06-B codes for details of airborne or space vehicles.

## W02-C03B1C [1992]

#### **Ground station**

Search with W02-G02A codes for mobile or portable terminal aspects.

Earth station, very small aperture terminal, VSAT, SAT

## W02-C03B1D [1992]

#### **Multiple access**

Search with W02-K codes to define access method. e.g. W02-K01A for FDMA, W02-K02D for TDMA, W02-K05 codes for spread-spectrum multiple access.

Time division, TDMA, frequency division

## W02-C03B1F [2005]

#### Airborne relay

This code is used with other W02-C03B1 codes as appropriate to highlight the use of an atmospheric radio relay system, i.e. one using balloons, highaltitude aircraft, etc.

## W02-C03B2 [1992]

## Terrestrial relay system

(H04B-007/14-195)

#### W02-C03B2A [1992]

## Terrestrial radio relay system/operating method

## W02-C03B2B [1992]

### Terrestrial radio relay apparatus

This code covers all radio-related aspects of repeaters used in terrestrial radio relay systems. Other codes are also assigned as appropriate, e.g. W02-B codes for repeater antennas, or W02-G05C plus other W02-G codes for actual novelty in radio circuitry. Equipment for extending the range or providing 'fill-in' coverage in a mobile phone system is also assigned W02-C03C1B (i.e. it is coded as a base station). Repeaters for extending coverage in a radio broadcast system are also assigned W02-D05 codes, e.g. W02-D05C1 for DAB and W02-F09 is also assigned for terrestrial TV relay stations.

Repeater

#### W02-C03C [1987]

## Mobile radio, including cellular systems

(W02-C03X)

For mobile radio telephone system use with W01-B05A codes. For mobile telephones per se, (including 'non-RF' details not assigned W02-C03C codes), see W01-C01D codes. From 1997, all mobile **telephone** and system-related details have been regarded as cellular, unless specifically indicated as being otherwise, such as 'call-point' or other cordless types, which are covered by W02-C03C3 codes. Prior to 1997, W02-C03C3 codes were used as a 'general' or 'unspecified' area for mobile telephones not clearly of cellular type.

## W02-C03C1 [1987]

### Cellular

(W02-C03X)

Application to telephone systems is indicated by assignment of W01-B05A1A for systems (with W02-C03C1A) or base stations (with W02-C03C1B), and by W01-C01D3 codes for subscriber telephones themselves (with W02-C03C1C). Analogous cellular aspects for inventions with emphasis on wireless data networks are also assigned W02-C03C1 codes with W01-A06C4 codes and other W01-A06 codes as appropriate. From 2012 W01-E codes have been introduced to cover aspects of wireless systems, normally operating on a cellular model, that may be equally applicable to data networks and mobile phone networks These codes cover topics such as roaming and registration, (previously indicated by assignment of W01-B05A1R and W01-B05A1N respectively in the case of mobile phone networks), and should be included in searches to provide more detail on specific cellular radio topics. Since 2002, non-TDMA access schemes, or systems not using that multiple access scheme alone, have been assigned W02-C03C1G, with other W02-C03C1 codes as appropriate. To discriminate these aspects, when the novelty lies in the multiple access technique used, W02-K codes are assigned as well. Thus for CDMA and W-CDMA W02-K05A7 is

assigned (e.g. for UMTS), and for use of OFDM (e.g. as the access scheme for '4G' telephones), W02-K07C is used. Does not include 'call-point' cordless telephone systems, which are covered by W02-C03C3 codes. Satellite telephone systems are regarded as cellular types and thus W02-C03C1 codes are assigned in addition to W02-C03B1 codes.

CA, carrier aggregation, cell, frequency re-use, radiotelephone, zone

## W02-C03C1A [1992]

## Cellular radio system/operating/method

This code is normally assigned along with W01-B05A1A to indicate layout or design of a cellular telephone system, the arrangement of cells and base stations, or novel methods of operating the network involving call set-up procedures, signalling, paging, and the like. This code is also applied for all communication between the network node and the user equipment. For example, beam management procedures such as beam sweeping, beam reporting, and beam failure recovery are covered here along with W02-C03C1L. Also includes control and shared data channels for 4G and 5G networks. Appropriate codes for 3G, 4G and 5G are also assigned to highlight the type of system.

Synchronization Signals, P-SS, S-SS, RACH, PDSCH, PDCCH, PUSCH, PUCCH, Beam Sweeping, Beam reporting, Beam failure recovery, Beam scheduling

[1992]

## W02-C03C1B

**Base station apparatus** 

## W02-C03C1C [1992]

### Mobile apparatus

General and non-RF aspects of cellular telephones (which are not assigned W02-C03C1 codes) are covered by W01-C01 codes only, especially W01-C01D3 codes.

Mobile radiotelephone

#### W02-C03C1D [1992]

#### Cellular radio hand-off

Received signal strength indicators (RSSI) and signal quality measurements in radio receivers in general are covered by W02-G03J codes, which are also assigned for hand-off aspects as appropriate. Soft hand-off in CDMA systems is indicated by additional assignment of W02-K05A7, and since 2002, by W02-C03C1G. Hand-off for non-cellular mobile radio is covered by W02-C03C3D. From 2012 W01-E01 codes are also assigned for mobility-related aspects of wireless data networks and mobile phone networks such as roaming and registration, e.g. W01-E01C5 for transfer of registration information.

Hand-over, reselect, transfer

#### W02-C03C1E

#### [1992]

## Mobile location determination by the network

This code is intended for the determination of location for the purpose of operating the mobile radio system, and does not cover the provision of position information by a navigation receiver built into a mobile station for the benefit of the user only. It does not cover the provision of position information as a 'subscriber service' (e.g. using an unrelated system such as GPS), except when cellular system location register information is employed, in which case W02-C03C1J ('Cellular radio applications') is also assigned. From 2012 W01-E01 codes are also assigned for mobilityrelated aspects of cellular wireless data networks and mobile phone networks, such as location register details in W01-E01C1 (see W01-B05A1Q prior to 2012). For mobile location determination in non-cellular systems see W02-C03C3F.

#### W02-C03C1F

## [2017]

#### Distributed antenna system

This code covers systems in which multiple remote units are used as access points or base stations in a cellular or similar system, usually to provide coverage in localized areas not well-served by normal wireless infrastructure, such as within buildings, tunnels, or other areas underground. Use of optical fiber links such as 'radio-over-fiber' between a hub and remote units is indicated by coassignment of W02-C04B1R.

Active, BDA, bidirectional amplifier, DAS, head end, hub, hybrid, passive, radio access unit, RAU, radio interface unit, RIU, radio-over-fiber

## W02-C03C1G

## [2002]

# Radio system or apparatus details of third generation or analogous mobile phone system

From 2012 the title of this code has been changed to clarify the way it is used. W02-C03C1G is assigned with any other cellular (W02-C03C1) code as appropriate, for inventions involving the use of non-TDMA multi-access techniques, especially CDMA. For example, novel aspects of a 3G mobile phone system are represented by W02-C03C1A and W02-C03C1G, a novel 3G base station by W02-C03C1B and W02-C03C1G, and a novel 3G mobile station by W02-C03C1C and W02-C03C1G. Novel details of the spread spectrum aspect are also assigned W02-K05 codes, e.g. W02-K05A7, as appropriate. Systems based on other multiple access schemes are also covered here with access codes assigned as appropriate, but please note that from 2014 'Fourth generation' mobile phone systems (i.e. '4G' systems) are covered by W02-C03C1H.

3G, 3GPP

## W02-C03C1H [2014]

# Radio system or apparatus details of fourth generation or analogous mobile phone system

This code is assigned with any other cellular (W02-C03C1) code as appropriate, for inventions concerned with 'Fourth generation' (i.e. '4G') mobile phone systems. For example, novel radio-based aspects of a 4G mobile phone system are represented by W02-C03C1A and W02-C03C1H, a novel 4G base station by W02-C03C1B and W02-C03C1H, and a novel 4G mobile station by W02-C03C1C and W02-C03C1H. Novel details of the multiple access aspect are also assigned W02-K codes as appropriate, e.g. W02-K07C for OFDM. Long term evolution, LTE, WiMax

### W02-C03C1J [2002]

## **Cellular radio applications**

This code is generally used without other W02-C03C1 codes, and is intended for inventions making use of the cellular system, while not involving novel cellular aspects. It is used only when the particular application cannot be coded elsewhere, and for cases specific to e.g. alarms and remote monitoring, relevant W05-B or W05-D codes are used instead.

#### W02-C03C1K [2017]

#### Hierarchical cellular network aspects

Covers systems and details of cellular networks organized on a hierarchical basis, e.g. with conventional large cells and smaller cells. Includes the use of local millimeter wave access points to separately deliver high rate data streams, e.g. as proposed for 5G for which W02-C03C1L is also assigned. Distributed antenna systems are covered by W02-C03C1F and are not assigned W02-C03C1K unless specific relevance to hierarchical cellular systems is involved. Hand-off between cells operating at different levels is also assigned W02-C03C1D.

Femtocell, macrocell, microcell, millimeter wave cell, mmWave cell, picocell, small cell

#### W02-C03C1L [2016]

# Radio system or apparatus details of fifth generation or analogous mobile phone system

This code is assigned with any other cellular (W02-C03C1) code as appropriate, for inventions concerned with 'Fifth generation' (i.e. '5G') mobile phone systems. For example, novel radio-based aspects of a 5G mobile phone system are represented by W02-C03C1A and W02-C03C1L, a novel 5G base station by W02-C03C1B and W02-C03C1L, and a novel 5G mobile station by W02-C03C1C and W02-C03C1L. Novel details of the

multiple access aspect are also assigned W02-K codes as appropriate, e.g. W02-K10 (from 2017) for RDMA.

BDMA, beam-division multiple access, SDMA, space-division multiple access, spatial-division

#### W02-C03C1M [2022]

## Radio system or apparatus details of sixthgeneration (6G) or analogous mobile phone system

This code is assigned as a tag with other codes as appropriate for inventions relating to sixthgeneration (6G) communications technology.

#### W02-C03C3 [1992]

#### Private mobile radio, MCA

Prior to 1997, W02-C03C3 codes were used (with W01-B05A or W01-C01D codes as appropriate) to indicate radio telephone systems which were not clearly cellular in nature. From 1997, all radio telephones are regarded as cellular (and thus assigned W02-C03C1 codes for RF aspects) unless recognisable as non-cellular type, such as 'callpoint', or other cordless telephone system.

Multi-channel access, push-to-talk (PTT) system, CT2, CT3, DECT, PHS

#### W02-C03C3A [1992]

## Private mobile radio system/operating method

W02-C03C3B [1992]

**Base station details** 

W02-C03C3C [1992]

Mobile station details

## W02-C03C3D [1997]

## Mobile radio hand-off

Covers arrangements to transfer communication with mobile unit to another base station. Such arrangements for cellular mobile radio are covered by W02-C03C1D. Allocation of channels in trunked radio communication is covered by W02-C03C3G, and only coded in W02-C03C3D also if inter-base station transfer is involved.

#### W02-C03C3E [1992]

## Characterised by mobile radio access method

Search with W02-K codes to define access method, e.g. W02-K01 codes for FDMA, W02-K02 codes for TDMA, W02-K05 codes for spread spectrum multiple access. Prior to 1997, W02-C03C3E was used to represent general aspects of trunked radio systems (now covered by W02-C03C3G) but will

now only be used as well for specific access-related inventions in this category.

## W02-C03C3F [1997]

#### **Mobile location determination**

Includes use of existing navigation systems, such as GPS, (for which W06-A03A5 codes are also assigned), in conjunction with the mobile radio system. For mobile location determination in cellular systems, see W02-C03C1E.

## W02-C03C3G [1997]

#### Trunked radio system

Prior to 1997, this aspect was chiefly indicated by W02-C03C3E. See W02-C03B2 codes also for land-based radio relay systems.

## W02-C03C3H [2002]

#### **Direct mode**

This code is intended for mobile radio communication conducted directly between mobile stations, rather than via a base station, although the base station may be involved in setting up the link. When applicable to trunked radio systems W02-C03C3G is also assigned.

## W02-C03D [1992]

## Point-to-point radio link

(W02-C03X)

### W02-C03D1 [1992]

## Point-to-point radio link system/operation method

(W02-C03X)

## W02-C03D2 [1992]

## Point-to-point radio link apparatus

(W02-C03X)

## W02-C03D5 [1997]

## Characterised by access method

Search with W02-K codes to define access method. e.g. W02-K01 codes for FDMA, W02-K02 codes for TDMA, W02-K05 codes for spread-spectrum multiple access.

#### W02-C03E [1992]

#### General circuit details

(W02-C03X)

## W02-C03E1 [1992]

#### Radio system equalising

(W02-C03X)

W02-C03E1A [1992]

Radio system equalising method

(W02-C03X)

W02-C03E1B [1992]

Radio system equalising apparatus

(W02-C03X)

See U22-G03E3C for digital signal processing aspects of equalising.

W02-C03E2 [1992]

Radio system echo cancelling

(W02-C03X)

W02-C03E2A [1992]

Radio system echo cancelling method

(W02-C03X)

W02-C03E2B [1992]

Radio system echo cancelling apparatus

(W02-C03X)

W02-C03E3 [1992]

**Power control** 

(W02-C03X)

W02-C03E3A [2002]

Novel algorithms for power control

Includes software aspects of power control for which T01-S codes should also be searched.

W02-C03E3B [2024]

**Terminal power control** 

Includes power saving at the user equipment side e.g by means of discontinuous reception (DRX).

W02-C03E3C [2024]

System power control

Includes 'systems' aspects of power control e.g. based on signal transmitted from base station to mobile unit. Transmitter power control circuits per se are covered by W02-G01C codes.

W02-C03E4 [1997]

Doppler shift compensation

(W02-C03E9)

Covers methods and equipment, such as receiver circuitry, for compensation of Doppler effects in e.g. mobile radio, communication with space vehicle, etc.

W02-C03E5 [1997]

Simulation systems for radio communication

(W02-C03E9, W02-C05A)

Includes modelling and planning of radio links. See also T01-J15A codes for CAD aspects, e.g. T01-J15A4, and W02-C05A for system testing aspects.

Search with W02-H01J1 for radio communication simulation during network design to minimise interference.

Path loss, attenuation, rain, fade, margin, signal-tonoise ratio, target

W02-C03E7 [2006-2009]

Resource allocation\*

\*This code Is discontinued from 2010 and the subject matter transferred to W02-C03G1. It included channel allocation and similar aspects of radio communication management. When interference avoidance is the aim W02-H01J5 is also assigned.

W02-C03E9 [1992]

Other general radio circuit details

(W02-C03X)

W02-C03G [2010]

Carrier aggregation, dual connectivity and cognitive radio

W02-C03G1 [2010]

Carrier aggregation and dual connectivity

From 2021, this code has sub-codes which cover carrier aggregation and dual connectivity in 4G and 5G networks.

W02-C03G1A\* [2021-2022]

**General resource allocation** 

\*This code is now discontinued and transferred to W02-C03R from 2023. It is still searchable and valid for records from 2021 and 2022.

W02-C03G1C [2021]

**Carrier Aggregation** 

Includes carrier aggregation for 4G and 5G systems for which W02-C03C1H or W02-C03C1L are also assigned.

CA, Supplementary uplink, Bandwidth Parts (BWP)

W02-C03G1E [2021]

**Dual Connectivity** 

Appropriate codes for 4G and 5G i.e. W02-C03C1H and W02-C03C1L are also assigned to highlight the type of system.

DC

## W02-C03G5 [2010]

### **Cognitive radio systems**

This code covers cognitive radio systems, i.e. those making use of locally-unoccupied frequency allocations. Prior to 2010 this topic was chiefly covered by W01-A06F1A when wireless data networks were involved, which will continue to be assigned for channel occupancy sensing aspects. Channel occupancy, Mitola radio, opportunistic network, primary user, white space

#### W02-C03H [2021]

#### Unlicensed radio network

This code is used to denote radio systems which use available unlicensed frequency bands such as 2.4GHz or 5-6GHz for communication.

LTE-U. NR-U

## W02-C03R [2023]

### Resource/Traffic Management

This code covers more precise details of resource allocation and prior 2023 the same is covered under W02-C03G1A. This is a broad level code and general resource allocation are covered under W02-C03R1.

W02-C03R1 [2023]

General resource allocation

W02-C03R1A [2023]

Allocation in time domain

W02-C03R1B [2023]

Allocation in frequency domain

W02-C03R1C [2023]

Allocation in variable band

W02-C03R1D [2023]

Semi-persistent scheduling (SPS)

W02-C03R1E [2023]

**Grant-free scheduling** 

W02-C03R1F [2023]

#### **Uplink management**

This code is used along with other W02-C03R codes to tell that resource allocation is for uplink management.

#### W02-C03R1G [2023]

#### **Downlink management**

This code is used along with other W02-C03R codes to tell that resource allocation is for downlink management.

W02-C03R2 [2023]

Selection of wireless resources by user or terminal

W02-C03R3 [2023]

#### **Traffic Management**

Traffic/load control for data networks area covered under W01-A06A3.

W02-C03R4 [2023]

Resource management for control channels and signalling

W02-C03R5 [2023]

Resource management for broadcast services

W02-C03R6 [2023]

Resource management for direct mode communication

#### W02-C03X

#### Other radio systems

Ionospheric/tropospheric scatter communication

## W02-C04

#### Light and infra-red systems

Covers free-space and optical fiber communication systems, but note that optical fibers and purely optical components per se are in V07. Electro-optical sources and detectors, and circuitry directly connected to them, are assigned codes in U12 also.

The following subject matter is not coded in W02-C04 unless of general application also, or unless specific novel details represented by W02-C04 codes are involved: General digital optical communication (W01-A07E), Optical fiber data network (W01-A06C1), TV optical remote control (W03-A02C), General optical remote control (W05-D06A3 or W05-D06C with W05-D08C), Optical 'radar' systems (W06-A06).

W02-C04A [1992]

Characterised by apparatus

W02-C04A1 [1992]

Transmitter circuits and apparatus

W02-C04A1A [1992]

#### Modulator

See also V07-K codes for optical modulators in general and V08 codes for laser source modulators.

W: Communications

W02-C04A1B [1992]

#### Amplifier, output stage

Includes source driving circuits.

W02-C04A1C [1992]

**Power control** 

W02-C04A1D [1992]

#### Source

Semiconductor lasers are also assigned U12-A01B codes and V08-A04A codes.

W02-C04A1X [1992]

Other optical transmitter details

W02-C04A3 [1992]

Receiver circuits and apparatus

W02-C04A3A [1992]

**Demodulator** 

W02-C04A3B [1992]

## Amplifier, input stage

Includes circuit for photodiode and the like, also assigned U12-A02B4.

W02-C04A3C [1992]

**AGC** 

See U24-C01 codes also.

W02-C04A3D [1992]

**Optical detector** 

See U12 for photodiode details.

W02-C04A3X [1992]

Other optical receiver details

W02-C04A4 [1997]

#### **Transceiver**

Systems and circuitry specific to transmitters or receivers only are covered by W02-C04A1 or W02-C04A3 codes.

W02-C04A5 [1992]

Repeater circuits

W02-C04A5A [1997]

#### **Optical amplifier arrangements**

Prior to 1997, see W02-C04A1B, W02-C04A5, and W02-C04B1A. Optical amplifiers per se are covered by V07-K01C codes.

## W02-C04A6 [2006]

## Optical multiplexing and switching devices

This code covers novel aspects of optical switches and multiplexers for communications purposes, the core technology area for these topics being covered by V07 codes. Novel switching devices and systems for communications purposes are also assigned W01-B02 or W01-A06G5 codes, and novel multiplexers are covered by W02-C04B4B and W02-K04.

## W02-C04A7 [1992]

## Equalising, noise and distortion eliminating, diversity

From 1997, this code is subdivided to include noise reduction circuits, previously covered by W02-C04C7. See W02-C04B7 for inherently non-dispersive systems, such as transmission using solitons.

#### W02-C04A7A [1997]

#### Equaliser

Prior to 2002, this code was used with W02-C04A7 for dispersion compensation, which is now covered by W02-C04A7J.

#### W02-C04A7C [1997]

#### **Noise reduction circuits**

(W02-C04C7)

#### W02-C04A7E [1997]

#### **Distortion reduction arrangement**

Includes arrangements to reduce effects due to nonlinearities, such as four-wave mixing.

## W02-C04A7G [1997]

## Diversity and polarisation control arrangements

Includes polarisation diversity aspects. Control of polarisation in general (for communications and analogous purpose) is covered by V07-K03 and V07-F02B for gratings, filters and polarizers.

#### W02-C04A7J [2002]

## **Dispersion compensation**

(W02-C04A7, W02-C04A7A)

This code is intended to cover apparatus or methods for the compensation of dispersion arising from e.g. optical fiber characteristics. (Previously covered in W02-C04A7 and W02-C04A7A). V07-K codes are also assigned as appropriate. Optical transmission systems using signals with an inherent resistance to dispersion, e.g. solitons, are covered by W02-C04B7.

## W02-C04A8 [1997]

#### **Optical alignment system**

This code mainly relates to free-space communication apparatus (W02-C02B2 codes also assigned) and covers arrangements to optimise alignment of optical systems at transmitting or receiving stations. W06-A02C codes are also assigned as appropriate for systems detecting angle of incidence of incoming light signals.

## W02-C04A8A [1997]

## **Tracking system**

Covers dynamic arrangements for maintaining alignment. Analogous systems for radio antennas are covered by W02-B06C.

W02-C04A9 [1992]

Other optical communication apparatus

W02-C04B [1992]

## Characterised by system type

W02-C04B codes are assigned to indicate system type, either alone or with W02-C04A codes.

W02-C04B1 [1992]

Fiber optic

W02-C04B1A [1992]

### With coherent light i.e. laser source

Novel laser sources are assigned W02-C04A1D in conjunction with appropriate U12-A01B codes and V08-A codes.

## W02-C04B1R [2017]

### Radio-over-fiber

Covers systems in which radio frequency signals are directly modulated onto an optical carrier wave for transmission from a remote site over optical fibers. For use of this technology in distributed antenna systems for cellular communications search with W02-C03C1F.

DAS, distributed antenna system, remote unit

W02-C04B2 [1992]

Free space

W02-C04B2A [1992]

With coherent light i.e. laser source

W02-C04B3 [1992]

Mobile

W02-C04B4 [1992]

Multiplex optical communication systems

W02-C04B4A [1992]

## With multiplexed baseband

See W02-K codes also.

## W02-C04B4B [1992]

#### With optical multiplexing

Includes WDM, also coded in W01-A03E1 when data transmission aspects are significant. See W02-K04 and V07 codes, e.g. V07-K04, also for novel aspects of optical multiplexing.

W02-C04B7 [1992]

#### **Anti-dispersive**

Includes transmission using solitons.

W02-C04B9 [1992]

Other optical communication system

W02-C04C [1992]

**General details** 

W02-C04C1 [1992]

## Testing of optical communication apparatus/system

See also the appropriate codes in V07-J.

W02-C04C1A [1992]

**Testing of apparatus** 

W02-C04C1C [1992]

**Testing of system** 

W02-C04C7\* [1992-1996]

#### **Noise reduction circuits**

\*This code is now discontinued and the subject matter transferred to W02-C04A7C. W02-C04C7 remains valid and searchable for records prior to 1997.

#### W02-C05

#### **Monitoring; Testing**

See S01 also for measurement of specific electrical parameters. Includes monitoring/testing in general, except for measurements specific to line communication (W02-C01D). Since 1992 testing of optical communications is not included in W02-C05, and has been covered by W02-C04C1 codes.

Test equipment, spectrum analyser, RF power, harmonic radiation, signal-to-noise ratio, noise figure, field strength, propagation loss

W02-C05A [1992]

**Testing of transmission system** 

#### W02-C05B

[1992]

#### **Testing of apparatus**

For equipment test, search together with appropriate code e.g. W02-C05B and W02-G01 codes, for transmitter testing.

#### W02-C06

[1987]

## **PCM** transmission systems (general)

(W02-C09)

See W02-F07 codes for pulse code modulation TV systems, which are **not** included here.

Pulse code modulation, pulse amplitude modulation, voice coding, telephony

#### W02-C06A

[1997]

## **Novel PCM communication systems**

This code is intended for communication systems in general using PCM, for which there is not a more specific code elsewhere.

#### W02-C06C

[1997]

### **Novel coding scheme**

For further details of coding systems, and for coder/decoders per se, see W04-V05G codes. Speech codecs and coding methods specifically for telephone communication are covered by W01-C01C7.

Coding in general is covered by U21-A05 codes, and for video signals, by W02-F07 (prior to 200101) and W04-P01A codes.

## W02-C07

[1987]

## Ultrasonic/sonic systems (including hydrophones)

(W02-C09)

Sonar systems are in W06-A05 as required. For transducers see also V06-B03 and other V06 codes as appropriate.

Underwater communication, diver communication system, passive sonar system, free space sonic/ultrasonic system

## W02-C07A

[1997]

#### Sonic or ultrasonic communication

This code is intended for actual communication systems, i.e. intentional transmission of information from one point to another. Passive arrangements such as hydrophones are covered by W02-C07C.

#### W02-C07C

[1997]

### **Hydrophones**

See V06 codes for actual transducer details, e.g. V06-B03. Sonar transducers are covered in W06-A05C7.

#### W02-C09

#### Other transmission system

Includes communication via other media, e.g. ground.

#### W02-D

#### Sound broadcast distribution systems

Codes in this group relate to the broadcast system as a whole and to studio / transmitter aspects, and are not assigned for receiver details. Broadcast radio receivers are covered by W03-B codes. For radio broadcast studio equipment see also W04-G08.

Broadcast sound studio, sound mixing, outside broadcast equipment

#### W02-D01

[1992]

#### Wired broadcast system

Line, wired system, line amplifier

#### W02-D02

[2011]

## Stereophonic and multiple audio channels sound broadcasting

This code is assigned for digital stereophonic broadcasting when this is a significant aspect, e.g. with W02-D05C codes for digital radio broadcasting. Analog FM and AM stereophonic broadcasting is covered by W02-E codes.

#### W02-D04

[2010]

## **Monitoring; Testing**

(W02-C05; W02-D)

Includes testing equipment and methods for complete sound broadcast systems (including those covered by W02-E codes) or broadcast systems in general. Monitoring of sound broadcast systems for audience research purposes is covered from 2010 by W02-D04B (formerly W02-D08). Note that testing and monitoring of audio recording equipment and (sound) broadcast radio receivers is not included and is covered by W04-J codes and W03-B10A codes respectively. Testing and monitoring of television systems for broadcasting and other purposes and of interactive broadcasting systems is covered by W02-F04 codes.

#### W02-D04A

[2010]

**Testing** 

#### W02-D04A1

[2010]

## Signal testing

Includes checking of signal quality.

Bandwidth, bit rate, coverage, distortion, error, harmonic content, modulation depth, service area, sidebands, spectral regrowth, spurious content, THD

## W02-D04A5 [2010]

#### **Testing of apparatus**

These codes cover the testing of equipment forming part of a sound broadcast system.

Switching centre

## W02-D04A5A [2010]

#### Testing of apparatus in broadcast studio

Testing of audio processing related aspects such as sound mixing is also assigned W04-G codes. Control desk. console. talkback

## W02-D04A5B [2010]

## Testing of apparatus at transmitter or repeater site

W02-G01 or W02-G05 codes are also assigned when radio equipment is involved.

Antenna, cooling, enclosure, generator, power amplifier, power supply, tower

#### W02-D04A5X [2010]

## Other sound broadcast apparatus testing

### W02-D04B [2010]

## Audience research system

(W02-D08)

Analogous systems for TV broadcast audience monitoring are covered by W02-F04B. Systems analyzing listening habits for the purpose of building a profile used to select or suggest content in interactive broadcasting are not included and are covered by W02-F10Q codes.

Tuned frequency, selected channel monitoring system, listener data acquisition

## W02-D04C [2010]

### Station output monitoring

(W02-C05; W02-D)

Covers arrangements to enable verification of scheduled transmission. Analogous systems for TV station output monitoring are covered by W02-F04C.

FCC, monitor, log

## W02-D04C1 [2010]

#### Monitoring programme output

(W02-C05; W02-D)

Includes checking adherence to schedule, timing, etc., and monitoring of automatic recorded programme transmission.

## W02-D04C5 [2010]

## Checking transmission of commercial message

(W02-C05; W02-D)

Sponsor, advertisement, commercial break

### W02-D04X [2010]

## Other sound broadcast system monitoring

#### W02-D05 [1992]

#### Radio broadcast system

W02-G codes are also assigned as appropriate for novel equipment, e.g. W02-G01 codes for transmitters and W02-G05 codes for repeaters. Novel antennas for radio broadcasting are also assigned W02-B codes. Broadcast radio **receivers** are not included and are covered by W03-B codes. *Radio network* 

## W02-D05A [1992]

**Satellite** 

## W02-D05C [1997]

#### **Digital broadcast system**

For broadcasting (not necessarily for entertainment purposes) in cellular telephone or data networks see W01-B05A1M and W01-A06E1A respectively.

#### W02-D05C1 [1997]

### **Involving multiplex transmission**

Includes OFDM systems. Prior to 1997, see W02-K01, W02-K09 in addition to W02-D05. From 1997, W02-K07C is assigned in addition to W02-D05C1. *DAB, packet* 

## W02-D05C5 [2002]

#### Internet broadcasting

(T01-H07C5E, W01-A06B7, W02-D, W02-F10E) See T01-N01D1A also. Interactive broadcasting aspects are covered by W02-F10E codes.

## W02-D07 [2011]

## Additional information transmitted with broadcast signals

These codes are assigned to highlight the transmission of additional information with a sound (e.g. radio) broadcast signal. Other codes relating to the additional information itself are also assigned as necessary. The transmission of additional information using analog FM or AM stereophonic broadcasting is covered by W02-E01 codes.

## W02-D07A [2011]

## **Emergency sound broadcasting**

Codes indicating 'disaster-related' alarms in W05-B08 are also assigned as appropriate. Emergency television broadcasting is covered by W02-F05D. Reception of emergency broadcast messages in radio receivers is covered by W03-B08C7 and in TV receivers by W03-A18A5J.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano

## W02-D07C [2011]

## Traffic and public transport information

T07-G01 is also assigned for systems providing information to drivers designed to warn of, or reduce, traffic congestion.

## W02-D07E [2011]

### Electronic program guide (EPG) systems

Includes details of programming and also 'now playing' information. Broadcast radio receiver aspects are covered by W03-B08C5. Analog broadcast systems providing additional information on program content are covered by W02-E01B1. EPG systems for TV broadcasting are covered by W02-F10E5 and TV set aspects by W03-A13J.

## W02-D07X [2011]

## Other additional information in broadcast

[1997-2009]

## W02-D08\*

## **Audience monitoring**

(W02-C05, W02-D)

\*This code Is discontinued from 2010 and the subject matter transferred to W02-D04B. W02-D08 was used with W02-D01 or W02-D05 codes as appropriate. (Prior to 1997, W02-C05 was used with the relevant W02-D code.) Analogous arrangements for TV audience research are covered by W02-F04B.

#### W02-D09 [2022]

#### Other sound broadcast systems

Includes FM radio transmitters and repeaters (i.e. radio equipment) for which W02-G01 codes and W02-G05C are respectively assigned also. Includes mounting aspects of FM radio transmitting devices.

#### W02-E

#### Analog stereophonic broadcast systems

From 2011 codes in this group are only assigned for inventions specific to analog stereophonic sound broadcasting. Prior to 2011 W02-E codes were assigned for some inventions involving digital stereophonic broadcasting but from 2011 stereophonic broadcasting of digital or unspecified type is covered by W02-D02. TV stereophonic sound transmission is covered by W02-F06B only. See W03-A and W03-B codes for receiver aspects. *AM, FM multiplex systems, pilot tone, modulator, encoder* 

## W02-E01 [1992]

## **Transmitting additional information**

Includes use of additional subcarriers in a multiplexed analog stereophonic signal for providing subsidiary information channels. Transmission of additional information for digital or unspecified sound broadcasting is covered from 2011 by W02-D07 codes.

Subcarrier authorisation, SCA

### W02-E01A [1992]

#### **Carrying separate programme**

Includes 'storecast' background music.

#### W02-E01B [1992]

## Carrying separate information e.g. RDS

See W03-B codes for receiver details - W02-E01B codes are only used for novel aspects of the system as a whole, and the transmitting station per se (usually with W02-G01 codes).

CCIR 634

#### W02-E01B1 [1992]

### Relating to broadcast station

Includes station identification and radio broadcast program guides. Broadcast radio receiver aspects of program guides are covered by W03-B01C. EPG systems for TV broadcasting are covered by W02-F10E5 and TV set aspects by W03-A13J.

Programme identification, PI, alternative frequency,  $\Delta F$ 

## W02-E01B5 [1992]

#### **Unrelated to broadcast station**

Includes road traffic information (e.g. ARI), financial information, and paging signal transmission (with W05-A05C codes).

#### W02-F

### **Television systems**

TV receivers are covered in W03, studio equipment, cameras etc. in W04.

#### W02-F01

#### **Closed circuit**

The definition of 'closed circuit' intended here is that images are transmitted, usually to a single location, for viewing by humans, i.e. camera systems providing a video signal for image analysis only are not included, being covered by e.g. T04-D07 codes. Novel aspects of video cameras are also assigned W04-M01 codes.

## W02-F01A [1992]

## Closed circuit television for surveillance and security

See also W05-B01C5 for automatically-actuated alarm systems.

#### W02-F01A1 [1992]

### **Entry-phone with CCTV**

See also W01-C04A1 for entry-phone.

#### W02-F01A5 [1997]

## Combined with alarm or surveillance system

See also T01 and T04 image analysis codes and W05-B codes, e.g. W05-B01C5 codes for intruder detection, W05-B02 codes for fire detection and monitoring aspects.

## W02-F01A9 [1992]

Other security CCTV systems

W02-F01B [1992]

**Process control** 

## W02-F01C [1992]

#### Component inspection during manufacture

Systems involving pattern recognition only, without a monitor display for an operator, are assigned T04-D codes and **not** covered here.

#### W02-F01D [1992]

## Calibrated system for measuring dimensions

See also S02-A03 codes.

#### W02-F01E [1997]

## Vehicle external-view CCTV system

(W02-F01X)

See also under application, e.g. X22-E09 for land vehicle, W06-B01B1 for aircraft.

### W02-F01F [1992]

## CCTV over non-wire (or fiber) link e.g. radio link

Includes near-field and low-power systems also.

#### W02-F01M [2006]

#### **Medical CCTV systems**

This code covers the use of CCTV systems and equipment with medical apparatus, normally for diagnosis, for which S05 codes are also assigned such as S05-D04B for endoscopes.

#### W02-F01X [1992]

#### Other closed circuit TV systems

#### W02-F02

#### Color

This code is only used for novel systems, e.g. modified PAL, NTSC etc., and relates to analogue color TV systems only.

#### W02-F03

#### Cable and stereoscopic TV systems

## W02-F03A [1987]

#### Cable

W02-F03A codes are assigned for 'system' inventions, including cable hardware. W03-A codes are assigned for receiver details.

Community antenna TV (CATV), masthead amplifier TV

## W02-F03A1 [1992]

## **Coaxial cable network**

See X12-D05 for coaxial cable per se. *Cable installation* 

#### W02-F03A3 [1992]

**Optical fiber network** 

## W02-F03A5 [1992]

Head-end details, control aspects

W: Communications

## W02-F03A7 [1997]

### Microwave distribution system

(W02-F03A9)

Includes 'microwave cable' TV system providing local distribution of signals, usually in GHz frequency range.

Masthead

#### W02-F03A9 [1992]

#### Other cable TV aspects

Includes hardware aspects such as connectors (see V04 codes also), cable installations and fittings (see W01-D codes also) and repeaters (also assigned W02-C01E and W02-C04A5 codes as appropriate)

#### W02-F03B [1987]

#### Stereoscopic

Includes broadcast and industrial systems. Stereoscopic TV receivers are in W03-A12, signal generation is in W04-M09.

Three-dimensional TV

W02-F03B1 [1992]

**Broadcast** 

W02-F03B3 [1992]

Industrial

W02-F03B9 [1992]

#### Other stereoscopic TV

Includes medical applications of stereoscopic TV - see  ${\sf S05}$  codes also.

## W02-F04

## **Monitoring; Testing**

Includes testing equipment and methods for whole system, or any component part in conjunction with that code, and also audience research systems. Note that monitoring and testing of sound broadcast systems and equipment is covered from 2010 by W02-D04 codes, and that video recording equipment monitoring/testing is covered by W04-J codes only.

Switching centre

## W02-F04A [1992]

## Testing

Production line test equipment, vectorscope, test pattern generator

## W02-F04A1 [1992]

### Signal testing

Covers measurements on analog or digital video signals. Measurement and testing of equipment used in video systems is covered by W02-F04A5 codes

Artifact, BER, bit error rate, black level, color saturation, DC offset, differential gain, differential phase, hue, IRE unit, link quality, link testing, perceptual evaluation of video quality, PEVQ, picture quality, PSNR, SNR, SSIM, structural similarity, video quality

W02-F04A5 [1992]

Testing of apparatus

W02-F04A5A [1992]

In TV studio

W02-F04A5B [1992]

#### At transmitter or repeater

See also W02-G01 or W02-G05 codes.

## W02-F04A5C [1992-2009]

## In receiver\*

\*This code is now discontinued and from 2010 all aspects of TV receiver testing, including production line testing and internal self-monitoring are covered by W03-A18A codes. W02-F04A5C was assigned prior to 2010 for these aspects in addition to the W03 codes.

#### W02-F04A5X [1992]

#### Other TV or video apparatus testing

#### W02-F04B [1992]

#### Audience research system

This code covers arrangements for analyzing user opinions and/or determining viewing figures for audience research purposes. When equipment installed at the viewer location is involved W03-A18R is also assigned. Systems analyzing viewing habits for the purpose of building a profile used to select or suggest content in interactive broadcasting are not included and are covered by W02-F10Q codes. Analogous systems for audience research in broadcasting other than TV are covered by W02-D04B.

Selected channel monitoring system, viewing figure data acquisition

## W02-F04C [1997]

### Station output monitoring

(W02-F04X)

Covers arrangements to enable verification of scheduled transmission. Includes analogous arrangements for cable TV and similar distribution systems.

FCC, monitor, log

### W02-F04C1

[1997]

## Monitoring programme output

(W02-F04X)

Includes checking adherence to schedule, timing, etc., and monitoring of automatic recorded programme transmission.

#### W02-F04C5

[1997]

## Checking transmission of commercial message

(W02-F04X)

Sponsor, advertisement, commercial break

#### W02-F04X

[1992]

Other TV system monitoring

W02-F05

Secrecy, subscription, teletext

## W02-F05A

[1987]

#### Secrecy (scrambling), subscription

From 9701, interactive broadcasting, formerly covered in W02-F05A3C, is transferred to W02-F10 codes.

#### W02-F05A1

[1992]

#### Secrecy

(W02-F05A, W02-L)

See W02-F10N1 codes for scrambling and coding aspects of interactive broadcasting, which take precedence over W02-F05A1 codes.

Synchronising signal suppression, black-white inversion

### W02-F05A1A

[1992]

## Video/audio scrambling system, jamming signal insertion

## W02-F05A1B

[1992]

#### Video/audio descrambling system

TV receiver aspects of descrambling are not included, being covered by W03-A16C3A.

#### W02-F05A3

[1992]

#### Subscription

From 1997, two-way aspects of subscription TV are covered in W02-F10 codes, especially W02-F10A.

#### W02-F05A3A\*

[1992-1996]

### **Billing system**

\*This code is now discontinued and from 1997 billing aspects of subscription TV are covered by W02-F10A codes and W02-F10N5. (These codes are assigned even in cases of non-interactive systems). W02-F05A3A is no longer assigned but remains valid for records prior to 1997.

#### W02-F05A3C\*

[1992-1996]

#### Two-way working

\*This code is now discontinued and from 1997 subject matter previously coded here is transferred to W02-F10 codes, under the general heading of interactive broadcasting. W02-F05A3C remains valid and searchable, for two-way subscription TV and analogous arrangements, for records prior to 1997.

#### W02-F05A9

[1992]

## Other TV secrecy and subscription aspects

#### W02-F05B

[1987]

#### Teletext, screen text systems

Teletext TV receiver decoder is in W03-A10 only. Character multiplex, videotext, off-air system, data base access, horizontal/vertical blanking interval data insertion, framing code, multiplex

## W02-F05B1

[1992]

#### Telephone line-based system

(See also W01-C05B1) Includes e.g. CAPTAIN system.

## W02-F05B5

[1992]

## Transmitted as additional information with television signal

Includes teletext and analogous non-VBI systems as used in e.g. DVB, in which case W02-F07M1 is also assigned.

Burst-and-random error correction system for teletext (BEST)

## W02-F05B9

[1992]

#### Other screen text systems

## W02-F05C [1992]

## Other additional (non-picture) information

Includes transmission of information for station ID or VPS, ghost control reference signals, URLs and the like. See W04-E04C5 codes for recording equipment aspects of off-air programming and W03-A04G for TV receiver ghost-cancelling circuitry. Teletext transmission systems for digital and analog TV broadcasting are covered in W02-F05B5.

Video programming system, GCR

## W02-F05D [2011]

## Transmission of emergency TV broadcast messages

Codes indicating 'disaster-related' alarms in W05-B08 are also assigned as appropriate. Emergency sound radio broadcasting is covered by W02-D07A. Reception of emergency broadcast messages in TV receivers is covered by W03-A18A5J.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano

#### W02-F06 [1987]

## Satellite TV; MAC systems; High definition TV; Stereophonic/bilingual sound

(W02-F09)

Radio relay systems for communications purposes are assigned W02-C03B codes.

## W02-F06A [1992]

#### Satellite TV

Radio relay systems for communication purposes are coded in W02-C03B codes.

Direct broadcast by satellite (DBS)

#### W02-F06B [1992]

## Stereophonic and multichannel sound TV

W02-F06B1 [1992]

#### Involving companding

Includes NICAM system.

W02-F06B3 [2006]

**Surround sound TV** 

#### W02-F06B5 [1992]

## For carrying separate sound channel

Includes e.g. bilingual broadcast. Second audio programme, SAP

#### W02-F06C [1992]

#### **High definition TV transmission systems**

Covers non-compatible and compatible systems such as IDTV, EDTV, HDTV etc.

#### W02-F06C1 [1992]

## Involving time-multiplexed transmission of TV signal components

Includes MAC system and variants.

## W02-F06C3 [1992]

Involving distinct transmission of motion information

## W02-F06C7 [1992]

**Involving sub-sampling** 

## W02-F06C8 [1992]

#### Increased definition

Includes compatible 'side panel' systems modifying e.g. NTSC or PAL (see W02-F02 also) including 'letterbox' format.

## W02-F07\* [1987-2001]

## Bandwidth/bit-rate reduction, PCM systems

(W02-F09)

\*This code is now discontinued from 2002, as are the W02-F07 subdivision codes up to W02-F07K. These discontinued codes are replaced by the single code W02-F07M - 'Digital image transmission'. W04-P01A codes are still assigned as before, and may be used to highlight the type of coding. (Prior to 2002, the W02-F07 codes were used for methods and complete systems for PCM TV).

See T01-J10D for computer-based image coding and compression, and U21-A codes for coding in general. (Bandwidth reduction for facsimile and analogous systems is covered by S06-K07A4D).

Compression, encoding, narrow band TV, block coding, predictive coding, motion detection

## W02-F07A\* [1992-1997]

## **Movement detection system**

\*This code is now discontinued and from 1997 its subject matter is covered by W04-P01A1.

## W02-F07B\* [1992-2001]

#### **Transform coding**

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A3 codes.

## W02-F07C\*

[1992-2001]

#### **Predictive coding**

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5 codes.

#### W02-F07C1\*

[1992-2001]

#### Motion detection and compensation

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5 codes. Interframe, difference, differential

#### W02-F07C1A\*

[1997-2001]

#### **Motion detection**

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5A.

#### W02-F07C1C\*

[1997-2001]

### **Motion compensation**

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5C.

### W02-F07D\*

[1992-2001]

## Subsampling

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A7.

Multiple sub-Nyquist sampling encoding, MUSE

#### W02-F07E\*

[1997-2001]

### **Hybrid coding**

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4 codes.

#### W02-F07E1\*

[1997-2001]

## Combined transform and predictive coding

(W02-F07B, W02-F07C)

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4 codes, which include MPEG system coding and variants.

## W02-F07E5\*

[1997-2001]

#### Motion detection and compensation

(W02-F07B, W02-F07C1)

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4 codes.

## W02-F07E5A\*

[1997-2001]

#### **Motion detection system**

(W02-F07B, W02-F07C1)

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4A.

#### W02-F07E5C\*

[1997-2001]

### **Motion compensation system**

(W02-F07B, W02-F07C)

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4C.

### W02-F07K\*

[1997-2001]

#### **Coding based on fractals**

\*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A8.

#### W02-F07M

[2002]

#### **Digital image transmission**

This code is intended to cover digital image transmission from a systems viewpoint, novel aspects of image coding are covered by W04-P01A codes.

#### W02-F07M1

[2005]

#### Digital video broadcasting

Includes DVB and similar systems. TV receivers for signals in this format are covered by W03-A11G. Includes non-interactive broadcasting of video via the internet, e.g. by streaming. Interactive broadcasting via the internet in general is covered by W02-F10E3.

#### W02-F07M1A

[2008]

## Mobile digital video broadcasting

This code is intended for transmission of digital TV broadcasts at a deliberately-reduced data rate, e.g. for handheld receivers with reduced processing and display capabilities.

DVB-H

#### W02-F07M5

[2005]

## Digital video for non-broadcasting applications

Includes digital video transmission for conferencing, surveillance, equipment interconnection and the like.

## W02-F08

[1992]

## **Two-way television systems**

(W02-F09)

#### W02-F08A

[1992]

#### TV conference system

(W02-F09)

W01-C05B1 or other W01-C codes are also assigned if telephone communication is involved.

## W02-F08A1

[1992]

#### System

(W02-F09)

W: Communications

W02-F08A3 [1992]

**Apparatus** 

(W02-F09)

W02-F08B [1992]

Video telephone

(W02-F09)

W02-F08B1 [1992]

**System** 

(W02-F09)

Also assigned W01-C05B1 codes.

W02-F08B3 [1992]

**Apparatus** 

(W02-F09)

Subscriber apparatus is also coded in W01-C01G4.

W02-F08X [1992]

Other two-way TV systems

(W02-F09)

Two-way TV systems.

W02-F09

#### Other television systems

Includes TV transmitters and repeaters (i.e. radio equipment) for which W02-G01 codes and W02-G05C are respectively assigned also. Also includes mounting aspects of television transmitting devices.

#### W02-F10 [1997]

#### Interactive broadcast systems

(W02-F05A3C)

Codes in this section cover subject matter chiefly coded, prior to 1997, in W02-F05A3, and include video, audio/video, sound-only, and information systems provided for access by entertainment equipment, usually of 'subscription' type. W02-F10 codes are used to represent 'head-end' and overall systems aspects. See W03-A16C codes for equipment based at a subscriber location.

W02-F10A [1997]

## Video-on-demand, video-on-request and video-based systems

(W02-F05A3C)

Covers systems predominately of a video nature. Systems involving selection of predominately non-video programme material are covered by W02-F10C.

From 2002 the title of this code has been expanded to better reflect its content, and to separate actual video-on-demand systems from those in which some interactive facility is available

without the provision for causing the downstream transmission of a different programme.

The title of this code has been further expanded to allow the inclusion of video-on-request systems, covered from 2006 in W02-F10A1E.

VOD, pay-per-view

W02-F10A1 [2002]

**Video-on-demand system** 

(W02-F05A3C)

W02-F10A1A [2002]

Full video-on-demand system

(W02-F05A3C)

W02-F10A1C [2002]

Near video-on-demand system

(W02-F05A3C) NVOD

W02-F10A1E [2006]

## Video-on-request system

Covers systems in which video programming is delivered for later viewing, e.g. taking advantage of unused network capacity overnight.

#### W02-F10A1G [2007]

## Video-based systems with different-view facility

Covers interactive video-based systems including the facility to select a different viewing angle. Multiple camera systems for generating different views of a scene are covered by W04-M01V.

## W02-F10A5 [2002]

## TV broadcasting with interactive aspects

(W02-F05A3C)

This code is intended for largely standard TV broadcasting or video distribution with limited interactivity, e.g. the facility to respond to questionnaires, cast votes, etc. Systems enabling fuller control over programme content are covered by W02-F10A1 codes.

## W02-F10C [1997]

#### Audio-on-demand system

(W02-F05A3C)

The title of this code was amended in 2005 to reflect its normal use for audio entertainment. Includes remote access of entertainment library system, e.g. of 'pay-per-play' type.

W02-F10A codes take precedence for interactive systems in which audio is transmitted as a normal accompaniment to video signals in interactive TV.

## W02-F10E [1997]

## For access to information system, programme guide systems, and internet

Database systems in general are covered by T01-J05B codes.

In 2002 the title of this code was expanded to reflect its use for internet aspects including WWW access provided as part of an interactive broadcast system and internet broadcasting itself of an interactive nature, and also programme guide systems. For internet aspects see T01-N codes also.

## W02-F10E1 [2002]

#### For access to internet

(T01-H07C5E, W01-A06B7, W02-F10E)

This code is intended for internet access provided as a facility of interactive broadcasting.

#### W02-F10E3 [2002]

### Interactive internet broadcasting

(T01-H07C5E, W01-A06B7, W02-F10E)

This code is intended for interactive broadcasting using the internet itself. Non-interactive internet radio is covered by W02-D05C5 and non-interactive transmission of video via the internet is included in W02-F07M1.

#### W02-F10E5 [2002]

#### Programme guide systems

(T01-H07C5E, W01-A06B7, W02-F10E)

TV receiver aspects of interactive programme guides are covered by W03-A16C5E and of programme guides in general by W03-A13J. *EPG* 

#### W02-F10F [2005]

## Archival storage of content primarily submitted by user

Includes storage and retrieval of images accessed by digital camera via a communication link. (Digital camera details are covered by W04-M01B1 codes). Also covers storage of video footage and other information.

## W02-F10G [1997]

## For game playing, virtual reality, or karaoke

(W02-F05A3C, W04-X02C)

Video games in general are covered by W04-X02C. For virtual reality aspects, see also W04-W07E codes. Karaoke systems are also coded in W04-X03A3.

## W02-F10H [2002]

#### For access to multimedia systems

(W02-F10X, W04-K10)

Audio/video aspects of multimedia systems in general are also assigned W04-K10.

### W02-F10J [1997]

#### For access to financial network

(W02-F05A3C)

Includes monetary transaction and interactive shopping, also assigned T01-N01A1 or T01-N01A2 codes as appropriate for applications of computing.

#### W02-F10K [1997]

## Storage systems and servers

(W02-F05A3C, W04-K05)

This code covers file servers and similar arrangements for general storage of programme material, and to enable playback operation simulating e.g. VTR functions, such as rewind, fastforward, etc. Multiple recording unit arrangements are also assigned W04-K05A codes.

## W02-F10N [1997]

#### Security aspects and access control

(W02-F05A1, W02-F05A3C)

#### W02-F10N1 [1997]

## Scrambling, coding and copy marking aspects

(W02-F05A1, W02-F05A3C)

From 2009 the title of this code has been expanded to reflect previous inclusion of copy marking. W02-F10N1 codes take precedence over W02-F05A1 codes which cover secrecy and scrambling for non-interactive video systems. See W02-L05 for audio scrambling systems in general. Data encryption in general is covered by W01-A05A codes.

### W02-F10N1A [2009]

#### Broadcast signal scrambling and coding

Covers scrambling and coding (i.e. encryption, especially of video signals) to prevent unauthorised viewing. Arrangements to prevent or restrict the making of copies are covered by W02-F10N1C. Coding for compression is not included, being covered by W04-P01A codes.

## W02-F10N1C [2009]

## Broadcast signal copy restriction and watermarking

Covers arrangements to prevent or restrict the making of copies. Signal processing involving scrambling and coding (especially of video signals) to prevent unauthorised viewing or listening is covered by W02-F10N1A. Signal processing aspects of copy restriction and watermarking within recording equipment are covered by W04-F01L codes or W04-G01L codes.

Digital rights management, DRM

## W02-F10N3 [1997]

### **Access control**

(W02-F05A1, W02-F05A3C)

Includes use of smart cards to authorise decoding (see W03-A16C3C also for subscriber-end aspects), and control of access from server. See W02-F10N7 also for arrangements temporarily increasing access rights.

## W02-F10N5 [1997]

## **Billing arrangements**

(W02-F05A3A)

Aspects of financial transactions **using** an entertainment network, for purposes unrelated to billing for the service itself, are covered by W02-F10J.

## W02-F10N5A [2005]

## According to user-determined level of commercial message provision

Overriding of systems which prevent the recording of commercial messages is covered in W04-E04C5E.

### W02-F10N7 [1997]

## Temporarily increasing access rights and request transmission

(W02-F05A1, W02-F05A3C)

Covers systems enabling 'impulse' decision to e.g. view programme, and associated communications aspects. See W01-C05B5A also where telephone-based link is involved.

#### W02-F10Q [2005]

# User profiling; Content recommendation; Selective insertion of commercial messages

From 2011 the title of this code has been expanded to allow inclusion of user profiling and 'recommendation' or 'suggester' systems which offer content based on a user's profile. W02-F10Q codes relate to systems and equipment at the 'content distribution end' of the broadcast system

and do not cover self-contained analogous systems wholly based at the viewer or listener end which are part of e.g. a TV receiver and are not supplied by the content provider. Arrangements for analyzing user opinions and/or determining viewing figures for audience research purposes, rather than tailoring content, are covered by W02-F04B (TV broadcasting) and W02-D04B (sound broadcasting).

## W02-F10Q1 [2011]

## **User profiling**

This code covers the building of a user profile e.g. to be used to determine preferences in terms of content.

### W02-F10Q1A [2011]

#### Learning aspects

This code covers novel aspects of monitoring user behaviour in terms of content that has been selected and includes automatic detection of patterns in viewing or listening habits.

## W02-F10Q3 [2011]

#### **Content recommendation**

Covers 'recommendation' or 'suggester' systems for offering content based on the determined profile. Selective insertion of commercial messages is **not** included and is covered by W02-F10Q5.

#### W02-F10Q5 [2011]

## Selective insertion of commercial messages

Covers equipment, methods and systems for selective insertion of commercial messages (CMs) presumed to be of interest based on the user profile or geographical region. Offering of content other than CMs is **not** included and is covered by W02-F10Q3.

#### W02-F10X [1997]

## Other interactive broadcasting aspects

(W02-F05A3C)

#### W02-G

## Radio transmission system details and equipment

Broadcast radio and TV receivers are in W03, sound studio equipment is in W04 and W02-D/E. Codes from the radio systems section (W02-C03) which denote apparatus are also assigned as appropriate.

#### W02-G01

#### **Transmitters**

Includes transmitters (for radio and TV) per se and those forming part of e.g. transceiver, where this aspect is the significant part of the disclosure.

## W02-G01A [1992]

#### Oscillator and frequency conversion

### W02-G01A1 [1992]

#### Oscillator

Includes oscillator circuits per se (see U23-A codes also).

#### W02-G01A3 [1992]

#### Frequency control

Include frequency control aspects such as PLL synthesisers (also assigned U23-D01B codes).

#### W02-G01A5 [1992]

#### Frequency translation

Includes frequency mixing. See U23-J codes for frequency changing and U23-B codes for frequency multiplying.

## W02-G01B [1992]

### Amplifier, output stage

Includes buffer amplifiers, driver stages, and output stages, e.g. power amplifiers.

#### W02-G01C [1992]

## Power control, protection

#### W02-G01C1 [1992]

#### **Power control**

Overall systems aspects of power control are covered by W02-C03E3.

Output/level control

#### W02-G01C5 [1992]

## Power limiting, protection

See S01-D05B5 for systems involving reflected power measurement, and U24-G03C for amplifier protection in general.

VSWR power limiting, thermal

#### W02-G01D [1992]

#### Modulator

See U23 codes for modulator circuits in general. *AM, FM, SSB, DSB, balanced modulator* 

## W02-G01E [1992]

## Tuning, matching, impedance networks

From 2012 the title of this code has been expanded to reflect the existing coverage of any impedance network forming part of transmitter RF amplifier input or output circuitry, such as filters, directional couplers, splitters and combiners. For lumped constant impedance networks U25 codes are also assigned as appropriate and for distributed constant circuits W02-A codes.

#### W02-G01H [1992]

#### **Construction and cooling**

#### W02-G01K [2002]

## **Transmitters with digital architecture**

This code is intended for radio transmitters employing a digital architecture within the signal path, i.e. using DSP. See corresponding codes for transceivers and receivers also (W02-G02K and W02-G03K codes respectively).

### W02-G01X [1992]

## Other radio transmitter aspects

#### W02-G02

#### **Transceivers**

Covers fixed and mobile radio transceivers and also relevant RF aspects of e.g. cordless and cellular telephones where appropriate. (Non-RF aspects of mobile phones are not assigned W02-G02 codes and are covered by W01-C01D codes and other W01-C01 codes as necessary). Details specific to radio transmitters are covered by W02-G01 codes and to radio receivers (of non-broadcast or unspecified type) by W02-G03 codes. For transceivers other than radio type codes relating to the communications medium should be considered, such as W02-C04A4 for optical transceivers.

Radiotelephone, transmitter-receiver, two-way radio

#### W02-G02A [1992]

#### Portable and mobile transceiver

#### W02-G02A1 [1992]

## Personal radio transceiver e.g. hand-held walkie-talkie

## W02-G02A2 [1992]

#### Mobile radio transceiver

Covers transceivers installed in vehicles and generally of a higher power than normal hand-held walkie-talkie units.

W02-G02A3 [1992]

### Selective calling e.g. answer-back pager

See also W05-A05C codes for paging details.

W02-G02A5 [1992]

#### Characterised by operation

See W02-G02C3A for novel transmit-receive switching.

W02-G02A5A [1992]

**Push-to-talk** 

PTT

W02-G02A5B [1992]

### **Duplex**

Includes aspects such as duplexers, for which filter codes are also assigned as appropriate (e.g. W02-A05K7 in the case of distributed constant types).

W02-G02A5C [1997]

### Voice-operated switching

(W02-G02C, W04-V04A1)

Prior to 1997 see W02-G02C. See also W04-V04A1 which covers applications of speech recognition and speech/noise discrimination systems.

VOX

W02-G02A5X [1992]

Other radio transceiver operation

W02-G02A9 [1992]

Other radio transceiver details

W02-G02B [1992]

**Base station** 

W02-G02C [1992]

### Control and interfacing

Includes general processor control, see appropriate T01 code also. From 1997 voice actuated control is coded under W02-G02A5C.

W02-G02C1 [1997]

## Controls per se

See also V01-A03 codes for potentiometers, and U21 or V03 codes respectively for electronic and electromechanical switches.

W02-G02C3 [1997]

**General control circuitry** 

W02-G02C3A [1997]

## **Transmit-receive switching**

Portable and mobile transceiver operating modes are covered by W02-G02A5 codes.

W02-G02C5 [1997]

**Testing, monitoring** 

W02-G02C7 [1997]

#### Interfacing

Includes circuitry such as bus and network interface aspects, and connectors (also assigned V04 codes, especially V04-M30G).

W02-G02C9 [1997]

Other radio transceiver control

W02-G02H [1992]

Construction

W02-G02K [2002]

## Transceivers with digital architecture

This code is intended for radio transceivers employing a digital architecture within the signal path, i.e. using DSP. See corresponding codes for transmitters and receivers also (W02-G01K and W02-G03K codes respectively).

#### W02-G03

#### Receivers

Used for receivers of 'professional' i.e. communications type and for application to receivers in general, or where application not disclosed. Broadcast radios are covered by W03-B codes, and not coded here except when used in conjunction with W02-G03B codes for noise/interference suppression or (from 2005) with W02-G03J codes for RSSI aspects. Since 2002, W02-G03K codes have been assigned for receivers with digital architecture.

#### W02-G03A

#### **Tuners**

The W02-G03A codes chiefly cover superheterodyne receivers, TRF types being assigned W02-G03A9. Since 2002 W02-G03A8 codes have been assigned for direct conversion and low-IF receivers.

Preset, step, continuous, variable capacitor, varicap diode, variable inductor, permeability, ganged, tracking, peaking

## W02-G03A1 [1992]

## Tuned circuits, input filters, and attenuators

Search with appropriate codes in U25 for lumped-constant tuned circuits and filters, and W02-A03 or W02-A05 for distributed-constant elements. The title of this code has been expanded from 2002 to allow the inclusion of attenuators, previously coded as W02-G03A9. See U25-D07 codes for lumped constant attenuators and W02-A04C codes for distributed constant types.

### W02-G03A3 [1992]

### **RF** amplifier

Novel RF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, RF AGC is covered by W02-G03D3, previously coded as W02-G03A3 and W02-G03D.

#### W02-G03A5 [1992]

#### Mixer

Mixer circuits in general are covered by U23-J codes.

#### W02-G03A5A [2006]

#### Image rejection mixer

For application to low-IF receivers search with W02-G03A8C. Prior to 2006 image rejection mixers were represented (in W02) by W02-G03A5 and W02-G03B4A (receiver image signal suppression in general). From 2006 W02-G03B4A will only be assigned for specific novelty in the image rejection aspect.

## W02-G03A7 [1992]

### **Local oscillator**

Includes frequency translation aspects e.g. multipliers, also assigned U23-B codes.

#### W02-G03A7A [1992]

## Frequency control

Includes frequency synthesisers of general application to radio equipment, if specific purpose not disclosed. See U23-D01B codes for details of PLL implementations, and U23-F01 codes for 'direct' synthesisers. For AFC circuits, search with U25-J05.

#### AFC

## W02-G03A8 [2002]

## **Direct conversion and low IF receivers**

These codes are used, in conjunction with other W02-G03 codes as necessary, to represent receivers of homodyne, synchrodyne, 'zero-IF', or 'low-IF' type. Arrangements for suppression of offsets at the output of the mixer are also assigned W02-G03B4G. Direct digital conversion (DDC) in

digital architecture communications receivers is not included here, being covered by W02-G03K5. Direct conversion TV receivers are covered by W03-A01B6 codes and direct conversion broadcast receivers by W03-B01A6 codes.

#### W02-G03A8A [2002]

#### Zero-IF direct conversion receivers

This code is intended for direct conversion schemes in which the baseband information is centered on zero frequency.

## W02-G03A8C [2002]

#### Low IF receivers

This code is intended for direct conversion schemes in which the baseband information is centered on a low frequency, e.g. of the same order as the baseband bandwidth itself.

## W02-G03A9 [1992]

## Other tuner circuitry, including nonsuperheterodyne tuners

TRF, superregenerative receiver

#### W02-G03B

### Noise/interference suppression

Noise suppression at source is covered by W02-H codes.

## W02-G03B1 [1987]

## Squelch/muting arrangements

Search with W04-V04A1 for arrangements lifting squelch only on detection of valid speech signal. Muting of amplifiers in general is covered by U24-C05C.

Squelch, tone squelch, muting, inter-station, carrieroperated, noise-operated, noise filter, noise amplifier, comparator, squelch gate

## W02-G03B2 [1997]

## Noise reduction by variation of RF/IF passband

(W02-G03B9)

Noise reduction by control of signal bandwidth at baseband is covered by W02-G03B8.

## W02-G03B2A [1997]

## **Based on bandwidth modification**

(W02-G03B9)

Includes use of highpass, lowpass, or other input filter (coded in W02-G03A1 also) and also reduction of IF bandwidth (also coded in W02-G03C1). 'IF-shift' techniques are covered by W02-G03B2C. FM threshold extension is covered by W02-G03B7.

## W02-G03B2C

## Based on change in centre-frequency

[1997]

(W02-G03B9)

Covers arrangements with emphasis on changing centre frequency of passband, rather than changing its width, such as 'IF-shift' techniques (also assigned W02-G03C codes when appropriate).

#### W02-G03B3 [1992]

#### Thermal noise reduction

For RF amplifier noise reduction aspects search with W02-G03A3 also. Amplifier noise reduction in general is covered by U24-G03D1.

Search with V04-T03 codes for arrangements involving cooling of circuitry.

#### W02-G03B3A [1997]

## **Based on circuit configuration**

## W02-G03B3C [1997]

#### **Based on low-noise components**

Covers choice of devices with low noise figure. Search with codes relating to semiconductor devices per se, e.g. U12-D codes for bipolar transistors and FETs, and U14-F02 codes for superconductive elements.

#### W02-G03B4 [1992]

## Reducing internal unwanted signals

### W02-G03B4A [1992]

Reducing image response

#### W02-G03B4C [1992]

## **Reducing spurious signals**

Includes reduction in level of oscillator harmonics in dual-conversion receiver, and avoidance of instability (also assigned U24-G01D and U24-G03L when involving HF amplifiers). Also includes arrangements reducing noise due to e.g. CPU clock oscillator harmonics by spread-spectrum techniques, also assigned W02-H01 and W02-K05A1 codes.

## W02-G03B4E [1992]

## Reducing effects due to device transfer characteristic

Includes effects due to non-linear or non-square law characteristic e.g. cross-modulation, intermodulation. For further details of amplifier or mixer circuit improvements to increase strong-signal handling, search with W02-G03A3 and W02-G03A5 respectively. Such arrangements for high frequency (small-signal) amplifiers in general are assigned U24-G01D and U24-G03D5 codes.

RF amplifier, mixer, overload, blocking, desensitising

## W02-G03B4G [2002]

#### Reducing offset effects

This code relates to the reduction of offsets arising from limitations in receiver performance, especially DC offsets due to e.g. LO leakage in a direct conversion receiver, for which W02-G03A8A is also assigned. Correction of offsets, e.g. by AFC, arising from mistuning are **not** included, and are covered by W02-G03A7A and e.g. U25-J05.

#### W02-G03B5 [1987]

## Impulse noise suppression, noise blanker

Automatic noise limiter, peak limiter, noise silencer, blanking signal generator, wideband noise receiver, pulse stretching

### W02-G03B6 [1992]

## Multipath reception compensation

Prior to 1997 this code included television receiver ghost signal canceller, also assigned W03-A04G. Since 1997 this topic is **not** included in W02-G03B6 unless wider applications are also stated.

## W02-G03B6A [2002]

#### Rake receiver

Search with W02-K05 codes for spread spectrum aspects, especially W02-K05A7 for CDMA. Time diversity radio reception equipment is covered by W02-C03A2B which from 2002 will not be routinely assigned for rake receiver configurations.

Delay, finger

#### W02-G03B7 [1992]

## Threshold extension, frequency compressive feedback

Frequency demodulators are coded in U23-L also. Noise reduction by baseband bandwidth reduction is covered by W02-G03B8, and RF/IF bandwidth reduction in W02-G03B2A.

## W02-G03B8 [1992]

## Noise reduction by demodulated baseband bandwidth control

See also U25-F05A codes. Includes dynamic variation of e.g. audio passband dependent on signal strength. Arrangements involving variation of RF or IF passband are covered by W02-G03B2 codes.

Variable de-emphasis

#### W02-G03B9 [1987]

## Other noise reduction and S/N ratio improving circuits

Includes use of non-linear element such as magnetostatic wave device to improve signal-to-noise ratio (also code in W02-A06E as a distributed constant element, and in V06-V).

#### W02-G03C [1992]

## IF system

(W02-G03X)

From 2006, W02-G03C5 is introduced to separately highlight IF amplifiers, and IF AGC is covered by W02-G03D5 (previously coded as W02-G03C and W02-G03D).

## W02-G03C1 [1997]

#### IF filter

For specific analogue filter types search with codes in e.g. V06-V, U14-G, U25-B, U25-E, or W02-A05 codes. Digital filters are covered in U22-G01 codes. Includes 'IF-shift' techniques (also coded in general in W02-G03B2C).

#### W02-G03C5 [2006]

#### IF amplifier

Novel IF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, IF AGC is covered by W02-G03D5, previously coded as W02-G03C and W02-G03D.

## W02-G03D [1992]

#### **AGC**

(W02-G03X)

Also assigned U24-C01 codes. Prior to 2006 this code was used with W02-G03A3 for RF AGC and W02-G03C for IF AGC. These topics are now covered solely by the subdivision codes below.

## W02-G03D1 [2006]

#### **Novel AGC characteristic**

Covers delayed AGC, or other specific characteristic. See U24-C01C1 for signal processing aspects to obtain a particular AGC characteristic.

## W02-G03D3 [2006]

#### **RF AGC**

Prior to 2006 this topic was covered by W02-G03A3 and W02-G03D.

#### W02-G03D5 [2006]

#### **IF AGC**

Prior to 2006 this topic was covered by W02-G03C and W02-G03D.

## W02-G03D9 [2006]

## Other communications receiver AGC aspects

#### W02-G03E [1992]

#### Demodulator

(W02-G03X)

See U23 codes for demodulators also.

#### W02-G03F [1992]

## **Audio amplifier**

(W02-G03X)

See U24-G and W03-C codes for audio amplifiers in general.

### W02-G03H [1992]

#### Construction

(W02-G03X)

#### W02-G03J [1997]

#### Received signal strength indicator

(W02-G03E, W02-G03X)

Includes arrangements to display signal strength (e.g. 'S-meter') and also to provide a signal for control of an associated transmitter (see W02-G01C1 also).

Since 2005 W02-G03J codes have also been assigned for RSSI aspects of TV and radio receivers, with W03-A and W03-B codes as appropriate. *RSSI* 

#### W02-G03J1 [1997]

#### Based on signal level per se

(W02-G03E, W02-G03X)

Implies use of signal rectifier to generate level-responsive output. Signal level detection purely as part of a receiver AGC system is covered in W02-G03D, but use of existing AGC voltage or current to provide level indication is included. Signal rectifiers in general are covered by U24-C03 codes.

## W02-G03J1A [2002]

## Application of signal strength measurement

(W02-G03E, W02-G03X)

This code is intended for applications of RSSI measurements which are already available. From 2002 novel RSSI measurement circuits are covered by W02-G03J1C.

## W02-G03J1C [2002]

## Novel signal strength measurement arrangements

(W02-G03E, W02-G03X)

This code is intended for novel arrangements or circuits for RSSI measurement. From 2002 applications of RSSI measurement are covered by W02-G03J1A.

#### W02-G03J3 [2002]

## Compensation arrangements for RSSI and BER measurements

(W02-G03E, W02-G03X)

This codes is intended for arrangements to compensate for the effects of external factors, such as temperature, on signal strength and signal-tonoise ratio measurements in radio receivers.

#### W02-G03J5 [1997]

## Based on signal-to-noise ratio or BER

(W02-G03E, W02-G03X)

Includes arrangements to measure S/N ratio by detection of noise accompanying signal, and measurement of bit error rate, or similar, which is also coded in W01-A01C.

#### W02-G03J5A [2002]

## Application of signal-to-noise ratio or BER measurement

(W02-G03E, W02-G03X)

This code is intended for applications of measurements which are already available. From 2002 novel BER measurement arrangements are covered by W02-G03J5C.

## W02-G03J5C [2002]

## Novel signal-to-noise ratio or BER measurement

(W02-G03E, W02-G03X)

This code is intended for novel arrangements or circuits for BER or signal-to-noise ratio measurement. From 2002 applications of these measurements are covered by W02-G03J5A.

## W02-G03J7 [2021]

### Based on power level per se

Includes arrangements to measure the received power

RSRP, SS RSRP, CSI RSRP

#### W02-G03J7A [2021]

#### Applications of power level measurement

## W02-G03J7C [2021]

**Novel power measurement** 

#### W02-G03K [2002]

### Digital and hybrid receiver architecture

This code is assigned for receivers - of signals with analogue or digital modulation - which are implemented using DSP techniques in whole or in part. The codes are used in conjunction with other W02-G03 codes as necessary where there are direct equivalents in analogue receivers, in particular for RF amplifiers, oscillators, IF stages and demodulators. Corresponding digital techniques for broadcast radio receivers are covered by W03-B07 codes and for TV receivers by W03-A11K codes.

## W02-G03K1 [2002]

#### Characterised by usage of DSP

These codes are used to distinguish between different levels of DSP being applied to the signal path in the receiver. As such, they do not normally represent novel digital processing aspects, which are conveyed by use of other W02-G03K codes. DSP in general is covered by T01-J08A2, T01-J08B and U22-G codes depending on specific aspects.

## W02-G03K1A [2002]

## With baseband digital signal processing only

This code covers receivers with a digital signal processing path **after** the conversion to baseband.

#### W02-G03K1C [2002]

## With baseband and IF digital signal processing only

This code covers receivers with DSP in IF, demodulator, and baseband stages.

#### W02-G03K1E [2002]

#### With digitising of RF spectrum

This code covers receivers with digitising of the whole signal processing path, except for the possible use of analog RF amplifiers.

#### W02-G03K1X [2002]

#### Other use of DSP

## W02-G03K3 [2002]

#### **AD** conversion

Novel aspects of AD converters and AD conversion are covered by U21-A03 codes.

#### W02-G03K5 [2002]

## Digital mixing and direct digital conversion

### W02-G03K6 [2002]

#### **Filtering**

Novel digital filters are also assigned U22-G01 codes and T01-J08B when the emphasis is on computing aspects.

#### W02-G03K7 [2006]

## **Transform implementation**

DSP-based transform implementation is covered by U22-G03E1A and computer data processing aspects in general by T01-J04B1.

Fourier, Hilbert, Walsh

#### W02-G03K8 [2006]

#### **DA** conversion

Novel aspects of DA converters and DA conversion are covered by U21-A02 codes.

#### W02-G03K9 [2002]

Other digital receiver aspects

## W02-G03P [2017]

## Radio receiver power supply and power management

Covers novel details of power supplies and also power management for battery saving and the like in portable equipment.

## W02-G03P1 [2017]

## Radio receiver power supply

Covers novel aspects of power supplies for communications-type radio receivers. Novel details of power supplies are covered in U24, such as U24-D codes for power converters and U24-E codes for voltage regulation.

## W02-G03P5 [2017]

#### Radio receiver power management

Covers power management to reduce drain on the supply, e.g. for battery saving and the like in portable equipment by modifying circuit operation or disabling circuitry when idle. U24-H04 and U24-K are also assigned as necessary for power management techniques and modifying PSU operation.

#### W02-G03X

## Other communications radio receiver aspects

#### W02-G04

#### **Bandwidth reduction; Signal predistortion**

Used for RF and other systems, including e.g. audio compander arrangements for recording and communications. (See U24-C02 codes for companders/amplitude limiters in general).

Speech processing, dynamic range limiter, automatic level control, non-linearity correction, feed-forward

### W02-G04A [1992]

**Bandwidth reduction** 

#### W02-G04A1 [1992]

Time compression or expansion

#### W02-G04A9 [1992]

Other bandwidth reduction

## W02-G04B [1992]

## **Signal predistortion**

See U24-G03B1 also for feedforward amplifier circuits.

## W02-G04B1 [1992]

#### Volume compression or expansion

PAPR, peak-to-average power ratio

#### W02-G04B9 [1992]

### Other signal predistortion

## W02-G04C [1992]

#### Single-side band

Includes vestigial sideband transmission. SSB, DSB, VSB

## W02-G05 [1992]

## Transponder, responder, repeater

(W02-G09)

From 2008 transponders and interrogation systems for RFID application are respectively covered by W02-G05A and W02-G05B and in W06-A04B codes only when there is some RF novelty. T04-K codes, e.g. T04-K03B, can be assigned for any aspect, including memory storage and the like. Transponder-based telemetry or telecontrol is covered by W05-D08G and other W05-D codes as appropriate. Satellite 'transponders', i.e. 'repeaters', are coded in W02-G05C.

## W02-G05A [1992]

### Transponder

(W02-G09)

From 1997, the scope of this code is expanded to cover all aspects of transponders per se. Interrogation equipment and system details are covered in W02-G05B. Search with application codes also, e.g. T04-K01 for smart cards, T05-G02B1A for workpiece tags, W05-B01A2C for antitheft tags, W05-D06A1 codes with W05-D08G for telemetry systems, and W06-A04B codes for identification systems.

## W02-G05B [1992]

## Interrogation system

(W02-G09)

From 1997, transponders per se are covered by W02-G05A. This code is intended to represent all other aspects of transponder systems as a whole.

## W02-G05C [1992]

## **Satellite transponder, terrestrial repeaters** (W02-G09)

To discriminate between satellite and terrestrial repeaters, search with W02-C03B codes for radio relay systems. Details of satellites per se, other than 'internal' details of telecomms equipment carried on space vehicles, are covered by W06-B03 codes. Duplex, circulator, isolation, filtering

#### W02-G05X [1992]

## Other transponder or repeater details

(W02-G09)

#### W02-G06 [1992]

#### Construction; Equipment rack; Casing

(W02-G09)

This code is used for radio equipment construction in general only.

#### W02-G08 [1992]

## Standby systems and redundancy networks

(W02-G09)

Fail-safe communications

## W02-G08A [1992]

With automatic switching to powered-up backup equipment e.g. hot-standby system

(W02-G09)

## W02-G09

## Other radio equipment details

#### W02-H

### Noise suppression at source

See W02-G03B codes for radio receiver circuits. W02-H codes are normally assigned together with codes for the apparatus in which noise is being suppressed.

Feedthrough filter, composite LC component, ferrite bead

## W02-H01 [1992]

#### **RFI** suppression at source

IC engine ignition interference suppression, motor commutation, parasitic oscillation prevention

#### W02-H01A [2002]

## RFI suppression of non-communications equipment

This code is intended to cater for the suppression of radiated RF energy from equipment whose primary function is not that of communication, e.g. electric motors, IC engine ignition systems, microwave ovens.

## W02-H01C [2002]

## RFI suppression in communications equipment

This code is intended to cater for the suppression of radiated RF energy from communications equipment, e.g. transmitters, receivers, etc.

## W02-H01C1 [2002]

## Suppression or avoidance of interference within communications equipment

This code is intended to cater for the suppression of interference generated by one part of communications equipment with another part of the same equipment, or a group of similar units assembled together, e.g. prevention **at the transmitter**, of interference with an associated receiver. Arrangements for avoiding interference by modifying the operation of the equipment, including software changes only, are also assigned W02-H01G (or a subdivision). Self-interference

### W02-H01C5 [2002]

## Suppression of interference caused to separate communications systems

This code is intended to cater for the suppression of radiated RF energy from equipment, especially transmitters, which could interfere with other communication systems, e.g. reducing harmonic radiation.

## W02-H01E [2002]

## Suppression or avoidance of interference based on constructional features

Covers screening, siting of modules, etc. and thus V04-S, V04-T or V04-U codes are normally assigned also, as well as constructional details codes specific to the equipment involved.

#### W02-H01G [2002]

## Suppression or avoidance of interference based on circuitry or operation

This code is intended to focus on aspects of circuit design or equipment operation (including software modifications) resulting in a reduction in the level or effect of unwanted radiated RF energy from equipment, or parts of equipment.

## W02-H01G1 [2002]

## Suppression or avoidance of interference based on reduction in harmonic energy

### W02-H01G3 [2002]

## Suppression or avoidance of interference based on energy dispersal

These codes are intended for arrangements reducing the effect of a potentially interfering signal by dispersing its energy, usually over a range of frequencies.

## W02-H01G3A [2002]

#### Based on use of FM

Novel frequency modulators are assigned U23-H if intended for analogue signals, U23-P01 and W01-A09A2 with W01-A09E1 if modulated by digital data.

#### W02-H01G3C [2002]

## Based on use of frequency hopping

Frequency hopping in general is covered by W02-K05A6, which is **not** assigned here unless specific novel aspects are to be conveyed, or more general applications are cited.

## W02-H01G3E [2002]

## Based on direct sequence spectral spreading

Direct sequence spread spectrum systems in general, such as CDMA, are covered by W02-K05A7, which is **not** assigned here unless specific novel aspects are to be conveyed, or more general applications are cited.

## W02-H01G5 [2007]

## Interference avoidance based on selection of operating frequency

This code involves avoidance of interference by changing frequency, e.g. selecting an alternative second local oscillator, clock, or PWM audio amplifier switching frequency depending on the channel selected in a radio receiver. Avoidance of interference based on frequency allocation in radio networks is covered by W02-H01J5.

#### W02-H01J [2002]

# Interference avoidance in radio systems based on frequency allocation and network operation or planning

This code is intended for prophylactic measures, e.g. at the network planning phase or during normal operation, to reduce the likelihood of interference between communications systems. Simulation systems for radio communication are assigned W02-C03E5 also.

## W02-H01J1 [2005]

## Interference avoidance at radio network planning stage

Includes use of CAD (see W02-C03E5 and T01-J15A4 also). Interference avoidance as a normal part of network operation is covered by W02-H01J5.

### W02-H01J5 [2005]

# Interference avoidance based on frequency allocation and network operation

This code is intended to cover interference avoidance during normal network operation, and may involve channel allocation which is also assigned W02-C03G1 (W02-C03E7 prior to 2010) and interference avoidance aspects of cognitive radio systems which are also assigned W02-C03G5. Avoidance of interference at a network design stage is covered by W02-H01J1, and avoidance of interference by changing frequency, e.g. of a clock signal, in equipment is covered by W02-H01G5.

## W02-H01J9 [2005]

Other aspects of interference avoidance based on frequency allocation and network operation

## W02-H03 [1992]

Supply line noise suppression e.g. mains filter

## W02-J\*

[1980-2009]

#### **Facsimile**

\*This code is now discontinued, see S06-D to K. Includes analogous systems for still picture information. See also under application e.g. S06-C02B for electronic color separation systems. Note that digital cameras are not included, and are covered by W04-M01B1 codes.

Copy, print, scan, sheet, image, document, line, satellite weather picture system

#### W02-J01\*

[1980-2009]

## **Scanning arrangements**

\*This code is now discontinued, see S06-D. Includes optical system, lens etc. and scanning drive (See also V07-K05), but not read/write components such as sensors, print heads, and light sources.

Beam, laser, expose, slit, optical magnifications

#### W02-J01A\*

[1992-2009]

## Optics e.g. lenses and mirrors

\*This code is now discontinued, see S06-D03. *Polygonal* 

#### W02-J01B\*

[1992-2009]

#### Scanning drive system

\*This code is now discontinued, see S06-D04. *Raster* 

## W02-J01C\*

[1992-2009]

## Synchronising, position detection and adjustment

\*This code is now discontinued, see S06-D04A. Includes control and error compensation of scanning velocity and position.

## W02-J01X\*

[1992-2009]

#### Other scanning arrangements

\*This code is now discontinued, see S06-D. Includes scanner construction.

## W02-J02\*

[1980-2009]

## **Recording and reproducing arrangements**

\*This code is now discontinued, see S06 codes. Covers methods and recording and reproducing components per se.

### W02-J02A\*

[1987-2009]

#### Recording i.e. line image sensor, CCD etc.

\*This code is now discontinued, see S06-D. See also U14-H01B for thin film image sensor, U13-A01 and U13-A02 for circuitry and CCD.

Reader, monolithic

#### W02-J02A1\*

[1992-2009]

#### Sensors

\*This code is now discontinued, see S06-D05. Photoelectric detector, thin film image sensor, multi-element array

#### W02-J02A1A\*

[1992-2009]

#### Integral reading circuitry

\*This code is now discontinued, see S06-D05A.

#### W02-J02B\*

[1987-2009]

#### Reproducing i.e. printing

\*This code is now discontinued, see S06 codes.

Dot matrix, pressure sensitive, magnetic printing

#### W02-J02B1\*

[1987-2009]

#### **Thermal**

\*This code is now discontinued, see S06-H.

Head, resistive elements, thermal transfer ink ribbon

#### W02-J02B2\*

[1987-2009]

### Optical

\*This code is now discontinued, see S06-E. See also V07-K01 codes for optical modulator per se. Light valve, shutter, modulator

## W02-J02B2A\*

[1992-2009]

#### **LED**

\*This code is now discontinued, see S06-E03A2. *Array* 

#### W02-J02B2B\*

[1992-2009]

#### Laser

\*This code is now discontinued, see S06-E03A3.

#### W02-J02B2X\*

[1992-2009]

#### Other optical printing

\*This code is now discontinued, see S06-E03.

## W02-J02B3\*

[1992-2009]

## Ink jet

\*This code is now discontinued, see S06-G.

#### W02-J02B5\*

[1992-2009]

#### Integral drive circuitry for printhead

\*This code is now discontinued, see S06-G03.

## W02-J03\*

[1980-2009]

## Picture signal circuits, bandwidth reduction, blanking, transmission control

\*This code is now discontinued, see S06-K07.

## W02-J03A\*

## Control circuits, monitoring circuits

\*This code is now discontinued, see S06-K07. Used for general picture signal processing and control, including electronic magnification and blanking. Also includes color processing. For picture processing see also T01-J10B codes.

Drive circuits

#### W02-J03A1\*

[1992-2009]

[1987-2009]

#### **Image acquisition**

\*This code is now discontinued, see S06-K07A4. *Scan, read, shading compensation* 

#### W02-J03A1A\*

[1992-2009]

## **Compensating for sensor characteristics**

\*This code is now discontinued, see S06-K07A4A. Shading compensation

#### W02-J03A2\*

[1992-2009]

#### Image and data processing

\*This code is now discontinued, see S06-K07A4. Picture signal amplifier, halftone screening, edge enhancement, noise or error suppression

#### W02-J03A2A\*

[1992-2009]

#### **Changing magnification**

\*This code is now discontinued, see S06-K04A4B.

#### W02-J03A2B\*

[1992-2009]

#### Composing and electronic layout control

\*This code is now discontinued, see S06-K04A4B.

### W02-J03A3\*

[1992-2009]

#### **Image output**

\*This code is now discontinued, see S06-K04A4C. Write, print, display

#### W02-J03A4\*

[1992-2009]

### User interface i.e. control input, displays

\*This code is now discontinued, see S06-K07A1.

Operator warning device, mode setting

#### W02-J03A5\*

[1992-2009]

## Monitoring

\*This code is now discontinued, see S06-K07B. Includes self-testing, error correcting and resetting, maintenance.

Fault indication

#### W02-J03A7\*

[1992-2009]

### **Control of operation**

\*This code is now discontinued, see S06-K07A. Includes general control system details and external control e.g. by personal computer. Use with corresponding interface code.

Mode control, non-image memory, start up, standby

#### W02-J03A7A\*

[1992-2009]

## Copy sheet counting

\*This code is now discontinued, see S06-K07A5.

#### W02-J03A9\*

[1992-2009]

#### Other facsimile circuits

\*This code is now discontinued, see \$06-K07.

#### W02-J03B\*

[1987-2009]

## Bandwidth reduction, encoding e.g. MH, run-length etc.

\*This code is now discontinued, see S06-K07A4D. See U21-A05 codes for coding in general, W04-P01A codes for TV signal compression, and W02-G04A codes for bandwidth reduction in general.

#### W02-J03B1\*

[1992-2009]

### Encoding

\*This code is now discontinued, see S06-K07A4D. Compression, data reduction, white block skipping

#### W02-J03B2\*

[1992-2009]

#### Decoding

\*This code is now discontinued, see S06-K07A4D. Regenerate

## W02-J03C\*

[1987-2009]

#### **Transmission details**

\*This code is now discontinued, see S06-K07C. Includes input-output arrangements, telephone interface and secrecy systems (with W02-L). Search W01-C05B1 and W01-C01H for telephone aspects also. For ISDN aspects see W01-C05B7. For LAN aspects see W01-A06 codes.

Synchronising, privacy, transmission standards (e.g. G2, G3, G4 etc.)

#### W02-J03C1\*

[1992-2009]

## Signal processing, preparing data for transmission, modulation, and coding

\*This code is now discontinued, see S06-K07C3. Scrambling

#### W02-J03C2\*

[1992-2009]

## Determining and setting type of transmission link, mode, and priority

\*This code is discontinued, see S06-K07C4. Includes detecting type of receiving station (e.g. G3, G4).

Autodialer, modem

#### W02-J03C3\*

[1992-2009]

#### Monitoring, error checking

\*This code is now discontinued, see S06-K07C6.

## W02-J03C4\*

[2006-2009]

### Remote control/monitoring of a facsimile

\*This code is now discontinued, see S06-K07C6. E.g. monitoring from host over network, etc.

#### W02-J03C5\*

[1992-2009]

#### **Reception details**

\*This code is now discontinued, see S06-K07C5. *Automatic answering* 

#### W02-J03C6\*

[1992-2009]

#### Secrecy

\*This code is now discontinued, see S06-K07C7. Encoding transmission date, password, data encryption.

password, data encryption

### W02-J03C6A\*

[1992-2009]

#### Scrambling of signals, etc.

\*This code is now discontinued, see S06-K07C8.

#### W02-J03C6B\*

[1992-2009]

## **Document handling**

\*This code is now discontinued, see S06-K07A3/K07C9. Includes sealing of received documents in envelopes.

## W02-J03C7\*

[1992-2009]

#### Interface with telephone

\*This code is now discontinued, see S06-K07C2A. Also includes combined facsimile-telephone. See W01-C01P4. Also W01-C05B3H.

### W02-J03C8\*

[1997-2009]

#### Interface with computer

\*This code is now discontinued, see S06-K07C2D. See also T01-C03B.

#### W02-J03C9\*

[1992-2009]

#### Other transmission details

\*This code is now discontinued, see S06-K07C. Includes interface to other independent device e.g. copier, but not composite.

Multimedia

#### W02-J03D\*

[1992-2009]

#### Image memory

\*This code is now discontinued, see S06-K07A4. Refers to image memory only, but not external memory e.g. computer memory. See also T01-J10A2 for image memory management. Stores

#### W02-J04\*

[1980-2009]

#### **Color systems**

\*This code is now discontinued, see S06-K01. Used for any aspect of color system, with other codes as appropriate.

#### W02-J05\*

[1980-2009]

#### Constructional details

\*This code is now discontinued, see S06-K03. Housing, casing, cooling/ventilating arrangements, transport system drive, cutter

#### W02-J05A\*

[1980-2009]

#### Sheet feeding

\*This code is now discontinued, see S06-K02. Includes original document and recording/copy sheets. Also includes page turning mechanism. Paper roll, paper tray, document holder

### W02-J05B\*

[1980-2009]

## **Finishing apparatus**

\*This code is now discontinued, see \$06-K05. Includes stapling, binding, laminating, and cutting, etc. of output sheets.

### W02-J05C\*

[1980-2009]

## Connectors, physical aspects of circuits

\*This code is now discontinued, see S06-K03F.

#### W02-J05D\*

[1980-2009]

### **Recycling systems**

\*This code is now discontinued, see S06-K04. See also X25-W04 for electrical aspects of recycling system in general.

## W02-J06\* [1980-2009]

### **Power supplies**

\*This code is now discontinued, see S06-K03/K07A2. Includes mains and battery supplies for all types of units including portable systems. Also includes protection circuits. See U24-D, U24-E, U24-F and U24-X codes.

#### W02-J07\*

[1980-2009]

## Combined unit with facsimile, copier, and/or printer functions

\*This code is now discontinued, see S06-K99F1.

#### W02-J08\*

[1992-2009]

#### **Facsimile communication systems**

\*This code is now discontinued, see S06-K07C.

#### W02-J08A\*

[1992-2009]

### Store and forward exchange

\*This code is now discontinued, see S06-K07C2B.

#### W02-J08C\*

[1992-2009]

#### **ISDN** interface

\*This code is now discontinued, see S06-K07C2C. See also W01-C05B7 codes for general aspects of ISDN.

#### W02-J09\*

[1980-2009]

#### Other facsimile details

\*This code is now discontinued, see S06-K. Includes sheet marking and stamping. Multiple facsimile system, exchange, coin freed

## W02-J10\*

[1992-2009]

#### **Analogous systems**

\*This code is now discontinued, see S06-K99G. For medical stimulable sheet phosphor systems see also S05-D02A5C. For electronic blackboard (previously coded in W02-J09) see also W04-W05. Radiation imaging

#### W02-J11\*

[2006-2009]

## Prevention of illegal photocopy transmission/reception

\*This code is now discontinued, see S06-K07A3. See S06-A14F for prevention of illegal photocopying.

## W02-K

### **Multiplex systems**

For multiplex data transmission see W01-A03 also, multiplex telemetry/telecontrol is in W05-D02.

#### W02-K01

#### Frequency division multiplex

FDM, carrier generator, baseband signal, modulator, telephony transmission, group, supergroup

#### W02-K01A

[1992]

#### For satellite system

Includes SCPC (single channel per carrier). (See also W02-C03B1D).

#### W02-K01C

[1997]

## Frequency division duplex

For mobile radio aspects use with W02-C03C codes or W02-G02A5B.

#### W02-K02

#### Time division multiplex

TDM, frame, burst

#### W02-K02A

### Synchronising

Synchronisation, word detection

#### W02-K02A1

[1992]

Framing, aligning, multiframe

### W02-K02A3

[1992]

**Pulse stuffing** 

#### W02-K02A9

[1992]

[1992]

#### Other

#### W02-K02B

#### Calling signals; Branching; Monitoring

Testing, error detection, addressing

W02-K02B1
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Calling signals

W02-K02B3 [1992]

**Branching** 

W02-K02B5

[1992]

Monitoring

W02-K02B5A

[1992]

**Error detection** 

W02-K02B5B

[1992]

**Testing** 

W: Communications

W02-K02B5X [1992]

Other

W02-K02C [1997]

## **Time division duplex**

For mobile radio aspects use with W02-C03C codes or W02-G02A5B.

TDD

W02-K02D [1992]

## **Satellite TDMA system**

See W02-C03B for transmission system details.

W02-K02E [1992]

Statistical multiplexing

(W02-K02X)

W02-K02X

Other

W02-K03 [1992]

#### Packet switching (general)

Includes e.g. voice packet systems. For data transmission system see W01-A03B codes, and W01-A06G2.

W02-K04 [1992]

### **Optical multiplex system**

(W02-K09)

Includes wavelength-division multiplexing, see W02-C04B4B also.

#### W02-K05 [1987]

## Spread-spectrum, frequency hopping, time hopping and UWB systems

(W02-K09)

W02-K05A codes define system type while W02-K05B codes indicate novelty at the system level, or in apparatus. From 2005 W02-K05A9 codes are introduced for ultra-wideband and time hopping systems. Where the use of spread spectrum technique is inherent to a particular technology (e.g. Bluetooth or 3G mobile phones), W02-K05 codes are only assigned when the novelty lies in the SS aspect. Novel details of radio systems are also assigned W02-C03 codes and novel radio equipment is also assigned W02-G codes.

Pseudo-random, synchronisation, frequency step, synthesiser control, radio system, data transmission, power line carrier communication W02-K05A [1992]

Systems type

W02-K05A1 [1992]

Non-deliberate interference immunity system; Increased reliability

W02-K05A5 [1992]

## System providing secrecy or anti-jamming capability

Note secret transmission per se is coded in W02-L05.

W02-K05A6 [1997]

Frequency hopping spread spectrum

W02-K05A7 [1997]

### **Direct sequence spread spectrum**

Includes CDMA. Prior to 1997 see W02-K08 with W02-K05 codes as appropriate.

W02-K05A8 [1997]

#### Hybrid spread spectrum system

Covers e.g. combined frequency hopping and CDMA system.

W02-K05A9 [2005]

## Ultra wideband and time-hopping systems

This code is used with other W02-K05 codes as appropriate, e.g. with W02-K05B7 for synchronising aspects of UWB communication. Wireless data interfaces between two points using this technology are covered by W01-A07H2K and network communication by W01-A06C4K.

W02-K05A9A [2005]

**Carrier-free impulse communication** 

W02-K05A9C [2005]

## **Carrier-based impulse communication**

Includes spectrally-filtered systems.

W02-K05B [1992]

System or apparatus details

W02-K05B1 [1992]

Operating method/system

W02-K05B3 [1992]

**Apparatus** 

## W02-K05B5 [1992]

# Pseudonoise code details for direct sequence, frequency hopping codes and time hopping codes

Covers details of noise-like codes used in CDMA, frequency hopping and time hopping communication systems. W02-K05A codes are also assigned to differentiate system type, e.g. W02-K05A9A for hopping codes used in a carrier-free impulse communication system.

W02-K05B7 [1992]

Synchronising

W02-K05B9 [1992]

Other spread-spectrum system details

W02-K06 [1992]

## Time assigned speech interpolation (TASI)

(W02-K09)

See also W04-V04A1 for application of speech recognition systems to detection of voice presence in speech interpolation multiplexing systems. *DSI* 

#### W02-K07 [1992]

## Hybrid and orthogonal multiplex systems

(W02-K01, W02-K02, W02-K09)

From 1997, the scope of this code is widened to include orthogonal multiplexing, previously coded in W02-K09.

W02-K07A [1997]

**Mixed FDM-TDM system** 

W02-K07C [1997]

## Orthogonal frequency division multiplexing

(W02-K01, W02-K09)

This code covers the use of OFDM for communication e.g. in a 5G system for which W02-C03C1L is also assigned. See also W02-C03D5 for access methods, e.g. OFDMA is denoted by W02-K07C along with W02-C03D5 code. Pre-1997 this topic was covered by W02-D05, W02-K01 and W02-K09. Receivers for DAB are covered in W03-B codes.

OFDM, CP-OFDM, DFT-S-OFDM, SC-FDMA

## W02-K07E [1997]

## **Orthogonal multiplexing**

(W02-K09)

Search with W02-C03B1 codes, especially W02-C03B1D, for satellite communication aspects of orthogonal multiplexing.

**OTFM** 

#### W02-K07X [1997]

## Other hybrid multiplexing systems

Hybrid spread-spectrum systems are **not** covered here - see W02-K05A8.

### W02-K08 [1992]

#### **Code division multiplexing**

Prior to 1997 this code was used for all aspects of CDMA, which is now transferred to W02-K05A7. From 1997 W02-K08 will be assigned for code division multiplexing not specific to spread spectrum communication.

#### W02-K09

## Other multiplexing

Prior to 2017 this code included beam division and spatial division multiple access (i.e. BDMA and SDMA), e.g. as used at a cellular base station (W02-C03C1B also with W02-C03C1H or W02-C03C1L for '4G' or '5G' respectively) but from 2017 this topic is covered by W02-K10. Prior to 1997 this code included orthogonal multiplexing which is now coded under W02-K07.

### W02-K10 [2017]

## Beam division multiple access: Space division multiple access

Covers BDMA and SDMA, especially in radio communications. For application to millimeter wave data transmission in 5G cellular systems search with W02-C03C1L. Directional diversity is covered by W02-C03A4 and MIMO systems by W02-C03A5 codes. For antenna beam control aspects see W02-B06 codes. Prior to 2017 BDMA and SDMA were covered by W02-K09.

BDMA, SDMA

#### W02-L

## Secret communication; Jamming and antijamming; Eavesdropping and antieavesdropping

Note secret data transmission is covered in W01-A05. For digitised speech/video (e.g. with bit order rearrangement) search with W01-A05 codes. See W02-F05A codes for video systems.

Secrecy, privacy, anti-eavesdropping system, telephone 'wire-tap' detection

## W02-L01 [1992]

#### Jamming and anti-jamming

Jamming/anti-jamming for radar is covered by W06-A04E1 codes only and for GPS by W06-A03A5M only.

W02-L01A [2005]

**Jamming** 

W02-L01C [2005]

**Anti-jamming** 

W02-L05 [1992]

Scrambling

Scrambled audio/video communication

## W02-L07 [2005]

## **Eavesdropping on communications and anti-eavesdropping**

This code covers the interception of communications using any medium, bugging of conversations using hidden microphones, laser reflection from windows etc., and also countermeasures to these techniques. For systems specific to telephone communications (wired or wireless) see W01-C08F1 codes.

## W02-L07A [2005]

#### **Eavesdropping**

Covers systems, methods and equipment for intercepting communications and also use of covert listening devices.

## W02-L07C [2005]

## **Anti-eavesdropping**

Covers arrangements to detect or prevent interception of communications by a third party, other than purely by scrambling or encryption, which in general is covered by W02-L05, and also detection of listening devices, e.g. by 'sweeping' for bugs and similar techniques.

#### W03: TV and Broadcast Radio Receivers

This class covers general audio/video equipment for entertainment purposes, including interconnection aspects, and radio receivers of broadcast type.

Prior to 2007 displays for non-TV receiver applications and associated signal processing circuitry were not coded in W03-A ('TV receivers') being covered under T04 (for computer monitors), or W05 (general display details). From 2007, due to the increasing convergence of TV and general purpose displays all relevant aspects of video displays will be coded in W03, including: signal processing (W03-A04 and W03-A05 codes);

synchronizing (W03-A04 and W03-A05 display aspects (W03-A08 codes); constructional details (W03-A09 codes); stereoscopic aspects (W03-A12 codes); and audio details (W03-A15 codes).

Please note that W03 only covers displays capable of presenting video information. For displays of a general nature (e.g. segment displays), or where there is no particular emphasis on displaying video information (e.g. public information displays) see W05-E codes (W05-E05G for details of construction).

Where a novel display is for a specified non-TV receiver application, W03-A21 (Video display for non-TV receiver application) is also applied along with relevant application codes from other classes (e.g. T04).

Novel module and manufacturing details of liquid crystal, plasma, electroluminescent and field transmission displays for general applications, as well as display driving and interfacing circuitry are not coded in W03. (See U14 and V05 for these topics).

Radio receivers of communications or unspecified type are covered by W02-G03 codes, but note that in addition to appropriate W03 codes, the topic of broadcast TV or radio receiver noise reduction is assigned W02-G03B codes, and from 2005, received signal strength indicating circuits and their applications are also assigned W02-G03J codes. Audio and video recording equipment is covered in class W04.

## W03-A

## **TV** receivers

Since 2002 W03-A11K codes have been assigned for TV receivers with digital architecture. From 2005, TV receivers for digital signals (e.g. DVB-T) are covered by W03-A11G, and set-top boxes by W03-A16E codes. Video signal processing for applications other than TV receivers is covered in W04.

#### W03-A01

#### **Tuners; Tuning displays**

RF amplifier/mixer, local oscillator, tuning band switching, preset, step, continuous, variable capacitance, tracking, tuning scale, channel number digital display, on-screen display

#### W03-A01A

#### [1987]

#### Satellite TV/cable TV converter

Search with W03-A01B codes for specific tuner details.

#### W03-A01A1

#### [1992]

#### Satellite converter

For other aspects of satellite TV reception see W03-A16A.

DBS, LNA, LNB, low noise amplifier, low noise block, down converter

#### W03-A01A5

#### [1992]

#### **Cable TV converter**

Prior to 1992 search W03-A01A and W02-F03A (W02-F03A no longer assigned). This code covers RF/IF tuner circuitry. For general (including non-RF) aspects of cable converters and all other ancillary aspects of home installation see W03-A16C codes. CATV, subscription, wide-band, super-band, set-top box

#### W03-A01B

#### [1992]

#### Tuner circuitry and construction

W03-A01B codes are used to describe actual tuner circuitry in conjunction with W03-A01A codes or alone for standard TV tuners, as appropriate. Communications receiver tuners are covered by W02-G03A codes.

Superheterodyne, single-conversion, double-conversion, homodyne

#### W03-A01B1

### [1992]

## **Tuned circuits, input filters**

Includes input attenuators. See U25 codes for details of lumped constant circuits. Waveguide technology filters and resonators are covered by W02-A codes.

Inductor, capacitor, varicap, varactor diode, block filter

## W03-A01B3 [1992]

## **RF** amplifier

Novel RF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, RF AGC is covered by W03-A03A3, previously coded as W03-A01B3 and W03-A03A. Amplifiers external to the receiver itself are covered by W02-B08C5 codes.

FET, MOSFET, MESFET, IGFET, dual-gate, bipolar, transistor

## W03-A01B5 [1992]

#### Mixer

Novel mixer details are also assigned U23-J01 codes.

FET, MOSFET, IGFET, dual-gate, bipolar, transistor, diode, ring

## W03-A01B5A [2006]

### Image rejection mixer

Prior to 2006 this topic was represented by W03-A01B5 and W02-G03B4A (receiver image signal suppression in general). From 2006 W02-G03B4A will only be assigned for specific novelty in the image rejection aspect.

## W03-A01B6 [2002]

## **Direct conversion and low-IF receivers**

These codes are used, in conjunction with other W03-A01B codes as necessary, to represent receivers of homodyne, synchrodyne, 'zero-IF', or 'low-IF' type. Arrangements for suppression of offsets at the output of the mixer are also assigned W02-G03B4G. Direct digital conversion (DDC) in digital architecture TV receivers is not included here, being covered by W03-A11K5. Direct conversion communications receivers are covered by W02-G03A8 codes and broadcast receivers of this type by W03-B01A6 codes.

Homodyne, synchrodyne, zero-IF

#### W03-A01B6A [2006]

#### **Zero-IF receivers**

This code is intended for direct conversion schemes in which the baseband information is centred on zero frequency.

#### W03-A01B6C [2006]

#### Low-IF receivers

This code is intended for direct conversion schemes in which the baseband information is centred on a low frequency, e.g. of the same order as the baseband bandwidth itself.

## W03-A01B7 [1992]

#### Local oscillator

Novel oscillator circuits are also assigned U23-A codes. Control of oscillator frequency is covered by W03-A02 codes.

## W03-A01B8 [1997]

#### **Tuner constructional details**

(W03-A01B9, W03-A09A5)

Covers construction of tuner per se, general internal constructional details of receiver being covered by W03-A09A5, which was previously assigned in addition to W03-A01B9 to indicate the construction aspect. Since 1997, W03-A09A5 has only be added for details affecting the design of the receiver, such as mountings, etc.

Shield, screen, housing, PCB, circuit board

#### W03-A01B9 [1992]

#### Other tuner details

Includes testing and alignment (with W03-A18A codes) and diversity arrangements involving tuner or aerial circuitry - see also W02-C03A codes and W03-G08 if receiver is vehicle-mounted.

**Trimming** 

## W03-A01C [1992]

#### **Tuning display**

Includes on-screen display of e.g. channel number. See W03-A10C1 for character generator circuits and W03-A13G for on-screen display systems in general.

OSD, scale, dial

#### W03-A01D [2008]

#### Multiple tuner aspects

This code is assigned with other W03-A codes as appropriate and is intended to highlight the use of two or more tuners in a TV receiver, set-top box, and the like. For novel tuner circuitry W03-A01B codes are also assigned and for novel frequency or channel control aspects W03-A02A or W03-A02B codes. For use in connection with PIP or POP display W03-A13B is also assigned.

# Dual **W03-A02**

Automatic frequency control; Band scanning; Remote control

## W03-A02A [1992]

## AFC and synthesis control

AFC circuits are also coded in U25-J05. PLL synthesisers are also assigned U23-D01B codes. 'Direct' type synthesisers are covered by U23-F03 codes.

Automatic frequency control, automatic fine tuning, AFT, frequency synthesiser

### W03-A02B [1992]

# Bandscanning, channel switching and channel number storage

Band scanning is also assigned U25-J01 codes and step tuning U25-H03 codes.

Seek, search, sweep, stop, store, preset, priority, local, station

## W03-A02B1 [1997]

#### **Channel storage**

Search with U25-H03A for setting up presettable channels, or U25-J01A1 where bandscanning is involved.

## W03-A02B1A [1997]

#### Based on stations received off-air

Search with U25-J01 codes for bandscanning aspects, e.g. U25-J01A1 for storing channels while scanning.

## W03-A02B1C [1997]

## **Based on channel listing**

Includes in-built memory and channel-guide systems. For channel presetting based on location, W03-A02B1E takes precedence.

## W03-A02B1E [1997]

## **Based on receiver location**

For automatic arrangements search with codes for navigation systems, e.g. W06-A03A5E for use of GPS. Memory systems with pre-loaded station information without regard for receiver location, are covered by W03-A02B1C.

## W03-A02B1G [2006]

## User control of channel storage

Includes re-ordering stored channels, deleting channels, forming 'favorites' lists and the like. For security aspects, e.g. parental control, PIN control etc. search with W03-A18A6 and W03-A18A7.

## W03-A02B3 [2007]

### **Channel switching arrangements**

This code covers arrangements for changing the channel to which a TV set is tuned, either under user control or automatically.

Auto-zap, zapping, channel surfing

## W03-A02C [1992]

#### Remote control

Remote control for recording apparatus is coded in W04-E04A, for audio/video equipment in general in W03-G05A codes, and for general or unspecified applications in W05-D codes. For TV remote control by 'Universal' or 'Learning' type controller search W03-A02C codes with W03-G05A1A. For general TV receiver control aspects see W03-A18A. Ultrasonic, optical, IR, transducer, LED, photodiode, APD

## W03-A02C1 [1997]

#### Remote control unit

Covers details of portable controller. Overall system aspects and circuitry within the receiver itself are covered by W03-A02C5.

## W03-A02C1A [1997]

#### **Novel circuitry and components**

Includes IR LEDs and drive circuits, etc. (see U12-A codes also for aspects relating to LEDs) together with coding aspects.

## W03-A02C1C [1997]

### **Construction and layout**

(W03-A02C, W03-A09A)

Includes shape, style and format of control keys etc., and also protective covers and stands (also coded in W03-A09C).

## W03-A02C5 [1997]

#### Remote control system

Includes circuitry and components internal to the receiver and overall system aspects.

#### W03-A02C5A [1997]

#### Involving on-screen display

(W03-A02C, W03-A13G)

Includes application of GUI techniques to control of TV receivers and video displays, such as manipulation of a cursor, menu navigation and virtual keyboard aspects. For use of remote controller in connection with other interactive systems making use of a TV set search with W03-A16C5 codes also. OSD in general is coded in W03-A13G.

## W03-A02C5C

#### [1997]

## **Remote control location system**

Covers transponder-type arrangements providing e.g. audible tone as aid to locating remote unit, in response to signal transmitted from TV set itself.

## W03-A02C5E [2005]

## **Combined with additional features**

This code covers the provision of features beyond the basic remote control function and generally refers to extra facilities being provided to the user on the remote control handset. Examples include a dedicated display, e.g. for indicating control functions, viewing alternative channel or electronic programme guide (for which W03-A13J is also assigned), or the provision of a separate loudspeaker or headphone socket (also assigned W03-A15 codes).

#### W03-A02C5G [2006]

## Receiver-based remote control circuitry, components and construction

This code is assigned with other codes as appropriate, e.g. W03-A09A5 for internal receiver constructional aspects, W02-C04A3 codes for IR receiver circuitry, U12-A01A codes for LEDs or U12-A02B2A for photodiodes.

#### W03-A02C5J [2011]

### Image recognition-based remote control

This code covers the use of image recognition technology as part of a remote control system for TV sets and video displays. It includes recognition of gestures, movement of hands or head, etc. to derive control information. For use in conjunction with virtual keyboards or other on-screen display aspects W03-A02C5A is also assigned. Image-based recognition of individual users, e.g. for parental control or selecting a 'favorites' list, is covered by W03-A18A6. Novel aspects of image recognition are covered by T01-J10B2A and applications are also assigned T04-D07 codes.

## W03-A02C5L [2011]

#### Voice recognition-based remote control

This code covers the use of voice recognition to provide a 'remote control' facility, with or without a remote control handset unit being used, in which spoken commands are used to control the functions of a TV set or video display. The general 'speech recognition application' code, W04-V04A5 is also assigned (with other W04-V codes in case of novel aspects). Voice-based recognition of individual users, e.g. for parental control or selecting a 'favorites' list, is covered by W03-A18A6.

#### W03-A03

## IF amplifiers; Automatic gain control; Sound and vision detectors

#### W03-A03A

#### TV receiver AGC

Prior to 2006 this code was used with W03-A01B3 for RF AGC and W03-A03B for IF AGC. These topics are now covered solely by the subdivisions below

Keyed-AGC, synchronizing signal, burst, level control

## W03-A03A1

## [2006]

[1992]

#### **Novel AGC characteristic**

Covers delayed AGC, or other specific characteristic. See U24-C01C1 for signal processing aspects to obtain a particular AGC characteristic

#### W03-A03A3

#### [2006]

#### **RF AGC**

Prior to 2006 this topic was covered by W03-A01B3 and W03-A03A.

#### W03-A03A5

#### [2006]

#### IF AGC

Prior to 2006 this topic was covered by W03-A03A and W03-A03B.

## W03-A03A9

## [2006]

#### Other TV receiver AGC aspects

### W03-A03B

[1992]

#### TV receiver IF system

From 2006, W03-A03B5 is introduced to separately highlight IF amplifiers, and IF AGC is covered by W03-A03A5 (previously coded as W03-A03A and W03-A03B).

Integrated circuit, multistage, cascade, interstage coupling, sound, picture, vision, video, trap circuit, IF-based ghost suppression circuit

#### W03-A03B1

#### [1992]

## IF filter

For specific filter types, see appropriate codes in e.g. V06-V and U14-G for electromechanical filters, U25-E for analogue lumped constant types, and U22-G01 codes for digital filters.

SAW, surface acoustic wave, ceramic, LC, tuned circuit, passband, ripple

## W03-A03B5 [2006]

#### IF amplifier

Novel IF amplifier details are also assigned U24-G01D and other relevant amplifier codes.

#### W03-A03C [1992]

#### Sound and vision detectors

Demodulation circuits in general are coded in U23.

## W03-A03C1 [1992]

#### Sound detector

For stereophonic decoder search with W03-A12B1. (Also coded in U23-P05).

Intercarrier sound, FM discriminator

## W03-A03C5 [1992]

#### **Vision detector**

For stereoscopic receiver aspects search with W03-A12A.

FM, AM, picture, video

#### W03-A04

## Video signal processing

Includes general processing for black/white signals and where nature of signals is unimportant. See W04-P codes for general non-receiver application, and W04-F codes for processing specific to video recording.

## W03-A04A [1992]

#### Gamma control

Gamma control/correction in general is coded in W04-P01E1.

## W03-A04B [1992]

## **Bandwidth control**

Control of bandwidth in general is covered by U25-F codes which are also assigned as appropriate.

## W03-A04B1 [1992]

#### Peaking, aperture correction

Aperture correction in general is coded in W04-P01E5.

Response, accentuate, HF

## W03-A04C [1992]

#### Clamping circuits, DC restoration

Clamping circuits of general application are coded in U24-C02A5 also. (Prior to 1992 search W03-A04 and U24-C02A for TV receiver clamp circuits.)

## W03-A04D [1992]

#### **Contrast and brightness control**

Includes automatic arrangements and circuitry responding to manual control or remote control operation.

#### W03-A04D1 [1997]

#### Based on display drive aspects

Includes CRT beam current limiting when combined with W03-A08A8A.

## W03-A04D5 [1997]

#### **Based on ambient lighting**

Prior to 1997, see U24-C01C and W03-A04D.

#### W03-A04F\* [1992-2005]

#### Display interface circuit

\*This code is now discontinued. From 2006 this topic is covered by W03-A08S codes.

#### W03-A04G [1992]

## **Ghost suppression and equalising**

The title of this code has been expanded to reflect the previous inclusion of equalising circuits, even when ghost suppression has not been explicitly mentioned. Prior to 1997, ghost cancelling was also coded in W02-G03B6, which covers compensation for multipath reception in general. From 1997, W03-A04G only has been used for this topic in TV receivers. See also U22-G01 codes for digital filters, especially U22-G01A5 codes which relate to adaptive types and U22-G03E3C for application of DSP to equalising in general. Transmission of ghost control reference signals (GCR) is covered by W02-F05C.

Reflection, pulse, delay, transversal filter

#### W03-A04H [1992]

#### **Noise reduction**

For details relevant to the radio receiving aspect W02-G03B codes are also assigned.

## W03-A04H1 [1997]

## Reducing noise generated outside receiver

Covers suppression within the receiver of external interference such as impulse noise (also coded in W02-G03B5) and interference to terrestrial digital TV signals from analogue transmissions, or viceversa. Ghost signal suppression is covered by W03-A04G.

## W03-A04H5 [1997]

## Reducing noise generated in receiver

Includes arrangements to reduce noise and aberrations on picture, except that arising from luminance/chrominance separation, which is covered by W03-A05B5.

#### W03-A05

## **Color signal processing**

W03-A05 codes covers demodulators, luminancechrominance separation, etc., chiefly for analogue color TV. (Color modulators/encoders are covered by W04-Q05).

W03-A05A [1992]

**Color synchronization** 

W03-A05A1 [1992]

**Color subcarrier recovery** 

W03-A05A3 [1992]

Separation of color burst signal

W03-A05B [1992]

**Luminance-chrominance separation** 

Luma, chroma, Y-C

W03-A05B1 [1992]

#### Using comb filter, using digital filter

Comb filters per se are covered by U22-G01B5 (digital) and U25-A03 (analogue).

Delay, line, period

#### W03-A05B5 [1992]

#### Suppressing interference

Includes suppression of cross-color, 'hanging dots' interference, etc. Reduction in the visible effect of radio interference is covered by W03-A04H1.

## W03-A05B7 [1992]

## Adaptive luminance-chrominance separation

Includes movement-responsive control of separation. W03-A11C, which covers detection of picture motion content in general, is also assigned where this aspect is significant.

Scene, change, HF, interframe

### W03-A05C [1992]

#### Control circuit details

Covers automatic and manually/remotely adjustable control.

W03-A05C1 [1992]

Automatic chroma control

W03-A05C3 [1992]

**Color killer circuit** 

W03-A05C5 [1992]

White balance control

W03-A05C7 [1992]

Hue and intensity control

W03-A05D [1992]

**Demodulation circuits** 

NTSC, PAL, SECAM, MAC

W03-A05D1 [1992]

## With recognition of standard

See also W03-A11 codes for multistandard receiver details, especially W03-A11B codes for standard recognition.

W03-A05E [1992]

**Matrix circuit** 

W03-A05F\* [1992-2005]

#### Display interface circuit

\*This code is now discontinued. From 2006 this topic is covered by W03-A08S codes.

## W03-A05X [1992]

#### Other color signal processing

Includes clamping/DC restoration specifically for color video when W03-A04C is also applied, and noise reduction (other than that due to luminance-chrominance separation) with W03-A04H codes. Dithering

#### W03-A06

### Synchronizing

Separation circuit, vertical/horizontal signal separation, clock recovery, deflection/blanking generator control

## W03-A06A [1992]

### **Extracting synchronizing information**

Covers separation of synchronizing signal information from composite video signal. Separation of horizontal and vertical synchronizing information from extracted 'sync' pulses is covered by W03-A06C.

## W03-A06A1 [1992]

## **Detecting presence of signals**

## W03-A06A5

#### Recognising type of signals

See W03-A11B codes also for multistandard receiver aspects.

[1992]

### W03-A06C [1992]

## Separation of vertical and horizontal information

Also coded in U22-D05 if of general application to pulse circuitry. Prior to 1992 search U22-D05 with W03-A06.

Vertical, horizontal, frame, field, line

#### W03-A06E [1992]

# Synchronizing signal distribution and control of other equipment

Covers use of synchronizing signals within receiver.

#### W03-A07

## **Power supplies**

See U24 for (low power) power supplies in general.

## W03-A07A [1992]

## Mains or battery power supply

Transformer, rectifier, smoothing, filter, voltage regulator, converter, AC-DC

#### W03-A07A1 [1992]

## Standby arrangements, timed disconnection

## W03-A07C [1992]

#### **EHT power supply**

Includes discharge protection circuits. Also coded in W03-A08A1C. See also V02-F02A for flyback transformers.

Rectifier, voltage multiplier, tripler, ultor, final anode

#### W03-A08

#### **Display arrangements**

W03-A08 codes cover display aspects of TV receivers and (since 2007) video displays in general. The following codes are assigned to indicate application of the particular display device to TV sets and video displays only: W03-A08A codes, W03-A08B, W03-A08C, W03-A08D, W03-A08G and W03-A08J. Novel details of these display devices are covered in the respective codes for the particular technology, in either V05 or U14 class.

## W03-A08A

#### Cathode ray tube display

CRTs per se are assigned V05-D codes, especially V05-D01B codes.

#### W03-A08A1

#### **Deflection circuits**

## W03-A08A1A [1992]

## **Deflection signal generator and control**

Prior to 1997, this code included picture width and height control which is now transferred to W03-A08A1F. See U22-C codes also for details of sawtooth waveform generators.

Line oscillator, frame oscillator, horizontal, vertical

## W03-A08A1B [1992]

## **Deflection yoke**

Also coded in V02-F01A and V05-D06B1A (and V05-D01B codes depending on tube type). *Coil, winding, core, connections* 

## W03-A08A1C [1992]

#### **Deflection system with power supply**

Also coded in W03-A07C. Includes line output transformer (also coded in V02-F02A).

### W03-A08A1D [1992]

### **Distortion and linearity correction**

Includes pincushion distortion correction.

S-correction, capacitor, coil, barrel, ringing

#### W03-A08A1E [1992]

## Centering of picture on screen

## W03-A08A1F [1997]

### Controlling picture width or height

(W03-A08A1A)

See W03-A08A1A prior to 1997.

#### W03-A08A1G [1992]

## **Deflection with non-uniform speed**

Includes velocity modulation systems.

#### W03-A08A1H [1992]

#### **Progressive scanning**

Covers non-interlaced systems. For HDTV receiver aspects search with W03-A11 codes.

#### W03-A08A1J [1992]

#### Non-raster scanning

Covers scanning systems not following normal sequential raster pattern, such as fractal scanning. Progressive scanning is covered by W03-A08A1H. *Peano* 

### W03-A08A1X

[1992]

## Other deflection system details

W: Communications

## W03-A08A3 [1992]

#### **Focusing arrangement**

(W03-A08A9)

Includes coils (also coded in V02-D), power supply aspects, focus potentiometer, etc.

#### W03-A08A3A [1997]

#### **Dynamic focusing**

See U22-D01A codes also for pulse-shaping aspects.

#### W03-A08A3C [1997]

## **Focusing system components**

Includes high-voltage potentiometers, bias resistor networks, etc. which are covered in V01-A codes, e.g. V01-A03D2 for preset variable resistors.

## W03-A08A4 [1992]

## **Degaussing arrangements**

(W03-A08A9)

For demagnetising in general see V02-D, which is also assigned here.

#### W03-A08A4A [1992]

## **Degaussing coil**

(W03-A08A9)

#### W03-A08A4C [1992]

## **Control circuitry**

(W03-A08A9)

Includes automatic control aspects, e.g. causing current decay by PTC resistance (also coded in V01-A02A7C where the resistance element per se is novel).

## W03-A08A5 [1992]

#### Convergence and beam control

(W03-A08A9)

Beam landing error, misconvergence

#### W03-A08A5A [1992]

## Components e.g. magnets, coils

(W03-A08A9)

#### W03-A08A5C [1992]

#### **Automatic control**

(W03-A08A9)

#### W03-A08A5E [1992]

#### **Beam index control**

(W03-A08A9)

Includes circuitry and electro-optical or other detection system.

## W03-A08A6 [1992]

#### Radiated field suppression

(W03-A08A9)

Covers suppression of magnetic, electromagnetic, or electric fields for EMC or health and safety considerations. See W03-A09 codes also for constructional aspects. Compensation for effects of external magnetic fields is covered by W03-A08A4 for de-magnetising and by W03-A08A1D for distortion correction in deflection circuits.

## W03-A08A7 [1992]

#### **Blanking circuits**

Beam cut-off, bias, grid

## W03-A08A7A [1992]

## Responsive to scan failure

(W03-A08A9)

Includes arrangements to protect screen from damage.

Spot killer

## W03-A08A7C [1992]

## Blanking selective part of screen area

(W03-A08A9, W03-A11)

See W03-A11B1A also for control of display area in multi-standard receiver.

Aspect ratio, widescreen, letterbox, HDTV, IDTV, EDTV. border, edge

## W03-A08A8 [1992]

### **Tube drive circuitry**

(W03-A08A9)

Includes cathode drive circuits, and also matrix drive circuitry. See U24-G codes for amplifiers in general.

## W03-A08A8A [1992]

#### Limiting excess beam current

(W03-A08A9)

Also coded in U24-C02A when based on limiting excessive brightness level of video. (See also W03-A04D1)

ABL

#### W03-A08A8C [1997]

#### Drive circuitry for matrix-type tube

Covers matrix drive with deflection type tube arrangements. Cathode ray tubes of this type are covered by V05-D01B3C. Interface arrangements for matrix displays other than CRTs are covered by W03-A08S5.

MDWD

#### W03-A08A9

### Other CRT display aspects

## W03-A08B

## Liquid crystal display

(W03-A08X)

This code is used to denote the use of an LCD in a TV set or video display, and includes novel LCDs (full details of which are covered by U14-K01 codes). W03-A08B is assigned for drive circuitry integral with the LCD (in U14, U14-K01A3 is assigned for this), external circuitry forming part of the TV set or video display is assigned W03-A08B3. Backlighting components and arrangements are covered by W03-A08B1 and control of backlighting by W03-A08B3. From 2007 backlighting and analogous arrangements are also assigned X26-U04A codes (formerly W05-E05B codes and X26-U041).

[1987]

## W03-A08B1 [1997]

#### Module and constructional details

This code covers module aspects and constructional details associated with the incorporation of the display device itself, including backlighting light sources, filters, diffusers, etc. Control of backlighting is not included being covered by W03-A08B3. From 2007 backlighting and analogous arrangements are also coded in X26-U04A and other X26 codes depending on novelty.

Back lighting, CCFL, lamp, display module connector

#### W03-A08B3 [1997]

## **Drive circuitry**

This code is intended for drive circuitry forming part of the TV set or video display, i.e. it does not include circuitry that is part of the LCD which is coded as W03-A08B. Drive circuitry for backlighting sources is also included.

Matrix drive circuitry, scan signal generator, lamp drive, inverter

## W03-A08C [1997]

## **Display using LEDs**

This code is used to denote the use of inorganic or organic light emitting diodes in a TV set or video display, either as an array of individually-encapsulated LEDs for a large-scale display or as an integrated circuit. LEDs themselves are covered by U12-A01A codes. Note that in the case of 'LED' displays, 'light emitting diode' displays are covered here but 'light emitting device' displays not using LEDs are regarded as being electroluminescent displays and are therefore covered by W03-A08J instead. The use of LEDs for backlighting of liquid crystal displays is **not** regarded as an 'LED display' and is covered by W03-A08B1 for module and constructional aspects and by W03-A08B3 for drive circuitry and control aspects.

## W03-A08D [1992]

## Plasma display

Plasma displays themselves are covered by V05-A01 codes.

#### W03-A08E [1987]

# Optical aspects, incl. head-mounted display

Note that optical elements covered by W03-A08E codes are **not** part of display devices themselves, such as CRTs, FEDs, LCDs, OELDs, or PDPs, but are separate elements used with the display device. Projection TV in general is covered by W04-Q01 codes and only coded in W03 when relevance to receivers is disclosed, such as in a self-contained projection receiver, or for video circuitry details, e.g. light valve driving.

Anti-reflection coating, lens, color filter, projection display, stereoscopic display shutter control, polarisation control

## W03-A08E1 [1997]

#### **Filters**

This code includes color-separation filters, polarising filters, antiglare filters and the like which are separate from the display device itself. Thus a color-separation filter within an LCD for example cannot be assigned this code, and being regarded as an aspect of the display itself, would be coded as W03-A08B only. Display filters of general or unspecified application are covered by W05-E05A.

W03-A08E3 [1997]

Lens systems

W03-A08E5 [1997]

Mirror

## W03-A08E7 [1997]

# Head-mounted displays and electronic shutter arrangements for 3D displays

From 2013 this code is subdivided to distinguish video head-mounted displays (now covered by W03-A08E7A) from shutter arrangements for use with stereoscopic displays (now covered by W03-A08E7C).

## W03-A08E7A [2013]

#### **Head-mounted display**

This code covers head-mounted displays for presenting visual information to the user from video signals. Head-mounted displays using retinal-projection are also assigned W04-Q01L. Application to augmented reality or virtual reality systems is indicated by assignment of W04-W07E1A. Head-mounted displays in general, including those not capable of presenting video, are covered by W05-E07.

### W03-A08E7C [2013]

# Shutter arrangement for stereoscopic display

This code covers arrangements in the form of spectacles with e.g. electro-optical shutters to alternately transmit or block light from a display to left and right eyes of the viewer. W03-A12A, the general code for stereoscopic or '3D' TV receivers and video displays is also assigned and novel aspects of electro-optical shutters are covered by V07-K01A.

3D glasses

#### W03-A08E7E [2013]

## Spectacles using filters for stereoscopic display

This code covers arrangements in the form of **passive** spectacles with e.g. different colour filters or different polarization for each eye to produce a stereoscopic display effect. W03-A12A, the general code for stereoscopic or '3D' TV receivers and video displays is also assigned. Electro-optical shutters to alternately transmit or block light from a display to left and right eyes of the viewer are **not** included and are covered by W03-A08E7C.

Anaglyph, 3D glasses, blue filter, green filter, red filter

## W03-A08E8 [2014]

## Parallax and different-view displays

This code covers optical and electro-optical aspects of displays in which parallax or similar effects are used to enable different images to be perceived depending on the viewer's position. For autostereoscopic displays (i.e. those not requiring the wearing of spectacles with LC shutters, polarized filters, etc.) W03-A12A is also assigned.

Where the object is privacy, e.g. deliberately creating a narrow viewing angle so that someone sitting next to the user of a portable device cannot view displayed content, W03-A08L is also assigned. Confidential, diffraction, diffuser, grating, overlay, refraction, restricted view

#### W03-A08F [1992]

## Optomechanical and electro-optical scanning display

Light beam scanning is covered by V07-K05.

## W03-A08F1

#### With laser light source

For details of lasers per se see V08 codes. Projection TV with laser light source is coded in W04-Q01B1.

[1992]

## W03-A08G [2002]

## Field emission display

(W03-A08X)

This code is intended for non-CRT field emission display arrangements for TV receivers. CRT TV displays using field emission are covered by W03-A08A codes. Novel aspects of field emission displays are covered by V05-D01C3 and other V05-D codes as appropriate.

FED

## W03-A08J [2002]

#### **Electroluminescent display**

(W03-A08X)

Novel aspects of electroluminescent displays are covered by U14-J codes. Note that 'LED displays', in the sense of 'light emitting diode displays' are **not** included here and are covered by W03-A08C. When 'LED' refers to 'light emitting devices' which are **not** LEDs, W03-A08J **is** assigned.

## W03-A08L [2013]

# Display arrangements preventing direct recording by camera and display privacy

This code covers arrangements to prevent direct off-screen recording of still or moving images using e.g. a digital camera, camera phone or camcorder or to perform watermarking on images recorded, and also arrangements to maintain confidentiality or privacy of displayed information, e.g. by deliberately restricting viewing angle.

Arrangements using infra red light within an LCD backlighting system are also covered in W03-A08B codes. The use of similar techniques for projection displays is not included and is covered by W04-Q01J5. Copy protection involving signal processing is covered by W04-F01L1.

Camera blinding, flooding, IR, over-expose, secrecy

## W03-A08S [2006]

## **Display interfacing**

Covers circuitry for interfacing between the receiver and displays that may be integral with it or external. This topic was previously covered in W03-A04F for general interfacing aspects and in W03-A05F for interfacing and display driving specifically related to color video signals. Other W03-A04 or W03-A05 codes are assigned in addition to W03-A08S codes as necessary.

#### W03-A08S1 [2006]

## Digital display interfacing

This code covers aspects specific to the digital nature of the display, such as digitizing and signalling the type of display or resolution. Specific details relating to matrix display driving are covered by W03-A08S5.

DisplayID, EDID, extended display identification data, E-EDID, enhanced EDID

#### W03-A08S5 [2006]

#### Matrix drive details

(W03-A08X)

For driving e.g. LCD, plasma displays with native resolution. Color matrix circuits for converting color-difference signals into color drive signals are not coded here, being covered by W03-A05E instead.

## W03-A08X

## Other TV receiver display aspects

Includes display arrangements using discharge tubes forming a matrix, etc. From 2002 electroluminescent displays for TV receivers are assigned W03-A08J.Also includes touchscreens which are also assigned T04-F02A2 and W03-A13G when OSD aspects are significant.

## W03-A09

#### **Constructional details**

Constructional details of electronic equipment in general are covered by V04-S and V04-T codes.

W03-A09A [1992]

**Receiver constructional details** 

W03-A09A1 [1992]

**Cabinet** 

W03-A09A5 [1992]

#### Internal construction

Cooling

## W03-A09C [1992]

#### Stands and supports

Includes stands for flat-screen TVs, furniture aspects such as stacks for audio/video equipment (see W03-G codes also for general application) and mounting brackets for walls, etc.

## W03-A10 [1983]

## Teletext and related systems

(W03-A20)

Teletext transmission system aspects are covered by W02-F05B codes. Non-television text equipment (e.g. receiving text information over telephone line) is **not** coded here, unless interfacing equipment such as a modulator is being used to insert the text in e.g. the field blanking interval (in which case W03-A18C would be assigned also). For non VBI-based systems used in digital TV search along with W03-A11G.

Character multiplex

## W03-A10A [1992]

#### Decoder

Framing code detector

### W03-A10A1 [1992]

#### **Error protection**

Ghost-cancelling circuits are covered by W03-A04G.

Burst-and-random error correction system for teletext, BEST

## W03-A10C [1992]

## **Character generator**

Character generators for computer peripheral CRT VDUs are covered by T04-H01A1.

## W03-A10C1\* [1992-2005]

#### For other on screen display

\*This code is now discontinued. From 2006 it is assumed that all character generators are for a range of purposes, including teletext type systems, on screen menus and interactive information provision such as Internet TV.

## W03-A10C5 [2006]

### **Character sets and fonts**

Includes use of particular character sets for different languages. Character set encoding is also covered in U21-A05D1.

Cyrillic, Kanji, Kana, Hangul, Arabic, shift JIS

#### W03-A10E\*

#### [1992-2011]

#### **Memory aspects**

\*This code is now discontinued and from 2012 this subject matter will be covered by W03-A11M5. W03-A10E remains valid and searchable for records prior to 2012 when it was assigned for the use of memory to increase apparent speed of retrieval or other purposes in text and subtitle display arrangements. Prior to 2012 memory circuits for OSD and PIP applications were covered by W03-A13A (now W03-A11M3) and for digital/high definition receivers by W03-A11M. Buffer, page memory

## W03-A10G [1997]

## 'Closed caption' and subtitle systems

(W03-A10X, W03-A13G)

Search with S05-K for 'closed caption' systems.

## W03-A10J [1997]

## **Processing additional information signals**

Includes use of VPS data and extraction circuitry (only) for ghost-control reference signals. See W03-A04G for all aspects of ghost signal suppression in receivers.

## W03-A10X [1992]

### Other text system details

Includes the use of text-to-speech conversion (also assigned W04-V04C1) to provide an audible version of text-based information.

## W03-A11 [1987]

## High-definition, multi-standard, and digital architecture receiver

(W03-A20)

HDTV transmission systems are covered by W02-F06C codes. Codes in this section are used with W03-A05 codes for color demodulation, and with W03-A08 codes for display aspects.

From 2002 W03-A11K codes have been assigned for digital architecture TV receivers, i.e. those using DSP. Prior to 2002 this aspect was covered by W03-A11X

HDTV, IDTV, EDTV, MUSE, dual-standard, video signal interpolation

#### W03-A11A [1992]

#### Receiver standards-conversion circuit

TV standards conversion equipment for studio/broadcast use is covered by W04-N05A, and for recording equipment by W04-F01H3.

## W03-A11A1 [2005]

#### Transcoding

Covers conversion of standard of received digital TV signals including changing the coding format used.

#### W03-A11A5 [2010]

TV display upscaling and resolution improvement This code covers arrangements for upscaling a signal to improve resolution, e.g. to provide a 100 Hz field rate from an original 50 Hz rate in the received signal, or to increase the effective number of pixels. Upscaling for video recording and reproducing equipment is covered by W04-F01H3C.

Flicker reduction, interpolation, pixel displacement, pixel shaping

## W03-A11B [1992]

## Standard recognition circuits and switching

Includes recognition based on color signal characteristic (see W03-A05D1 also), synchronizing signal type (see W03-A06A5 also) or e.g. bandwidth of received signal. From 2006 novel standard recognition circuits are covered by W03-A11B5.

#### W03-A11B1 [1992]

## Automatically switching receiver circuitry

Covers control aspects to select appropriate demodulator, or other signal processing stage. Includes use of standard recognition circuits in switching receiver circuitry.

#### W03-A11B1A [1992]

## Controlling display area or scanning format

See W03-A08A7C for arrangements to selectively blank e.g. border area of CRT display. For similar system using physical masking of screen see W03-A08X

Progressive scan, interlaced, non-interlaced, aspect ratio, letterbox, pan-and-scan, 4:3, 16:9

## W03-A11B5 [2006]

## Novel standard recognition circuits

## W03-A11C [1992]

## Picture signal motion detector

This code is not used routinely for decoding predictively encoded video data. Covers novel methods and circuitry for determining motion content of picture, e.g. in adaptive circuitry such as luminance - chrominance separator (also coded in W03-A05B7) as well as in predictive decoding. Motion detector circuits in general are coded in W04-P01A1.

Inter-frame, correlation, difference, H

## W03-A11D [1992]

#### Decoder

Includes decoder for digital TV, e.g. DVB-T signals. Descrambling of encrypted signals is **not** included and is covered by W03-A16C3A.

Decoders/demodulators for 'standard' analogue color TV signals are covered by W03-A05D codes. DVB, ATSC

## W03-A11D1 [2007]

#### **Error detection and correction**

See W01-A01B codes for general error correction in data transmission systems, which were previously assigned with W03-A11D to indicate this topic.

## W03-A11G [2005]

## TV receiver for digital broadcasts and digital multimedia broadcast receiver

From 2011 the title of this code is expanded to reflect the previous inclusion of receivers for digital multimedia broadcast (DMB - now covered by W03-A11G5) as well as receivers of digital TV signals such as DVB-T, irrespective of analogue or digital receiver architecture. Set-top box receivers are also assigned W03-A16E. Digital TV receiver architecture details (for analogue or digital signals) are covered by W03-A11K codes.

#### W03-A11G1 [2006]

## Combined with analogue receiver

### W03-A11G5 [2011]

#### Digital multimedia broadcast receiver

For receivers built-into mobile phones search with W01-C01D3C and W01-C01P6G. DMB

## W03-A11K [2002]

## Digital and hybrid TV receiver architecture

(W03-A11X)

This code is assigned for receivers - of signals with analogue or digital modulation - which are implemented using DSP techniques in whole or in part. The codes are used in conjunction with other

W03-A codes as necessary where there are direct equivalents in analogue receivers, in particular for RF amplifiers, oscillators, IF stages and demodulators. Corresponding digital techniques for communications and broadcast radio receivers are covered by W02-G03K and W03-B07 codes.

## W03-A11K1 [2002]

#### Characterised by usage of DSP

(W03-A11X)

These codes are used to distinguish between different levels of DSP being applied to the signal path in the receiver. As such, they do not normally represent novel digital processing aspects, which are conveyed by use of other W03-A11K codes. DSP in general is covered by T01-J08A2, T01-J08B and U22-G codes depending on specific aspects.

## W03-A11K1A [2002]

## With baseband digital signal processing only

(W03-A11X)

This code covers receivers with a digital signal processing path **after** the conversion to baseband.

## W03-A11K1C [2002]

# With baseband and IF digital signal processing only

(W03-A11X)

This code covers receivers with DSP in IF, demodulator, and baseband stages.

## W03-A11K1E [2002

## With digitising of RF spectrum

(W03-A11X)

This code covers receivers with digitising of the whole signal processing path, except for the possible use of analogue RF amplifiers.

## W03-A11K1X [2002]

## Other use of DSP in digital TV receivers

(W03-A11X)

## W03-A11K3 [2002]

## **AD** conversion

Novel aspects of AD converters and AD conversion are covered by U21-A03 codes.

## W03-A11K5 [2002]

# Digital mixing and direct digital conversion

(W03-A11X) DDC

## W03-A11K6 [2002]

## **Filtering**

(W03-A11X)

Novel digital filters are also assigned U22-G01 codes, and T01-J08B when the emphasis is on computing aspects.

## W03-A11K7 [2006]

## **Transform implementation**

DSP-based transform implementation is covered by U22-G03E1A and computer data processing aspects in general by T01-J04B1.

## W03-A11K8 [2006]

#### **DA** conversion

Novel aspects of DA converters and DA conversion are covered by U21-A02 codes.

#### W03-A11K9 [2002]

## Other digital TV receiver aspects

(W03-A11X)

## W03-A11M [2005]

### TV receiver memory

From 2012 the scope of this code is expanded to enable it to be used as a single reference for 'TV receiver memory' in the sense of memory for images or text. Subdivisions have been introduced to cover the use of memory in video decoding (W03-A11M1), for onscreen display and related topics (W03-A11M3), for text and subtitle display (W03-A11M5) and novel memory itself (W03-A11M7). Prior to 2012 memory circuitry used in TV receivers for applications such as PIP and OSD was covered by W03-A13A, and for teletext by W03-A10E. For memory circuits used for general video applications see W04-P01C codes. For memory circuits used in dynamic recording of video signals (e.g. as a buffer) see W04-F01M codes. Memory used for storing operational settings such as stored channels or for general receiver control aspects is not included, being covered respectively by W03-A02B1 codes and W03-A18A codes.

#### W03-A11M1 [2012]

# TV receiver memory used in decoders and other signal processing

This code covers the use of memory in a TV receiver in connection with video decoding or other signal processing, such as upscaling, standards conversion, noise reduction etc. Codes for these topics are also assigned as necessary

#### W03-A11M3 [2012]

# TV receiver memory for on-screen display and image manipulation

This code replaces W03-A13A and covers the use of memory in a TV receiver in 'image manipulation' applications as covered by W03-A13 codes, such as picture-in-picture, freeze-frame, zoom etc. and also on-screen display (OSD). Where the use of memory is specific to a particular type of image manipulation the corresponding W03-A13 code is also assigned, e.g. W03-A13B for PIP.

#### W03-A11M5 [2012]

## TV receiver memory for text display and subtitles

This code replaces W03-A10E and covers the use of memory in a TV receiver in text or subtitle applications as covered by W03-A10 codes, such as teletext, MHEG text, or closed caption display. W03-A10 codes are also assigned as necessary to provide more information, e.g. W03-A10G is also assigned for inventions specific to the presentation of closed caption information.

Buffer, page memory

## W03-A11M7 [2012]

## Novel memory and memory circuits for TV receivers

This code covers novel memory and memory circuits and as such is likely to be assigned for inventions which are also assigned U14-A codes for memories and/or T01-H01 codes for use of memory in a computing context. W03-A11M7 is intended to indicate application to TV receivers (when specific) for novel memories or memory circuits.

#### W03-A11M9 [2012]

## Other TV receiver memory aspects

#### W03-A11X [1992]

## Other HDTV/dual standard details

Includes multiple analogue standard reception. Receivers for both digital and analogue reception are coded in W03-A11G1.

#### W03-A12 [1987]

# Stereoscopic, stereophonic, and multichannel sound receiver

(W03-A20)

## W03-A12A [1992]

# Stereoscopic and three-dimensional display TV receiver

Covers all aspects of stereoscopic and autostereoscopic TV receivers, such as decoding circuitry and display aspects (see W03-A08 codes also, e.g. W03-A08E7C for LC shutter spectacles) including 3-dimensional displays. For autostereoscopic displays and displays which can present different programme images when viewed from different angles based on optical gratings, grids and the like placed in front of a display panel search with W03-A08E8 (from 2014).

Left, right, image, shutter synchronization

## W03-A12B [1992]

## Stereophonic and multichannel sound TV receiver

Left, right, bilingual sound, separate/second audio programme, SAP, NICAM

## W03-A12B1 [1992]

## Stereophonic decoder

See W03-A03C1 also. (Coded in U23-P05 also).

## W03-A12B1A [1997]

## With separate sound channel

Covers arrangements enabling output of audio signals in different language. TV transmission systems of this type are covered by W02-F06B5. Separate audio programme, SAP, bilingual

### W03-A12B3 [2005]

#### Surround sound aspects

This code is used with W03-A12B1 or W03-A12B5 as appropriate. General aspects of surround sound systems are covered by W04-R01C5.

#### W03-A12B5 [1992]

#### **Audio aspects**

Includes amplifiers, loudspeaker systems, etc. Search with W03-A15 codes.

#### W03-A13 [1987]

# Picture-in-picture, image manipulation, EPG and OSD

(W03-A20)

From 2012 the title of this code has been changed to reflect the transfer of memory circuits to W03-A11M codes (from W03-A13A). W03-A13 codes cover special display modes under control of the viewer, including picture-in-picture, freeze frame, zooming and image manipulation. Special effect generation for general video applications, including its use in TV studio equipment, is covered by W04-N05C codes. On-screen display forming

part of teletext information is covered by W03-A10 codes (see note for W03-A13G).

## W03-A13A\* [1992-2011]

#### Memory circuitry and control

\*This code is now discontinued and from 2012 this subject matter will be covered by W03-A11M3. W03-A13A remains valid and searchable for records between 1992 and 2011 when it was assigned for memory aspects of functions described by W03-A13 codes only, such as PIP or OSD applications, and included novel memory itself and memory addressing. Memory circuits and applications specific to digital and high definition TV receivers, such as memory used in standards conversion or decoding, are covered by W03-A11M1 from 2012. Memory circuits specifically for VBI and digital text reception (e.g. to increase apparent retrieval rate) are coded in W03-A11M5 from 2012. Frame stores for general video applications are covered by W04-P01C codes and the use of memory in video recording signal processing by W04-F01M codes.

## W03-A13B [1992]

## Picture-in-picture display function

Includes picture-outside-picture arrangements. For display of inset picture of different aspect ratio and/or standard, search with W03-A11B1A. Picture inlay for TV special effects in general is covered by W04-N05C5.

PIP. POP

#### W03-A13B1 [1992]

## Displaying external video source in subimage

See W03-A18C also for peripheral connection aspects.

Peripheral, CCTV, monitor, security, video, intercom, door-phone, entry

## W03-A13C [1992]

#### Still-picture display facility

Includes 'freeze-frame' facility. For use to hold picture during low S-N conditions search with W02-G03B1.

Hold, action, video, squelch

#### W03-A13E [1997]

#### Zoom facility and image manipulation

The title of this code has been expanded to reflect the previous inclusion of image manipulation, for which W03-A13X was also assigned as appropriate and W04-N05C codes for inventions of wider application. The code has also been subdivided to separate image zooming and manipulation when the distinction can be made. Image manipulation in general, and for TV studio special effects, is

covered by W04-N05C3 codes and in T01-J10B3A when computer processing aspects are emphasised.

## W03-A13E1 [2005]

#### **Zoom facility**

Covers zooming to enlarge displayed image, or a portion of it. Other special effects such as repositioning, rotating, and altering the shape of the picture are covered by W03-A13E5.

## W03-A13E5 [2005]

## Image manipulation

Covers use of special effects such as resizing, repositioning and altering shape of picture. Zooming is covered by W03-A13E1. Prior to 2005 image manipulation was covered by W03-A13E and/or W03-A13X as appropriate, depending on novel aspects.

## W03-A13G [1992]

## General on-screen display

From 2006 character generation aspects are covered by W03-A10C codes. Includes OSD aspects of touch screens (also assigned W03-A08X and T04-F02A2).

Digit, pattern, ramp, monitoring, self-test

#### W03-A13J [2002]

#### Electronic programme guide systems

(W03-A13G, W03-A16C5E)

This code is regarded as the main one for EPG aspects in receivers and set top boxes. See W03-A13G also for specific OSD aspects of programme guide systems in TV receivers (this code was used more generally for this topic prior to 2002). Interactive aspects of guide systems will continue to be assigned W03-A16C5E as appropriate. Systems or 'head-end' aspects are covered by W02-F10E5. Display of program guide information in radio receivers is covered by W03-B01C.

## W03-A13X [1992]

## Other special display mode aspects

#### W03-A15 [1992]

#### **Audio system aspects**

(W03-A20)

Includes loudspeakers, audio amplifier, and connection to e.g. external Hi-Fi system (with W03-A18C). Search with W03-G05C5A for cordless headphone arrangements. (Prior to 1997, see W03-A15, W03-A18C, and W03-G05).

#### W03-A15A [1992]

# **Audio amplifiers, volume and tone control** (W03-A20)

## W03-A15C [1992]

## Loudspeakers and loudspeaker enclosures

(W03-A20)

See also V06-A codes for loudspeakers per se, and V06-G/W04-S01 codes for enclosures of general application. (Prior to 1992, W04-S was assigned even for self-contained enclosure aspects). From 2005, wireless loudspeaker systems are also assigned W03-G05C5C.

### W03-A16 [1992]

# Ancillary equipment for cable, satellite or subscription TV

(W03-A20)

This code mainly covers equipment external to actual receiver e.g. decoders or converters. (Converter RF circuitry is covered by W03-A01 codes). Search with W02-F03A or W02-F05A codes for wider cable/subscription aspects.

### W03-A16A [1992]

#### Satellite TV

(W03-A20)

Search with W02-B codes for aerial aspects, and W03-A16C3 codes for security and decoding. Satellite TV transmission systems are covered by W02-F06A.

#### W03-A16C [1992]

## Cable, subscription, and interactive TV

(W03-A20)

Systems aspects of cable, interactive and satellite TV (i.e. broadcast infrastructure) are covered by W02-F codes.

## W03-A16C1 [1997]

### Cable TV receiver

The title of this code has been changed to better reflect its coverage. From 2005, cable TV set-top box aspects are highlighted by co-assignment of W03-A16E. Prior to 2005, W03-A16C1 was used more generally for set-top box details.

## W03-A16C3 [1997]

## Security and decoding aspects

See also W02-F05A1 codes for secrecy/scrambling aspects of TV systems in general.

### W03-A16C3A [1997]

## **Descrambling circuitry**

Also coded in W02-F05A1B.

## W03-A16C3C [1997]

### Access control, including card systems

Includes smart cards used to authorise decoding of encrypted broadcast. Access control details relating to e.g. cable head-end are covered by W02-F05A1 codes and W02-F10N3.

#### W03-A16C5 [1997]

## **Interactive TV aspects**

Covers details of (subscriber) systems interacting with rest of two-way network, e.g. to request a programme, carry out a transaction, etc.

## W03-A16C5A [1997]

#### For video-on-demand system

Includes pay-per-view systems for temporarily increasing access rights, and arrangements enabling viewer to influence sequence of events within programme. For systems involving selection of predominantly non-video programme material W03-A16C5C takes precedence.

## W03-A16C5C [1997]

## For audio-on-demand system

The title of this code has been changed to reflect its actual coverage of audio-based on-demand receiving systems. As before, it includes remote access of entertainment library systems, e.g. of 'pay-per-play' type, using an interactive TV installation or other equipment as an interface.

#### W03-A16C5E [1997]

#### For access to information system

This code covers interactive aspects of programme guide systems in receivers, which from 2002 are covered for all aspects by W03-A13J. Prior to 2002, W03-A16C5E was also used for aspects of internet access (now W03-A16C5K).

#### W03-A16C5G [1997]

## For game playing, virtual reality, or karaoke

In 2006 the title of this code was amended to reflect its coverage (since 1997) of virtual reality and karaoke interactive broadcast reception in addition to game playing. Video games in general are covered by W04-X02C and virtual reality in general is covered by T01-J40 codes and W04-W07E codes).

## W03-A16C5H [2005]

#### For access to multimedia system

## W03-A16C5J [1997]

#### For access to financial network

Includes use of TV receiver for online banking or purchasing goods, including 'TV commerce'. Systems involving use of the internet are also assigned W03-A16C5K.

#### W03-A16C5K [2002]

## For access to internet and receiving internet broadcasts, including 'Smart TV'

(T01-H07C5E, W01-A06B7, W03-A16C5E)

This code covers arrangements for internet access as a facility of an interactive broadcast system, and also reception of content on an interactive basis over the internet, such as internet TV, which is also assigned W03-A16C5A.

IPTV, streaming

#### W03-A16C5X [1997]

## For interfacing interactive broadcast terminals with other systems

## W03-A16E [2005]

## Set top box

(W03-A16C1)

This code is used with others as necessary to highlight specific applications, e.g. with W03-A11G for a set-top box DVB receiver, with W03-A16A for a satellite TV receiver, and with W03-A16C1 for a cable TV receiver.

## W03-A16E1 [2005]

### Personal video recorder

Covers personal video recorder aspects that relate to receiver, e.g. programming recording using programme guide. This code is used in conjunction with W04 codes, e.g. W04-B14C3 for hard disk recorders, and other W03 codes to denote novel aspects as appropriate.

PVR, TIVO, ReplayTV, SonicBlue, Digital Video Recorder, DVR

#### W03-A16G [2006]

## Local storage of commercial messages

Production of and arrangements for displaying commercial messages for TV are also covered in W05-E03C. Local storage of AV content in home networks is covered by W03-G05C1A (from 2013) which can also be assigned with W03-A16G when locally-stored TV commercials are accessible over a home network.

#### W03-A18 [1992]

# General control and peripheral connection systems

(W03-A20)

## W03-A18A [1992]

# General aspects of receiver control and monitoring

(W03-A20)

Includes self-checking systems. For microprocessor control aspects, see T01-J08A. Arrangements specific to remote control, not involving overall control aspects, are assigned W03-A02C codes only.

Function display, time programming

#### W03-A18A1

[1992]

# Testing/monitoring with external equipment

(W03-A20)

This code covers any aspect of testing or monitoring of TV receivers or video displays using external equipment, including production line testing or testing subsequently for e.g. fault-finding or repair. Self-testing or self-monitoring arrangements are covered by W03-A18A2.

#### W03-A18A2 [2006]

## Self-testing, monitoring and calibration of TV receiver

This code covers control aspects within the receiver itself for test and diagnosis and also internal calibration. Testing or monitoring of TV receivers and video displays using **external** equipment is covered by W03-A18A1.

#### W03-A18A3 [1997]

# Preventing viewing below minimum distance; Locating viewer

See also S03-C, W06-A02, W06-A05, and W06-A06 codes for detection system details. From 2010 the scope of this code is enlarged to include determination of viewer direction or location. Arrangements for orienting a receiver or display based on this determination are also assigned W03-A18A9. Viewer or user identification is covered by W03-A18A6.

## W03-A18A5 [1997]

## Time programming, channel control and programme guide control

Covers use of programme guide to present suitable channels for viewing to user. Note that the 'time programming' referred to for this code, W03-A18A5A and W03-A18A5C relates to programming of the TV receiver itself, e.g. to switch-on and tune to a desired channel at a particular time, and not programming of recording, which is covered by W04-E04C codes in conjunction with the appropriate W04-B, W04-C and/or W04-F codes.

### W03-A18A5A [2002]

## Time programming with manual input

## W03-A18A5C [2002]

# Time programming, channel and programme guide control with learning function

This code covers automatic time programming arrangements based on learned user preferences, e.g. through monitoring of manual time programming operations or manual channel selection. For analogous arrangements for programming of video recorders see W04-E04C7 along with other relevant W04 recording equipment codes.

Suggester

## W03-A18A5G [2006]

#### **Detecting commercial messages**

Includes arrangements to change channels when commercials are detected. Video recorder-based systems for preventing recording of commercial messages are covered by W04-E04C5C, and for overriding of this feature by W04-E04C5E.

### W03-A18A5J [2007]

## **Detecting emergency broadcast messages**

Includes arrangements to change channels or switch on TV receiver when emergency broadcast messages are detected. See W02-F05D for transmission of emergency TV broadcasts and W05-B08 codes which are assigned for all aspects of emergency broadcasts and disaster warning alarms. Emergency broadcast radio receivers are covered by W03-B08C7.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano.

## W03-A18A6 [2005]

## **Identifying user**

Covers arrangements to control presented programme content or settings, e.g. brightness, volume, according to individual user. Use in conjunction with W03-A18A7 for arrangements to identify child user and prevent access to certain programming content. Recognition based on biometrics such as fingerprint, palm-print, and similar parameters is also assigned T04-D07F codes, and that based on voice recognition by W04-V04A3. Recognition of user gestures or spoken commands for remote control purposes is not included and is covered by W03-A02C5J and W03-A02C5L respectively.

## W03-A18A7 [1997]

#### Security and child-lock systems

V-chip

#### W03-A18A8 [2005]

## Program control aspects, software updating methods

T01-F codes (computer program control) are also assigned as necessary.

## W03-A18A8A [2010]

## Software updating

This code covers arrangements for downloading or otherwise inputting data to modify the program controlling operation of a TV receiver or analogous equipment.

[1997]

OTA, over the air

#### W03-A18A9

Other TV receiver general control

## W03-A18C [1992]

## **Peripheral connection system**

(W03-A20)

Includes SCART socket per se and details of interconnection with any external equipment. Euroconnector, peritelevision, HDMI, interface, RGB. direct video. baseband

## W03-A18C1 [2005]

#### Interfacing hardware

Includes cables, connectors, and other hardware aspects.

## W03-A18C5 [2005]

Interfacing with other systems

#### W03-A18C5A [2005]

Interfacing with stand-alone systems

## W03-A18C5C [2005]

## Interfacing with local network

W03-G05C1 (for general AV bus systems) is also assigned as necessary, and significant network aspects are also covered by W01-A06 codes, especially W01-A06B5A.

## W03-A18R [2007]

#### **Audience research aspects**

Search in conjunction with W03-A18A6 for monitoring viewing of a particular user. Previously coded in W03-A18A1 for devices separate to subscriber equipment itself, along with W02-F04B for system aspects of audience research.

## W03-A19 [2006]

# Manufacturing, recycling and packaging of TV receiver

See W03-G10 codes for manufacture, recycling and packaging of general audio/video equipment.

## W03-A19A [2006]

### **Manufacturing TV receiver**

Includes assembly of component parts into TV receiver. Manufacture of displays and other TV receiver components is covered in V05, U14 etc. as appropriate, along with relevant W03 codes.

## W03-A19C [2006]

## **Recycling TV receiver**

Recycling of CRTs themselves is not included, being covered by V05-L05D1B and V05-L07E6 (these codes relating especially to tube manufacture).

Scrapping

## W03-A19G [2006]

## **Packaging TV receiver**

Carton, packing

#### W03-A20

#### Other TV receiver details

Includes antenna details. *Input isolation* 

#### W03-A21 [2007]

## Video display for non-TV receiver application

This code is only assigned in conjunction with other W03-A codes used to indicate novel aspects of video displays that are **analogous** to TV receivers but are intended for other applications. For example, a display for radar equipment (also W06-A04C) with a novel gamma control circuit would be assigned W03-A04A and W03-A21. Note that video displays that are suitable for other applications **and** for TV receivers are **not** assigned.W03-A21.

### W03-B

## **Broadcast radio receivers**

Communications receivers and general receiver circuitry are covered by W02-G03 codes, TV receivers by W03-A codes. Where noise reduction aspects of broadcast receivers are involved, W02-G03B codes are **also** assigned.

From 2002, W03-B06 codes are introduced for receivers of digital broadcasts, and W03-B07 codes for digital and hybrid broadcast receiver architecture.

#### W03-B01

## **Tuners; Tuning displays**

RF amplifier, mixer, local oscillator, synthesiser tuning, step tuning, continuous tuning, variable capacitance, permeability, tracking, pushbutton tuner, tuning scale, digital display

#### W03-B01A

[1992]

RF tuner circuitry and construction

#### W03-B01A1

[1992]

#### **Tuned circuits, input filters**

See U25.

#### W03-B01A3

[1992]

### **RF** amplifier

Novel RF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, RF AGC is covered by W03-B02A3, previously coded as W03-B01A3 and W03-B02A. Amplifiers external to the receiver itself are covered by W02-B08C5 codes.

## W03-B01A5

[1992]

#### Mixer

Novel mixer details are also assigned U23-J01 codes.

#### W03-B01A5A

[2006]

## Image rejection mixer

Prior to 2006 this topic was represented by W03-B01A5 and W02-G03B4A (receiver image signal suppression in general). From 2006 W02-G03B4A will only be assigned for specific novelty in the image rejection aspect.

## W03-B01A6

[2002]

#### **Direct conversion and low-IF receivers**

In 2006, the title of this code was amended to better describer the inclusion of 'low-IF' receivers as well as 'direct conversion' types. The subdivisions of this code are used, in conjunction with other W03-B01A codes as necessary, to represent receivers of homodyne, synchrodyne, 'zero-IF', or 'low-IF' type. Arrangements for suppression of offsets at the output of the mixer are also assigned W02-G03B4G. Direct digital conversion (DDC) in digital architecture broadcast receivers is not included here, being covered by W03-B07E. Direct conversion communications receivers are covered by W02-G03A8 codes and TV receivers of this type by W03-A01B6 codes.

## W03-B01A6A [2006]

#### **Zero-IF receivers**

This code is intended for direct conversion schemes in which the baseband information is centred on zero frequency.

## W03-B01A6C [2006]

#### Low-IF receivers

This code is intended for direct conversion schemes in which the baseband information is centred on a low frequency, e.g. of the same order as the baseband bandwidth itself.

#### W03-B01A7

[1992]

#### Local oscillator

See U23-A codes also for oscillator circuits.

#### W03-B01A8

[1997]

#### **Tuner constructional details**

(W03-B01A9, W03-B05B)

Covers construction of tuner per se, general internal constructional details of receiver being covered by W03-B05B, which was previously assigned in addition to W03-B01A9 to indicate the construction aspect. From 1997, W03-B05B has only been used for details affecting the design of the receiver, such as mountings, etc.

#### W03-B01A9

[1992]

## Other broadcast radio receiver tuner circuitry

Includes non-superheterodyne tuners. *TRF, homodyne* 

#### W03-B01B

[1992]

## Band scanning, synthesiser tuning, AFC

See also U25-J01 codes for band scanning, U25-J05 for AFC, U23-D01B codes for PLL synthesisers, and U23-F01 codes for 'direct types'.

## W03-B01B1

[1997]

#### Channel-storing arrangements

## W03-B01B1A

[1997]

## Based on stations receivable off-air

Signal strength, level

#### W03-B01B1C

[1997]

#### Based on channel listing

Includes use of information derived from RDS signals (search with W03-B08 for this aspect). Prior to 1997 see W03-B01B and W03-B02C5.

Alternative frequency, AF, program identification, PI

## W03-B01B1E [1997]

#### **Based on determined location**

Covers use of position information, e.g. input manually, or derived from navigation system data. Search with W06-A03A5 codes for use of GPS.

#### W03-B01B1G [2006]

## User control of channel storage

Includes re-ordering stored channels, deleting channels, forming 'favorites' lists and the like.

## W03-B01B3 [2007]

**Channel switching arrangements** 

## W03-B01B5 [1997]

Frequency control system per se

## W03-B01C [1992]

#### **Tuning and related displays**

Includes scales, illumination etc., and digital readout of received frequency. The use only of the tuning display to present other information is also included, e.g. for RDS or radio text (also assigned W03-B08 codes) or for DAB program guide (EPG) aspects (also assigned W03-B06). From 2011 novel aspects of broadcast radio receiver program guide reception and data handling are covered by W03-B08C5. (For EPG in TV receivers see W03-A13J).

## W03-B01D [2008]

#### **Multiple tuner aspects**

This code is assigned with other W03-B codes as appropriate and is intended to highlight the use of two or more tuners in a broadcast radio receiver. For novel tuner circuitry W03-B01A codes are also assigned, and for novel frequency or channel control aspects, W03-B01B codes.

Dual

#### W03-B02

#### IF amplifiers; Detectors; Stereo decoders

## W03-B02A [1992]

## Automatic gain control

Prior to 2006 this code was used with W03-B01A3 for RF AGC and W03-B02B for IF AGC. These topics are now covered solely by the subdivisions below.

IF, RF, AGC

#### W03-B02A1 [2006]

#### **Novel AGC characteristic**

Covers delayed AGC, or other specific characteristic. See U24-C01C1 for signal processing aspects to obtain a particular AGC characteristic.

## W03-B02A3 [2006]

#### **RF AGC**

Prior to 2006 this topic was covered by W03-B01A3 and W03-B02A.

#### W03-B02A5 [2006]

#### IF AGC

Prior to 2006 this topic was covered by W03-B02A and W03-B02B.

## W03-B02A9 [2006]

## Other broadcast radio receiver AGC aspects

## W03-B02B [1992]

#### **Broadcast receiver IF system**

From 2006, W03-B02B5 is introduced to separately highlight IF amplifiers, and IF AGC is covered by W03-B02A5 (previously coded as W03-B02A and W03-B02B).

#### W03-B02B1 [1992]

#### IF filter

See U25 codes for LC and active filters. Crystal, SAW, and ceramic filters are also coded in V06 (and U14-G for SAW devices).

## W03-B02B5 [2006]

### IF amplifier

Novel IF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, IF AGC is covered by W03-B02A5, previously coded as W03-B02A and W03-B02B.

#### W03-B02C [1992]

**Demodulators, decoders** 

## W03-B02C1 [1992]

## **AM/FM demodulators**

See U23 codes for demodulator circuits also.

#### W03-B02C3 [1992]

# Stereophonic decoders and stereo separation control

From 2006, the title of this code is expanded to distinguish novel stereo decoders and automatic control of separation, e.g. by blending, whether performed within the decoder or in a subsequent stage. Where noise reduction is involved W02-G03B codes are also assigned.

Phase-lock loop, PLL, pilot tone detector, matrix circuit

W: Communications

## W03-B02C3A [1992]

# Automatic stereo switching and stereo separation control

This code covers switching between stereo and mono modes, e.g. in response to low signal strength, and automatic control of separation, e.g. by blending, whether performed within the decoder or in a subsequent stage including audio amplifiers. Receiver noise reduction aspects are also assigned W02-G03B codes, e.g. W02-G03B8. Separation control, mixing

## W03-B02C3C [2006]

## **Novel stereophonic decoder**

U23-P05 is also assigned.

## W03-B02C5 [1992]

## **Decoder for additional information**

Includes decoder e.g. for RDS signals, which is also assigned W03-B08 (assigned for all aspects of RDS and similar-system receivers). Prior to 1997, W03-B02C5 codes were used for inventions involving RDS-type decoders and their use in a broad sense. From 1997 only inventions strictly relating to the decoder per se and its operation have been coded in W03-B02C5. In all other cases, W03-B08 is assigned, together with other W03-B codes as appropriate.

Radio data system, station ID, traffic information, ARI, radio teletext

## W03-B02C5A\* [1992-2005]

## With storage function

\*This code is now discontinued. From 2006 this code is no longer assigned, the subject matter being transferred to W03-B08A1. W03-B02C5A remains valid for records prior to 2006, when it was assigned for arrangements to store received bulletins and the like, whether the storage facility was part of the decoder or external to it, additional codes in W04 being also applied depending on storage technology, such as W04-B12 codes for magnetic tape based storage, and W04-G01B codes for storage of audio information in e.g. RAM.

#### W03-B03

#### Car radios

Used in conjunction with other W03-B codes for specific features. For aerial preamplifiers search with W02-B08C5. (Previously coded in W02-B09, W03-B01 and W03-B03). In-car entertainment systems are covered by W03-G08 and systems including car radios in which the radio is not itself linked with the novel aspect are not assigned W03-B03.

Traffic information detector, diversity receiver, antitheft system

## W03-B03A [1992]

#### **Antitheft arrangements**

Includes mechanical aspects such as removable fascias, W03-B05 codes (for constructional details) being assigned as necessary.

## W03-B03A1 [1992]

#### **Electronic**

Includes radio forming part of vehicle alarm system which is also coded in X22-D and W05-B01 codes. Also coded in X22-X03 for general antitheft measures. For 'password' aspects search with T01-J08A and T01-J12C.

#### W03-B04 [1992]

## Audio amplifier and audio circuitry

This code covers audio stages of a broadcast radio receiver and includes details of audio amplifiers and associated circuitry, such as volume and tone controls, auxiliary inputs, and muting arrangements when used with W02-G03B1. Novel amplifier muting circuits are also coded in U24-C05C and gain control in general by U24-C codes. Audio amplifiers in general are covered by W03-C01 codes, and amplifiers in general by U24-G codes. These codes are also assigned as appropriate along with other W03-C codes such as W03-C03C for volume control and W03-C05 codes for tone control and equalizers.

## W03-B05 [1992]

#### **Constructional details**

(W03-B09)

Constructional details of electronic equipment in general are covered by V04-S and V04-T codes.

#### W03-B05A [1992]

## Casing, housing, mounting kit

(W03-B09)

Cabinet, sleeve, escutcheon, bracket, support

#### W03-B05B [1992]

#### Internal construction

(W03-B09)

Includes e.g. PCB or component mounting, etc.

## W03-B06 [2002]

## **Receiver for digital broadcasts**

(W02-K07C, W03-B09)

These codes are intended for broadcast receivers of digital radio signal formats such as DAB, DRM, and analogous systems. Systems aspects of DAB are covered by W02-D05C1 and W02-K07C for the OFDM aspect. Receivers employing digital architecture - for analogue or digital broadcast reception - are covered by W03-B07 codes, which may be assigned as well for digital broadcast receivers with digital architecture.

Digital audio broadcast, digital radio mondiale, digital AM, QAM

#### W03-B06A [2002]

#### Satellite radio broadcast receiver

(W03-A16A, W03-B09)

Prior to 2002, satellite receivers were assigned W03-A16A as well as W03-B09. W03-A16A will continue to be used for satellite radio reception from 'TV' satellites, but from 2002 will not be used for 'pure' radio satellite reception. Systems aspects of satellite radio are covered by W02-D05A and satellite TV by W02-F06A.

## W03-B06C [2002]

#### Internet broadcast receiver

(T01-H07C5E, W01-A06B7, W03-B09)

This code is intended for 'internet radio' receiving arrangements, which may be part of a receiver, accessory equipment, or wholly contained within a PC as hardware or software.

#### W03-B06E [2012]

## Terrestrial digital broadcast radio receiver

This code covers receivers of digital radio broadcasts from terrestrial transmitters, such as digital audio broadcast (DAB) or digital radio mondiale (DRM) receivers. Note that 'DRM' in the sense of 'digital rights management' is not included and is covered by W03-B06J. Prior to 2012 W03-B06 was assigned for terrestrial digital radio broadcast receivers. Receivers for digital satellite radio are covered by W03-B06A.

#### W03-B06E1 [2012]

# Terrestrial digital broadcast radio receiver with analog reception capability

This code covers receivers of digital radio broadcasts from terrestrial transmitters, such as DAB or DRM, which are also capable of receiving analog broadcasts, e.g. in AM or FM bands. TV receivers capable of receiving analog and digital broadcasts are covered by W03-A11G1.

## W03-B06J [2012]

# Digital rights management, copy protection and access control

This code covers digital rights management aspects of digital sound broadcast receivers, including copy protection and access-restriction. Note that when these topics arise in interactive systems, e.g. 'audio on demand', W03-A16C3 codes take precedence and are assigned instead of W03-B06J (with W03-A16C5C in the case of audio-based systems).

#### W03-B07 [2002]

## Digital and hybrid broadcast receiver architecture

(W03-B09)

This code is assigned for receivers - of signals with analogue or digital modulation - which are implemented using DSP techniques in whole or in part. The codes are used in conjunction with other W03-B codes as necessary where there are direct equivalents in analogue receivers, in particular for RF amplifiers, oscillators, IF stages and demodulators. Corresponding digital techniques for communications and TV receivers are covered by W02-G03K and W03-A11K codes. Receivers for digital broadcasts, such as DAB, are covered by W03-B06 codes, and may also be assigned W03-B07 codes if the receiver itself employs a digital, or part digital, architecture.

## W03-B07A [2002]

#### Characterised by usage of DSP

(W03-B09)

These codes are used to distinguish between different levels of DSP being applied to the signal path in the receiver. As such, they do not normally represent novel digital processing aspects, which are conveyed by use of other W03-B07 codes. DSP in general is covered by T01-J08A2, T01-J08B and U22-G codes depending on specific aspects.

#### W03-B07A1 [2002]

# With baseband digital signal processing only

(W03-B09)

This code covers receivers with a digital signal processing path **after** the conversion to baseband.

## W03-B07A3 [2002]

# With baseband and IF digital signal processing only

(W03-B09)

This code covers receivers with DSP in IF, demodulator, and baseband stages.

W: Communications

## W03-B07A5 [2002]

## With digitising of RF spectrum

(W03-B09)

This code covers receivers with digitising of the whole signal processing path, except for the possible use of analogue RF amplifiers.

## W03-B07A9 [2002]

## Other use of DSP in digital broadcast radio receivers

(W03-B09)

## W03-B07C [2002]

#### **AD** conversion

Novel aspects of AD converters and AD conversion are covered by U21-A03 codes.

## W03-B07E [2002]

## Digital mixing and direct digital conversion

(W03-B09) DDC

## W03-B07G [2002]

## **Filtering**

(W03-B09)

Novel digital filters are also assigned U22-G01 codes, and T01-J08B when the emphasis is on computing aspects.

## W03-B07J [2006]

## **Transform implementation**

(W03-B09)

DSP-based transform implementation is covered by U22-G03E1A and computer data processing aspects in general by T01-J04B1.

## W03-B07L [2006]

## **DA** conversion

(W03-B09)

Novel aspects of DA converters and DA conversion are covered by U21-A02 codes.

## W03-B07X [2002]

# Other digital broadcast radio receiver aspects

(W03-B09)

## W03-B08 [1997]

## Receiving additional information

(W03-B02C5, W03-B09)

From 2011, the title of this code has been changed and its scope expanded to include arrangements for receiving 'additional information' such as text and electronic program guide (EPG) information transmitted with digital audio broadcast (DAB) signals, RDS information and emergency broadcast messages. Between 1997 and 2010 this code was used for all aspects of receivers for RDS and similar text-based systems with W03-B02C5 codes being assigned for inventions involving RDS-type decoders. Before 1997 W03-B02C5 was assigned in a broader sense to indicate receivers for RDS and similar systems. In all cases other W03-B codes are also assigned as appropriate.

## W03-B08A [2006]

# Storage for additional information and programme content

(W03-B02C5A)

This code, which replaced W03-B02C5A in 2006, is intended for buffer storage of either additional information (as defined above) for subsequent replay, or programme content, e.g. content missed by the reproduction of a traffic message, or due to channel changing. W03-B08A1 and W03-B08A5 indicate what is stored while W03-B08A7 is assigned when the storage arrangement itself is novel. The storage of messages or content may occur within the broadcast receiver, or within external equipment which is connected to it. For both of the specific subdivisions below. W04 codes are also assigned as appropriate for the technology used to store the information. Full-scale recording within a receiver - e.g. of an extended section of a broadcast program - is not included, and is regarded as a 'radio-recorder' combination and covered by W03-B codes, W03-G03A and W04 codes as appropriate.

#### W03-B08A1 [2006]

#### Storage for additional information

(W03-B02C5, W03-B09)

Covers arrangements for storing traffic bulletins (e.g. TMC announcements, emergency broadcasts, or other information) in text, audio or other form, for replay as desired.

## W03-B08A5 [2006]

## Storage for programme content

(W03-B02C5, W03-B09)

Covers arrangements for storing a limited amount of program content. Includes arrangement for storing e.g. the part of a radio program interrupted by a traffic announcement in RDS or similar systems, so that listening can resume from the time of the interruption. The content stored may be a radio programme received by the broadcast receiver itself, or external sources such as a CD or DVD player, a TV receiver, etc.

#### W03-B08A7 [2011]

## Novel aspects of storage and memory

(W03-B02C5, W03-B09)

Covers novel arrangements such as memory circuits etc.

## W03-B08C [2011]

## Characterised by type of additional information

These codes are assigned to indicate the type of additional information as it is actually received. W03-B08C8 is assigned to denote the conversion of the information into another form.

#### W03-B08C1 [2011]

### **Visual information**

Program guide reception is covered by W03-B08C5 which takes precedence over W03-B08C1 codes as EPG information is assumed to be in the form of text and/or graphics unless other codes indicate another method of presenting it. Prior to 2011 W03-B01C was used to denote EPG presentation but from 2011 will only be assigned for novel display-related aspects.

### W03-B08C1A [2011]

**Text** 

## W03-B08C1C [2011]

## Visual information

This code covers the reception of still or moving images only as 'additional information' transmitted with a radio broadcast. Reception of normal TV signals is covered by W03-A codes and is not included here.

## W03-B08C3 [2011]

## **Audio information**

Includes reception of additional information in the form of spoken announcements.

## W03-B08C4 [2012]

#### Weather information

This code covers reception of meteorological information. When disaster warning or emergency aspects are involved W03-B08C7 ('Emergency broadcasts') is also assigned.

## W03-B08C5 [2011]

# Program guide systems (EPG) and content descriptions

This code covers program guide information and also 'now playing' information describing e.g. a musical piece being played, or other associated information. This code takes precedence over W03-B08C1A, i.e. the information is assumed to be in text form unless other codes indicate another method of presenting it. EPG aspects of DAB receivers are indicated by assignment of W03-B06 also.

## W03-B08C6 [2012]

#### **Transport-related information**

This code covers reception of information related to transport, including road traffic information concerning congestion.

## W03-B08C7 [2011]

#### **Emergency broadcasts**

Codes indicating 'disaster-related' alarms in W05-B08 are also assigned as appropriate. Reception of emergency broadcast messages in TV receivers is covered by W03-A18A5J.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano.

## W03-B08C8 [2011]

## **Transforming information type**

This code is used with other W03-B08C codes indicating the original form of additional information and denotes its conversion into another form, e.g. from text to audible form or vice versa. W04-V04A6 and W04-V04C1 are also respectively assigned for speech-to-text or text-to-speech conversion when necessary.

#### W03-B08C9 [2011]

## Other information type

#### W03-B09

#### Other broadcast radio receiver aspects

This code was used for digital receivers prior to 2002, now assigned W03-B07 codes, and for testing, control and interfacing aspects until 2010, which are now assigned W03-B10 codes.

Power supply

## W03-B10 [2010]

## Broadcast radio receiver testing, control and interfacing

(W02-C05B; W03-B)

These codes cover testing of broadcast radio receivers and also control in a general sense, rather than control of a specific parameter as part of normal receiver operation.

## W03-B10A [2010]

## **Broadcast radio receiver testing**

(W02-C05B; W03-B)

Testing of a specific part of a broadcast receiver is indicated by co-assignment of the appropriate W03-B code. Testing of broadcast radio **systems** is covered by W02-D04 codes.

## W03-B10A1 [2010]

## **Broadcast radio receiver self-testing**

(W02-C05B; W03-B)

Includes monitoring arrangements for detecting e.g. low battery or fault condition.

## W03-B10A5 [2010]

## Broadcast radio receiver testing using external equipment

(W02-C05B; W03-B)

Includes monitoring and testing using external test equipment, e.g. for production line testing or repair.

## W03-B10C [2010]

#### **Broadcast radio receiver control**

(W03-B09)

This code covers control of broadcast radio receivers in a general sense, and not control of a specific parameter as part of normal receiver operation, such as automatic frequency control (W03-B01B5) or automatic gain control (W03-B02A).

## W03-B10E [2010]

#### **Broadcast radio receiver interfacing**

(W03-B09)

This code covers arrangements for interfacing with broadcast radio receivers including hardware and software aspects. Interfacing with TV receivers is covered by W03-A18C codes and with AV equipment in general by W03-G05C codes.

## W03-B10R [2012]

## Broadcast radio receiver audience research details

Broadcast system aspects of audience research are covered by W02-D04B. TV receiver audience research aspects are covered by W03-A18R.

#### W03-B10X [2010]

# Other broadcast radio receiver control and interfacing aspects

(W03-B09)

#### W03-C

## Audio amplifiers; Tone and volume control; Balancing

Monaural, stereophonic amplifier, preamplifier power amplifier, output stage

#### W03-C01 [1992]

#### Audio amplifier per se

See U24-G codes for circuitry details.

#### W03-C01A [1992]

#### **Preamplifier**

Also coded in U24-G01C.

## W03-C01C [1992]

#### Power amplifier

Also coded in U24-G01B1.

## W03-C01C1 [2005]

#### Amplifier integrated with loudspeaker(s)

For wireless loudspeaker systems W03-G05C5C is also assigned.

Powered speaker

### W03-C01G [2005]

## **Digital amplifier**

Covers amplifiers generally of class-D type, for which U24-G01B1 and U24-G02E are assigned also.

## W03-C01G1 [2005]

Digital input

#### W03-C01G3 [2005]

Digital input and output

## W03-C03 [1992]

Volume and balance control

## W03-C03A [1992]

#### **Balance control**

See W04-R01C codes also for stereophonic systems.

## W03-C03C [2005]

#### Volume control

U24-C codes are also assigned for novel aspects of automatic and manual gain control.

AGC

## W03-C05 [1992]

## Tone controls and equalisers

See U25-F05 and U24-C05D codes for further circuit details.

Fader

W03-C05A [1992]

**Tone controls** 

W03-C05C [1992]

#### **Analogue equalizer circuits**

This code includes analogue graphic equalizers. Prior to 1992, audio equalizing was also routinely coded in W04-G, which is now only assigned for general applications.

## W03-C05E [2005]

## **Digital EQ**

U22-G codes are also assigned for details of digital filters and DSP.

## W03-C05E1 [2005]

## Adaptive EQ

Includes sensing and matching character of speakers. Adaptive digital filters are also assigned U22-G01A5 codes.

## W03-C07 [1992]

## **Constructional details**

See V04-S and V04T codes also.

W03-C09 [1992]

Other audio amplifier details

## W03-G [1992]

## General aspects of audio-video equipment

(W03-X)

Codes in this section are used for general aspects only, and not for instances for which a **single** specific code exists elsewhere (e.g. in W03 or W04).

## W03-G01 [1992]

#### **Constructional details**

(W03-X)

W03-G01A [1992]

Constructional details of equipment per se

W03-X)

W03-G01A1 [1992]

Internal construction

(W03-X)

W03-G01A5 [1992]

## Casings/housings

(W03-X)

Front panel, marking, legend

W03-G01C [1992]

Mountings, supports, stands

(W03-X)

W03-G02 [1992]

## **Power supplies**

(W03-X)

See U24 codes also as appropriate.

W03-G02A [2005]

**Battery power supply** 

W03-G02A1 [2005]

#### Battery per se

Novel details of batteries are covered by X16 codes.

W03-G02A3 [2005]

**Battery supply circuitry** 

W03-G02A5 [2005]

**Battery charging** 

W03-G02C [2005]

Mains power supply

W03-G03 [1992]

**Combination equipment** 

(W03-X)

W03-G03A [1992]

#### Contained in one housing

(W03-X)

Radio-cassette player, radio-TV receiver, clock-radio

## W03-G03A1 [2006]

## Media centre PC and related equipment

This code is assigned for multimedia PC systems designed to perform the functions of several AV equipment units, e.g. TV set, CD/DVD recorder/player, radio receiver, etc. See also T01 codes for specific computing aspects, such as multimedia computer systems in T01-J30 codes.

## W03-G03C [1992]

## Mountable in rack, interlocking apparatus

(W03-X)

Stacked combination hi-fi system

## W03-G03H [2007]

## Home theatre equipment

Covers home theatre applications. Novel details of audio processing circuitry, surround sound and interfacing are assigned e.g. W03-C, W04-R and W03-G05C codes respectively.

#### W03-G04 [2006]

## Portable AV equipment

#### W03-G05 [1992]

## Remote control, general control, general displays and interconnection

(W03-X)

From 2006 the title and scope of this code is expanded to include control and display aspects of AV equipment in general, these topics being respectively covered in W03-G05E and W03-G05G codes.

#### W03-G05A [1992]

## Remote control for audio video apparatus

(W03-X

Remote control specific to TV receivers is covered by W03-A02C codes, and for recording equipment by W04-E04A. W05-D codes cover remote control in general.

#### W03-G05A1 [1997]

### **Coding and transmission format**

## W03-G05A1A [1997]

#### Universal type remote controller

Includes 'learning' types.

#### W03-G05A5 [1997]

#### Combined with additional features

Includes combination with e.g. telephone (see W01-C codes also, e.g. W01-C05B5A, or W01-C01P codes), and remote audio or video display facility. Includes provision of dedicated display, e.g. for indicating control functions.

## W03-G05A6 [2006]

#### In conjunction with on-screen display

This code includes the application of GUI techniques to control of AV equipment in general. When specific to remote control of a TV set W03-A02C5A is assigned instead.

## W03-G05A7 [1997]

#### Locator system

Covers 'transponder' arrangement producing e.g. audible tone in response to signal emitted from main equipment.

## W03-G05A8 [2009]

## AV equipment remote control repeaters and extenders

This code covers arrangements for extending the range of remote control signals transmitted to AV equipment such as 'remote control extenders', usually based on repeaters. Novel aspects of repeaters are also assigned codes depending on technology, e.g. W02-C04A5 for optical repeaters and W02-G05C for radio types. Similar arrangements for remote control applications other than AV equipment are covered by W05-D08R. Free-space, IR, relay, RF, room

#### W03-G05C [1997]

## Interconnection of audio/video equipment

See also appropriate codes for communication system, e.g. W01-A06 codes for networks. HAVI, Home Audio Video Interface, HDMI

## W03-G05C1 [1997]

#### AV home network

Novel network aspects are also assigned W01-A06 codes

DLNA, HANA, Universal Plug and Play, UPnP

## W03-G05C1A [2013]

#### **Networked media storage**

Covers centralised storage of e.g. audio or video content that can be accessed over a home AV network. Novel recording equipment aspects are covered in T03 and W04 as appropriate. Remote servers for content storage in on-demand broadcast systems are not included and are covered by W02-F10K.

Home AV server, network drive

#### W03-G05C1C [2013]

## **Network communication aspects**

Covers novel aspects of communication between AV equipment units over a home network. Novel aspects of network communication are also assigned W01-A06 codes. Home automation (HA) networks for control of heating, lighting and domestic appliances are covered by W05-D07A but that code may be assigned with W03-G05C1 when both AV equipment and other equipment in the home are connected to the same network.

#### W03-G05C3 [2012]

## High definition multimedia interface (HDMI)

This code covers interfacing using high definition multimedia interface (HDMI) standard and is subdivided into novel aspects of HDMI (W03-G05C5A), such as circuitry, cables or connectors, and inventions where the use of HDMI is significant (W03-G05C5C).

#### W03-G05C3A [2012]

### **Novel aspects of HDMI**

This code covers novel aspects of HDMI, such as circuitry, cables or connectors. Specific details of the novelty are indicated by assignment of additional codes, e.g. W03-G07A for a novel HDMI cable.

#### W03-G05C3C [2012]

#### **Applications of HDMI**

This code covers inventions where the use of HDMI is significant. It is not assigned in cases where a number of other types of interface are equally applicable.

W03-G05C5 [1997]

'Dedicated link' systems

W03-G05C5A [1997]

**Cordless headphones** 

W03-G05C5C [2005]

Wireless speaker systems

## W03-G05E [2006]

#### **General AV equipment control**

This code covers control systems of general application to AV equipment, but not remote control, which is covered by W03-G05A codes.

#### W03-G05E1 [2006]

Menu-based AV equipment control

#### W03-G05G [2006]

## **General AV equipment operation display**

These codes are intended for display aspects applicable to AV equipment in general. For display aspects specific to TV sets and recording equipment see W03-A and W04-J03 codes respectively.

## W03-G05G1 [2006]

## **Dedicated display for AV equipment**

Dedicated displays forming part of recording and playback equipment are covered by W04-J03A.

### W03-G05G5 [2006]

## On-screen display for AV equipment

OSD generated within a TV set is covered by W03-A13G and within recording equipment by W04-J03C.

#### W03-G06 [2006]

## AV equipment requiring operation with PC

Includes sound, TV and video recording/editing cards installed in a PC or external devices with e.g. USB interface which operate using a PC processor. See also T01 for computing aspects.

## W03-G07 [1992]

Connectors, leads, plugs, sockets, components in general

W03-G07A [1992]

Leads and cables, connectors

(W03-X)

#### W03-G07C [1992]

#### **Components in general**

(W03-X)

## W03-G08 [1992]

## AV equipment used in a vehicle

(W03-X)

The title of this code has been changed to better reflect its actual use. W03-G08 includes in-car entertainment systems, for which X22-J13 is also assigned, and AV equipment used in any other kind of vehicle for which other codes are also assigned as appropriate, such as W06-B01C7 for aircraft inflight entertainment. Specific W03 and W04 codes are also assigned depending on equipment type. Note that car radios with no other aspect are not included here and are covered by W03-B03 codes.

## W03-G09 [1992]

# Other general audio-video equipment aspects

(W03-X)

Prior to 2006 this code included recycling and packaging aspects. This topic is now covered in W03-G10.

## W03-G10 [2006]

# Manufacturing, recycling and packaging of AV equipment

(W03-X)

Coves all general audio-video equipment, including recording equipment (see W04 for other aspects). Manufacturing, recycling and packaging specifically for TV receivers is covered in W03-A19. For manufacturing, recycling and packaging aspects of general electrical equipment see V04-X01 codes.

W03-G10A [2006]

**Manufacturing AV equipment** 

W03-G10C [2006]

**Recycling AV equipment** 

W03-G10G [2006]

**Packaging for AV equipment** 

#### W03-X

Other audio and video equipment details

## W04: Audio/Visual Recording and Systems

Prior to 2002 this class covered all aspects of audio/visual recording and reproduction (covered chiefly by W04-A to W04-L codes). Signal processing aspects were generally coded in W04 only while details of record carriers and headcarrier drive systems were coded in both T03 (Data recording) and W04. From 2002, with the exception of mechanical recording methods (W04-A), W04 will only cover applications, formatting, signal processing and constructional aspects specific to audio/visual recording. All carrier and mechanical aspects of recording and reproduction are coded in T03 only. Accordingly from 2002 a large number of codes in W04-B, W04-C, W04-D, W04-E, and W04-L have been discontinued. Additionally, from 2006 a number of general aspects of audio-video equipment are covered in W03-G, such as manufacturing, recycling and packaging in W03-G10 and portable equipment in W03-G04. As well as the above, W04 covers the following material:-

- (1) General audio signal processing and sound mixing (W04-G codes)
- (2) Video cameras, TV studio and special effects equipment (W04-M/N codes)
- (3) General video signal processing (W04-P codes)
- (4) Projection TV and analogous systems (W04-Q codes)
- (5) Stereophonic systems, loudspeaker enclosures, public address (W04-R/S/T codes)
- (6) Electronic musical instruments (W04-U codes)
- (7) Sound analysis, synthesis, speech coding, audio coding, and antiphase sound cancelling (W04-V codes)
- (8) Educational and sports equipment, games, amusements (W04-W/X codes)
- (9) Audio and video aspects of multimedia
- (10) Hearing aids (W04-Y codes)

From 1997 W04-E20 codes were introduced to highlight recording equipment operating mode. These codes are intended to be used in conjunction with any other W04 codes relating to recording, to indicate aspects such as time lapse, reverse playback, etc.

#### W04-A

## **Recording using mechanical methods**

Gramophone

## W04-A01

#### **Record carriers; Cleaning**

Brush, fluid, liquid, cleaning pad, anti-static 'gun', groove, vinyl

#### W04-A02

#### Heads; Record carrier positioning

See V06-B01 also for head details.

Pick-up, cartridge, magnetic, moving coil, piezoelectric, stylus, diamond, turntable, mat, motor drive, speed selector/control, autochanger

#### W04-A03

#### Head positioning, i.e. tone arms

Parallel, tangential, radial, tracking, cueing arm, raising, lowering, track selection

#### W04-A09

## Other mechanical recording aspects

Includes integral 'loudspeaker' cone for prerecorded message reproduction in e.g. toy or warning device.

#### W04-B

## **Recording using magnetic record carriers**

Prior to 2002 record carrier materials and carrier manufacture were **not** included, and were assigned T03-A codes only. From 2002 **only** applications, formatting, and signal processing aspects of audio/visual magnetic recording are included in W04-B.

Equalising

## W04-B01

#### Recording formats; Re-recording

For recording format, emphasis is on physical disposition of tracks, see W04-F01 and W04-G01 for signal transformation aspects.

#### W04-B01A

#### [1992]

#### **Recording formats**

Channel, helical, slant, slope, parallel, guard band,

#### W04-B01C\*

#### [1992-2005]

#### Re-recording, anti-copying

\*This code is now discontinued. Since 2006 hardware aspects of anti-copying have been covered in T03-H07 while signal processing aspects are covered in W04-F01L.

#### W04-B01C1\*

## [1992-2005]

## Preventing re-recording of signal

\*This code is now discontinued.

#### W04-B01C1A\*

[1992-2005]

## By signal modification or additional recorded data

\*This code is now discontinued. *Guard* 

## W04-B01C3\* [1992-2004]

#### Re-recording

\*This code is now discontinued and since 2005 all duplication for production of pre-recorded tapes or disks is covered in T03-B07B. See W04-H05A for dubbing.

Сору

## W04-B02\*

[1980-2001]

## Audio/video heads and head cleaning

\*This code is now discontinued and since 2002 this subject matter is assigned T03-A03 and T03-A04 codes only. The codes W04-B02A and W04-B02C remain valid and fully searchable for records prior to 2002.

Core, gap, thin-film, ferromagnetic, ferrite, glass, coil

#### W04-B02A\*

[1992-2001]

#### Audio/video head

\*This code is now discontinued and since 2002 magnetic heads have been assigned T03-A03 codes only, and head manufacture has been covered by T03-A04A codes.

## W04-B02C\*

[1992-2001]

### Cleaning and demagnetisation of heads

\*This code is now discontinued. Prior to 2002, search with T03-A04B codes to discriminate particular aspects e.g. T03-A04B1 for demagnetising (also coded in V02-D); T03-A04B3B and T03-N03 for cleaning cassette.

## W04-B03\*

[1980-2001]

#### **Head positioning**

\*This code is now discontinued and since 2002 the subject matter previously coded here has been covered by T03-A05 codes only. The codes in this sub-group remain valid and fully searchable for records prior to 2002.

Drive, motor, angle, step, track selecting/aligning

#### W04-B03A\*

[1980-2001]

#### For disks or drums

\*This code is now discontinued.

### W04-B03B\*

[1980-2001]

#### For tape

\*This code is now discontinued. Prior to 2002 synchronisation with tape movement was indicated by co-assignment of W04-E10.

#### W04-B03B1\*

[1992-2001]

#### For helical scan

\*This code is now discontinued. Prior to 1992, this topic was indicated by assignment of W04-E01A with W04-B03B. From 2002, T03-A05D codes alone are assigned for helical scan head positioning, including details of the head drum itself.

Rotating drum

#### W04-B03B1A\*

[1992-2001]

## Dynamic adjustment of head position

\*This code is now discontinued. Prior to 2002 T03-A05A1 codes were also assigned for this topic which includes speed control, track following, alignment, and also adjusting elements themselves. (See V06-M06D for piezoelectric elements). Since 2002 T03-A05A1 codes have been assigned exclusively for this subject matter.

Tracking, bimorph

## W04-B03B1C\*

[1992-2001]

#### Head rotary drive per se

\*This code is now discontinued, but prior to 2002 it included the motor itself and drive components.

## W04-B04\*

[1980-2001]

### **Record carrier positioning**

\*This code is now discontinued and from 2002 the subject matter previously coded in this sub-group is covered by T03 codes only. W04-B04 codes remain valid and fully searchable for records prior to 2002.

Cassette, cartridge, load, eject, motor, drive

## W04-B04A\*

[1980-2001]

## For disks or drums

\*This code is now discontinued and from 2002 this subject matter is covered by T03-F codes only. W04-B04A remains valid and fully searchable for records prior to 2002 and included housings in which the carrier is driven during normal operation. W04-E02A codes were also assigned for this topic between 1992 and 2001.

### W04-B04B\*

[1980-2001]

#### For tape

\*This code is now discontinued and since 2002 this subject matter has been coded in T03-E only. The codes W04-B04B1 to W04-B04B7A remain valid and fully searchable for records prior to 2002. For synchronization with head movement, W04-E10 was also assigned.

#### W04-B04B1\*

[1992-2001]

### **Tape containers**

\*This code is now discontinued. For cassettes it was assigned with W04-E02B1 codes and T03-H01B codes but since 2002 only T03-H01B codes have been used to denote this subject matter.

#### W04-B04B3\*

[1992-2001]

### Tape drive system

\*This code is now discontinued. Tape drive systems were also assigned T03-E codes which are now used alone for this topic.

#### W04-B04B3A\*

[1992-2001]

## **Tape drive components**

\*This code is now discontinued.

#### W04-B04B3C\*

[1992-2001]

#### Tape speed control

\*This code is now discontinued. Prior to 2002, combined head/tape speed control was also assigned W04-B03B1A and W04-E10.

## W04-B04B5\*

[1992-2001]

#### Tape drive mode control

\*This code is now discontinued.

#### W04-B04B5A\*

[1992-2001]

## Automatic control of operating mode\*

\*This code is now discontinued and from 2002 this subject matter is coded in T03-E05A or its subdivisions only.

Autostop, blank, space, gap, leader

#### W04-B04B5C\*

[1992-2001]

#### Manual control of operating mode

\*This code is now discontinued and since 2002 this subject matter, which includes switches, operating keys etc., is covered by T03-E05B alone.

#### W04-B04B6\*

[1992-2001]

## Tape cassette loading and changing

\*This code is now discontinued and since 2002 this subject matter has been covered by T03-E01B or its subdivisions only.

#### W04-B04B7\*

[1992-2001]

### Tape looping and threading

\*This code is now discontinued and since 2002 this subject matter has been covered by T03-E01C only.

#### W04-B04B7A\*

[1992-2001]

#### Looping/threading for helical-scan tape

\*This code is now discontinued and since 2002 this subject matter has been covered by T03-E01C1 and T03-N02.

#### W04-B10

[1987]

#### Video tape recorder

Prior to 1992, this code was only used for VTR details which were not completely covered by other W04-B codes. Since 1992 W04-B10 codes have been applied to **all** aspects of VTRs, and are intended to provide broad groupings of subject matter. Other W04 codes should be used in conjunction to provide more detail.

#### W04-B10A

[1992]

## Heads, head and tape transport

Includes recording formats, for which W04-B01A is also assigned. (Prior to 2002 all W04-B01 to W04-B04 codes were assigned with W04-B10A). Since 2002 this code has been used in conjunction with T03-A and T03-E codes to denote the VTR application for inventions relating to heads, head movement, and tape transport.

#### W04-B10B

[1992]

#### Signal processing

For full details of signal processing see W04-F codes also. (for audio signal processing aspects, search with W04-G01 codes).

#### W04-B10C

[1992]

## Control, power supplies, interfacing

For remote control or control or programming search with W04-E04 codes. For editing and indexing aspects search with W04-H codes, and for testing/monitoring, W04-J codes).

#### W04-B10D

[1992]

#### Construction

Also assigned W04-L05 codes.

## W04-B10G

[1992]

#### Digital video tape recorder

**DVTR** 

#### W04-B10K

[1992]

### **Dual cassette deck VTR**

## W04-B12 [1992]

#### Audio tape recorder

Codes in this section are assigned for **all** aspects of audio tape recorders, in conjunction with other W04 codes as appropriate.

## W04-B12A [1992]

## Heads, head and tape transport

Includes recording formats (i.e. scope of this code is that of W04-B01 to W04-B04 codes).

## W04-B12B [1992]

Signal processing

## W04-B12C [1992]

## Control, power supplies, interfacing

For remote control or programming see W04-E04 codes also. For editing and indexing aspects search with W04-H codes and for testing monitoring, W04-J codes.

#### W04-B12D [1992]

#### Construction

Also assigned W04-L05 codes.

## W04-B12G [1992]

## Digital audio tape recorder

DAT, R-DAT

#### W04-B12H [1992]

#### Miniature audio tape recorder

Includes 'personal stereo' type of equipment - with or without recording facility.

#### W04-B12J [1992]

**Dictation recorder** 

## W04-B12K [1992]

**Dual cassette-deck audio tape recorder** 

## W04-B14 [1992]

## Magnetic audio and video disk equipment

From 1997 the scope of this code is expanded to encompass magnetic disk systems for audio recording also, and hard disk systems for both audio and video.

## W04-B14A [1992]

#### Flexible disk system

For use within electronic still picture camera see also W04-M01B1A. Digital cameras using hard disks for picture storage are assigned W04-B14C3.

## W04-B14B\* [1992-2004]

## Playback unit for recorded disk

\*This code is now discontinued and since 2005 systems for playback of flexible disks used for storing pictures from digital cameras are covered in W04-B14A.

## W04-B14C [1997]

#### Hard disk system

Hard disk systems purely for computer data storage are covered in T03 only, e.g. T03-A08A1C or T03-A08A5. For hard disk system storing information in an on-demand entertainment system, see W04-K05A and W02-F10K also. For editing aspects, search with W04-H05 codes.

## W04-B14C1 [1997]

Audio hard disk system

## W04-B14C3 [1997]

Video hard disk system

## W04-B16 [1992]

## Cassette library system

Also coded in T03-N03 and T03-Q01.

#### W04-C

#### **Recording using optical methods**

W04-C10 codes are assigned as appropriate to indicate equipment type.

From 2002 **only** applications, formatting, and signal processing aspects of audio/visual optical recording are included in W04-C. From 2002, optical record carriers and head/record carrier drive arrangements are assigned T03-B codes **only**. Magneto-optical recording is **not** included and is covered by W04-D codes.

Disk, compact, digital, laser

## W04-C01\* [1980-2001]

#### Record carriers

\*This code is now discontinued and since 2002 this subject matter has been covered in T03-B01 only. W04-C01A to W04-C01E remain valid and fully searchable for records prior to 2002.

WORM, DRAW

#### W04-C01A\* [1992-2001]

#### Record carrier substrate

\*This code is now discontinued. Mould, transparent resin, PMMA

## W04-C01B\*

## **Light-sensitive layers**

\*This code is now discontinued.

Photochromic, ablation, deformation, interaction, phase transition, combination, reversible, multilevel, segregation

#### W04-C01C\*

[1992-2001]

[1992-2001]

## Protective and (anti-) reflective layers

\*This code is now discontinued.

#### W04-C01E\*

[1992-2001]

#### **Record carrier manufacture**

\*This code is now discontinued.

#### W04-C01F\*

[1992-2006]

## Physical recording format aspects

\*This code is now discontinued. Since 2007 this topic can be searched using T03-B01F codes in conjunction with T03-B01D1A, T03-B01D3A or T03-B01D5A as appropriate. See W04-C05 for signal aspects of recording formats.

## W04-C02\*

[1980-2001]

#### Heads

\*This code is now discontinued. From 2002 this subject matter is covered by T03-B02B codes only. W04-C02 and its subdivisions remain valid and fully searchable for records prior to 2002.

#### W04-C02A\*

[1992-2001]

#### Light source and photodetector

\*This code is now discontinued.

## W04-C02A1\*

[1992-2001]

#### **Light source**

\*This code is now discontinued. Prior to 2002 it included semiconductor lasers, full details of which are highlighted by U12-A01B codes and corresponding codes in V08, which also includes other laser types.

## W04-C02A5\*

[1992-2001]

#### **Photodetector**

\*This code is now discontinued. Prior to 2002 it included photodetectors for reading from a carrier and for focus detection. U12-A02B codes, e.g. U12-A02B2A for APD and other types of photodiode, are assigned for this topic.

#### W04-C02B\*

[1992-2001]

### Lens and optical system

\*This code is now discontinued.

Objective, beam splitter, polarizer

#### W04-C02C\*

[1992-2001]

#### **Head cleaning**

\*This code is now discontinued and this topic, including use of dummy cleaning carriers, is covered by T03-B02B8 only.

#### W04-C03\*

[1980-2001]

#### Head positioning (incl. focusing)

\*This code is now discontinued and from 2002 this subject matter is now covered by T03-B02A codes only. The codes W04-C03A to W04-C03H remain valid and fully searchable for records prior to 2002 when W04-C10 codes enabled a distinction to be made between head positioning for disks, tapes, etc.

#### W04-C03A\*

[1992-2001]

## For focusing

\*This code is now discontinued.

Focus detection, servo, objective positioning, voice coil motor, VCM

#### W04-C03B\*

[1992-2001]

## For track selection and alignment

\*This code is now discontinued. Prior to 2002 it included topics such as linear motors (see V06-M codes also), and track access/tracking servo systems.

#### W04-C03D\*

[1992-2001]

## **Control circuit for light source**

\*This code is now discontinued and from 2002 is covered by T03-B02A7 only. Laser diode bias control is also assigned U12-A01B4 and corresponding codes in V08.

## W04-C03H\*

[1997-2001]

#### Head positioning for double-sided disk

\*This code is now discontinued but prior to 2002 it included dual-head systems and arrangements for moving a single head to the other side of a disk.

#### W04-C04\*

[1980-2001]

## **Record carrier positioning**

\*This code is now discontinued. From 2002 - 2004 this subject matter was assigned T03-B03 codes, while since 2005 T03-B10 codes have been used, in all cases T03-E and T03-F codes being also assigned as appropriate. The codes W04-C04A to W04-C04B remain valid and fully searchable for records prior to 2002.

Turntable, loading device, drive, motor

#### W04-C04A\*

[1992-2001]

#### **Record carrier container**

\*This code is now discontinued but prior to 2002 it covered containers in which carriers are driven, for which W04-E02 codes were also assigned to indicate further details. Storage containers are covered by W04-L01 codes.

#### W04-C04B\*

[1992-2001]

#### **Record carrier drive**

\*This code is now discontinued. Prior to 2002 it was assigned with W04-E02 codes for further details, e.g. W04-E02A5 codes for disk changing.

#### W04-C05

[1992]

## Signal recording format and methods

From 2002 this code is only used for recording formats and methods specific to audio/video. General optical recording formats and methods are coded in T03-B05. Covers arrangement of data only, physical aspects such as hard sectoring of data, are covered by T03-B01F from 2007. Prior to 2007 this topic was coded in W04-C01F.

#### W04-C06

[1992]

## Reading and writing circuitry

From 2002 this code is only used for reading and writing circuitry with aspects relevant to audio/video recording. General optical reading and writing circuitry is coded in T03-B06.

This code is used with W04-F or W04-G01 codes if audio/video processing is significant.

#### W04-C10

[1992]

#### Optical recorder/player

Codes in this section are applied for **any** aspect of optical recording/playing equipment.

#### W04-C10A

[1992]

Disk

CD, CDi, interactive

W04-C10A1

[1992]

Audio e.g. 'CD player'

W04-C10A1K

[2005]

#### Dual deck optical disk player/recorder

## W04-C10A2\*

[2002-2004]

### Multilayer, e.g. 'DVD player'

\*This code is now discontinued. From 2002 to 2004 it was used to denote multilayer optical disk player/recorders used for non-specified audio/video/data storage. Since 2005 this topic has been covered in T03-B10A1, and for storage of audio/video information along with additional data formats, in W04-C10A3A. Prior to 2002 digital versatile disk or digital video disk player/recorders were coded in W04-C10A3.

#### W04-C10A3

[1992]

## **Optical video players and recorders**

Includes e.g. DVD, Blu-ray disk equipment.

#### W04-C10A3A

[2005]

#### **Combined with additional data formats**

Covers provision of computer program data and surround sound tracks in disk used primarily for storing video information.

### W04-C10A5

[1992]

## Jukebox system

See W04-C04C and W04-E02A5 codes for disk feeding aspects.

W04-C10B

[1992]

**Tape** 

W04-C10C

[1992]

Card

### W04-D

## Magneto-optical and other recording methods

From 2002 only audio/visual applications of magneto-optical and other types of recording are included in W04-D. Head, head positioning and carrier positioning aspects are coded **only** in T03-C and T03-D.

Includes capacitive recording and combination methods. For magneto-optical recording W04-D20 codes are assigned in the case of equipment. Record carriers and head/carrier drive systems are assigned T03-C and T03-D codes also.

### W04-D01\*

[1983-2001]

#### **Record carriers**

\*This code is now discontinued and since 2002 this subject matter now being coded in T03-C and T03-D01A. W04-D01 codes remain valid and fully searchable for records prior to 2002, and covered mainly capacitive record carriers, now assigned T03-C01 codes only.

PVC, carbon, conductive, dielectric, lubricant

#### W04-D01A\*

[1987-2001]

## For 'combination' recording e.g. magnetooptical

\*This code is now discontinued and the subject matter covered by T03-D01A codes.

Photomagnetic, Kerr effect, substrate, film, lightsensitive layer, reflective/antireflective layer, magnetic layer, reference layer, rare earth material, amorphous, protective coating

#### W04-D01A1\*

[1992-2001]

#### **Carrier manufacture**

\*This code is now discontinued. Since 2002 this topic has been covered by T03-D01A8 codes only.

#### W04-D02\*

[1983-2001]

#### **Heads**

\*This code is now discontinued, the subject matter now being coded in T03-C, and in T03-D01C (for optical heads) and T03-D01F1 (for magnetic heads) when magneto-optical recording is involved. W04-D02 remains valid and fully searchable for records prior to 2002.

Stylus, diamond, shank, lens, objective, beam splitter, polarizer, laser, photodetector, magnet, bias, erase

## W04-D03\*

[1983-2001]

## Head positioning

\*This code is now discontinued and since 2002 this subject matter has been coded in T03-C, T03-D01D and T03-D01F1A. W04-D03 remains valid and fully searchable for records prior to 2002.

Prior to 2002, for magneto-optical recording this code included focusing (now only assigned T03-D01D1 codes) and track selection/alignment (now only assigned T03-D01D3 and T03-D01D5 codes).

Track selection, kick-pulse, linear motor, voice coil motor, VCM, focusing

#### W04-D04\*

[1983-2001]

#### **Record carrier positioning**

\*This code is now discontinued and since 2002 this subject matter has been coded in T03-C and T03-D01B, T03-E and T03-F. W04-D04 remains valid and fully searchable for records prior to 2002, when W04-E02 codes were also assigned to provide a more detailed breakdown of subject matter.

Turntable, drive, carriage, load, motor

#### W04-D10

[1987]

#### Hard-copy video arrangements

See S06 codes also for non-standard video applications. Includes photographic methods and use of e.g. line printer. (See also S06-B codes, e.g. S06-B04A, and S06-D to K codes respectively).

Photographic reproduction, optical system, thermal/ink jet/impact/optical printer, electronic still-picture camera hard copy unit

#### W04-D20

[1992]

## Magneto-optical recorder/player

W04-D20 codes are used with other codes in W04 as appropriate.

## W04-D20A

[1992]

## Magneto-optical disk recorder/player

Includes mini-disk recorder/players

#### W04-D20B

[1992]

## Magneto-optical tape recorder/player

#### W04-E

[1983]

## **Recording in general**

From 2002 head positioning, carrier positioning and head record carrier motion synchronisation aspects of audio/visual recording are no longer coded in W04-E, the subject matter being covered in T03-E, T03-F, T03-G, T03-H and T03-J. Consequently the title of this code has been amended.

## W04-E01\*

[1983-2001]

#### **Head positioning**

\*This code is now discontinued, the subject matter now being coded in T03-G only. The codes W04-E01A to W04-E01C remain valid and fully searchable for records prior to 2002.

These codes were assigned for generally applicable cases. See appropriate codes in W04-B, W04-C or W04-D which took precedence.

#### W04-E01A\*

[1983-2001]

#### **Helical scan**

\*This code is now discontinued. Drum, cylinder

#### W04-E01B\*

[1983-2001]

## For longitudinally scanned tape

\*This code is now discontinued.

#### W04-E01C\*

[1983-2001]

#### For disks

\*This code is now discontinued.

## W04-E02\* [1983-2001]

## **Record carrier positioning**

\*This code is now discontinued and from 2002 this subject matter is covered by T03-E, T03-F and T03-H codes only. W04-E02 codes remain valid and fully searchable for records prior to 2002.

For motor and other position transducer aspects see V06 codes. Includes housings in which carriers are driven during normal operation.

## W04-E02A\* [1983-2001]

#### For disks

\*This code is now discontinued.

## W04-E02A1\* [1992-2001]

#### Disk cassettes per se

\*This code is now discontinued.

## W04-E02A1A\* [1992-2001]

#### Disk cassette manufacture

\*This code is now discontinued.

## W04-E02A1C\* [1992-2001]

#### Disk cassette construction

\*This code is now discontinued.

#### W04-E02A3\* [1992-2001]

#### **Disk driving arrangement**

\*This code is now discontinued and from 2002 T03-F02 (and T03-N01) codes are assigned for this topic.

## W04-E02A3A\* [1992-2001]

## **Disk drive components**

\*This code is now discontinued. Prior to 2002 it included motors (see V06-M codes also), turntables, spindle brakes, etc.

## W04-E02A3C\* [1992-2001]

#### Disk drive speed control

\*This code is now discontinued. Motor control circuits are also assigned V06-N codes.

## W04-E02A5\* [1992-2001]

#### Disk changing systems

\*This code is now discontinued and from 2002 the subject matter is covered by T03-F01 and T03-N01 codes (previously assigned as well as W04-E02A5). For general aspects of optical disk 'jukebox' systems, see W04-C10A5. See also T03-Q codes for library systems in general.

## W04-E02A5A\* [1992-2001]

## Single feeding of manually-loaded disk

\*This code is now discontinued.

### W04-E02A5C\* [1992-2001]

## Selecting from simultaneously-loaded disks

\*This code is now discontinued but previously included carousel-type arrangements enabling initial loading of several disks for playing sequentially or in a selected order. Arrangements to feed one disk at a time into recording/playing equipment from a library of carriers were covered by W04-E02A5E.

## W04-E02A5E\* [1992-2001]

## Automatic feeding from library of disks

\*This code is now discontinued and the subject matter covered by T03-Q05 codes and in T03-F01F5 (and T03-N01).

## W04-E02B\* [1983-2001]

#### For tape

\*This code is now discontinued. Reel, spool

## W04-E02B1\* [1983-2001]

#### **Cassettes**

\*This code is now discontinued. Prior to 2002 the code was assigned only for cassettes themselves, not all cassette recording related aspects. For magnetic tape cassettes W04-B04B1 was also assigned. These topics are now covered by T03-H01B codes (or T03-H01C for loop-type cassette) and T03-N03.

Housing, casing, mould plastics, audio/video cassette, protective cover

## W04-E02B1A\* [1992-2001]

## **Cassette manufacture**

\*This code is now discontinued and the subject matter is now coded in T03-H01B8 codes alone.

## W04-E02B1C\* [1992-2001]

## **Cassette constructional details**

\*This code is now discontinued.

## W04-E02B1E\* [1992-2001]

### Cassette for helical-scan tape

\*This code is now discontinued but was previously only assigned for cassettes where the helical-scan aspect impacts on the design to a significant extent. T03-N02 is assigned for all aspects of helical scan equipment and carrier cases.

VHS, VTR, DAT, protective cover

## W04-E02B3\*

[1983-2001]

#### **Drive**

\*This code is now discontinued. W04-B04B3 codes were assigned in preference for magnetic tape recorders.

Control, capstan, roller, pulley, belt, gear

#### W04-E02B5\*

[1983-2001]

## **Operating mode control**

\*This code is now discontinued.

Select, switch, function, play, record, position, fast forward, rewind, pause, stop, autostop

#### W04-E02B5A\*

[1992-2001]

#### **Automatic control**

\*This code is now discontinued. For magnetic tape recorders, W04-B04B5A was assigned from 1992.

#### W04-E02B5C\*

[1992-2001]

#### Manual control

\*This code is now discontinued. For magnetic tape recorders W04-B04B5C was assigned between 1992 and 2001.

#### W04-E02B5E\*

[1992-1996]

## Special reproduction mode

\*This code is now discontinued but was used for topics such as arrangements for replay at differing speeds. Since 1997, that subject matter has been covered by W04-E20 codes, applicable to all recorder types (rather than just tape recorders). W04-E02B5E remains valid and searchable for records between 1992 and 1996.

#### W04-E02B7\*

[1983-2001]

#### **Helical scan**

\*This code is now discontinued.

Head drum, guide, rotating cylinder, tape looping

## W04-E03\*

[1983-2001]

#### Record carriers

\*This code is now discontinued and from 2002 this subject matter is now covered by codes in T03-H only. The codes in this subgroup remain valid and fully searchable for records prior to 2002 and covered general aspects of record carriers.

Disk, compact, tape, manufacture, clean

### W04-E03A\*

[1997-2001]

## Labels and authentication marks

\*This code is now discontinued.

#### W04-E03A1\*

[1997-2001]

#### Labels

\*This code is now discontinued but prior to 2002 it included labels applied to the carrier itself and to housings such as a cassette case or jewel box.

#### W04-E03A5\*

[1997-2001]

## Authentication markings for record carrier

\*This code is now discontinued but covered both human-readable and machine-readable markings, such as bar coding (see T04-A and T04-C codes also). Identification of counterfeit audio or video recordings by added signals is included in W04-G01L3 and W04-F01L3 respectively.

Code, serial number, hologram, pressing plant

#### W04-E04

[1987]

## Remote control, time programming

See S04-C for timer aspects. Prior to 2002 see W04-B04B5 and T03-E05 codes also for tape recorder operating mode control. From 2002 W04-B04B5 is no longer used.

#### W04-E04A

[1992]

#### Remote control

For general aspects of audio/video remote control see W03-G05A codes, and for remote control specific to TV receivers, W03-A02C codes. Remote control in general is covered by W05-D codes.

## W04-E04C

[1992]

#### Time programming

Time programming devices in general are covered by S04-C, e.g. S04-C02.

## W04-E04C1

[1992]

## Programming from record carriers or programming codes

Includes input of timer information by e.g. bar code reading, (reading of bar codes is also coded in T04-A03B1), and 'universal' programming devices learning function of normal remote control unit (from 1997, also assigned W03-G05A1A). From 2005 use of electronic programme guides and GUIs is covered in W04-E04C8.

# Video Plus W04-E04C5

[1992]

## Programming and control based on off-air signals

For signal processing aspects, such as extraction of control signals, use with W04-F01K. Prior to 1997, this code was used for arrangements to prevent recording of commercial messages in conjunction with W04-J05. From 1997 this topic is wholly covered by W04-E04C5C.

## W04-E04C5A [1997]

## Involving transmitted programme identification

Includes systems such as VPS. Transmission of such signals is covered by W02-F05C.

#### W04-E04C5C [1997]

## Preventing recording of commercial messages

(W04-E04C5, W04-J05)

This code covers arrangements, usually relating to the recorder itself only, for pausing recording when a commercial message is being transmitted and continuing recording once the programme resumes.

Blank screen, cue

## W04-E04C5E [2005]

## Overriding prevention of recording of commercial messages

See W02-F10N for variation of subscription fees based on choice of whether or not to receive commercial messages.

Blank screen, cue

#### W04-E04C7 [2002]

#### With learning function

This code covers automatic time programming arrangements based on learned user preferences, e.g. through monitoring of manual time programming operations or manual channel selection. For analogous arrangements for channel selection in TV receivers see W03-A18A5C.

#### W04-E04C7A [2006]

## **Determining recording priority**

Deciding between conflicting time programming settings, searching for repeat showings etc.

## W04-E04C8 [2005]

## Using programme guides

Includes use of EPG data transmitted with TV signal or interfacing with PC receiving programme guide information from e.g. Internet.

## W04-E10\* [1992-2001]

## Head-record carrier motion synchronisation

\*This code is now discontinued. Since 2002 this subject matter has been covered by T03-A05, T03-E, T03-F, T03-G and T03-J03 codes only. W04-E10 remains valid and fully searchable for records prior to 2002

Tape track, magnetic, speed, rotating VTR/DAT head, drum, position, scan, motor pulse synchronisation, phase, servo drive, dynamic tracking arrangement

#### W04-E20 [1997]

## **Recorder operation mode**

The codes in this section, which replace W04-E02B5E used with tape equipment only, are assigned together with other W04 codes to indicate operating mode for any recorder type. W04-E20A and W04-E20C codes include arrangements with differing recording and reproduction speeds.

W04-E20J is assigned as appropriate when recording is involved, and W04-E20R for reverse operation (normal forward operation being otherwise assumed).

W04-E20A [1997]

**High speed** 

W04-E20C [1997]

Slow speed, time-lapse, freeze-frame

W04-E20C1 [1997]

Slow speed

W04-E20C3 [1997]

Time-lapse

W04-E20C5 [1997]

## Freeze frame and still picture

Use with W04-E20R for recording of still pictures. Electronic still picture cameras only capable of still-picture recording are not included here - see W04-M01B1 codes.

#### W04-E20E [1997]

#### Search mode

For arrangements linked to the use of indexing signals or carrier travel, see W04-H codes.

W04-E20G [2007]

Erasing

(W04-E20X)

## W04-E20J [1997]

#### Recording

This code is assigned with other W04-E20 codes as appropriate, e.g. with W04-E20A for high-speed recording.

#### W04-E20K [2007]

## Multiple viewing angle and foveation aspects

(W04-E20X)

Covers general aspects of multiple-viewing angle systems. Multi-view displays are covered in W03-A12A and/or W04-Q01S while encoding systems are covered in W04-P01A2.

#### W04-E20M [2002]

## Simultaneous playing and recording

Covers arrangements to allow playback of one section of carrier while recording onto another section, e.g. to allow playing from start of recorded programme before recording is finished.

## W04-E20P [2008]

## **Playlist management**

This code covers the creation and selection of playlists, either manually or automatically. Indexing aspects are covered by W04-H01C codes. Automatic selection of playlists based on sensed emotional or mental state is also assigned S05-D01X (and other S05-D codes as appropriate). For determination of such states based on voice analysis, W04-V04A4 is also assigned and if based on image analysis T04-D07F codes are also assigned.

Favorite, top-rated, star-rated, daytime, evening, weekend, jazz, classical, rock, pop, tempo, rhythm

## W04-E20R [1997]

#### Reverse mode

Covers e.g. reverse playback.

## W04-E20S [2005]

## Changing recording quality

Covers arrangements to allow switching from SP to LP mode during recording and automatic adjusting of recording quality to fit programme within available capacity of recording medium.

## W04-E20T [2005]

#### **Multiple operation modes**

This code is used for inventions concerned with several modes of operation with no particular emphasis on any given one.

Trick play

## W04-E20V [2005]

#### Time shift recording

Covers arrangements to allow viewer to select recording from start of current programme even when this programme is part-way through by use of buffer to continuously record a given channel or set of channels. For arrangements to allow pausing of programme while viewing and then continue recording programme from pause point search in conjunction with W04-E20M.

#### W04-E20X [1997]

## Other recording equipment mode

## W04-E30 [2013]

## General audio and video (AV) recording and playing equipment

These codes are intended to indicate equipment for audio or video recording and playing in general, including 'media players' which are also covered by T01-J30C. The codes do not take account of storage technology (e.g. hard disk, solid-state memory etc.) and are not applied for specific equipment that is covered elsewhere in W04.

#### W04-E30A [2013]

## General AV recording and playing equipment characterised by content

#### W04-E30A1 [2013]

## Multimedia and media players and recorders

This code takes precedence over W04-E30A3 and W04-E30A5. Prior to 2013 this topic was chiefly covered by W04-P01C8 when solid-state storage was involved. Media players in a computer context are also covered by T01-J30C and AV equipment in general requiring operation with a PC is also covered by W03-G06.

## W04-E30A3 [2013]

#### Audio players and recorders

Prior to 2013 this topic was chiefly covered by W04-G01B8 when solid-state storage was involved and that code can also be assigned for novel aspects specific to recording in solid-state memory. This code is assigned for 'MP3 players'.

#### W04-E30A5 [2013]

## Video players and recorders

Prior to 2013 this topic was chiefly covered by W04-P01C8 and that code can also be assigned for novel aspects specific to recording in solid-state memory.

#### W04-E30A5A

[2013]

## Digital photo frames and viewers

This code is assumed to refer to portable equipment so W04-E30C1A is not also assigned.

#### W04-E30C

[2013]

General AV recording and playing equipment characterised by form

#### W04-E30C1

[2013]

## Self-contained AV recording and playing equipment

Includes players and recorders as separate equipment.

## W04-E30C1A

[2013]

## Portable AV recording and playing equipment

Portable AV equipment in general is covered by W03-G04.

#### W04-E30C5

[2013]

# General AV recording and playing equipment incorporated in other equipment

Includes players and recorders incorporated into a PC, mobile phone, or similar equipment. AV equipment in general combined with other equipment in a single housing is assigned W03-G03A.

#### W04-F

#### General video signal recording

This code is used merely to highlight video recording or reproduction in a general sense. It relates to recording and reproduction using dynamic methods such as tape, disk, etc. but excluding static storage in e.g. flash memory which is covered by W04-P01C codes (except in the case of dynamic video recorders/players in which solid-state memory is also used for signal processing, this being covered by W04-F01M codes). W04-F can be used alone or with other codes. Its subdivision codes (all W04-F01 and W04-F02 codes) are applied for novel signal processing details either alone or with technology-specific codes such as W04-B, W04-C or W04-D codes as necessary.

Signal processing for dynamic recording in general or recording and reproduction of non-audio or non-video information is covered by T03-P codes. *Video, tape, disk, drum, colour, digital, frame, field* 

#### W04-F01

## Video signal processing for recording

Frequency band translation, AM/FM recording, compression, noise reduction

#### W04-F01A

[1992]

## Signal transformation, frequency changing, demodulation

Includes e.g. 'colour-under' system.

## W04-F01A1

[1992]

## Signal transformation and frequency changing

Folding

## W04-F01A1A

[1992]

#### **Modulation and demodulation aspects**

See U23 codes for novel demodulator circuits.

#### W04-F01A5

[1992]

## Dynamic range control, amplitude compression, AGC

Compression by coding is covered by W04-F01F codes. See also U24-C01 and U24-C02 codes for AGC and compression respectively.

### W04-F01B

[1992]

## **Equalising and peaking circuits**

See W04-B for equalising specific to magnetic recording.

#### W04-F01B1

[1992]

#### Peaking, crispening

Crispening for general video processing is covered by W04-P01E3.

#### W04-F01C

[1992]

## Synchronising signal processing

#### W04-F01D

[1992]

## Signal processing specific to colour video (W02-F06)

## W04-F01D1

[1992]

#### **Luminance/chrominance separation**

Luma-chroma, Y-C, comb filter, digital filter

## W04-F01D3

[1992]

## **Colour synchronising**

Signal processing of TV synchronising information in general is covered by W04-F01C.

Colour burst, subcarrier

W04-F01E [1992]

**Noise reduction** 

W04-F01E1 [1992]

Head switching noise suppression

W04-F01F [1992]

## Signal coding and compression

Covers compression as part of signal coding. Compression of dynamic range without coding is covered by W04-F01A5. Prior to 1997, video coding aspects specifically for recording were covered by W04-F01F codes only, but from 1997 codes are also be assigned from the general W04-P01A section to indicate the nature of the coding involved.

## W04-F01F1\* [1992-2006]

## **Movement-responsive compression**

\*This code is now discontinued. Since 2007 all predictive motion-based coding systems have been covered in W04-P01A codes.

## W04-F01F5 [1997]

## **Error detection and correction**

See T03-P01A for error detection in recording in general.

#### W04-F01H [1992]

Multistandard and HDTV signal processing (W02-F06, W04-F01)

W04-F01H1 [1992]

Recognition of standard, automatic switching

W04-F01H3 [1992]

## Standards conversion

(W04-F01, W04-N)

Standards conversion in video recording is **not** assigned the general code W04-N05A. Prior to 1992 search W04-F01 and W04-N.

#### W04-F01H3A [2005]

#### **Transcoding**

This code covers the conversion of one form of video coding to another, e.g. MPEG-2 to MPEG-4, or changing the sample rate without changing the type of coding, during the recording or reproduction of video signals. Transcoding of video in general is covered by W04-N05A1.

## W04-F01H3C [2010]

## **Upscaling of video signals**

This code covers upscaling, especially of reproduced video, to provide e.g. improved resolution on an HD display device. Codes for recording and reproducing equipment are also assigned as appropriate, e.g. W04-C10A3 for DVD video players.

#### W04-F01H5 [1992]

**HDTV** signal processing

#### W04-F01K [1992]

## Signal processing for additional picture information

Includes arrangements to enable recording of data contained in blanking periods, e.g. teletext signals (prior to 1992 see W02-F05B and W04-F01), or in connection with VPS data. Also covers recording of other supplementary signals received off-air. All aspects of control of recorder by off-air signals are coded in W04-E04C5.

Closed caption, region code

## W04-F01L [1992]

## Copy restriction, copy marking and scrambling

From 1997 the title of this code is expanded to reflect the inclusion of arrangements to enable identification of copy recordings (now assigned W04-F01L3).

#### W04-F01L1 [1997]

## Signal processing to prevent or restrict recording or viewing

Includes arrangements either preventing copying completely, or producing unacceptable quality copy. For signal processing aspects specific to magnetic recording W04-B01C1A is also assigned. Similar inventions for audio recording are assigned W04-G01L1, but W04-F01L1 takes precedence for combined audio and video recording.

## W04-F01L3 [1997]

## Signal processing to indicate occurrence of copying

Includes arrangement to insert a signal, in general not visibly affecting reproduction, but enabling subsequent identification of copy or recording source. Similar systems for audio recording are coded in W04-G01L3, but W04-F01L3 takes precedence for combined recording of audio and video information. Distinguishing legitimate from illegitimate copies based on other marking methods is covered by T03-H02A1C.

Watermarking

## W04-F01M [1992]

## **Processing involving memory**

(W04-F01, W04-P01C)

This code is used for circuits employing memories as part of the recording signal processing system, and is **not** used for frame stores per se or frame store processing system of general application as covered by W04-P01C codes.

Freeze-frame, still picture

#### W04-F01M1 [1997]

#### For storing still picture

See also W04-D10 for use of memory in video hard copy systems. Electronic still picture cameras using memory card storage are not included here - see W04-M01B1C and W04-P01C5.

#### W04-F01M5 [1997]

## In connection with signal processing

Search with other W04-F codes as appropriate, e.g. with W04-F01F for coding involving use of memory circuitry, or W04-F02B for timebase error correction.

## W04-F01P [2006]

#### Multiple channel recording

Covers simultaneous recording of separate video streams. For simultaneous recording of multiple camera outputs search in conjunction with W04-M01V.

## W04-F01X [1992]

#### Other recording signal processing

#### W04-F02

Drop-out and time-base error compensation

## W04-F02A [1992]

#### **Drop-out compensation**

Noise reduction for video recording other than due to drop-out is covered by W04-F01E codes, error correction is covered by W04-F01F5.

Correct, error, concealment

## W04-F02B [1992]

#### **Timebase error compensation**

For skew correction in general see T03-A06H. *Phase, TBC* 

#### W04-G

## Audio signal processing; Mixing and studio equipment

W03-C and W03-G codes are used as appropriate to convey additional information regarding audio equipment.

## W04-G01 [1987]

## General audio recording and audio processing for recording

#### W04-G01A [1992]

#### For dynamic recording

This code is used for signal processing irrespective for record media, (see T03-P codes also).

#### W04-G01B [1992]

#### For static recording

Covers recording in solid-state memory.

## W04-G01B3 [1992]

Signal processing aspects

### W04-G01B5 [1992]

Memory addressing and control

#### W04-G01B7 [1992]

### Static recording applications

This code is used merely to highlight the use of static recording and is generally assigned when no significant details are given of the audio recording or playback device used. Solid-state audio recorders and players with novel details described are covered by W04-G01B8.

## W04-G01B8 [2002]

#### Solid state digital audio player/recorder

This code is assigned for novel details of solid-state audio recorders and players. Applications of such devices without any significant novel details being described are covered by W04-G01B7.

[1992]

MP3 player

## W04-G01B9

Other static recording aspects

#### W04-G01D [1992]

Noise and distortion reduction

## W04-G01F [1992]

## Audio signal coding and decoding

Includes sampling, digitising, etc. See W04-V05G for speech coding for non-recording applications, and U21-A codes for coding in general. See also W04-V10 for general audio coding.

#### W04-G01F1 [1992]

#### **Error detection and correction**

Also coded in T03-P01A.

Bit error rate, BER, Reed-Solomon, cross interleave

## W04-G01L [1997]

## Copy restriction, copy marking and scrambling

## W04-G01L1 [1997]

## Signal processing to prevent or restrict recording or listening

Includes arrangements either preventing copying completely, or producing unacceptable quality copy. For signal processing aspects specific to magnetic recording W04-B01C1A is also assigned. Similar inventions for video recording are assigned W04-F01L1, which takes precedence for combined audio and video recording.

## W04-G01L3 [1997]

## Signal processing to identify occurrence of copying

Includes arrangement to insert a signal, in general not audibly affecting reproduction, but enabling subsequent identification of copy or recording source. Similar inventions relating to video recording are coded in W04-F01L3, which takes precedence for combined recording of audio and video information. Distinguishing legitimate from illegitimate copies based on other marking methods is covered by T03-H02A1C.

W04-G01M [2005]

Multiple channel recording

W04-G01M1 [2005]

Stereo and surround sound recording

W04-G01M3 [2005]

#### Recording of separate audio track

Covers arrangements to record alternative language versions of soundtrack.

W04-G01M5 [2005]

Multitrack recording

## W04-G03 [1992]

#### **Audio noise reduction**

For audio recording noise reduction see W04-G01D.

W04-G03A [1992]

Improving signal-to-noise ratio

W04-G03C [1992]

#### Reducing acoustic feedback

Use with W04-S05 codes for public address application.

Howl-round, howling, Larsen effect, squealing

## W04-G04 [1992]

## Audio signal dynamic range and frequency control, other effects

#### W04-G04A [2005]

#### Audio signal dynamic range control

Includes AGC, compression, expansion, limiting and companding schemes. See also U24 codes. Note that audio signal compression in the sense of coding is not included, being covered by W04-V05G codes or speech and W04-V10 codes for audio signals in general.

#### W04-G04E [2005]

## Frequency enhancement and addition of harmonics

Includes exciters, enhancers, bass expanders etc. See W04-U03E for delay-based effects, e.g. reverberation, flanging, phasing.

#### W04-G05 [1992]

## Sound mixing and switching

Blending, mixing console, multichannel sound system

#### W04-G05A [1992]

## **Control aspects**

Includes circuitry and control elements per se, e.g. slider potentiometers.

#### W04-G05B [1992]

## Interfacing

Includes connection to MIDI systems. For musical instrument aspects see W04-U05 also.

## W04-G05C [1992]

## **Mixer circuitry**

For amplifier circuitry see U24-G01C and other U24-G codes as appropriate.

W04-G05E [2007]

Switching and routing of audio sources

W04-G08 [2006]

### Sound recording studio equipment

Use in conjunction with W03-C, W04-U03E, W04-S and other W04-G codes as necessary. Includes all professional audio equipment for use in recording or audio broadcast studio.

## W04-H

## **Editing; Indexing**

Except for audio/video signal processing aspects, also coded in T03-J, T03-K codes.

W04-H01 [1992]

Index signal recording and detection

W04-H01A [1992]

Time code system

**SMPTE** 

W04-H01C [1997]

## Indexing information relating to recorded contents

Includes 'table of contents' information, recorded separately or interleaved with main recorded information, but usually by same recording process in either case. For records prior to 2002 labels providing such information in human-readable form are covered by W04-E03A1. From 2002 these are covered by T03-H02A1A only.

Metadata

W04-H01C1 [1997]

## User-recordable contents index information

Includes 'user table of contents' information, and thus implies use of recordable, rather than 'read-only' carriers.

UTOC

W04-H01C5 [2006]

#### **Automatic content indexing**

Includes thumbnail indexing, and use of EPG data to generate searchable indexing information.

W04-H01C8 [2006]

Differentiating between different data types

Music photo video (MPV)

W04-H01E [2006] Error management information W04-H03 [1992]

Measuring travel of carrier

See also T03-J05 codes.

W04-H05 [1992]

Editing, dubbing, splicing tape

W04-H05A [1992]

**Dubbing** 

W04-H05A1 [2007]

**User controlled dubbing** 

W04-H05A5 [2007]

**Automatic dubbing** 

Includes automated back-up and archival operations.

W04-H05C [1992]

Splicing

W04-H05E [1997]

**Editing** 

W04-H05E1 [2006]

User controlled editing

W04-H05E5 [2006]

**Automatic editing** 

## W04-J

#### Monitoring/testing recording equipment

W04-J01 [1992]

## Theft alarms, security system, access control

See W05-B01 codes also for theft alarms. Antitheft, disconnection-detector

W04-J01A [2005]

#### Access control

Includes child lock systems, user authentication and user interfacing aspects of region control.

W04-J01C [2005]

Theft alarms

W04-J03 [1992]

**Recording equipment operation displays** 

W04-J03A [1997]

Dedicated display

## W04-J03C [1997]

#### **On-screen display**

For such arrangements in TV receivers see W03-A13G. Includes menus etc. on digital camera display.

OSD

#### W04-J05 [1992]

## Recording equipment controls and circuits (general)

Automatic level control, gain control, intensity control, feedback, compensate, correct, jog wheel

#### W04-J07 [1992]

## **Recording equipment testing**

Codes in this section are used together with the appropriate code for the function being tested.

#### W04-J07A [1992]

## **Testing during manufacture**

Includes testing complete and partially complete equipment.

Production line testing

#### W04-J07C [1992]

## Post-manufacture equipment testing and monitoring

Includes self-testing apparatus.

Signal-to-noise ratio, distortion, head alignment, inbuilt testing circuit

## W04-K

## Synchronising, co-operation with other equipment, and interfacing

The title of this code has been changed to reflect the fact that audio/video recording and reproduction aspects of multimedia systems (coded in W04-K05 until 1997, and in W04-K10 between 1997 and 2004) are no longer included. Computing aspects of multimedia are covered by T01-J30 codes. Codes in this group are used with the appropriate code for the type of recording equipment involved or alone if the type is not specified. To indicate co-operation of W04 equipment with other types of equipment or systems in a general sense W04-K itself may be assigned (i.e. without subdivision).

#### W04-K01

#### Synchronisation between recording units

Includes synchronisation of e.g. photographic and audio equipment and also general arrangements with the emphasis on timing to enable recording or playback equipment to work together.

'Blip' detector for slide projector, re-recording synchronisation, synchronous dubbing

## W04-K05 [1987]

#### **Recording equipment systems**

Includes use of several recording/playback units e.g. for picture file, and recording equipment used as a 'functional block' in a larger system. Prior to 1997, this code included audio/video recording and reproduction aspects of multimedia systems.

Combination recording, home entertainment system, animated objects control, video game, simulator

#### W04-K05A [1997]

#### Multiple recording equipment systems

Includes audio/video file server arrangements, e.g. for on-demand entertainment systems (see W02-F10K also).

## W04-K05C [1997]

## Recording/reproducing unit as 'functional block'

This code covers arrangements involving interconnection of a recording equipment with some other system, e.g. self-contained VTR used to store surveillance camera image (with W04-B10C and W02-F01A5 or W05-B01C5 codes).

## W04-K06 [1992]

#### Modulator/demodulator

Includes arrangements to interface recording equipment with e.g. TV receiver (for VTR search with W04-B10C).

## W04-K07 [1992]

## Interfacing arrangements e.g. cables, plugs, etc.

See V04 codes for plug and connector details.

#### W04-K08 [2002]

#### Interfacing with PC

Includes arrangements to allow control of recording equipment by PC or downloading of recorded material.

#### W04-K10\* [1997-2004]

## Audio/video aspects of multimedia

\*This code is now discontinued. Prior to 2005 it was used to indicate audio/video aspects only of multimedia, but due to the ubiquity of that term the code was discontinued. Since 2005 audio and video aspects of personal computers have been assigned the relevant W04 code in conjunction with T01 codes. (Multimedia computer systems are covered by T01-J30 codes).

#### W04-L

## **Recording housings**

From 2002 this group no longer includes containers for record carriers. Constructional details specific to audio/video recording equipment are still coded in W04-L05 but any non-specific constructional aspects are coded in T03-L05 only.

For records prior to 2002 codes in this section cover housings for storing record carriers, and housings and constructional details of audio/video recording equipment. Corresponding codes in the T03-L section are also applied, (additional information may be gained by use of T03-N codes where W04-L codes are not specific).

## W04-L01\* [1987-2001]

#### For record carriers

\*This code is now discontinued and from 2002 this subject matter is assigned T03-L01 codes only. W04-L01 codes remain valid and fully searchable for records prior to 2002. W04-L01 covered cassette boxes, racks, record cases, etc., but **not** casings in which carriers are driven during the recording or playback process.

## W04-L01A\* [1992-2001]

#### **Record carrier container**

\*This code is now discontinued but prior to 2002 covered containers for individual carriers. Storage racks were covered by W04-L01C codes.

## W04-L01A1\* [1992-2001]

#### For disks

\*This code is now discontinued. *CD, compact disk case* 

## W04-L01A3\* [1992-2001]

#### For tape

\*This code is now discontinued. Cassette case, spool/reel box

## W04-L01C\* [1992-2001]

#### Storage racks, boxes, cases

\*This code is now discontinued. It covered racks and similar structures used for storage only, from which a carrier is removed **with** its individual container. (Individual containers were covered by W04-L01A codes). This code was also used for display arrangements in retail stores.

## W04-L01C1\* [1992-2001]

#### For disks

\*This code is now discontinued. Floppy disk box, file box, record case

#### W04-L01C3\*

[1992-2001]

#### For tape

\*This code is now discontinued. Cassette rack

#### W04-L05

[1987]

Housings and constructional details of recording equipment

#### W04-L05A

[1987]

#### Cabinets, casings, stands

See V04-S codes for casings in general.

#### W04-L05B

[1987]

## Construction e.g. mounting of PCBs, components

See V04-T codes for these details for electronic equipment in general.

#### W04-M

#### Video and synchronising signal generators

#### W04-M01

#### Video cameras

Electrical aspects of photographic cameras are covered by S06-B codes. Features common to both photographic and video cameras are coded in both sections. Novel imaging and camera aspects of endoscopes are included here. See also S05-D codes and W02-F01M for this topic.

Imager, image pick-up, electronic imaging

#### W04-M01A

## **Camera tube arrangements**

Image pick-up tubes per se are coded in V05-D codes only, but details such as tube/coil assemblies are included.

Tube biasing, power supplies, deflection signal generators, deflection coil, focusing, astigmatism correction, screening, vidicon, plumbicon, imageorthicon camera

#### W04-M01B

## Solid state pick-up device arrangements

CCD Camera

## W04-M01B1 [1987]

## **Digital camera**

This code is used for solid-state video cameras used predominantly for recording single frames in e.g. RAM, hard disk or optical disk. W04-M01B1 codes are used for **any** aspect of the camera. For still-picture recording facility in camera designed primarily for video recording see W04-E20C together with W04-M01B and W04-M01K.

Shutter release control, disk drive control, disk loading/unloading system, interface for hard copy

### W04-M01B1A [1992]

## Dynamic recording type

W04-B14 and W04-C10A3 codes are also assigned for recording on magnetic and optical disks respectively.

#### W04-M01B1C [1992]

## Static recording type

Includes camera storing image in solid state memory.

Digital still-picture camera, digital camera

#### W04-M01B1E [2005]

Video recording aspects

## W04-M01B1S [2013]

## Digital single lens reflex camera

This code is assigned for **all** aspects of digital SLR cameras. For specific novel optical details search with W04-M01C codes as appropriate, e.g. W04-M01C5 for mirror arrangements.

DSLR

## W04-M01B5 [1992]

#### Solid state image pick-up element

Covers image pick-up per se which is also assigned U13-A codes.

## W04-M01B5A [1992]

#### **Reading methods**

Covers methods of read-out and operation circuitry integral with the pick-up element. For 'electronic-shutter' arrangements based on e.g. limiting charge accumulation time, search with W04-M01D5C. (Electro-optical shutters separate from the image sensor and based on e.g. liquid crystal devices are not included and are covered by W04-M01C7A from 2014).

Shift register

## W04-M01B7 [1992]

#### **External circuitry**

Covers drive circuitry external to pickup per se. Includes circuitry linked to CCD.

#### W04-M01B8 [2009]

## **Image sensor movement arrangements**

This code and its subdivisions cover devices imparting mechanical movement to the image sensor for focusing or other purposes. Similar arrangements acting on optical system components are covered by W04-M01C1 codes or W04-M01C9 as appropriate. Details of actuators and the like are indicated by assignment of V06 codes.

Displacement

## W04-M01B8A [2009]

## Image sensor movement for enhancing imaging

This code covers arrangements for imparting mechanical movement to the image sensor for enhanced imaging, such as resolution improvement (previously treated as optomechanical scanning by assignment of W04-M01E5) or as an anti-shake measure with W04-M01D7.

Dithering

## W04-M01B8B [2009]

#### Image sensor movement for focusing

This code covers arrangements for imparting mechanical movement to the image sensor for focusing purposes, e.g. where the lens system is fixed. Arrangements for moving lenses for focusing are covered by W04-M01C1B. Manual focusing is indicated by assignment of W04-M01D1 and automatic focusing with W04-M01D5D.

## W04-M01B8C [2009]

## Image sensor movement for cleaning

This code covers arrangements for imparting mechanical movement to the image sensor for cleaning purposes, e.g. the use of ultrasonic vibration to remove dust from a sensor window. Particle, speck, foreign body, detachable lens.

#### W04-M01B8X [2009]

Other image sensor movement

## W04-M01C [1987]

## (Auto)focusing, zooming, lenses for TV camera, shutters, filters

Single lens reflex (SLR), optical system, beam splitter, iris, aperture

#### W04-M01C1 [1992]

#### Lens system

Search with W04-M01G1B for constructional details of lens systems.

## W04-M01C1A [1992]

#### **Novel lens details**

Covers novel aspects only of single lenses and lens groups such as zoom lenses. Search with W04-M01B5 for lens or lens array integral with image pick-up element which from 2018 is also specifically covered by W04-M01C1G. Since 2011 the use of variable lenses, including those with electrically-controlled variable parameters has been indicated by W04-M01C1E. If the variable lens is novel W04-M01C1A is also assigned. Note that 'lens systems', 'lens barrels' and 'lens tubes' without any novelty in lenses themselves are not included and are covered by W04-M01C1 with W04-M01G1B for constructional details such as lens mounting arrangements.

Abbe number, aberration, concave, convex, chromatic, coating, focal length, glass, material composition, plano-concave, plano-convex, plastics, power, refractive power, V number

## W04-M01C1B [1992]

#### Motor drive for focusing

See V06-M codes for details of motors or actuators themselves, and V06-N codes for novel drive circuitry for motor control. This code is used with W04-M01D5D (focus control) for control of focus involving novel motor drive aspects, or position feedback, only, for all other aspects of automatic focusing, W04-M01D5D is used alone. W04-M01C1B is assigned with W04-M01D1 codes for manual control of focus. From 2009, focusing by movement of the image sensor alone is not included, being covered by W04-M01B8B.

Stepper, piezoelectric, shift, HF content, hillclimbing, servo, automatic

#### W04-M01C1C [1992]

#### Motor drive for zooming

See V06-M codes for details of motor per se, and V06-N codes for novel drive circuitry for motor control. This code is used with W04-M01D5E (magnification control) for control involving novel motor drive aspects, or position feedback, only, for all other aspects of magnification control, W04-M01D5E is used alone.

Stepper, shift, automatic

## W04-M01C1D [2014]

#### Detachable/interchangeable lens

This code covers lens units that can be removed from or fitted to a camera body. For interfacing and electrical connection details W04-M01D8A is also assigned.

Interchangeable, long focus lens, long lens, telephoto

### W04-M01C1E [2011]

#### Variable lenses

This code covers the use of lenses with variable properties, e.g. where the lens is physically deformed to change its refractive power. If the variable lens is novel W04-M01C1A is also assigned. (V07 codes are also assigned for lenses with electrically-controlled variable parameters). W04-M01C1E does not cover lens systems in which magnification or focus is changed by changing the distance between lenses or between a lens and an image sensor.

Liquid crystal lens, ring electrodes, variable optical power lens element

## W04-M01C1G [2018]

## Lens or lens system integral with image sensor

This code covers lenses or lens systems that are integral with an image sensor. When novel lenses are involved W04-M01C1A is also assigned. Optical elements that are part of an integrated circuit image sensor are also assigned U13-A01F. *Microlens, wafer level optics* 

#### W04-M01C3 [1992]

## **Filters**

Neutral density

#### W04-M01C3A [1992]

#### For colour separation

Covers RGB matrix-type filters.

## W04-M01C3C [1992]

## For removing specific wavelengths

This code covers filters designed to block transmission of specific wavelengths, e.g. optical high-pass filters such as IR-cut filters. Video cameras intended for imaging in the infrared spectrum are covered by W04-M01E1 codes.

## W04-M01C3D [2011]

## **Neutral density filter**

This code covers filters designed to reduce the intensity of light, normally independent of wavelength, e.g. to allow use of different exposure settings.

ND filter, optical all-pass

## W04-M01C3E [1992]

## Integral with pick-up device

#### W04-M01C3G [2011]

## **Polarizing filter**

This code covers filters designed to block or reduce the intensity of light with a particular polarization, e.g. to reduce the effect of reflections.

## W04-M01C5 [1992]

## Beam splitter, mirror

Includes beam splitter or movable mirror for viewfinder of SLR camera.

#### W04-M01C6 [1992]

## Connection with external optical system

Includes connection with e.g. endoscope, which is also coded in S05-D04.

Coupler, fiber-optic, beam splitter

#### W04-M01C7 [1992]

## Electro-optical shutter, (electro)mechanical shutter and shutter drive

This code includes electromechanical or electrooptical shutters and from 2014 it is subdivided to distinguish these from motors and actuators for driving an electromechanical shutter which are specifically covered by W04-M01C7E. See V02-E02 for electromagnetic actuation and V06-M codes for motors. Electro-optical shutters are covered by W04-M01C7A. Electronic control of shutters is not included and is covered by W04-M01D5C. Electronic shutter action using controlled read-out of solid state imager is not included and is covered by W04-M01B5A and W04-M01D5C.

## W04-M01C7A [2014]

#### **Electro-optical shutter**

This code covers electro-optical shutter arrangements without moving parts, e.g. using liquid crystal devices. (Note that U14 or V07 codes are not assigned for this topic). 'Electronic shutter' arrangements based solely on controlling the image sensor itself, e.g. by limiting charge accumulation time, are not included and are covered by W04-M01B5A and W04-M01D5C. *LC, light valve* 

## W04-M01C7C [2014]

#### (Electro)mechanical shutter

This code covers novelty in the shutter itself. Novel aspects of motors or actuators driving the shutter are covered by W04-M01C7E.

Blade, curtain, focal plane, leaf

## W04-M01C7E [2014]

## (Electro)mechanical shutter drive

See also V02-E02 for electromagnetic actuators and V06-M codes for motors.

Solenoid

#### W04-M01C8

[1992]

# Electro-optical iris diaphragm, (electro)mechanical iris diaphragm, and iris drive

This code includes mechanical, electromechanical or electro-optical iris diaphragms and from 2014 it is subdivided to distinguish these from motors and actuators for driving an electromechanical iris which are specifically covered by W04-M01C8E. See V02-E02 for electromagnetic actuation and V06-M codes for motors. Electro-optical iris diaphragms are covered by W04-M01C8A. Electronic control of irises is not included and is covered by W04-M01D5C.

## W04-M01C8A [2014]

#### **Electro-optical iris diaphragm**

This code covers electro-optical iris diaphragm arrangements without moving parts, e.g. using liquid crystal devices. The general code for electro-optical area modulation, V07-K01A2, is also assigned.

LC, light valve

### W04-M01C8C [2014]

#### (Electro)mechanical aperture/iris

This code covers novelty in the iris diaphragm itself. Novel aspects of motors or actuators driving the iris are covered by W04-M01C8E.

Aperture, stop

#### W04-M01C8E [2014]

## (Electro)mechanical aperture/iris drive

See also V02-E02 for electromagnetic actuators and V06-M codes for motors.

Solenoid

#### W04-M01C9

[1992]

## Other optical aspects of video cameras

Includes white balance reference plate, optical arrangements compensating camera shake (with W04-M01D7), lens cap, and arrangements for cleaning the optical system including 'windscreen

wiper' devices and ultrasonic vibration devices for dust removal. From 2009 ultrasonic and other vibration devices acting on the image sensor itself are covered by W04-M01B8 codes. Prior to 2009 W04-M01C9 was assigned for any aspect of correcting for optical system distortions, including those using image processing (with W04-N05C3). From now on W04-M01C9 will only be assigned for systems acting directly on the optical system itself. From 2009 compensation by means of image manipulation processing for optical system geometry distortions, e.g. arising from use of wideangle lenses, is covered by W04-N05C3E. W04-M01D6 or W04-M01D6A will continue to be assigned also when the processing is performed within the camera, but not when performed subsequently.

## W04-M01D [1987]

## Control circuits, monitoring, displays, viewfinders

Codes in this section are used for general control circuits and with other codes for specific purposes. Studio aspects for control of several cameras, mixing, etc. are covered by W04-N codes.

### W04-M01D1 [1992]

## Operator controls and warning devices

Covers controls actually operated by user and devices signalling state of camera. Use with W04-M01D3 for warning as part of viewfinder display. Switch, key, knob, setting, display, indicator

#### W04-M01D1A [1992]

#### Remote control

When remote control of camera combined with recording equipment is involved, W04-E04A codes are also used, otherwise see W05-D codes when remote control signal transfer aspect is significant.

## W04-M01D1C [2011]

## **GUI control aspects of cameras**

This code covers the use of graphic user interfaces for controlling a camera and employing the camera display, including the use of touchscreens. Novel aspects of displays for cameras are covered by W04-M01D3A and of touchscreens by W04-M01D3E.

#### W04-M01D2 [1992]

#### **General control and monitoring circuits**

Prior to 1997 this code included generation and distribution of synchronising signals within camera, (also coded in W04-M05). From 1997 see W04-M01D2M.

## W04-M01D2A [1992]

## **Light metering**

Photometry in general is covered by S03-A01 codes, which are not assigned here unless broader application is indicated. Thus, methods involving determination of scene brightness from the video signal itself (rather than a separate photosensitive device) would not normally be assigned S03 codes.

#### W04-M01D2C [1992]

## Range finding and subject location/tracking

Includes rangefinding for setting focus. Focus detection by video signal characteristics (e.g. HF content) is covered by W04-M01D2E. Includes tracking using 'beacon' transmitter, and automatic systems using movement/position detection, which are also coded in e.g. W06-A02C1. Prior to 1997 this code included identification of subject or region of interest by eye-gaze direction determination, when used with S05-D01C5A. From 1997, see W04-M01D2G, which is used alone to represent the gaze-direction aspect. (Similar systems for photographic cameras are covered by S06-B01E). This code also included detection of faces and facial expression but from 2011 this topic is covered by W04-M01D2F instead.

#### W04-M01D2E [1992]

## **Focus detection**

Covers determination of focusing state by video signal characteristics, such as HF content. Control of optical system is covered by W04-M01D5D.

#### W04-M01D2F [2011]

#### Face and facial expression detection

This code covers the detection and identification of faces, parts of faces and facial expression of subjects to be photographed, e.g. to determine a region of interest or to control shutter actuation. Prior to 2011 this topic was covered by W04-M01D2C. Determination of eye gaze direction of the camera user is **not** included and is covered by W04-M01D2G. Facial recognition and detection as an application of image recognition is covered by T04-D07F1 which is also assigned as appropriate.

## W04-M01D2G [1997]

## **Eye-gaze direction determination**

This code covers the determination of gaze direction of the camera user for purposes such as control of exposure parameters. Prior to 1997, see W04-M01D2C and S05-D01C5A, which was used to discriminate the eye-gaze aspect. See also W04-M01D3 codes for aspects involving viewfinders, e.g. IR LEDs, dedicated image sensor, special optics, etc. Analogous systems for photographic cameras are covered by S06-B01E. Detection and identification of faces, facial features, or expressions of **subjects** to be photographed is **not** included, and is covered by W04-M01D2F

### W04-M01D2J [1992]

## Camera condition monitoring and testing

Includes calibration arrangements and self-checking circuits e.g. for low battery state in portable cameras (also assigned S01-G06 and X16-H codes).

#### W04-M01D2M [1997]

## Synchronising signal generation and distribution

Synchronising signal generators and 'studio' aspects are covered by W04-M05, which was assigned for this topic, with W04-M01D2, prior to 1997.

## W04-M01D2R [2007]

## Controlling use of camera in restricted area

(W04-M01D9)

See W01-C01P6C for camera phones.

## W04-M01D2S [2014]

## **Software version control**

This code covers software updating and version control for cameras. Software version management in general is covered by T01-F05F, which is also assigned for camera inventions as necessary Download, firmware

#### W04-M01D2X [1992]

## Other general control and monitoring circuits for cameras

This code covers control or sensing arrangements for video or still cameras not provided for in the above subdivisions. It includes accelerometers and the like (see e.g. S02-G03 or S02-H also) for use in detection of camera shake or vibration, for which W04-M01D7 is also assigned when part of a compensation system and the use of navigation information from e.g. GPS receivers, for which W06-A03A5 codes are also assigned.

## W04-M01D3 [1992]

#### Viewfinders

For display of menus etc. see W04-J03C.

## W04-M01D3A [1992]

#### **Display device**

This code is intended to indicate novelty in the actual display device itself, such as an LCD for which U14-K01 codes are assigned to indicate the specific novel aspects. W04-M01D3A is **not** assigned for novelty in the camera or camera circuitry for which W04-M01D3C is used when specific display drive aspects are involved, or W04-M01D3 for more general details. Novel aspects of touchscreens are covered by W04-M01D3E which is assigned with this code when the display itself is also novel.

## W04-M01D3C [1992]

## Display drive circuitry

Covers matrix addressing, drive circuits, etc.

## W04-M01D3E [2011]

## Touchscreens for digital or video cameras

This code covers novel aspects of touchscreens for cameras. The use of touchscreens and graphic user interfaces for controlling a camera is covered by W04-M01D1C. When the display device itself is novel W04-M01D3A is also assigned.

## W04-M01D4 [1992]

#### Character/subtitle generators

Subtitle generators for TV studio/video production use are coded in W04-N05C1A.

## W04-M01D5 [1992]

#### **Exposure control**

Includes evaluation of scene condition information (provided by devices covered by W04-M01D2 codes), and control of function to optimise imaging.

## W04-M01D5A [1992]

**Evaluation of exposure conditions** 

## W04-M01D5B [1992]

**Back-light compensation** 

#### W04-M01D5C [1992]

#### Control of aperture and/or shutter time

For electronic shutter action (simulating mechanical shutter) search with W04-M01B5A.

Iris, stop, diaphragm

## W04-M01D5D [1992]

#### **Automatic focus control**

Mechanical aspects of focus adjustment are covered by W01-M01C1B for lens movement and W04-M01B8B for image sensor movement. Detection of focus state is covered by W04-M01D2E. Manual setting of focus is covered by W04-M01D1 with W04-M01C1B or W04-M01B8B. For automatic control, W04-M01C1B or W04-M01B8B are not assigned unless significant aspects of actuator driving are involved.

Closed loop, hill-climbing, servo, feedback, optimize

## W04-M01D5E [1992]

## Zooming and magnification control

This code is normally used alone unless specific aspects of control and interaction with the motor circuit per se are involved.

## W04-M01D5H [1997]

## **Light source control**

Search with W04-M01H1 for control of continuous lighting units and W04-M01H5 for control of flash units. Drive circuit for discharge-tube type flash lamps are covered by X26-C01A.

#### W04-M01D5X [1992]

#### Other exposure control aspects

## W04-M01D6 [1992]

#### Image processing and function control

Used with W04-P and W04-N codes as appropriate, e.g. W04-P01D1 for white balance control, W04-N05C5E for red-eye removal (see T04-D07F1A for eye detection). From 2009 compensation by means of image manipulation processing for optical system geometry distortions, such as those arising from use of wide-angle lenses, is covered by W04-N05C3E. W04-M01D6 or W04-M01D6A is also assigned when the processing is performed within the camera, but **not** when performed subsequently. Prior to 2009 W04-M01C9 was also applied for this topic but from 2010 is only assigned for systems acting directly on the optical system itself.

#### W04-M01D6A [1997]

#### **Image acquisition aspects**

Covers processing associated with e.g. read-out of image sensor, such as compensation for imager characteristics. Use in conjunction with W04-P01H1 (and W04-M01B7) for solid state circuit imager dark current compensation.

## W04-M01D6C [2006]

### Multi-standard processing

Includes arrangements for changing resolution of still pictures (see also W04-M01B1) and standards conversion (see also W04-N05A).

## W04-M01D7 [1992]

## **Motion compensation**

This code covers arrangements for countering the effects of unwanted motion, such as camera shake. See W04-P01 and W04-M01G codes respectively for electronic and (electro-) mechanical movement compensation systems. Compensation involving movement of the image sensor is also assigned W04-M01B8A or W04-M01C9 if achieved optically.

## W04-M01D8 [2002]

## Video and digital camera interfacing

(W04-M01D9)

This code covers arrangements for interfacing of video and digital cameras with other equipment and systems. From 2014 the code is subdivided to distinguish between interfacing with separate parts of the camera or accessories, e.g. detachable lenses (W04-M01D8A) and interfacing with equipment or systems that are not part of the camera or camera system (W04-M01D8C). Search with W04-K codes for specific aspects of interfacing, e.g. W04-K07 for novel connectors or cables.

#### W04-M01D8A [2014]

## Interfacing with separate part of camera or camera system

This code covers interfacing with separate parts of a camera or accessories that may be detachable from the main camera body, such as lenses (for which W04-M01C1D is also assigned) or electronic flash units (for which W04-M01H5 is also applied).

#### W04-M01D8C [2014]

## Interfacing with separate equipment or system

This code covers novel aspects of interfacing with equipment or systems that do not form part of the camera or camera system. It includes interfacing with equipment such as computers, for which W04-K08 is also assigned and also interfacing with printers, other cameras and data networks.

## W04-M01D9 [1992]

## Other camera control

## W04-M01E [1987]

## For IR imaging, optomechanical scanning

(W04-M01X)

Includes 'staring' and scanning types. Non-video night vision systems are covered by W07-G codes, (tubes per se are coded in V05-D03 codes).

#### W04-M01E1 [1992]

## IR imager

FLIR imager, pyroelectric camera, heat sensing camera

#### W04-M01E1A [1992]

#### IR-sensitive pick-up device

See also appropriate code for solid-state pick-up element e.g. U14-E01, or U13-A codes.

#### W04-M01E5 [1992]

#### **Optomechanical scanning systems**

See V07-K05 also. Prior to 2009 this code was also used to indicate arrangements for increasing imaging resolution by imparting movement to an image sensor, e.g. to achieve dithering. This topic is now covered by W04-M01B8A.

Galvanometer mirror, polygonal mirror, motor driven scanning

#### W04-M01E5A [1992]

## With single scanning direction

Includes systems with subscanning action provided by motion of subject or imaging platform.

Satellite, missile, push-broom, vehicle, traffic, rail,

## W04-M01E5C [1992]

#### With main- and sub-scanning

Includes optomechanical/electromechanical arrangements to provide simultaneous line and field scanning.

#### W04-M01F [1987]

## For X-ray and other non-light imaging

(W04-M01X)

Includes medical diagnostic imaging (see S05-D02 or S05-D03 codes also), but **not** systems where the primary means of 'imaging' uses visible radiation. Medical ultrasound systems are **not** routinely covered in W04-M01F.

Image converter, image intensifier

## W04-M01F1 [1992]

#### X-ray imaging

W04-M01F3 [1992]

## **Nuclear imaging**

Gamma camera

W04-M01F5 [1992]

**Ultrasonic imaging** 

W04-M01G [1987]

#### **Constructional details**

Includes mounting, tripod, housing etc., and constructional features of cameras per se.

#### W04-M01G1 [1992]

#### **Camera construction**

Cooling, condensation prevention, heating

## W04-M01G1A [1992]

## Camera housing

Casing, cabinet

## W04-M01G1B [1992]

#### Internal constructional details

Card, circuit board, cooling, fan, layout, PCB, screening, shield

## W04-M01G5 [1992]

#### Carrying case for portable camera

Includes shoulder straps, etc.

## W04-M01G7 [1992]

#### Tripods, supports

Includes collapsible supports and permanent mountings e.g. for surveillance camera (also assigned W02-F01 codes).

#### W04-M01G7A [1997]

**Fixed mounting** 

## W04-M01G7C [1997]

### Movable mounting

Includes motor-driven positioning system. Search with W04-M01D2C for arrangements tracking a subject by moving the camera.

## W04-M01H [1992]

#### **Light sources**

(W04-M01X)

See X26 codes for details of light sources per se and fittings. Includes lighting integral with, or detachable from, portable cameras. TV studio lighting is covered by W04-N01. Prior to 1997, light source control was covered in W04-M01D9, but is now transferred to W04-M01D5H.

W04-M01H1 [1997]

**Continuous illumination** 

W04-M01H5 [1997]

## Flash light

Electronic still-picture cameras are assigned W04-M01B1 codes. Recording of single pictures with other types of recording equipment, e.g. VTRs, is covered by W04-E20C5 and W04-B10 codes. See S06-B03 codes for details of photographic camera flash circuits.

Stroboscope

W04-M01H5A [2007]

## Pre-light emission/Red eye reduction

Includes use of separate light source for pre-light emission before main flash to prevent red eye. Light source control aspects are covered in W04-M01D5H. See S06-B03A1 for non-digital camera.

#### W04-M01J [1992]

## Camera systems for imaging still pictures

(W04-M01X)

Covers the use of video cameras to image static objects such as slides and photographs, e.g. for video slide viewer (also coded in S06-B06B). 'Digital' ('electronic still picture') cameras are covered by W04-M01B1 codes, and telecine machines by W04-M02. Facsimile systems are not included and are covered by S06-D to K codes.

### W04-M01K [1992]

#### Camera-recorder

(W04-M01X)

Codes indicating the recording technology used are also assigned when significant, e.g. W04-B10G for DV tape, W04-B14C3 for hard disk, W04-C10A3 for optical disk, or W04-P01C8 for solid-state types. For a video recording facility in a digital camera W04-M01B1E takes precedence.

#### W04-M01L [1992]

## Stereoscopic image generating camera system

Complete stereoscopic TV systems are covered by W02-F03B codes, stereoscopic TV receivers are assigned W03-A12A and other W03-A codes as appropriate. Search with W04-M01V for stereoscopic imaging systems employing two or more video cameras.

### W04-M01M [2005]

#### **Audio aspects**

Covers all audio aspects of video cameras. Prior to 2005 this topic was included in W04-M01X.

W04-M01P [1992]

**Power supplies** 

W04-M01P1 [1992]

**Mains power** 

W04-M01P5 [1992]

## **Battery power supply**

Includes battery per se. See X16 codes also.

W04-M01P5A [1992]

**Battery charging** 

W04-M01S [2005]

#### Panoramic camera

(W04-M01X)

Use in conjunction with W04-M01C6 for optical arrangements and with W04-N05C5 for 'stitch mode'. For moving platforms see also W04-M01G7C.

## W04-M01V [2006]

## Multiple camera systems

(W04-M01X)

Search along with W04-F01P and W02-F01A for CCTV security systems recording multiple camera outputs. Search with W04-M01L for stereoscopic imaging systems employing e.g. two video cameras.

#### W04-M01V1 [2014]

## Multiple cameras within same equipment housing

This code covers the use of two or more digital or video cameras or image sensor arrangements that are contained within the same housing and are therefore part of the same equipment, e.g. for stereoscopic imaging with W04-M01L or in a mobile phone with front and rear-facing cameras used at the same time, for which W01-C01D3C and W01-C01P6C are also assigned.

#### W04-M01V5 [2014]

#### Multiple cameras in separate housings

This code is assigned for inventions depending on the use of two or more digital or video cameras that are contained within separate housings and therefore are not part of the same equipment. For stereoscopic imaging search with W04-M01L and for multiple-camera aspects of CCTV surveillance systems with W02-F01A5.

## W04-M01W [2011]

### Internal wiring of camera

This code is intended to highlight **internal** wiring details, including wires, cables and flexible PCB wiring arrangements, but **not** wiring within an integrated circuit. It includes both novel wires and cables (for which X12-D codes are also assigned) and constructional aspects such as the arrangement of wiring for which W04-M01G1B is also assigned. Arrangement of wiring within equipment in general is covered by V04-T01A.

#### W04-M01X

## Other video camera aspects

This code covers aspects of electronic imaging cameras not covered by the above subdivisions, including industrial inspection applications where the use of the camera is significant and linked to the novelty in some way. S02 or S03 codes, (e.g. S02-J04 or S03-E04 codes) are applied for these topics as appropriate. Also included are additional devices built-into a camera, for which codes for the particular device should also be employed when searching.

#### W04-M02

#### **Telecine**

See W04-M01 codes for image pick-up details and S06-B05 codes (cinematography) also.

Film, scan, frame, intermittent, gate, pull, continuous, photograph, cine

## W04-M05 [1992]

## Synchronising and blanking signal generators

(W04-M09)

TV receiver synchronising circuitry is covered by W03-A06.

## W04-M07 [1992]

## Video pattern generators

Includes generation of test patterns (see also W02-F04A).

#### W04-M09

## Other video source aspects

#### W04-N

## Video special effects and manipulation, TV studio equipment

Codes in W04-N relate to equipment for use in TV studios or for analogous purposes. W04-N05G codes are used to indicate application but only if this is stated or implied.

Video mixing desk, special effects generator, picture inlay, chromakeying, delay compensation, lighting control desk

## W04-N01 [1992]

## Studio and outside broadcast equipment

Includes e.g. lighting, camera control consoles (also coded in W04-N05B codes for video mixing and switching aspects, but not cameras per se, (covered by W04-M01 codes), or telecine, (covered by W04-M02)). For video processing see W04-N05 codes which cover such aspects as standards conversion, chroma keying, etc.

TV opaque projection, telop, teleprompter, autocue, intercom, talkback

## W04-N05 [1992]

## **Equipment with video processing function**

See also W04-P codes as appropriate for video processing. Where computer data processing is involved, T01-J10 codes are also assigned.

### W04-N05A [1992]

## Standards conversion equipment

Standards conversion in TV receivers is covered by W03-A11A, in recording equipment by W04-F01H3.

## W04-N05A1 [2005]

**Transcoding** 

#### W04-N05B [1992]

## Video mixing and switching equipment

Includes equipment for CCTV monitoring. (See also W02-F01 codes. W04-N05G5 is also assigned).

#### W04-N05B1 [1992]

## Video mixing equipment

Fade, blend, wipe, merge, combine, channel

## W04-N05B5 [1992]

### Video switching equipment

Where actual switching details are involved, W01-B codes may be assigned also.

## W04-N05C [1992]

## Image generation and manipulation, including special effects equipment

These codes cover the generation and manipulation of images for special effects or other purposes, such as image correction. Generation of images by video cameras is not included, being covered by W04-M01 codes. Manipulation of images in TV receivers is not included and is covered by W03-A13E codes. For computer-based image processing aspects search with T01-J10 codes.

## W04-N05C1 [1992]

## Image generation system

This code covers the generation of images electronically, e.g. using computer graphics techniques, and **not** the generation of images of real-world scenes using e.g. a camera.

#### W04-N05C1A [1992]

## Subtitle and text generator

Crawling text

#### W04-N05C3 [1992]

## **Image manipulation systems**

This code covers the application of image processing techniques to the manipulation of images, including moving, enlarging/reducing, correcting geometry and image cropping (as represented by W04-N05C3G from 2014). T01-J10 codes for computer-based image processing are also assigned as appropriate.

#### W04-N05C3A [1997]

Moving image, or part of image

### W04-N05C3C [1997]

Enlarging or reducing image

## W04-N05C3E [2009]

### **Correcting image geometry**

This code covers the application of image manipulation processing to the correction of faults in image geometry. Examples include 'keystone' correction in video projectors (with W04-Q01J) and compensation for camera optical system distortions (with W04-M01D6 codes as appropriate if carried out in the camera itself). Prior to 2009 W04-M01C9 ('Other optical aspects of video cameras') was assigned to indicate that optical system defects were being compensated for. From 2009 W04-M01C9 is no longer applied for this topic and would only be assigned for systems acting directly on the optical system itself.

Screen angle, perpendicular, normal, trapezium, fisheye, wide angle, lens, aberration.

## W04-N05C3G [2014]

## Image cropping

Covers selection of a desired area of an image and deleting the remainder.

Border, edge, trim, remove frame

## W04-N05C5 [1992]

#### Picture inlay or overlay system

For combining real-world and computer generated images for augmented reality search with W04-W07E1. Picture inlay circuitry for TV receivers is covered by W03-A13 codes.

Inset, superimpose

## W04-N05C5A [1992]

## By chroma keying

Colour, blue, background, video switch

#### W04-N05C5E [1997]

## Replacing designated part of image

Includes arrangements e.g. using recognition techniques to detect text in an image, or 'coding' a region of an image in some way, to substitute text in another language, or alternative images. For application to inserting 'domestic' advertisements in e.g. a sporting event broadcast from overseas, search with W05-E03C (TV with advertising) from 2002, W05-E03 prior to that.

## W04-N05C7 [2014]

## Image manipulation for stereoscopic or depth imaging

This code covers arrangements for creating stereoscopic or pseudo-stereoscopic images, e.g. from separate still images or video sources, and also for modifying the perceived depth of such images, both previously covered by W04-N05C9. W04-N05C7 is not assigned for normal stereoscopic video cameras, which are covered by W04-M01L, unless image processing to vary the depth characteristic of images produced is also involved.

Blend, merge, offset, parallax

## W04-N05C9 [1992]

#### Other special effect equipment

Prior to 2014 this code included simulation of 3-D images and also modification of the perceived depth of such images, both of which are now covered by W04-N05C7. Stereoscopic video camera arrangements are covered by W04-M01L, stereoscopic TV systems in general by W02-F03B codes and computer graphics aspects of three dimensional image generation are covered by T01-J10C4.

## W04-N05G [1992]

### Characterised by application

Codes in this section are intended to discriminate between broadcast and video production applications, and those performing analogous functions for use in e.g. industry. The codes are only applied when an application is stated.

W04-N05G1 [1992]

For TV studio or video production facility

W04-N05G3 [2007]

For digital cinematography

W04-N05G5 [1992]

For industrial or commercial application

## W04-P

## Video signal processing

See W03-A codes for TV receiver details, W04-F codes for application to recording. Where computer data processing of video is involved, T01-J10 codes are also assigned.

Image, camera, television, chrominance, luminance, code, encode, picture, memory

#### W04-P01 [1987]

## Video processing type and applications

For application to video cameras (i.e. circuitry forming part of camera), search with W04-M01D6.

## W04-P01A [1987]

#### **Encoding**

Includes encoding and decoding apparatus and methods e.g. for compression, bandwidth reduction, etc. See T01-J10D for computer-based image compression and coding, U21-A codes for encoding in general, W04-V05 codes for speech signal encoding, W04-V10 codes for audio coding, and W02-G04 codes for bandwidth reduction in non-video systems.

From 2002 the corresponding W02-F07 codes which covered 'systems' aspects of PCM and narrow band TV have been discontinued and are replaced by the general code W02-F07M 'Digital image transmission'. Thus, W04-P01A codes should be used to discriminate types of coding. Compression of still-picture information, e.g. in facsimile, is covered by S06-K07 codes.

Motion detection, vector quantisation, digitising, fractal, transformation

## W04-P01A1 [1992]

#### **Movement detection system**

This code is used as a general code for detection and estimation of movement and may thus be used for applications such as automatic alarm actuation. (See also W02-F01, W05-B01C codes). When specific to hybrid or predictive video coding W04-P01A4A and W04-P01A5A are respectively assigned instead of W04-P01A1.

#### W04-P01A2 [2007]

## Multiple video stream encoding, using foveation zones

Includes compression techniques using redundant data across multiple video streams or viewing angles.

## W04-P01A3 [1992]

## **Transform coding**

This code is intended for transform video and image coding methods, e.g. JPEG and its variants. Combined transform and predictive coding is covered by W04-P01A4 codes which take precedence over this code.

#### W04-P01A3A [2005]

## **Novel transform aspects**

DCT, Wavelet

W04-P01A3C [2005]

Quantisation

W04-P01A3E [2005]

## Run length, variable length encoding

Entropy coding

#### W04-P01A3F [2014]

## Converting between variable and fixed rate transform encoding

This code is intended to highlight fixed and variable rate aspects of transform-based video encoding. Fixed and variable rate aspects of hybrid video encoding are covered by W04-P01A4F, which takes precedence over this code.

#### W04-P01A3G [2012]

## Transform coding motion detection and estimation

Motion detection or estimation for hybrid coding is covered by W04-P01A4A, for purely predictive coding by W04-P01A5A, and for general and noncoding purposes by W04-P01A1.

## W04-P01A3J [2012]

## **Transform coding motion compensation**

Motion compensation for hybrid coding is covered by W04-P01A4C and for purely predictive coding by W04-P01A5C.

## W04-P01A4 [1997]

## **Hybrid coding**

(W04-P01A3, W04-P01A5)

This code is chiefly intended for combined transform and predictive coding, e.g. MPEG coding, H.263, H.264 and variants. From 2014, all coding for the purposes of broadcasting and streaming is assumed to be of this type unless specific details indicate otherwise.

AVC, CABAC, HEVC

## W04-P01A4A [1997]

## Hybrid coding motion detection and estimation

(W04-P01A3, W04-P01A5A)

Motion detection or estimation for purely predictive coding is covered by W04-P01A5A and for general and non-coding purposes by W04-P01A1.

## W04-P01A4C [1997]

#### **Motion compensation**

(W04-P01A3, W04-P01A5A)

Motion compensation for predictive coding is covered by W04-P01A5C (prior to 1997 see W04-P01A5A).

## W04-P01A4E [2005]

#### **Novel transform aspects**

Novel transform aspects for pure transform coding are covered by W04-P01A3A.

DCT, MDDT, Mode Dependent Directional Transformation, wavelet

#### W04-P01A4F [2008]

## Converting between variable and fixed rate encoding

This code is intended to highlight fixed and variable rate aspects of video encoding.

W04-P01A4G [2005]

Quantisation

W04-P01A4J [2005]

## Run length, variable length encoding

Entropy coding

## W04-P01A4L [2005]

#### **Reducing artefacts**

Reduction of noise and errors in video signals in general is covered by W04-P01F codes.

## W04-P01A4N [2005]

3-dimensional transforms

## W04-P01A4S [2005]

#### **Scalability arrangements**

Covers arrangements to allow change in bandwidth according to conditions or capability of receiver.

#### W04-P01A5 [1992]

**Predictive coding** 

#### W04-P01A5A [1992]

#### Motion detection and estimation

Motion detection or estimation for hybrid coding is covered by W04-P01A4A and for general and noncoding purposes by W04-P01A1.

## W04-P01A5C [1997]

Motion compensation

## W04-P01A5G [2011]

## Quantization for predictive video coding

Quantization for hybrid coding is covered by W04-P01A4G which takes precedence over this code.

## W04-P01A6 [2014]

## **Detecting and correcting errors**

This code is intended to highlight inventions concerned with detection and/or correction of errors in video encoding. It includes arrangements for dealing with errors arising from corrupted image data and also problems with recognizing type of coding, start codes, or other ancillary data. Error detection and correction in digital data transmission in general is covered by W01-A01B codes and for digital data in general by U21-A06 codes.

#### W04-P01A7 [1992]

#### Subsampling

Involves methods for discarding sampled values, e.g. by considering values of adjacent sample points.

Multiple sub-Nyquist sampling encoding, MUSE, phase alternate sub-Nyquist sampling, PASS, sample dropping, merging

## W04-P01A8 [1997]

## **Coding based on fractals**

Covers image coding using algorithms to generate fractal codes

Fractional dimension, graftal, pattern, shape, irregularity

#### W04-P01B [1987]

## For non-visible spectrum imaging

Includes video processing specific to IR, X-ray etc., e.g. in medical systems, (see S05-D codes also, such as S05-D02A).

Digital subtractive imaging, angiography, DSA

## W04-P01C [1987]

## Frame stores, video memory and solidstate video recorder/player

See W04-N05C codes also for TV special effects application.

## W04-P01C1 [1992]

## Novel frame stores and video memory This

code is assigned for novel aspects of solid-state memories intended to store still images or video. Circuitry for reading from or writing into memories of this type is covered by W04-P01C5. Use of solid-state memory in computer systems is covered by T01-H01B3 codes and novel memories in general are covered by U14-A codes.

#### W04-P01C5 [1992]

## Memory addressing and control

Variable readout control, scan conversion, scan reversal

#### W04-P01C8 [2005]

#### Solid state video recorder/player

Includes devices storing and reproducing video and also still pictures, e.g. in an electronic photoframe.

Digital photo frame, digital picture frame.

## W04-P01D [1987]

White balance and colour temperature control

W04-P01D1 [1992]

White balance control

## W04-P01D3 [1992]

## Colour balance and colour temperature control

## W04-P01E [1987]

#### **Gamma and aperture correction**

Contour

## W04-P01E1 [1992]

#### Gamma control

Correction for unequal amplitude response is covered by W04-P01H1.

## W04-P01E3 [1992]

## **Edge correction, crispening**

Peaking, emphasis circuit

## W04-P01E5 [1992]

Aperture correction

## W04-P01E7 [1992]

## Compensating phase shift in signal processing

Includes correction of phase errors in colour separation from single image pick-up device.

#### W04-P01E8 [1992]

## Dynamic range control, amplitude compression

See U24-C02B for amplitude compression in general.

## W04-P01F [1992]

## Noise reduction, error concealment

(W04-P01X)

Codes in this section are used to indicate arrangements for improving signal-to-noise ratio of a video signal, which may include compensating for noise-introducing defects in, for example, imaging devices. Compensation for imperfect imaging device characteristics in general is covered by W04-P01H codes. Noise reduction in connection with video recording is covered by W04-F01E codes and specifically for received radio signals, by W02-G03B codes.

#### W04-P01F1 [1992]

#### **Noise reduction**

(W04-P01X)

## W04-P01F3 [1992]

#### **Error concealment**

(W04-P01X)

Includes interpolation with adjacent pixel values.

#### W04-P01H

[1992]

## Compensation processing for imager characteristics

(W04-P01X)

Gamma and aperture correction is covered by W04-P01E codes. See W04-P01F codes for particular noise reduction or error concealment. Specifically, use W04-P01H with W04-P01F3 for systems concealing defective pixels. For video camera application see e.g. W04-M01B7 and W04-M01D6A.

## W04-P01H1

[1992]

## Non-uniform amplitude response correction

(W04-P01X)

Includes correction for dark current and varying sensitivity of imager photosites.

#### W04-P01H3

[1992]

## Correcting for 'charge-leakage' phenomena

(W04-P01X)

Includes correction for blooming.

#### W04-P01K

[1992]

## Clamping circuits

(W04-P01X)

Covers circuits establishing DC level of video signal. For such circuitry in TV receivers, see W03-A04C and, in general, U24-C02A5.

#### W04-P01L

[1992]

#### Luminance/chrominance separation

This code covers processing of color video signals involving the separation of luminance and chrominance components. For application to color TV receivers or color video displays see W03-A05B codes.

Luma-chroma, Y-C

#### W04-P01N

[1992]

## **Time shifting**

(W04-P01X)

Includes delay circuits and compensation for delays e.g. to equalise signal paths, for timebase correction etc. (For recording see W04-F02B).

## W04-P01X

[1987]

#### Other video signal processing

#### W04-Q

#### Colour coders; TV projection

#### W04-Q01

[1987]

## Video projectors and projection displays

This code and its subdivisions cover displays using projection of video or similar information on a screen. Codes relating to application are also assigned, e.g. for projection TV receivers search with W03 codes, for computer displays search with T04-H03E. Also included are special-purpose projection displays such as head-up displays projecting video information (covered by W04-Q01K) and direct retinal projection displays (covered by W04-Q01L).

Projection screen, transmission screen, optical system, laser projection system

#### W04-Q01A

[1987]

#### **Using CRT**

For optical and cooling aspects of tubes see V05-D07C codes also.

Colour filter, liquid filter, tube face cooling, alignment/convergence adjustment

#### W04-Q01B

[1987]

## Using light valve, e.g. LCD, laser sources

See V07-K01A2 for area modulation of light in general.

Liquid crystal, light source, cooling

#### W04-Q01B1

[1992]

With laser light source

## W04-Q01B2

[2007]

With LED light source

## W04-Q01B3

[1997]

#### Using mirror-array device

#### W04-Q01B5

[1992]

#### Novel light valve

Search with W04-Q01B3 for novel mirror-array devices.

## W04-Q01B7

[1992]

#### **Light source**

Laser aspects are covered by W04-Q01B1. See also appropriate codes in X26 for light sources, reflectors, etc. For light source testing and monitoring search in conjunction with W04-Q01J.

## W04-Q01E [1992]

#### **Optical system**

Includes lenses and filters, but **not** light valves, which are covered by W04-Q01B. For systems specific to the type of projection system e.g. using a CRT, see also the appropriate W04-Q01 code. Screens are covered by W04-Q01F.

W04-Q01E1 [1997]

Lens system

W04-Q01E1A [1997]

Focus adjustment

W04-Q01E1C [1997]

**Novel lens details** 

W04-Q01E3 [1997]

**Filter** 

W04-Q01E3A [1997]

Colour filter, colour separation filter

W04-Q01E3C [1997]

Removing specific wavelength

Includes IR cut filters.

W04-Q01E5 [1997]

## **Reflection systems**

Includes static mirrors and prisms. Optomechanical and electro-reflective scanning systems are covered in W04-Q01-E07S

W04-Q01E7 [2005]

Beam splitter, polarizer and other optical arrangements

W04-Q01E7A [2005]

**Beam splitter** 

W04-Q01E7C [2005]

## Polarising, diffraction gratings, polarising filters

Prior to 2007 polarisation filters are covered in W04-Q01E3.

Quarter wave plate

W04-Q01E7S [2007]

## **Scanning arrangements**

Includes optomechanical and electro-reflective scanning systems

W04-Q01E7X [2007]

Other optical elements

W04-Q01F [1992]

Screens

W04-Q01F1 [1992]

Transmission screens

W04-Q01F3 [1992]

Reflective screens

W04-Q01F5 [2005]

## Volumetric, non-planar projection screens or media

From 2014 video projectors specifically intended for use with screens of this type are covered by W04-Q01P.

W04-Q01H [1992]

## Constructional details, cooling

See V04-S and V04-T03 codes respectively for construction and cooling of electrical equipment in general.

W04-Q01H1 [1997]

Casing, cabinet, mountings

W04-Q01H5 [1997]

Internal construction and cooling

W04-Q01J [2002]

## Projection display circuitry and control systems

Covers circuitry for controlling the output of a projection display and includes auto-focusing and arrangements to correct distortion of the projected image when the screen is not normal to the projection axis. W04-N05C3E (W04-N05C3 prior to 2009) is also assigned for this topic when compensating pre-distortion of image geometry is used.

W04-Q01J1 [2005]

#### Monitoring display output

Covers use of sensors or CCD.

W04-Q01J3 [2011]

## Video projector remote control

Remote control for TV receivers is covered by W03-A02C codes and for AV equipment in general by W03-G05A codes.

## W04-Q01J5 [2006]

## **Copy protection systems**

Includes arrangements for projecting UV or IR light onto screen in order to prevent recording by video camera. Copy protection involving signal processing is covered in W04-F01L1.

## W04-Q01J7 [2011]

## Power supplies and power saving

Novel aspects of power supplies are also assigned U24-D, -E or -F codes as appropriate. Power supplies for TV receivers are covered by W03-A07 codes and for AV equipment in general by W03-G02 codes, which were also assigned with W04-Q01 codes for projector PSU inventions prior to 2011.

#### W04-Q01K [1992]

## Head-up display application

See also under application, e.g. W06-B01B for aircraft, X22-E for automobiles.

## W04-Q01L [2002]

## **Direct retinal projection display**

This code is intended for displays which directly project an image onto the retina of the viewer, and thus is likely to be in the form of a head-mounted display. For application to such displays the following codes are also assigned: W03-A08E7A for TV receiver HMD, W04-W07E1A for virtual reality HMD, and W05-E07 for HMD of general application.

#### W04-Q01P [2014]

#### Panoramic and volumetric projection

This code covers video and electronic image projectors which form images on non-planar screens, such as adjoining walls of a room or curved or annular screens. Novel screens for use with this kind of projector are covered by W04-Q01F5. Image processing systems to adapt image geometry to the projection screen surface are covered by W04-N05C3E. When applied to virtual reality systems W04-W07E1 is also assigned while for simulators other codes are assigned as necessary, e.g. W06-B04 for aircraft, W06-C04 for ship and W04-W07A and X22-X for land vehicle driving simulators.

## W04-Q01S [2005]

Stereoscopic and 3-dimensional projection display

W04-Q05 [1992]

#### Colour coder

Modulator, subcarrier generator

#### W04-R

### Stereo- and quadraphonic systems

Left, right channel, stereophonic, amplifier

W04-R01 [1992]

System type

W04-R01A [1992]

**Pseudo-stereophonic** 

Frequency separation

W04-R01C [1992]

Stereophonic

W04-R01C1 [1992]

**Binaural** 

Dummy head, recording, sound source location

W04-R01C5 [1992]

Surround sound system

W04-R01E [1992]

Quadraphonic

W04-R05 [1992]

#### Sound field control

Parametric audio systems are covered in W04-S05P and are not coded here.

W04-R05A [1992]

Responsive to e.g. sensed location of listener

#### W04-S

Loudspeaker enclosures; Public address systems

W04-S01 [1992]

Loudspeaker enclosures and leads

W04-S01A [1992]

Mountings for enclosure

W04-S01C [1992]

Connectors, leads

Plug, socket, wiring

W04-S01E [1992]

**Enclosure** 

Speaker, acoustic, box, housing, cabinet baffle, reflex enclosure, acoustic wadding, port, grille, dust cover

## W04-S01E1

#### Loudspeaker mounting

Also coded in V06-A and V06-G01.

#### W04-S01E5

## Achieving desired directional effect or frequency response

[1992]

[1992]

Also coded in V06-A and V06-G02.

### W04-S05 [1992]

## Public address and stage equipment

Includes analogous equipment used in sound broadcasting and recording apart from mixing desks which are coded in W04-G05.

Loudhailer, PA system, concert, exhibition, conference, monitor loudspeakers, acoustic feedback suppression, phase/frequency shifter

#### W04-S05A [1992]

## Amplifiers, mixing desk

Details of mixing desks are covered by W04-G05 codes.

#### W04-S05C [1992]

#### Microphones, stands

Microphones in general are covered by V06-B02.

#### W04-S05C1 [1992]

#### Cordless/wireless microphone

#### W04-S05P [2005]

## Parametric audio systems

Covers use of separate ultrasound sources providing highly directional beams that interfere at precise location. Includes non-public address application of parametric audio systems.

## W04-T

#### Circuits for transducers

See also V06-H. This code is used for circuits through which the transducer current flows, e.g. for impedance matching. It is **not** intended for circuitry preceding an amplifier which drives the transducer, for example.

Loudspeaker, microphone, amplify, feedback, impedance matching, crossover network, bridge network, motional feedback, motion pick-up transducer, MFB

## W04-T01 [1997]

### Impedance matching

Impedance matching in general, using lumped constant circuit elements, is covered by U25-D05.

## W04-T03 [1997]

#### Motional feedback (MFB)

This code is assigned for audio reproduction systems in which the output transducer, e.g. a loudspeaker, is incorporated into a feedback loop so that any non-linearity in its characteristics can be compensated for. Includes use of an additional transducer such as a microphone or accelerometer and also networks to isolate a signal such as back EMF that corresponds to motion of e.g. a diaphragm or voice coil.

## W04-T05 [1997]

#### Frequency selective networks

Includes crossover networks.

#### W04-U

#### **Electrical musical instruments**

#### W04-U01

#### **Electronic tone generation**

See also U23 codes for novel tone-generating circuits, e.g. reading sine wave values from memory, covered by U23-F codes.

Memory-storage, waveform generator, read-out circuit, variable clock, master oscillator, sample, synthesis

#### W04-U01A [1997]

#### **Tone generators**

Includes oscillators used in additive and subtractive synthesisers (see W04-U03C) and waveform generators using acoustic modelling.

## W04-U01C [1997]

## **Memory access**

Covers use of stored values (using ROM or RAM) to produce periodic waveforms, e.g. in 'wavetable' synthesis.

## W04-U01C1 [1997]

#### Sampling

(W04-U01, W04-U04D)

See also W04-U03 codes for control aspects and synthesisers, and W04-U04D for input-output aspects.

## W04-U02

## Electromechanical tone generation; Instruments using pick-ups

#### W04-U02A [1992]

### Instruments using pick-ups

Electric quitar, violin, transducer, string, bridge, fret

W: Communications

## W04-U02A1 [1992]

#### Pick-up per se

See V06 codes for transducer detail.

### W04-U02C [1992]

## Electromechanical tone or sound generation

Player piano, solenoid actuation, drum, percussion

#### W04-U03

## Controlling tone frequencies; Producing special effects

Level control, tone mixing, waveform shaping

#### W04-U03A [1992]

## Controlling generation or combination of tones

## W04-U03C [1992]

## **Synthesis**

Includes use of time varying filters and amplifiers, FM etc.

Additive, subtractive

## W04-U03E [1992]

### **Special effects**

Includes delay effects, e.g. reverberation. Also covers novel special effect processing for amplified or recorded acoustic instruments or voice, e.g. in karaoke device.

#### W04-U04

#### Other electrophonic instrument details

Includes selection circuits, accompaniment, keyboards, I/O, and construction.

#### W04-U04A [1992]

## Keyboards, pedals, and circuitry

Key switch, electronic switch, stop, voice, pedals

## W04-U04C [1992]

#### **Accompaniment systems**

Automatic rhythm generator

## W04-U04D [1992]

#### Input/output arrangements

Includes arrangements for interfacing with other equipment. See W04-U05 for MIDI aspect.

#### W04-U04G [1992]

#### **Constructional details**

## W04-U04J [1997]

#### Other electronic musical instruments

Covers non-keyboard instruments with electronic actuators, e.g. guitar synthesizers, electronic drum pads.

#### W04-U05 [1992]

## Musical equipment interfacing standards, MIDI

(W04-U09)

Includes general aspects. See also W04-U04D for specific circuitry or operation details for instrument per se, and W04-G05B for sound mixing interface aspects.

#### W04-U06 [1997]

## Sequencers and composition systems

(W04-U07)

Includes transcription systems. Prior to 1997 these were coded under W04-U07.

### W04-U07 [1992]

## Musical training system

(W04-U09)

Includes practice equipment. From 1992 to 1997 electronic music transcription systems were included. These are now coded under W04-U06.

Practice equipment, keyboard order/position display

#### W04-U08 [1992]

## Sound-to-light conversion equipment

Colour organ

## W04-U09

#### Other electrical music aspects

Includes metronome (see S04-C09 also). Electric bell, gong, chimes, sound-to-light converter

## W04-V

## Analysis, synthesis and processing of sound waves

Includes acoustic noise reduction system using antiphase sound, which is covered by W04-V07 codes. Novel aspects of speech recognition or synthesis are respectively assigned W04-V01 and W04-V02. Inventions involving the use of these techniques only, without any novelty being involved, are covered by W04-V04 codes. General audio signal processing aspects, including sound mixing and switching are covered in W04-G.

Digital, speaker, word, code, memory, model, pattern reference, encode, allophonic, formant, phoneme, linear predictive coding (LPC)

## W04-V01 [1987]

## Novel aspects of analysis or recognition

Parsing, segmentation, speaker-dependent, speaker-independent

## W04-V02 [1987]

## Novel aspects of synthesis or generation

## W04-V04 [1992]

## Applications of speech analysis and synthesis

Includes systems where method of analysis or synthesis is not necessarily novel. Previously coded in W04-V (no subdivision) if substantial disclosure of details. From 2002, W04-V04A7 is introduced to specifically cover the analysis of non-speech sound waves.

## W04-V04A [1992]

## **Analysis systems**

Voice-input, hands-free

## W04-V04A1 [1992]

## **Determining presence of speech only**

Covers systems intended to discriminate speech from e.g. noise or other signals, without recognition of words, phrases, etc.

Automatic telephone dialler, call progress tone detector

## W04-V04A3 [2002]

#### **Determining speaker characteristics**

From 2014 the title of this code has been changed to reflect the previous inclusion of arrangements for determining the gender of a speaker, now covered by the specific subdivision W04-V04A3C. Inventions described by the original title of this code - i.e. 'Determining identity of speaker' - are now covered by W04-V04A3A.

## W04-V04A3A [2014]

## Identifying individual

This code covers biometric identification of a speaker based on their unique vocal characteristics and should be searched with other codes for specific applications, e.g. with W01-C01D3C and W01-C01Q8C for control of access to a mobile phone based on recognizing a speaker.

### W04-V04A3C [2014]

## Discriminating gender of speaker

This code covers discrimination between male and female speakers, e.g. based on fundamental frequencies, without necessarily involving identification of the speaker themselves.

## W04-V04A4 [2008]

## **Determining emotional status of speaker**

For determining the emotional status of a speaker by analysing characteristics e.g. volume level, pitch of the speaker's voice, and/or words used by the speaker.

Tremor

## W04-V04A5 [2005]

## Voice-actuated control of equipment or machines

See also W05-D codes for general applications of remote control using speech recognition.

## W04-V04A6 [2005]

Speech-to-text

## W04-V04A7 [2002]

## Non-speech audio analysis applications

This code covers the analysis and recognition of non-speech (i.e. non-human) sound sources, such as musical sequences, machine noise, and animal sounds, including their analysis to discriminate or identify different species of animals or birds. Application to the testing of machines is indicated by assignment of S02 or S03 codes also, such as S02-J03A for bearings or S03-F02B for determining resistance to wear.

Amphibian, avian, bearing noise, bee, bird, cat, cattle, diagnosis, dog, eagle, elephant, engine noise, fox, horse, insect, Korotkov, mammal, note, pest, pitch, rattle, termite, tuning

#### W04-V04A8 [2014]

## Comparing speech or singing with reference

Covers arrangements for determining the degree of matching of sounds made by an individual with a reference. It includes evaluating the correctness of pronunciation of spoken words in language learning (with W04-W codes) and of pitch, tempo etc. of singing (with W04-U07). Evaluation of pitch and other qualities of musical instruments using analysis of sounds is not included and is covered by W04-V04A7 and W04-U codes.

Accent, expression, intonation, judge, karaoke, performance, score

W04-V04C [1992]

Synthesis systems

W04-V04C1 [2005]

**Text-to-speech** 

## W04-V04E [2005]

## Novel circuitry for speech analysis or synthesis

Includes novel features of signal processing circuitry, e.g. automatic gain control, noise reduction, used for speech analysis/synthesis applications. Applied in conjunction with U24, W04-G and W04-V05 codes as appropriate to indicate type of novel signal processing.

#### W04-V05 [1992]

## General speech signal processing and representation

Includes details of signal processing applicable to analysis or synthesis and also coding of speech or similar signals.

W04-V05A [1992]

**Filtering** 

W04-V05C [1992]

Correlation

W04-V05E [1992]

**Noise reduction** 

W04-V05G [1992]

#### **Coding systems**

From 2002 see W04-V10 codes for non-speech audio coding. See U21-A codes for coding in general, and W02-C06 for PCM transmission systems in general (including systems without novel coding aspects).

Quantisation

## W04-V05G1 [1992]

#### Involving simulation of e.g. vocal tract

Includes channel vocoder and use of bank of bandpass filters.

W04-V05G3 [1992]

#### **Predictive coding systems**

Vector

## W04-V05G3A [1992]

## Code excited linear predictive coding

CELP, sequential optimisation, simultaneous optimisation, excitation codebook, dynamic codebook, long term predictor filter

W04-V05G5 [1992]

#### **Transform coding systems**

Orthogonal

## W04-V05G6 [2002]

#### **Comfort noise**

This code covers systems introducing so-called comfort noise into a communications channel, e.g. to avoid disturbing silence periods. Systems of this type for use in telephone speech signal processing are assigned W01-C01C7A.

W04-V05G8 [1992]

Dynamic coding

W04-V05J [1997]

## Pitch, rate change

(W04-V05, W04-V09)

Search with S05-K for systems aiding e.g. hearingimpaired persons, and W04-Y codes where forming part of a hearing aid.

W04-V05J1 [1997]

Pitch change

(W04-V05, W04-V09)

W04-V05J5 [1997]

## Rate change

(W04-V05, W04-V09)

Prior to 2002 this code was used for sample rate conversion of digital audio signals. From 2002 this topic is covered in W04-V10A.

## W04-V07 [1992]

#### Noise cancelling systems

Covers systems using a sensor such as a microphone and suitable signal processing to cancel or reduce the level of unwanted sound. This can be achieved either by means of destructive interference using antiphase sound emitted by e.g. a loudspeaker, or by electronic signal subtraction which from 2019 is covered specifically by W04-V07C1.

Active noise control, air conditioning, ANC, channel, duct, machine, vehicle

#### W04-V07A [1992]

#### Installations

Includes physical detail of e.g. transducer per se, transducer mounting, description of complete installation not involving circuitry or control.

## W04-V07C [1992]

## Control system, circuitry

This code covers signal processing aspects of sound cancelling systems, normally involving a microphone to sense ambient noise sounds. It includes systems using acoustic cancellation based on antiphase sound waves emitted from a loudspeaker and systems in which electronic cancellation is performed using audio signals alone, which from 2018 are covered by W04-V07C1. See U22-G codes also, e.g. U22-G01A5 for adaptive filters, and U22-G03 codes for details of DSP in general (also assigned codes in T01-J08).

#### W04-V07C1 [2019]

## Cancellation using electronic signal subtraction

This code covers arrangements for cancelling or reducing unwanted sounds based on electronic subtraction of corresponding unwanted signals from a wanted audio signal, rather than generation of antiphase sound waves. For application to noise-cancelling headphones search with V06-V04A4.

## W04-V09 [1992]

## Other sound signal details

## W04-V10 [2002]

#### **Audio coding**

Includes general audio encoding methods and apparatus e.g. for compression, bandwidth reduction etc., chiefly in entertainment applications. Coding methods and apparatus specifically for speech signals, generally involving lower bandwidth, data rate and quality for communications applications, are covered by W04-V05G.

### W04-V10A [2002]

#### Standards conversion

Includes sample rate conversion.

## W04-V10C [2002]

#### **Nonuniform coding**

Includes floating point and nonuniform companding systems.

## W04-V10E [2002]

## **Predictive coding**

Includes differential, adaptive and companded predictive systems.

DPCM, ADM, CVDSM,CPDM, ADPCM, NICAM, time domain

## W04-V10G [2002]

#### **Perceptual coding**

Covers data reduction methods which use psychoacoustic models to reduce bit rate while retaining acceptable perceived audio quality, e.g. assigning higher quantisation errors to exploit masking properties of human hearing.

## W04-V10G1 [2002]

### Frequency domain coding

## W04-V10G1A [2002]

## **Subband coding**

Covers arrangements to feed input signal into filter bank for analysis and comparison with psychoacoustic model. Includes MPEG-1, Layers I and II, and Precision Adaptive Subband Coding (PASC).

Filter bank

#### W04-V10G1C [2002]

## **Transform coding**

Covers arrangements using e.g. discrete Fourier Transform (DFT), discrete cosine transform (DCT) and modified discrete cosine transform (MDCT). Includes AC-2 and perceptual audio coding (PAC). Also includes AAC coding used in MPEG2 and MPEG4 standards (also coded in W04-V10G1J).

Adaptive transform coding, ATC, dynamic bit allocation

## W04-V10G1G [2002]

#### **Hybrid coding**

Covers arrangements using a combination of subband and transform methods. Includes adaptive transform acoustic coding (ATRAC) and MPEG-1 Layer III.

Hybrid filter bank

## W04-V10G1J [2002]

## **Multichannel coding**

Covers arrangements to reduce redundancy and irrelevancy of multichannel signals in order to reduce overall bit rate. Includes AC-3, MPEG-2 multichannel coding and AAC (see also W04-V10G1C).

## W04-V10G7 [2002]

#### **Reducing artefacts**

Coded in conjunction with other W04-V10G codes to indicate type of perceptual coding system. Reduction of noise and other unwanted signals for speech coding is covered by W04-V05E with an appropriate W04-V05G code.

## W04-V10G9

[2002]

#### Other perceptual coding systems

#### W04-W

## **Educational equipment (electrical)**

Teach, student, tape, visual, monitor, play, learn, train

#### W04-W01

## **Question and answer apparatus**

Respond, test, correct multiple choice, keyboard, stylus, interactive

### W04-W05

[1992]

## **Educational and conference equipment**

Includes e.g. electronic blackboards. *Audio-visual aid, classroom equipment* 

#### W04-W05A

[1997]

## **Educational equipment in general**

This code is intended for systems and equipment used in a formal educational setting, e.g. a classroom. Electrical aspects of educational equipment used by individuals, e.g. at home, is covered by W04-W09.

#### W04-W05C

[1997]

#### **Conference equipment**

Includes electrical aspects of presentation equipment, including speaker aids, such as prompting systems, public address aspects (see W04-S05 codes also) etc.

#### W04-W07

[1992]

## Simulation systems, training and demonstration

See also under application. The following are **not** included:

- (1) Flight simulator W06-B04
- (2) Ship simulator W06-C04
- (3) Military training equipment W07-D codes
- (4) Sports training W04-X01A codes
- (5) Musical training W04-U07

#### W04-W07A

[1992]

## **Training simulator**

Includes land vehicle driving simulators, also coded in X22-X.

Machine/control system operator training, telegraph operator training

## W04-W07C

[1992]

### **Demonstration of process or effect**

Includes system for demonstrating physical phenomena which is also coded in S01 to S03 according to nature of phenomenon being modelled.

Physics, chemistry, mechanics, electrical, electronic

#### W04-W07E

[1997]

Virtual and augmented reality

See T01-J40 codes for computing aspects of virtual and augmented reality systems. Video-based augmented and virtual reality is covered by W04-W07E1 codes.

AR. VR

## W04-W07E1

[1997]

#### Video aspects

Includes image generation (also coded in T01-J10C) and image displays.

#### W04-W07E1A

[1997]

## **Head mounted display**

See W03-A08E7 for head mounted displays primarily for TV receiver applications, W05-E07 in general, and T04-H03C9 for claimed computer aspects. Displays employing direct retinal projection techniques are also assigned W04-Q01L.

HMD

#### W04-W07E3

[1997]

**Acoustic aspects** 

## W04-W07E5

[1997]

## **Tactile or mechanical aspects**

For example shaking of seat.

## W04-W07E9

[1997]

#### Other aspects of virtual reality

W04-W09

## Other educational equipment

This code is intended for electrical aspects of educational equipment used outside a classroom environment, e.g. by individuals at home, and includes language learning aids, individual study aids, electronic dictionaries and e-books, including software enabling reading of e-books

## W04-X

#### Sports, games, toys

Electrical aspects only are included. Non-electrical details are coded by P36 codes.

Leisure, recreation, pastime

## W04-X01 [1983]

### **Sports and leisure**

The title of this code has been changed to indicate the existing coverage of leisure activities in addition to organized sports. W04-X01 codes cover sports and leisure activities with some electrical aspect. From 2011 W04-X01K codes are introduced to indicate, where significant, the kind of sport or leisure activity involved and are assigned in addition to existing W04-X01 codes. For example, an alerting device to warn an angler of a fish biting would be assigned W04-X01E and W04-X01H to indicate sports equipment with a warning function and W04-X01K7A to denote fishing.

Fish, line, rod, reel, alarm, ski, pitch, court, lane, race, starter, ball, archery, athletics, ball-games, fencing, fishing, golf, gymnastics, hunting, racing, running, shooting

## W04-X01A [1983]

**Training equipment** 

## W04-X01A1 [1992]

#### Performance monitors

This code covers arrangements for general measurement during sports training, such as lap timing, speed, or distance covered, and also measurements on the individual performing the training, such as medical and physiological parameter monitoring, e.g. of pulse rate. For medical monitoring equipment in general and to highlight specific performance measurements, see also S05. See also W01-C01P8 for using software or devices incorporated in a telephone e.g. smartphone, to measure medical parameters. Measurements relating to actual playing of competitive sports are covered by W04-X01C.

Exercise, time, practice, stopwatch, strength testing, ergometer, pedometer

## W04-X01A3 [1992]

#### **Simulators**

Includes golf swing trainer, and simulation of game playing.

## W04-X01A5 [1992]

## Fitness training equipment

Includes exercise bikes, rowing machines, treadmills and similar equipment. Analogous equipment for medical purposes, e.g. physiotherapy, is covered by S05-A05.

Brake, Mechanical resistance, Weights, Rehabilitation equipment

## W04-X01A5A [2011]

## **Exercise bicycle**

Covers static exercise bicycle. Cycling on or off roads as a sport or leisure activity is covered by W04-X01K3C which is **not** assigned for exercise bicycles.

## W04-X01A5C [2011]

#### **Exercise treadmill**

Covers static arrangements for 'on-the-spot' running. Running in the sense of athletics, jogging or cross-country running is covered by W04-X01K3A which is **not** assigned for treadmills and the like.

## W04-X01A9 [1992]

Other sports training equipment

## W04-X01C [1992]

Counting, timing, measuring, scoring

## W04-X01C1 [1992]

## Counting, timing, measuring, scoring detection

From 2011 this code is subdivided to separately indicate measurement or timing aspects from the 'yes/no' aspects of determining that a point or goal has been scored, or that a foul or fault condition exists.

## W04-X01C1A [2011]

## Counting, timing, measuring

See also S02 codes for measurement of length or distance and S04 codes and T05-G03 for timing aspects.

Lap, recording, start, finish, measure, photo-finish

## W04-X01C1C [2011]

#### **Detection of scoring or fault condition**

Includes detection of scoring such as 'goal line' technology in football (soccer) or determining that a ball is out of play in e.g. a tennis match.

VAR

#### W04-X01C3 [1992]

#### Scoring, score display

See T04-H and W05-E codes for display details.

## W04-X01D [1992]

#### Locators and guiding systems

Includes arrangements for retrieving lost equipment, and guiding systems for e.g. golf courses.

## W04-X01E [1992]

#### Sports equipment per se

Covers equipment used by players. Includes electrical aspects of fishing rods, bats, skis, trampolines, hunting rifles and paintball guns. For electrical aspects of firearms, see also W07. Includes walking sticks for hiking (see also X27-A02E). General details of sport equipment are coded under P36-A08A.

## W04-X01F [1992]

## Sports grounds, stadia, courses, installations

Includes bowling alleys and equipment provided by administrators of sports facility e.g. golf carts, buggies, etc.

## W04-X01H [1992]

## Warning systems, alarms, protection

Includes systems warning of dangerous and nondangerous conditions. See W05-A codes also for signalling aspects.

## W04-X01K [2011]

## Type of sport or leisure activity

These codes are assigned, normally in addition to codes indicating novel aspects, to denote the main application of a sports or leisure-based invention with electrical content. If an invention is applicable to a large number of categories, or no application is given, W04-X01K codes are **not** assigned. In the descriptions below the terms 'sport' and 'leisure activity' are used interchangeably.

#### W04-X01K1 [2011]

## Sports using ball, puck, or shuttlecock

W04-X01K1 codes do not include sports involving measuring the distance over which a projectile, e.g. a javelin, is thrown which are covered by W04-X01K3A, or the launching or throwing of projectiles at a target which are covered by W04-X01K5 codes.

Bowling, curling

W04-X01K1A [2011]

Baseball

W04-X01K1C [2011]

**Basketball** 

W04-X01K1E [2011]

Billiards, pool, snooker

W04-X01K1G [2011]

Cricket

W04-X01K1J [2011]

Football (soccer)

W04-X01K1L [2011]

Golf

W04-X01K1N [2011]

Hockey

Includes ice hockey.

W04-X01K1P [2011]

**Racquet sports** 

Includes badminton, tennis, squash, etc.

W04-X01K1R [2011]

Rugby, American football

W04-X01K1T [2011]

**Table tennis** 

W04-X01K1V [2011]

Volleyball

Includes beach volleyball.

W04-X01K1X [2011]

Other sports played with ball or similar projectile

W04-X01K3 [2011]

Athletics, cycling, racing, air and waterbased sports

W04-X01K3A [2011]

#### Athletics and running

Includes running on track, cross-country, or marathons, and sports based on jumping and throwing, e.g. high jump, javelin, shot-put etc. (Darts is not included and is covered by W04-X01K5C).

#### W04-X01K3C [2011]

#### Cycling

Electrical aspects of cycles are covered by X22 codes. Static exercise bicycles are not included and are covered by W04-X01A5A.

Velodrome

W04-X01K3E [2011]

Horseracing

## W04-X01K3G [2011]

#### **Motor racing**

Electrical aspects of vehicles are covered by X22 codes.

## W04-X01K3J [2011]

### **Swimming**

Swimming pools per se are not included (see X25-X06) unless the invention concerns some sports aspect, e.g. related to competition or performance measurement.

#### W04-X01K3L [2011]

## Watercraft-based racing and water skiing

Includes rowing, sailing and power boat racing. Electrical aspects of watercraft are covered by W06-C codes. Skiing on snow, or dry slopes, is covered by W04-X01K3P.

## W04-X01K3N [2011]

#### Air sports

Includes flying, gliding, hang gliding, parachuting

### W04-X01K3P [2012]

## Skiing, snowboarding, curling

(W04-X01K3X)

Electrical aspects of skis are also assigned W04-X01E and testing of ski binding release force is also assigned S02-F03A and W04-X01H.

W04-X01K3X [2011]

Other racing

W04-X01K4 [2011]

**Combat-based sports** 

W04-X01K4A [2011]

## **Boxing and martial arts**

Wrestling is covered by W04-X01K4G.

W04-X01K4C [2011]

**Fencing** 

Épée, foil, sabre

## W04-X01K4E [2011]

## Paintball, laser-simulated shooting

Shooting at targets is covered by W04-X01K5E and at animals for hunting by W04-X01K7C.

## W04-X01K4G [2011]

#### Wrestling

Boxing and martial arts are covered by W04-X01K4A

W04-X01K4X [2011]

Other combat-based sports

W04-X01K5 [2011]

Archery, darts, shooting

## W04-X01K5A [2011]

#### Archerv

Covers shooting at targets using longbow, crossbow, etc. Shooting animals for hunting is covered by W04-X01K7C.

#### W04-X01K5C [2011]

#### **Darts**

Prior to 2011 darts was coded as a sport or as a game (in W04-X02B) depending on emphasis. From 2011 W04-X01K5C will be assigned instead for all aspects of darts.

### W04-X01K5E [2011]

## Shooting

Covers shooting at e.g. paper targets, or 'clay pigeons'. Simulated shooting at 'war game' opponents using e.g. light beams and paintball shooting is covered by W04-X01K4E. Shooting animals for hunting is covered by W04-X01K7C. Electrical aspects of weapons are covered by W07 codes.

## W04-X01K5X [2011]

## Other sports involving launching projectiles at a target

W04-X01K7 [2011]

Fishing, hunting

W04-X01K7A [2011]

#### **Fishing**

Covers fishing for sport or leisure purposes only, e.g. angling. Commercial fishing is covered by X25-N02.

## W04-X01K7C [2011]

#### Hunting

Includes shooting with e.g. rifle or bow and arrow. The use of these weapons to shoot at targets is covered by W04-X01K5E and W04-X01K5A respectively. Electrical aspects of weapons are covered by W07 codes.

W: Communications

W04-X01K9 [2011]

Other kinds of sport

W04-X01X [1992]

## Other sports

Includes animal training.

Horse, racing, stable, fishing boat, trolling, water ski, tow

W04-X02 [1983]

#### Games

Play, target, ball, number, score

W04-X02A [1983]

### **Arcade games**

Non-electrical aspects are coded in T05-H codes only, (assuming G07 IPC).

Motor, token, drive, change, arcade game

W04-X02A1 [1997]

## Pinball and pachinko machines

Launch, solenoid, trap

W04-X02A3 [1997]

## Amusement-with-prizes gambling machine

Fruit, symbol, reel, token

W04-X02A5 [2005]

### **Games with physical interaction**

Grapple, whack-a-mole

W04-X02A8 [1997]

## Arcade security, management, multimachine control

Includes overall control, and security aspects (see W02-F01A codes for CCTV, W05-B codes for alarms).

W04-X02B [1983]

## **Board and card game equipment; Dice games**

From 2011 W04-X02B7 is introduced for electrical aspects of dice games and is assigned alone or in addition to W04-X02B1 or W04-X02B5 as necessary if the dice aspect is significant. Dice games with an electrical aspect that are played in a casino are also assigned W04-X02E.

Electronic card dealing, chess, draughts, roulette, 'battleships'

W04-X02B1 [1997]

### **Board games**

Checkers, chess, draughts

W04-X02B5 [1997]

## Card game equipment

Includes dealing equipment.

W04-X02B7 [2011]

#### Dice games

Includes electrical aspects of dice-based games and electronic representations of dice. Board or card games are covered by W02-X02B1 and W04-X02B5 respectively and W04-X02B7 is only assigned as well as those codes when the dice aspect is novel.

W04-X02C [1983]

#### Video games

For 'arcade' game aspect search with W04-X02A. For control of visual display units see T04-H and W03 codes also. For manual control arrangements, such as joystick, see T04-F codes and for computer aspects, including networked games, see T01-J and T01-N codes.

Program, image, memory, memory card, screen, arcade game, home video game, console, controller, sound effect generator, software, computer games, online games

W04-X02E [1997]

**Casino games and equipment** 

W04-X02G [1997]

**Betting, Lottery equipment and Bingo** 

W04-X03 [1983]

Amusements, toys

W04-X03A [1992]

#### Music based entertainment apparatus

See codes relating to recording/playing equipment where this is involved.

W04-X03A1 [1992]

Juke box

Disk, select, play, sequence

W04-X03A3 [1992]

Karaoke

Sing, perform, screen, cue, lyrics, microphone

W04-X03C [1992]

## Ornaments, mobiles, household items, novelties

Includes animated ornaments, musical greetings cards, etc. See also X27.

Dancing flower, motor drive, sound responsive, animated dummy, robot

## W04-X03E [1992]

#### **Tovs**

From 2002 W04-X03E8 is applied to indicate use of remote control. For **novel** remote control aspects W05-D codes are also assigned, e.g. W05-D06A1A and W05-D08C for radio control.

Doll, robot, speech synthesiser

## W04-X03E1 [1992]

### **Model vehicles**

Car, train, boat, ship, aircraft, sound generator

## W04-X03E1A [2002]

## **Model aircraft**

Includes spacecraft.

W04-X03E1B [2002]

Model boat

W04-X03E1C [2002]

Model wheeled vehicle, e.g. car, truck

W04-X03E1D [2002]

#### Model racing track

Includes arrangements to drive wheeled vehicles on model road track.

### W04-X03E1E [2002]

Model train and train set

## W04-X03E1M [2002]

Model vehicle used for commercial or industrial purpose

W04-X03E2 [1992]

### **Outdoor toys and playing equipment**

Includes electrical aspects of skateboards, balls, slides, swings, playground equipment etc.

W04-X03E5 [1997]

Dolls, stuffed toys

W04-X03E6 [2002]

## **Animated toys**

Covers moving toys of a non-humanoid or non-vehicle form. Includes robots, virtual pets and gyroscope toys.

W04-X03E8 [2002]

Remote control

W04-X03E9 [1992]

Other toys

## W04-X03G [1992]

#### **Entertainment venues**

Screen, stage, special effects, box office, amusement park, merry-go-round, Ferris wheel

#### W04-X03G1

Theatre, auditorium, concert equipment

W04-X03G3 [1997]

Fairground, theme parks, etc.

## W04-X03G4 [2002]

### Disco, night club, bar, restaurant, etc.

Includes personal calling arrangements to facilitate human interaction.

### W04-X03G5 [1997]

#### Cinema equipment

For photographic aspects see S06-B codes also.

#### W04-X03G7 [2005]

### Museums, exhibitions

Prior to 2005 electrical equipment for museums was coded in W04-W09.

#### W04-X03G8 [2005]

#### Information provision, guiding devices

Apply in conjunction with other W04-X03G codes.

## W04-X03X [1992]

#### Other amusements

Electronic aid, puzzle solving

#### W04-Y

## **Hearing aids**

Ear, speech, acoustic, adjust, frequency response, receiver, deaf, implant, transducer, auditory, coil, nerve, medical prosthesis, amplifier, level/tone/bandwidth control, filtering, remote control, construction, casing, battery housing

## W04-Y01 [1992]

## **Constructional details**

Includes constructional details of aid per se, and ancillary equipment.

### W04-Y01A [1992]

## Casing, housing

Includes 'hygiene' arrangements, e.g. to prevent accumulation of cerumen.

## W04-Y01A1 [1992]

## Arrangements to reduce unwanted coupling

Includes design of housing, acoustic tube, etc. to minimise acoustic feedback. Gain control for this purpose is covered by W04-Y03A1A and feedback or noise reduction in DSP-based hearing aids (from 2014) by W04-Y03G7.

## W04-Y01B [1992]

## Internal details, e.g. PCB mounting.

Includes disposition of components, etc.

## W04-Y02 [1992]

## **Electroacoustic transducers for hearing aids**

This code covers novel details of electroacoustic transducers used in hearing aids, such as microphones and earphones. V06 codes are also assigned as necessary to highlight novel details of the transducer.

W04-Y03 [1992]

Circuitry

W04-Y03A [1992]

## **Audio amplifier**

See U24-G codes for further details of amplifier per

## W04-Y03A1 [1992]

## **Gain control**

See U24-C codes for control of gain in general.

#### W04-Y03A1A [1992]

## Feedback reducing arrangement

For design of e.g. housing to minimise feedback see W04-Y01A1. Feedback reduction in DSP-based hearing aids is covered (from 2014) by W04-Y03G7.

## W04-Y03A3 [1992]

#### Tone and bandwidth control

From 2005 digital signal processing is covered in W04-Y03G. See W03-C05 codes for audio amplifier control other than for hearing aids, and U25-F codes for bandwidth control in general.

### W04-Y03C [1992]

## Interfacing arrangements

For systems involving near-field link, such as inductive loop, see W02-C02 codes also especially W02-C02G3A.

Couple, induce, transfer

## W04-Y03C1 [1992]

## With separate part of hearing aid

Equipment to set-up a hearing aid as a programming exercise by e.g. a technician, is not regarded as part of the hearing aid itself, and thus not coded here - see W04-Y03C5.

## W04-Y03C1A [1992]

## For signal transfer

Includes transcutaneous transfer of audio information for implanted type aid.

## W04-Y03C1C [1992]

For remote control

## W04-Y03C5 [1992]

## With separate apparatus or system

This code covers interfacing with separate equipment, e.g. for programming, such as setting-up characteristics by technician, rather than by intended wearer, and also arrangements for operation with e.g. TV receiver, telephone, or across-counter communication system. Prior to 2014 it was also used (with W04-Y20) for programming in a general sense but this topic is now covered by W04-Y03P.

#### W04-Y03D [2006]

### Self-testing and diagnostic systems

#### W04-Y03E [1992]

#### **Power supply circuitry**

Includes details of battery per se (see X16 codes also).

#### W04-Y03G [2005]

#### Digital signal processing

Analogue filtering and tone control is covered in W04-Y03A3.

## W04-Y03G1 [2005]

#### Frequency domain manipulation

Includes digital filtering and use of transforms etc. for frequency shifting portions of the audio spectrum.

### W04-Y03G3 [2005]

### **Spatial localisation**

Includes use of direction finding algorithms to pinpoint location of speaker and amplify relevant frequencies.

## W04-Y03G5 [2005]

## Using digital speech processing

Covers coding input signal as speech and manipulating parameters to enhance intelligibility. Also coded in W04-V as appropriate.

#### W04-Y03G7 [2014]

## Noise and feedback suppression

This code covers arrangements in hearing aids using digital signal processing specifically to suppress or reduce internally-generated noise, external noise, or acoustic feedback. Suppression of acoustic feedback by acoustic design of the hearing aid (e.g. the shape of the housing) is covered by W04-Y01A1 and by gain reduction in analog hearing aids is covered by W04-Y03A1A. Background noise, cellphone noise, cellular phone noise, digital filter, howling, Larsen effect, multiplex noise, notch filter, pulse noise, TDMA noise, whistling

## W04-Y03P [2014]

## Hearing aid programming and setting-up

This code covers programming, e.g. setting-up characteristics by a technician. When interfacing aspects are novel W04-Y03C5 is also assigned. Prior to 2014 W04-Y03C5 and W04-Y20 were assigned for programming aspects in general. When audiometering is involved S05-D01D2 is also assigned.

Compensate, computer, frequency response, hearing test, PC

## W04-Y05 [1992]

## Characterised by type

Codes in this section are applied irrespective of claimed novelty to indicate the type of hearing aid only.

W04-Y05A [1992]

**External** 

W04-Y05A1 [1992]

### **Carried within auditory meatus**

Includes 'in-the-ear' type hearing aid.

W04-Y05A3 [1992]

## **Carried outside auditory meatus**

Includes e.g. 'behind-the-ear' type.

W04-Y05A5 [1992]

## Combined with other apparatus, e.g. spectacles

Electrical aspects of spectacles are coded in X27-A02D.

W04-Y05C [1992]

### **Implanted**

See S05-F01 also for implanted hearing aids.

W04-Y05C1 [1992]

#### With external apparatus e.g. for control

Includes e.g. inductive link system transferring signals from external unit.

W04-Y20 [1992]

Other hearing aid details

## W05: Alarms, Signalling, Telemetry and Telecontrol

This class covers the following topics:

- [1] alerting and personal calling (W05-A codes)
- [2] alarms (W05-B codes);
- [3] monitoring and testing of alerting systems and alarms (W05-C codes);
- [4] remote control and remote monitoring (W05-D codes); and
- [5] general displays and advertising (W05-E codes).

Note that inventions are assigned W05-B codes if they relate to alarms with some 'emergency' or 'urgency' aspect. Condition-responsive signalling arrangements e.g. 'status alarms' which indicate non-hazardous conditions such as incorrect posture, need for diaper changing, a fault condition in a machine etc. are **not** regarded as alarms in the sense of W05-B codes and are covered by W05-A codes instead. When alerting specifically involves audible signalling W05-A02 codes are assigned and if specifically visual signalling is involved W05-A03 codes are assigned. If the type of signalling is not disclosed or is unimportant a general W05-A code is assigned.

#### W05-A

## Signalling and personal calling arrangements

Covers signalling and warning systems characterised by either the means of attracting attention or the transmission medium. For personal alarm or alerting device attached to clothing see X27-A02B1 codes as well as appropriate W05 codes.

## W05-A01

Using mechanical, hydraulic, pneumatic, or electric transmission

## W05-A01A [1997]

Using mechanical, hydraulic, or pneumatic transmission

## W05-A01A1 [1997]

## Vibration based annunciator

See also W05-A05C1A for pager application. Mechanical ringers specifically for telephones are assigned W01-C01F1F. See also V06 codes for details of vibration transducers per se e.g. V06-L or V06-M codes, especially V06-M10.

Vibration transmitter

### W05-A01C [1997]

#### Using electric transmission

## W05-A01C1 [1997]

#### Telephone line signalling

For annunciator systems combined with telephone equipment see W01-C05A.

#### W05-A01C3

#### [1997]

## Power line signalling

Use of power lines to transmit control or measurement signals is covered by W05-D06P. See also W02-C01A3 and X12-H03E for power line communication in general.

#### W05-A02

## With audible alerting

From 2002 this code is subdivided to distinguish novel audible alerting devices from systems **using** audible signalling. For cases in which these aspects cannot be determined W05-A02 will continue to be assigned. Codes relating to applications should be considered also, e.g. doorbells in X27-X also, fire or police vehicle siren in X22-B03 and X22-P10.

Tone generator, oscillator, bell, buzzer, recorded speech, synthesised speech, explosive device

#### W05-A02A [2002]

### Novel audible alerting device

This code is intended for novel audible signal generators themselves. Electroacoustic transducers are assigned V06 codes also.

Tone generator, oscillator, bell, buzzer, recorded speech, synthesised speech, explosive device

## W05-A02C [2002]

## Alerting system using audible indication

This code is intended for systems characterised by the use of audible alerting in which the means of producing the signal is not novel. For example, it may be used to indicate that a warning system employs audible signalling, the means of producing it being unspecified or unimportant.

#### W05-A03

## With visible indication

From 2002 W05-A03E is assigned with W05-A03A or W05-A03X to indicate that the means of visual signalling is itself novel. W05-A03C is also introduced to highlight alerting aspects using a display. Thus, for example, a paging receiver with some novelty in the use of a display would be assigned W05-A03E and W05-A05C1A.

#### W05-A03A

## Using visible light sources

From 2002 W05-A03C is introduced for display devices and takes precedence over this code for active displays, i.e. self-luminous ones which are covered by W05-A03C1. For passive displays in which e.g. backlighting colour or intensity is used as a means of alerting W05-A03A will be assigned with W05-A03C, the backlighting aspect being conveyed by X26-U04A codes also.

Flashing light, lamp

## W05-A03C [2002]

## **Using display devices**

(W05-A03X)

This code takes precedence over other W05-A03 codes and is intended for arrangements using displays, e.g. in matrix or seven-segment form. W05-A03A may be assigned as well where the alerting novelty involves backlighting, in which case W05-E05B codes are also used. Novel displays themselves are also assigned W05-A03E, and codes from other classes as appropriate, e.g. U14-K01 codes for LCDs.

Back-lit display

### W05-A03C1 [2002]

## Using self-luminous display devices

(W05-A03A, W05-A03X)

This code takes precedence over W05-A03A and is intended for arrangements using displays which are light emitting, e.g. those using an array of LEDs or electroluminescent elements, or a 7-segment LED display. Visual alerting using a light source such as one or more LEDs which are not part of a display that can present variable information is covered by W05-A03A.

## W05-A03E [2002]

## **Novel visual indication device**

This code is used with other W05-A03 codes as appropriate to indicate that a visual indicator is itself novel.

## W05-A03X

#### Other visible indication aspects

Includes electromagnetically-operated indicators. From 2002 display-based signalling, e.g. matrix or seven-segment type, is covered by W05-A03C. Flag, semaphore signal, smoke, chemical dye

#### W05-A04

## With audible and visible indication; Order telegraphs

From 2002 this code is subdivided to separate the above topics.

## W05-A04A [2002]

## Alerting with audible and visible indication

This code is intended for alerting systems in which audible and visible signalling are used **together**. Arrangements in which these modes are employed separately are covered by W05-A02 and W05-A03 codes.

Simultaneous audible/visible signalling

#### W05-A04C

#### [2002]

## Order telegraphs and menu-based signalling

This code is used for signalling systems in which selection from a number of options is transmitted. It includes 'ship's telegraphs', for which W06-C01B codes are assigned, e.g. W06-C01B7, and also arrangements in e.g. a restaurant for transmitting orders. Where a radio link is involved W05-A05A is also assigned, along with W02 codes as necessary, for novel 'RF' details.

## W05-A05 [1983]

## **Electromagnetic transmission; Pagers**

These codes relate to the use of an EM transmission medium to convey an alerting signal, rather than the form of the alerting signal once received. To discriminate this aspect other W05-A codes should be used in conjunction with W05-A05 codes if necessary.

## W05-A05A [1992]

## Using radio transmission

Includes emergency broadcast receivers, for which W02-G03 or W03-B codes are also assigned, depending on receiver type.

## W05-A05B

[1992]

#### Using UV or IR transmission

### W05-A05C

[1992]

## **Paging**

Systems linked to the telephone network are assigned W01-C05A also. Mobile radio systems in general are covered by W02-C03C codes.

Selective calling, ERMES, FLEX®, MBS, POCSAG,

Selective calling, ERMES, FLEX®, MBS, POC RDS, TAP, TDP, TNPP, WCTP

#### W05-A05C1

[1992]

#### **Apparatus**

## W05-A05C1A [2002]

#### **Receiver details**

Covers details of the pager itself. Used alone or in conjunction with W05-A05C1C for constructional details. See W02-G03 and W02-C03C codes for RF aspects. Vibrators for silent alerting are also assigned W05-A01A1.

## W05-A05C1C [2002]

#### **Constructional details**

Constructional details of electronic equipment in general are assigned V04-S or V04-T codes, which are used here in addition as appropriate.

## W05-A05C1E [2002]

### Paging center details

This code may be used with W05-A05C1C for constructional details. See W02 codes for RF aspects.

Transmitters, aerials, control desks

#### W05-A05C2 [1992]

## System/method

This code is intended to cover a complete paging system e.g. from a mobile radio, protocol, or operating system perspective. For novelty in selective calling search with W01-B05A5 and for radio system details with W02-C03C codes.

W05-A05D [1992]

Tone decoder

W05-A05X [1992]

Other EM signalling aspects

## W05-A10 [2013]

## Condition-responsive alerting in general

(W05-A)

These codes are intended to indicate arrangements for signaling a condition, e.g. to remind a person to do something or to indicate the state of a machine, including malfunctions. They do not cover conditions involving emergencies, hazards to personal safety, etc. which are covered by W05-B alarm codes. W05-A10 codes may be assigned with other W05-A codes indicating audible or visual signaling if this is important or claimed but the codes can be used alone to indicate non-urgent or non-emergency 'alarm' conditions when the means of alerting is not stated or is unimportant. Other codes outside W05 are also assigned as necessary, e.g. W04 codes for use with educational or sports-related inventions.

## W05-A10A [2013]

## Alerting relating to human activity or human status

Includes alerting to modify human behavior such as reminding a person to do or not do something and alerting a person to non-urgent conditions such as incontinence detection (see also X27-A02A) or the need for changing a baby (see also X27-X01). Inventions concerned with warning related to personal safety are not included and are covered by W05-B07 codes instead. Note that arrangements for avoiding loss or forgetting of personal items are included but that those intended as theft alarms are not assigned W05-A10A and are covered by W05-B01 codes, e.g. W05-B01A5C.

Bed-wetting detector, computer usage warning, diaper alarm, leaving behind alarm, nappy alarm, posture alarm, reminder alarm, workstation alarm

#### W05-A10C [2013]

## Alerting relating to equipment, machine or vehicle operation and status

Includes warning or indicating operational state, such as fault conditions or the need for maintenance or replenishment of consumable items.

Battery indicator, malfunction, mode, overheat, refill, service indicator, temperature, wear indicator

#### W05-A10X [2013]

## Other general condition-responsive alerting

#### W05-B

#### **Alarms**

Since 1997 this code group has been expanded to cover 'disaster' alarms (W05-B08 codes), including alarms indicating failure in utility systems at source, in the distribution system, or at the point of consumption. Otherwise, condition-responsive circuitry relating to e.g. abnormal state of a machine, electrical equipment, etc. is not included and is coded in the appropriate place for the monitored equipment (See T05-E also) but may also be assigned W05-A codes if the signalling or alerting aspect is significant. From 2005, new code subgroups are introduced for personal safety alarms (W05-B07 codes) and general equipment details of alarm systems (W05-B10 codes).

#### W05-B01

## Burglar/intruder alarms; Scaring thieves

Search with X22-D03 also to distinguish inventions relating to vehicle theft alarms. Antitheft systems for vehicles, or other applications, not including alarms are excluded from W05-B01 codes. Includes alarm aspects of weapons detection (from 2011 also specifically covered by W07-F05C), e.g. at an airport or entrance to a building, for which technology-specific codes are assigned as appropriate, e.g. W05-B01A for detection based on electric or magnetic field systems (also covered by S03-C02 codes and S03-C06).

Personnel presence detection, restricted area monitoring, patient/detainee absconding detection

#### W05-B01A

## Electrical/magnetic field disturbance

Includes actuation by sensed variation of capacitance and inductance, and e.g. Doppler radar systems (see W06-A04A2 also).

Cable, electrodes, coil, antenna, interrogation loop, resonant circuit

## W05-B01A1 [1992]

#### Intrusion detection system

Includes interference with field distribution and proximity sensor(see U21-B02C codes for proximity switch circuits). Includes variation in circuit capacitance or inductance.

#### W05-B01A2 [1992]

#### Theft detection system using tags

These codes relate to theft detection systems based on sensing the presence of a tag associated with the item to be protected.

#### W05-B01A2A [1992]

### Ferromagnetic tag

Includes systems using non-linear magnetic properties, e.g. to generate harmonics from an applied magnetic field. For novel magnetic materials V02-A01 codes are also assigned.

## W05-B01A2B [1992]

#### Inductive tag

Includes LC resonant circuits, also coded in U25-E05B1, in arrangements in which energy is 'sucked out' by the tuned circuit causing a detectable drop in field strength. Tags including electrical devices to generate harmonics, e.g. a diode, are regarded as simple transponders, and are thus covered by W05-B01A2C.

## W05-B01A2C [1992]

#### RF transponder tag

See W02-G05A for transponder tags per se. Includes simple arrangements to generate harmonics, e.g. using diodes, for which U23-B01 is also assigned to indicate an analogue frequency multiplier. Transponders based on a passive tuned circuit arrangement **without** any active device to modify the interrogating signal are covered by W05-B01A2B.

#### W05-B01A2E [1997]

## Manufacture of theft detection tag.

This code is used with other W05-B01A2 codes to define the type of tag being manufactured.

## W05-B01A5 [1997]

## Theft detection and human separation alarms based on signal level or response

The title of this code has been expanded from 2002 to better reflect its coverage of alarm systems triggered by signal falling below threshold or non-response in a transponder interrogation system. This may be applied to the detection of child or elderly person wandering off, or the removal of, or separation from, an object of value. Novel RF details are assigned W02-C03 and W02-G codes as appropriate, e.g. W02-G03J1C for novel radio receiver signal strength determining circuitry.

## W05-B01A5A [2002]

## Detecting separation of child or supervised person

This code is used either alone, or with W05-B01A5B in the case of transponder-based systems, and may be applied to the monitoring of a single person or a group such as children on a school trip, in which case W04-W codes are also assigned.

## W05-B01A5B [2002]

## **Transponder-based systems**

This code is normally used with W05-B01A5A or W05-B01A5C, depending on the nature of the protection involved. Transponder-based systems for determining presence or for recognition in general are covered by W06-A04B codes, e.g. W06-A04B5 codes for object and human identification, and W02-G05 codes. From 2002, these W02 and W06 codes are not normally assigned for protection systems of the W05-B01A5 type unless specific 'RF' novelty is involved. Transponder-based remote measurement and control systems are covered by W05-D08G (from 2002 - formerly W05-D04G).

## W05-B01A5C [2002]

## Protected object theft detection and separation alarms

This code is used either alone, or with W05-B01A5B in the case of transponder-based systems, and concerns monitoring to determine that an item to be protected is within a desired range of an individual or specified point. Analogous systems for protection of a person or a group of people are covered by W05-B01A5A. Tracking systems for locating luggage in an airport or similar are covered by W06-B02A5.

#### W05-B01B

## Mechanical actuation intrusion or theft alarms

The title of this code has been expanded from 2002 to better reflect its coverage of alarms actuated as a consequence of physical action involving contact, e.g. the opening of a door or window, or the lifting of an article which results in the making or breaking of an electrical circuit. The emphasis is on mechanical contact with the sensing arrangement, thus an arrangement involving an optical fiber in which light transmission is modified by e.g. the weight of an intruder, is regarded as fitting into this category. (W05-B01B1 in the case of intruder sensing).

Loop continuity/attitude detection for shoplifting prevention, pressure mats, reed switches, limit switches, lock tampering detection, incorrect keyed-in password/code detection

## W05-B01B1 [2002]

## Mechanically-actuated intrusion alarms

Covers intruder and burglar alarms.

## W05-B01B2 [2002]

## Mechanically-actuated theft alarms

Covers theft alarms triggered by lifting of articles, or similar.

## W05-B01C [1987]

#### Optical, ultrasonic actuation

(W05-B01X)

## W05-B01C1 [1992]

## **Ultrasonic actuation**

This code has been subdivided from 2002 to cover separately intruder / burglar alarms and theft alarms. The codes include actuation by interference with sonic waves. See W06-A05 codes also for systems analogous to radar.

Ultrasonic transmitter/receiver, Doppler detector

## W05-B01C1A [2002]

## Ultrasonically-actuated intrusion alarms

Covers intruder and burglar alarms involving ultrasonic sensing.

#### W05-B01C1B [2002]

#### Ultrasonically-actuated theft alarms

Covers theft alarms involving ultrasonic sensing.

## W05-B01C2 [1992]

## **Optically actuated alarm**

The scope note of this code has been modified from 2002 to cover intruder / burglar alarms and theft alarms. Arrangements involving 'lidar' techniques are also assigned W06-A06 codes while 'light barrier' aspects are also assigned S03-C08 codes.

Light beam, light barrier, optical transmitter/receiver

## W05-B01C2A [2002]

## **Optically-actuated intrusion alarms**

Covers intruder and burglar alarms involving optical sensing.

### W05-B01C2B [2002]

#### Optically-actuated theft alarms

Covers theft alarms involving optical sensing.

#### W05-B01C5 [1992]

Image scanning and comparing system scanner or motion detection; CCTV

### W05-B01C5A [1997]

## Image scanning and comparing system scanner or motion detection

See also W02-F01A5 for CCTV surveillance, W04-M01G codes for camera mounting details, and T04-D07D codes for pattern recognition aspects. Novel video signal movement detectors in general are coded in W04-P01A1, used computer image processing aspects in T01-J10B2 codes.

## CCTV surveillance automatic alarm actuation

## W05-B01C5C [1997]

## CCTV triggered upon intruder detection by other means

This code covers alarm systems in which the presence of an intruder is sensed by a detection arrangement distinct from the CCTV system, which then actuates it to enable a protected area to be monitored. See also W02-F01A5 for CCTV surveillance aspects.

## W05-B01D [1987]

## Scaring thief or attacker and personal defensive alarms

From 2002 this code is subdivided to separately cover arrangements for preventing robbery from e.g. banks, and for personal defence of private individuals, e.g. anti-mugging alarms.

#### W05-B01D1 [2002]

### Scaring thief or attacker

This code covers the use of dyes to stain currency, gas or similar for incapacitation, and arrangements for trapping criminals, e.g. in a bank or cash machine lobby. Other codes which may also be assigned include T05-D codes for entry/exit registers, access control and automatic road blocks, T05-L05A for strongboxes, and T05-L03 codes for ATMs. Anti-mugging alarms for public use are covered by W05-B01D5.

Dye, smoke, trigger

## W05-B01D5 [2002]

#### Personal defence alarms

This code includes arrangements for deterring an assailant and attracting attention, normally using acoustic signalling, for which W05-A02 codes are assigned as appropriate. Arrangements for self defence in a military or law enforcement context are covered by W07-F01A.

Siren, whistle, spray

## W05-B01E [2005]

#### Passive acoustic intrusion detection

(W05-B01X)

Covers sensing of intrusion, e.g. using microphones to detect sound produced. Intruder alarms using e.g. reflection of ultrasonic waves are covered by W05-B01C1A. Acoustic detection of glass breakage for alarm purposes is covered by W05-B01G5.

## W05-B01G [1997]

### Glass breakage detector

(W05-B01B, W05-B01X)

#### W05-B01G1 [1997]

## Based on electrical 'switching' action

### W05-B01G5 [1997]

## Based on acoustic signal detection and analysis

W04-V04A7 is also assigned for the acoustic signal analysis aspect from 2002. Passive acoustic sensing of intrusion, not specifically for detection of glass breaking sounds, is covered by W05-B01E.

#### W05-B01X

### Other intruder or theft alarm aspects

Includes apparatus for detecting a change in breathing of criminal, and change in physiological parameters of victims, e.g. pulse rate (see also S05-D01 codes).

#### W05-B02

#### Fire alarms

Electrical aspects of fire-fighting systems, e.g. using sprinklers or other extinguishing methods, are coded in X25-X.

#### W05-B02A

## Responsive to smoke or gas

For detectors per se search S03 also. Includes detection of inflammable gas as a fire hazard. Alarms indicating failure in gas supply are assigned W05-B08J.

HV generator, shield

## W05-B02A1 [1992]

## Using light-emitting and receiving device

Includes optical scattering type, see S03-E04C codes also.

Light source, photodetector

#### W05-B02A3 [1992]

## **Using ionisation chamber**

See S03-E10 for detector details.

#### W05-B02A5 [1992]

## Detecting specific combustion products e.g. gas, produced by the fire

See appropriate S03 codes for gas analysis. Carbon monoxide alarms are covered by W05-B07L1 as a personal safety alarm, e.g. for detecting a malfunctioning heating appliance. When a fire alarm incorporates the sensing of a build-up of carbon monoxide or some other toxic combustion product, W05-B02A5 and W05-B07L1 may be assigned together.

## W05-B02B [1992]

## Radiation actuation e.g. from fire

(W05-B02X)

Flame detection for controlled combustion, is covered by X27-G02.

Temp. measurement, thermal trip, fire-type discrimination for automatic fire-fighting system

#### W05-B02B1 [1992]

#### Infrared radiation detection

IR radiation detector, photodetector, filter

### W05-B02B5

[1992]

#### Ultra-violet flame detection

Photodetector, filter

### W05-B02C

[1992]

#### Mechanically actuated alarm

Covers fire alarm actuation by breaking glass, or conductors.

### W05-B02D

[1992]

#### **Electric actuation of alarm**

Covers fire alarm actuation by thermally-responsive switch, or similar.

#### W05-B02X

#### Other fire alarm aspects

#### W05-B03

## Alarms responsive to two or more different conditions

Covers alarm sensor inventions, e.g. an IR sensor responsive to body heat for an intruder alarm and to heat radiation from a fire for a fire alarm, and not connection of a common alarm transducer (e.g. a klaxon, bell, or flashing light) to a number of separate sensors.

#### W05-B04

## Alarms responsive to unspecified condition

#### W05-B05

## Alarms with signalling to central station and alarm signal transmission

These codes includes alarms connected (electrically or by e.g. EM transmission) to a police or fire station, i.e. 'central station' alarms. They describe the transmission medium and mode between any alarm sensor and alarm reproducing transducer. Other W05-B codes are assigned as appropriate where alarms of a specific type are involved, e.g. W05-B01 codes for intruder alarms. From 2008, W05-B05A7 is introduced for 'reverse' transmission, i.e. to highlight novel aspects of alarm signalling from a central station to sensors or alarm substations.

#### W05-B05A

[1992]

### Alarm signalling mode

These codes define the mode of communication between sensors and central station. From 2008 the title of this code has been changed to reflect the inclusion of 'reverse' transmission, i.e. to highlight novel aspects of alarm signalling from a central station to sensors or alarm substations, for which W05-B05A7 has been introduced.

#### W05-B05A1

[1992]

## With sensor signalling to central station

#### W05-B05A5

[1992]

## With cyclic interrogation or polling from central station

Polling protocol in data networks is covered by W01-A06F1C and centralised control aspects in general by W01-A06E2A.

#### W05-B05A7

[2008]

## With central station signalling to alarm sensors or substations

This code covers 'reverse' transmission, i.e. alarm signalling from a central station to sensors or alarm substations.

## W05-B05B [1992]

#### Transmission medium

These codes define the medium used for communication between sensors and central station. W01 or W02 codes are also assigned as necessary to highlight particular **novel** aspects from a communications viewpoint, but from 2002, W05-B05B codes are used **without** W01 or W02 codes where there is no specific novelty in the communication system or equipment. **Note that from 2002, transmission via the telephone network (landline and radio) is transferred to W05-B05G and that W05-B05B3 is therefore discontinued.** 

## W05-B05B1

[1992]

### **Using power transmission lines**

Also assigned W02-C01A3 and in X12-H03 for **novel** aspects of power line transmission. (Prior to 2002, these codes were routinely assigned also)

### W05-B05B2

[1992]

#### Using radio transmission system

See appropriate W02-C03 codes for transmission details. From 2002, W02 codes are only assigned for **novel** aspects. Prior to 2002 mobile telephone networks used for alarm signal transmission were coded for the radio aspect, i.e. W05-B05B2 was assigned. From 2002, where radio systems are part of a **telephone network** W05-B05G5 codes take precedence.

## W05-B05B3\* [1992-2001]

## **Using telephone transmission**

\*This code is now discontinued and from 2002 this subject matter is transferred to W05-B05G1. W05-B05B3 remains valid and searchable for records between 1992 and 2001. Prior to 2002, W01-C05A was routinely assigned also for inventions making use of the telephone network for alarm transmission.

#### W05-B05B4 [1992]

## **Using optical link**

Includes fiber and free-space links.

## W05-B05B5 [2002]

### **Using internet**

(W01-A06B7, W05-B05B3, W05-B05B9)

This code covers the **use** of the internet as an alarm signal transmission medium. As such, 'internet' codes in W01-A06B7 are **not** normally used, unless some novel aspect from a data communications viewpoint is involved. Use of other, e.g. private, data transmission network is covered by W05-B05B6, but note that W05-B05B5 takes precedence over W05-B05B6 for systems involving joint use of internet and other data networks.

## W05-B05B6 [2006]

### Using data network

This code covers the use of data networks as an alarm signal transmission medium, other than internet-based systems which are covered by W05-B05B5 which takes precedence for use of the internet and systems involving joint use of internet and other data networks e.g. a local area network. W01-A06 codes are also assigned for novel data network aspects.

### W05-B05B9 [1992]

#### Other alarm signal transmission medium

## W05-B05G [2002]

## Using telephone transmission

This code and its subdivisions cover all aspects of telephone network transmission of alarm signals and from 2002 are used for this topic in place of W05-B05B2 or W05-B05B3 as appropriate. The breakdown of the codes is based on that used for telemetry and telecontrol signal transmission medium, as represented by W05-D06G codes. In the event that an invention concerns both alarm signal transmission **and** telemetry or telecontrol aspects, **W05-D06G** codes will be used in preference. From 2002, pure applications of telephone networks to alarm signal transmission are not covered in W01 (e.g. W01-C05A) or W02, these codes now being used only in cases of genuine 'communications' novelty.

## W05-B05G1 [2002]

#### Landline

(W05-B05B3)

### W05-B05G5 [2002]

#### Radio telephone

(W05-B05B4)

## W05-B05G5A [2002]

### **Cordless telephone transmission**

(W05-B05B2)

## W05-B05G5C [2002]

## **Cellular telephone transmission**

(W05-B05B2)

This code is intended for cellular systems of the 'TDMA' kind, especially GSM. Alarm signal transmission over UMTS or similar networks is assigned W05-B05B5G, which takes precedence.

## W05-B05G5G [2002]

#### **UMTS transmission**

(W05-B05B2)

This code is intended for alarm signalling over a 'third generation' or similar network, such as '4G', and takes precedence over W05-B05G5C which is intended for use of cellular systems of the 'TDMA' kind, especially GSM. **Novel** multiple access aspects are highlighted by assignment of W02-K05 codes, especially W02-K05A7 for CDMA, and W02-K07C for OFDM.

## W05-B05G5J [2002]

#### **WLL transmission**

(W05-B05B2)

This code is intended for alarm signalling over a fixed radio telephone link of 'wireless local loop' or similar type. Novel details of the radio system are highlighted by additional assignment of W02-C03D codes for the 'point-to-point' aspect.

## W05-B05G5X [2002]

## Other telephone network alarm signal transmission

## W05-B07 [2005]

### Personal safety alarms

(W05-B09)

Anti-mugging and personal defence alarms are covered by W05-B01D5. Alarms warning of abduction or separation from children based on transponders or received signal level are covered by W05-B01A5A.

W05-B07A [2005]

Industrial worker protection alarm

W05-B07C [2005]

## Aged or infirm persons protection alarm

Monitoring of patients in hospital is also assigned S05-G02B codes.

W05-B07E [2005]

## **Driver or pilot protection alarm**

X22-E04 is also assigned for road vehicle driver alertness alarms.

W05-B07G [2005]

## **Protection alarm triggering condition**

These codes are assigned with W05-B07A, W05-B07C, W05-B07E or W05-B07X as appropriate to indicate the condition being sensed, which in general involves measurement or observation of some aspect of the individual or their activity.

W05-B07G1 [2005]

Based on body position or attitude

W05-B07G3 [2005]

## Based on lack of activity

Includes detection of an alarm condition directly based on lack of movement or indirectly based on non-use of lighting, water supply, toilet etc.

W05-B07G5 [2005]

## Based on medical parameter or medical equipment failure

From 2012 the title of this code has been revised to reflect the previous inclusion of alarms related to the malfunctioning of medical equipment in addition to its original main scope of alarms based on a 'medical parameter' meaning a measurement or observation of some aspect of an individual. These two topics are now covered separately by the subdivisions below, the codes being normally assigned with W05-B07C. S05 codes as also assigned appropriate.

## W05-B07G5A [2012]

## Alarm based on medical parameter

This code covers alarms triggered by a measurement or observation of some aspect of the individual, e.g. by sensing abnormal cardiac rhythms. S05-D codes are also assigned as appropriate for the condition sensed, e.g. S05-D01A1 for an alarm triggered by ECG measurements. Alarms indicating a problem with equipment used to treat a patient are not included and are covered by W05-B07G5C.

## W05-B07G5C [2012]

## Alarm based on medical equipment failure

This code covers alarms generated by a malfunction in medical equipment that represents a danger or risk to a patient, such as an alarm indicating a problem with infusion apparatus or a ventilator. S05 codes are also assigned as appropriate for the type of equipment, e.g. S05-J01A for an alarm indicating a problem with an infusion device. Alarms which are triggered by a measurement on the patient themselves are not included and are covered by W05-B07G5A.

W05-B07G9 [2005]

Based on other parameter

W05-B07J [2005]

Accidental falling into water alarm

W05-B07J1 [2005]

### Swimming pool alarm

X25-X06 is also assigned for electrical aspects of swimming pools.

W05-B07J3 [2005]

#### Person overboard alarm

See W06-C01B codes also for details of on-board aspects of ship or boat systems.

W05-B07J9 [2005]

Other accidental falling into water alarm

W05-B07K [2006]

## Detecting presence of person in hazardous

Covers alarms indicating the presence of a person in a hazardous area, (other than in water as covered by W05-B07J codes), e.g. a person fallen onto a railway track (see X23-A09A3 also) or a highway (see T07 codes also). Industrial safety systems in general are covered by X25-X12. For specific details of the detection system, see S03-C06 and other S03-C codes as appropriate.

#### W05-B07L [2005]

#### Dangerous gas alarms

Covers detection of the presence of explosive, toxic, or other gases hazardous to life. Smoke detectors are covered by W05-B02A codes.

## W05-B07L1 [2005]

## Sensing poisonous combustion products

This code is intended for detecting the presence of toxic combustion products, e.g. carbon monoxide, or other dangerous gases. Carbon monoxide alarms in association with combustion monitors for gas heaters and the like are also assigned X27-G02, and those for use with a fire alarm system are also assigned W05-B02A5.

## W05-B07N [2011]

## **Electrical safety alarm**

This code covers alarms warning of electrical hazards, e.g. using a detector to warn an electrician that power lines, switchgear or other electrical equipment is 'live', or failure of safety measures such as residual current circuit breakers or earthing. To denote industrial applications of electrical safety alarms W05-B07A is also assigned and for inventions specific to the electrical supply industry X12 and X13 codes are also assigned as appropriate, e.g. X12-G01D for power line maintenance. W05-B07N is not assigned for mains supply failure alarms which are covered by W05-B08J codes (i.e. as 'Utility-based alarms'). Earth current, leakage, live, RCCB, residual current circuit breaker.

## W05-B07X [2005]

#### Other personal safety alarm

## W05-B08 [1997]

## Disaster, terrorist attack and utility failure warning and alarm systems

In 2005, the title of this code was expanded to better reflect its coverage. S03-C05 is also assigned for novel aspects of geophysical natural disaster prediction and detection. Emergency broadcast radio receivers are assigned W05-A05A, which may be searched in conjunction with W05-B08 codes as appropriate.

## W05-B08A [1997]

Earthquake alarm

#### W05-B08C [1997]

#### Adverse weather-related disaster alarm

Includes flooding, landslide, avalanche.

#### W05-B08G [2005]

#### Terrorist attack alarm

Includes systems, manually or automatically actuated, e.g. for warning of an attack in progress.

## W05-B08J [1997]

#### **Utility-based alarm**

Covers alarms indicating failure of supply interruption of utilities, e.g. due to adverse weather or faults at the point of generation or consumption.

#### W05-B08J1 [2005]

#### Domestic consumer utility alarm

Covers alarm at domestic customer premises.

#### W05-B08J3 [2005]

#### Industrial consumer utility alarm

Covers alarm at industrial customer premises.

## W05-B08J5 [2005]

#### Commercial consumer utility alarm

Covers alarm installed on commercial premises, e.g. in a shop or hotel.

## W05-B08J7 [2005]

## **Utility supply producer alarm**

Covers alarms relating to safety issues and the like affecting plant and distribution systems of a utility provider.

## W05-B08X [2005]

## Other disaster or public information warning and alarm systems

#### W05-B09

## Other alarm system details

See general note for W05-B code group.

#### W05-B10 [2005]

## General details of alarm systems

(W05-B09)

Codes in this subgroup cover equipment details of alarm systems. When specific to a particular alarm type, other W05-B codes are assigned as appropriate.

### W05-B10A [2005]

#### **Alarm switches**

(W05-B09)

Novel details of electromechanical switches are covered by V03 codes and electronic switches by U21-B codes.

#### W05-B10C [2005]

## **Alarm constructional details**

(W05-B09)

Covers external aspects such as housings and internal details such as PCB mounting. See V04-S and V04-T codes for further details.

....

## W05-B10E [2005]

#### **Alarm power supplies**

(W05-B09)

Power supplies in general are covered by U24 codes, (assuming low-power types), which are also assigned as appropriate to indicate novel aspects.

#### W05-B10X

[2005]

## Other general alarm system details

(W05-B09)

#### W05-C

## Monitoring and testing of signalling or alarm systems

This code group relates to monitoring and testing of equipment and systems covered by W05-A and W05-B.

Redundancy, standby supplies

#### W05-C01

[1992]

## Testing of signalling or alarm systems

Includes checking for power disruptions etc. Fail-safe

#### W05-C01A

[1992]

#### Sensor fault

Covers apparatus/system for checking that fault lies within sensor itself. Includes self-testing sensors, (with W05-C01C from 2002).

Sensor checking, faulty sensor identification

### W05-C01B

[1992]

#### Line fault

Covers apparatus/system for checking if fault lies within line.

Loop continuity checking

#### W05-C01C

[2002]

#### Self testing systems

Includes arrangements for testing on switch-on or start-up. Self-testing sensors are also assigned W05-C01A.

#### W05-C01J

[2005]

## **Detection of tampering with alarm systems**

Covers sensing of deliberate tampering or unauthorised access to alarm equipment, e.g. through opening of housing.

## W05-C02 [1992]

## Monitoring of signalling or alarm systems

From 2009, the scope of this code has been extended to include protection against false alarms, previously covered by W05-C05, and new subdivisions are introduced to distinguish this topic from other 'processing' and hardware aspects.

Alarm condition simulation, alarm acceptance

## W05-C02A [2009]

## Control desk, indicators, displays and other hardware

This code is intended for hardware aspects of alarm monitoring centers and the like.

### W05-C02C [2009]

## Alarm interpretation, prediction and false alarm discrimination

This code is intended for control aspects, including software, involved with the determination that an alarm condition exists.

## W05-C02C1 [2009]

## Alarm interpretation and processing

This code covers arrangements for determining that an alarm condition exists, e.g. based on outputs of several sensors, and extracting relevant data such as time, location, etc. When emphasis is on predicting an alarm condition W05-C02C3 is assigned and when emphasis is on disregarding of false alarms W05-C02C5 codes take precedence.

#### W05-C02C3 [2009]

#### **Alarm prediction**

This code covers arrangements for predicting an alarm condition based on e.g. trend in change of measured values from sensors, etc.

### W05-C02C5 [2009]

## **False alarm prevention**

(W05-C05)

This code covers arrangements for preventing or reducing the incidence of false alarms, including compensating for noise or other spurious effects.

## W05-C02C5A [2009]

## False alarm prevention involving sensor features

(W05-C05)

This code covers arrangements which are **part of the alarm sensor** for preventing or reducing false alarms

## W05-C02C5C [2009]

## False alarm prevention involving features external to sensors

(W05-C05)

This code covers arrangements which are **external to the alarm sensor** for preventing or reducing false alarms, e.g. by corroborating the output from several sensors.

## W05-C03 [1992]

### Arming/disarming of alarms

This code covers enabling and disabling of alarms by an authorized person, e.g. by use of an input security code. It includes temporary and permanent disabling of EAS tags at point-of-sale, for which W05-B01A2 codes are also assigned as appropriate.

#### W05-C05\*

[1992-2008]

#### **False alarm protection**

\*This code is now discontinued and from 2009 the topic of false alarm prevention is covered by W05-C02C5 codes to place it in the same hierarchy as alarm interpretation and prediction. W05-C05 remains valid and searchable for records prior to 2009.

#### W05-D

## Transmission systems for measurement or control signals

The codes in this group relate to telemetry and telecontrol systems and specifically inventions concerned with actual measurement or control signal transmission. In 2002 the codes were revised to better distinguish between the concepts of transmission medium (represented by W05-D06 codes), application (W05-D07 codes), and function or mode (covered by W05-D08 codes). The W05-D01, W05-D03 and W05-D04 subgroups used pre-2002 are still valid for records from 1980-2001. W05-D codes are intended to be used in combination to represent particular topics. For example, a wireless sensor network can be represented by W05-D06F1 (use of wireless data networks) with W05-D08E (code indicating remote measurement). Similarly, an infrared link used in a home automation system for remote control is coded as W05-D06A3, W05-D07A and W05-D08C. Note that applications of remote control to audio/video (AV) equipment such as TV receiver remote control (W03-A02C codes), recording equipment remote control (W04-E04A), and general audio-video equipment remote control (W03-G05A codes), are not covered by W05-D codes unless of general application also. In 2018 W05-D06E1 codes were introduced to denote use of the internet as a transmission medium for IoT communication. These codes should also be

considered for signal transmission aspects of Industry 4.0 systems, for which W05-D07B (for factory automation applications) is also likely to be relevant.

Remote actuation, control, remote operation, remote monitoring, process-variable transmission systems

## W05-D01\* [1980-2001]

#### **Digital encoders**

\*This code is now discontinued. From 2002 W05-D01 and its subdivisions are no longer used, the idea of 'absolute' position encoders being conveyed by a new U21 code, U21-A03J5, with other U21-A03J codes being assigned also to specify the technology used. W05-D01 codes remain valid and searchable for records prior to 2002, and were used for rotary or linear encoders giving unique digital representation of position (see U21-A03 codes also) but not systems determining speed or position by counting pulses generated by movement (covered by S02-G01 codes).

## W05-D01A\* [1980-2001]

#### Magnetic or inductive

\*This code is now discontinued.

Magnet, magnetic field, winding, coil, resolver

### W05-D01B\*

[1980-2001]

### **Photoelectric**

\*This code is now discontinued.

Light source, detector, shield, opaque/transparent sections, step-variable transmission, pattern

## W05-D01X\*

[1980-2001]

## Other digital encoders

\*This code is now discontinued. Electrode, brush, wiping contact, contact pattern capacitance

## W05-D02

## Multiplex systems and multiple access

This code covers multiplexing and multiple-access schemes, especially as used in data networks. To highlight novel aspects of such systems, W01-A and W02-K codes are also assigned as appropriate, e.g. W01-A06F1 codes which highlight access control protocols. Within W05-D, novelty in signal format or protocol other than for multiple access purposes is indicated by assignment of W05-D08J. Prior to 2012 W01-B06 was assigned for selection (i.e. switching) aspects of telemetry and telecontrol systems in addition to relevant W05-D02 codes but from 2012 that code is discontinued and the topic is covered by appropriate W05-D02 codes only. *Cyclic sensor interrogation, sequential monitoring* 

W05-D02A [2002]

**Time division** 

TDM

W05-D02A1 [2002]

**TDMA** 

W05-D02C [2002]

**Frequency division** 

**FDM** 

W05-D02E [2002]

## **Spread spectrum**

Transmission of measurement and control signals via UMTS is assigned W05-D06G5G, and as an inherent SS system is not assigned W05-D02E codes. Spread spectrum communication in general is assigned W02-K05 codes. For transmission systems for measurement or control W02-K05 codes are only assigned for actual novelty in the spread spectrum aspect.

W05-D02E1 [2002]

Hybrid spread spectrum system

W05-D02E6 [2002]

Frequency hopping spread spectrum

W05-D02E7 [2002]

**Direct sequence spread spectrum** 

CDMA, code division multiple access

W05-D02E9 [2002]

Other spread spectrum type

W05-D02J [2007]

## Sensor or actuator addressing

This code involves addressing for a multiplex or multi-access scheme and may be used alone or with other W05-D02 codes defining the scheme.

W05-D02X [2002]

## Other multiplex and multiple access systems

Wavelength division multiplexing, WDM

## W05-D03\* [1980-2001]

### **Electric signal transmission**

\*This code is now discontinued. From 2002 W05-D03 and its subdivisions are no longer used, the subject matter being covered by new subgroups for 'Transmission medium' (W05-D06) and 'Function and mode' (W05-D08). W05-D03 codes remain valid and searchable for records between 1980 and 2001. W05-D06 'medium' codes are assigned on the basis that pure applications with no novelty in the communications are **not** coded in W01 or W02. Prior to 2002, codes from those classes were routinely assigned in addition to W05-D03 codes.

### W05-D03A\* [1980-2001]

### **Using pulses**

\*This code is now discontinued.

Digital data transmission, pulse modulator/ demodulator, pulse code/width/amplitude/repetition rate/position modulation

#### W05-D03B\* [1980-2001]

## Using frequency, phase, current or voltage magnitude

\*This code is now discontinued. From 2002 analogue measurement or control signal transmission is indicated by W05-D08A. Continuous

#### W05-D03C\* [1992-2001]

## **Telephone line**

\*This code is now discontinued. From 2002, telephone line transmission for measurement and control signals is covered by W05-D06G1. Prior to 2002 W01-C05B3E or W01-C05B3F were assigned for all aspects of telephone line transmission in telemetry and telecontrol but from 2002 are only assigned for novelty in the telephone system or equipment.

Modem, public line

## W05-D03D\* [1992-2001]

#### **Power line**

\*This code is now discontinued but prior to 2002 was assigned with W02-C01A3 and X12-H03 codes. From 2002, power line transmission for measurement and control signals is covered by W05-D06P.

Power line carrier communication, PLCC, mains

## W05-D03E\*

[1992-2001]

#### Wired system; Dedicated wiring

\*This code is now discontinued. See W01-A06 codes for networks e.g. LAN, WAN, etc. From 2002, dedicated wired systems for transmission of measurement and control signals are covered by W05-D06R and the use of data networks by W05-D06F.

#### W05-D03X\*

[1980-2001]

### Other electric signal transmission aspects

\*This code is now discontinued but included inductive systems of e.g. rotary transformer type, with W05-D04. and V02 codes assigned as appropriate. From 2002 these aspects are covered by W05-D06T1.

Dynamo-electric devices, rotating/stationary part transmission using coils

## W05-D04\*

[1980-2001]

#### Using radio link; Non-electric systems

\*This code is now discontinued. From 2002 W05-D04 and its subdivisions are no longer assigned, the subject matter being covered by new subgroups for 'Transmission medium' (W05-D06) and 'Function and mode' (W05-D08). W05-D04 codes remain valid and searchable for records between 1980 and 2001. W05-D06 'medium' codes are assigned on the basis that pure applications with no novelty in the communications aspect are **not** coded in W01 or W02. Prior to 2002, codes from those classes were routinely assigned in addition to W05-D04 codes.

### W05-D04A\*

[1987-2001]

#### Radio link

\*This code is now discontinued. From 2002 see W05-D06A1A for radio systems or W05-D06G5 codes for radio telephone systems as appropriate. Radio-link remote vehicle locking, garage door opening, radio control of models, robot vehicles etc.

## W05-D04A1\*

[1987-2001]

#### Remote control

\*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08C (remote control) with W05-D06A1A for general radio systems or W05-D06G5 codes for radio telephone systems as appropriate.

Telecontrol

## W05-D04A5\*

[1980-2001]

#### Remote monitoring

\*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08E (remote monitoring) with W05-D06A1A for general radio systems or W05-D06G5 codes for radio telephone systems as appropriate.

Telemetry moving object

### W05-D04B\*

[1992-2001]

#### **Optical link**

\*This code is now discontinued. See W02-C04 codes for optical transmission in general. Light, IR, UV

#### W05-D04B1\*

[1992-2001]

#### **Optical fiber**

\*This code is now discontinued. From 2002 this subject matter is transferred to W05-D06C. Fiber-optic

#### W05-D04B3\*

[1992-2001]

### Free space transmission

\*This code is now discontinued. From 2002 this subject matter is transferred to W05-D06A3. Line-of-sight link

### W05-D04B5\*

[1992-2001]

#### Remote control

\*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08C (remote control) with W05-D06A3 for free space optical systems or W05-D06C for optical fiberbased systems as appropriate.

Telecontrol

## W05-D04B7\*

[1992-2001]

#### Remote monitoring

\*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08E (remote monitoring) with W05-D06A3 for free space optical systems or W05-D06C for optical fiber- based systems as appropriate.

Telemetry

## W05-D04B9\*

[1992-2001]

### Other optical system details

\*This code is now discontinued.

#### W05-D04C\*

[1992-2001]

#### Ultrasonic link

\*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D06A5. Sound transmission, telemetry, telecontrol

#### W05-D04D\*

[1992-2001]

## Pneumatic, hydraulic, mechanical transmission

\*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D06M.

#### W05-D04D1\*

[1992-2001]

## **Mud-pulse telemetry**

\*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D06M1. See also X25-E02A1 for well logging.

#### W05-D04G\*

[1997-2001]

## **Using transponders**

\*This code is now discontinued. It was used with other W05-D04 codes as appropriate. From 2002, this topic is represented by assignment of W05-D08G. RF transponder systems are also assigned W02-G05 codes.

#### W05-D05

## Preventing or correcting errors; Monitoring

#### W05-D05A

[1992]

## Noise suppression/compensation

Spread spectrum systems with inherent resistance to interference are covered by W05-D02E codes (or W02-K05 codes prior to 2002), and only assigned W05-D05A when this resistance is part of the novelty.

Filtering, redundancy

#### W05-D05A1

[2002]

## Based on error detection or correction

See U21-A06 for digital signal error detection in general and W01-A01B codes for specific application to data transmission.

#### W05-D05B

[1992]

## Security

This code is intended for novel aspects of remote measurement and remote control systems that relate to security in the sense of preventing or detecting unauthorized access, or other tampering with the system such as a remote locking/unlocking system for a vehicle (see W05-D07D and X22-D01A also). It is **not** intended as a code to indicate 'security' as an application and so is only used for specific aspects relating to **improving** the security of the telemetry or telecontrol system itself.

Access restriction, signal coding

#### W05-D05B1

[2009]

### Security based on use of codes

This code is intended for novel aspects of codebased security in remote control or monitoring systems. The term 'code' is intended to encompass the use of encryption and also generated pseudorandom digital words and digital passwords, but signal coding for error correction purposes is not included, being covered by W05-D05A1. For inventions involving the prevention or detection of interception of transmitted coded signals which are not themselves novel, W05-D05B5 codes take precedence.

#### W05-D05B5

[2009]

# Security based on preventing or detecting interception, malicious software, or unauthorized access

From 2012, the scope of this code has been widened to include arrangements for protecting against malicious software and preventing unauthorized access to a remote control or monitoring systems, e.g. via a network, in addition to its previous coverage of methods or apparatus for the detection and/or prevention of interception and retransmission of control or measurement signals, now covered by W05-D05B5A. W05-D05B5 codes take precedence over W05-D05B1 when coded signal interception or modification is to be avoided but both codes may be assigned together if the form of the coded signals themselves is also novel. Inventions relating to factory automation (FA) systems are also assigned W05-D07B.

### W05-D05B5A

## Security based on preventing or detecting interception

[2012]

This code is intended for security arrangements based on the detection and/or prevention of interception and retransmission of control or measurement signals. Where novel communications aspects are involved other telecommunications codes such as W01-A05L5 are also assigned as appropriate. W05-D05B5C takes precedence over this code for arrangements protecting against modification of software, e.g. by viruses, and W05-D05B5E takes precedence for preventing unauthorized access to a network-based control system.

Eavesdropping, intercept, relay attack

## W05-D05B5C [2012]

# Security based on protecting against malicious software or modification of control programs.

This code is intended for security arrangements based on the detection and/or protection against malicious software, such as viruses, trojans, worms etc., or other unauthorized modification of control programs. T01-N02B3 is also assigned for malicious software protection. W05-D05B5E takes precedence for protection of network-based control systems against unauthorized access.

#### W05-D05B5E [2012]

## Security based on preventing or detecting unauthorized network access

This code is intended for security arrangements based on the detection and/or prevention of unauthorized access to a networked control system. As such it is likely to be assigned with W05-D06E for remote control or measurement systems connected to the internet or W05-D06F for data network-based systems in general. Control of access to data networks in general is covered by W01-A06E1C and firewall aspects are also assigned T01-N02B1D.

### W05-D05B9 [2009]

## Other security aspects of remote control or remote monitoring systems

#### W05-D05C [1992]

## Testing/monitoring of system

Includes setting up and commissioning. See W02-C01D codes for line system testing, W02-C04C1 codes for optical system testing, and W02-C05 codes for monitoring of transmission systems in general. S01 codes may also be assigned for specific electrical testing.

Fail-safe, sensor/actuator monitoring, continuity testing, loopback

## W05-D06 [2002]

### **Transmission medium**

The codes in this subgroup are intended to allow the transmission medium for remote measurement or control signals to be separately highlighted, and replace the codes previously used which related to media in W05-D03 and W05-D04. To specify telemetry, telecontrol, or mode, W05-D08 codes are assigned as well as appropriate. W01 or W02 codes are also assigned as necessary to highlight particular **novel** aspects from a communications viewpoint, but W05-D06 codes are used **without** W01 or W02 where there is no specific novelty in the communication system or equipment. Note that part of the code structure below (W05-D06G codes in particular) is also used to define telephone

network signalling for 'central station' type alarms (W05-B05G codes). In the event that an invention concerns both telemetry or telecontrol **and** alarm signal transmission aspects, **W05-D06G** codes will be used in preference.

#### W05-D06A [2002]

#### Non-contact transmission media

(W05-D04)

These codes are intended to include 'wireless' or 'cordless' transmission systems, and thus encompass free-space optical, radio, and similar technologies.

## W05-D06A1 [2002]

#### Radio and near-field

Includes RF or near field systems using electric, or more commonly, magnetic field transfer as used for rotary couplings, 'smart card' or 'tag' type coupling where ends of link can be separated by variable (short) distance.

## W05-D06A1A [2002]

#### Radio

(W05-D04A)

This code is mainly intended for dedicated radio systems - transmission over radio telephone networks is covered by W05-D06G5 codes and transmission over wireless data networks is covered by W05-D06F1, **both of which take precedence over this code.** Radio systems in general are covered by W02-C03 codes, and radio equipment by W02-G codes, which are also assigned for **novel** aspects.

## W05-D06A1B [2002]

## **Near-field**

(W02-C02, W05-D03X, W05-D04)

Near-field systems in general are covered by W02-C02 codes, which are also assigned for novel aspects. This code is intended for near-field communication **without** a mechanical connection, i.e. it does **not** include capacitive or inductive couplings, e.g. of rotary type, which are covered by W05-D06T codes.

#### W05-D06A3 [2002]

### Free space optical

(W05-D04B3)

This code covers arrangements for transmitting remote control or measurement signals over a free-space optical path, using infrared, visible, or ultraviolet light. Optical fiber and light guide systems involving a mechanical connection are covered by W05-D06C. Novel optical communication system aspects are represented by W02-C04 codes, especially W02-C04B2 codes for free-space transmission, these being also assigned

where application to other systems as well as remote control or monitoring are indicated. *IR, UV* 

## W05-D06A5 [2002]

#### Sonic or ultrasonic link

This code is primarily intended for transmission of remote monitoring or control signals through air or similar gaseous medium. Systems involving sonic or ultrasonic transmission with a mechanical connection - including transmission through water - are covered by W05-D06M codes. Sonic or ultrasonic communication in general is covered by W02-C07 codes.

#### W05-D06C [2002]

## Optical fiber and light guide system

(W05-D04B1)

This code covers arrangements for transmitting remote control or measurement signals over a fiber-optic path, using infrared, visible, or ultraviolet light. Free space optical transmission is covered by W05-D06A3. **Novel** optical communication system aspects are represented by W02-C04 codes, especially W02-C04B1 codes for fiber-based transmission, these being also assigned where application to other systems as well as remote control or monitoring are indicated. *IR, UV* 

### W05-D06E [2002]

## Internet-based transmission

(W01-A06B7)

This code covers the use of the internet as a medium for measurement or control signal transmission, including use in 'internet of things' (IoT) applications. From 2018 specific subdivisions for this topic are introduced (W05-D06E1 codes). W01-A06 (data network) codes are not normally assigned for internet-based remote control and monitoring unless some novel aspect from a data communications viewpoint is involved but T01-N codes may also be assigned for significant computing aspects, especially T01-N01F. The use of data networks other than the internet for telemetry and/or telecontrol signal transmission is covered by W05-D06F codes and use of telephone networks by W05-D06G codes.

Web-based control, web-based monitoring

## W05-D06E1 [2018]

## Internet-based transmission for IoT communication

This code covers the use of the internet as a measurement or control signal transmission medium specifically for 'internet of things' (IoT) applications. Please note that W05-D06E1 codes are assigned for inventions where some aspect of control or measurement signal transmission is significant and not for all aspects of equipment that may be capable of operating in such a system for which codes for the equipment itself should be used. Additional W05-D06 codes are assigned for significant details such as intermediate arrangements for connecting to the internet but please note that use of wireless data networks is indicated by W05-D06E1A and use of cellular communications networks by W05-D06E1C. Search with W05-D07 codes for specific applications, e.g. with W05-D07A for home automation systems using IoT technology or with W05-D07B for use in factory automation including Industry 4.0 applications.

## W05-D06E1A [2018]

## Wireless network-based transmission for IoT communication

This code represents the use of wireless networks which form a significant part of IoT systems with the exception of cellular radio networks which are represented by W05-D06E1C. The use of wireless data networks in general for carrying remote control and measurement signals is covered by W05-D06F1.

6LoWPAN, BLE, Bluetooth®, LoRaWAN, Thread, wireless LAN, SigFox, WLAN, Z-wave, Zigbee®

#### W05-D06E1C [2018]

## Cellular network-based transmission for IoT communication

This code represents the use of cellular radio networks as wireless wide-area networks (WANs) for handling remote measurement and control signals for IoT purposes. The use of cellular radio networks for non-IoT remote control and monitoring purposes is covered by W05-D06G5 codes.

5G IoT, CloT, LTE Cat 0, LTE Cat 1, LTE Cat 3, LTE IoT, LTE-M1, massive IoT, narrow band IoT, NB-IoT

## W05-D06F [2005]

#### **Data network-based transmission**

This code covers the use of data networks as a transmission medium, other than internet-based systems which are covered by W05-D06E. W01-A06 codes are also assigned for novel data network aspects.

CAN, controller area network, EIB, European installation bus, field bus, FlexRay, KNX, LAN, local area network, profibus, VAN, vehicle area network

## W05-D06F1 [2016]

#### Wireless network

Covers use of a wireless (radio) based data network excluding networks used for internet of things applications which are covered by W05-D06E1 codes. Novel details of data networks are covered by W01-A06 codes. This code takes precedence over W05-D06A1A which covers the use of nonnetwork radio communication for remote control or remote measurement. For wireless sensor networks search with W05-D08E. Radio systems in general are covered by W02-C03 codes and radio equipment by W02-G codes, which are also assigned when these aspects are novel.

Bluetooth®, wireless LAN, WLAN, Zigbee®

#### W05-D06G

[2002]

#### **Telephone**

(W01-C05B3E, W01-C05B3F)

In addition to the **previously used** codes indicated below, W01-C05B3E or W01-C05B3F were routinely assigned depending on the remote control or remote monitoring aspect. Where some **novel** aspect of the telephone system itself is involved these W01 codes will also be assigned.

W05-D06G1 [2002]

Landline

(W05-D03C)

W05-D06G5 [2002]

Radio telephone

(W01-B05A1, W02-C03)

W05-D06G5A [2002]

**Cordless telephone transmission** 

(W01-B05A1B, W02-C03C3)

## W05-D06G5C [2002]

## Cellular telephone transmission

(W01-B05A1A, W02-C03C1)

Use of 3G, 4G, 5G or similar non-TDMA mobile telephone systems is covered by W05-D06G5G, which takes precedence over this code. Novel radio system aspects of cellular networks are represented by W02-C03C1 codes. From 2018 cellular 'internet of things' (CloT) systems are not coded here and are covered by W05-D06E1C.

#### W05-D06G5G [2002]

## Third, fourth or fifth-generation mobile phone system

The title of this code is amended (2018) to better reflect its coverage. Novel radio system aspects of cellular networks are represented by W02-C03C1 codes. This code is intended for measurement or control signaling over a 3G, 4G, 5G or similar network, and takes precedence over W05-D06G5C which is intended for use of cellular systems of the 'TDMA' kind, especially GSM. Significant multiple access aspects are highlighted by assignment of W05-D02 codes, novel aspects of these being assigned W02-K codes also, such as W02-K05A7 for CDMA, and W02-K07C for OFDM. Please note that from 2018 cellular 'internet of things' (CIoT) systems are not coded here and are covered by W05-D06E1C.

## W05-D06G5J [2002]

### WLL and fixed access systems

(W01-B05A1G, W02-C03D)

This code is intended for measurement or control signalling over a fixed radio telephone link of 'wireless local loop' or similar type. Novel details of the radio system are highlighted by additional assignment of W02-C03D codes for the 'point-topoint' aspect.

#### W05-D06G5X [2002]

## Other telephone network measurement or control signal transmission

## W05-D06M [2002]

## Pneumatic, hydraulic, mechanical

This code covers the transmission of measurement or control signals through water or other liquids. Systems involving sonic or ultrasonic transmission **without** a mechanical connection, e.g. via the air, are covered by W05-D06A5.

#### W05-D06M1 [2002]

Mud pulse telemetry

W: Communications

## W05-D06P [2002]

#### **Power line communication**

(W05-D03D)

### W05-D06R [2002]

#### **Dedicated wired system**

(W05-D03E)

This code is intended for electric signal transmission over wires specifically installed for the purpose. Fiber-optic systems of this type are covered by W05-D06C.

### W05-D06T [2002]

#### Inductive or capacitive coupling

(W05-D03X, W05-D04)

These codes are intended for mechanically-associated inductive or capacitive coupling, e.g. of rotary type between fixed and moving parts of a machine. Arrangements using near-field transmission **without** mechanical association, i.e. in a 'cordless' sense, are covered by W05-D06A1B.

## W05-D06T1 [2002]

## Inductive coupling

(W05-D03X, W05-D04)

Search with V02 codes for specific novel aspects, e.g. V02-F02D for rotary transformers.

## W05-D06T5 [2002]

## **Capacitive coupling**

(W05-D03X, W05-D04)

W05-D06X [2002]

Other medium

W05-D07 [1992]

## Transmission of control or measurement signals for specific systems

These codes are intended to highlight application and are used with other W05-D codes as appropriate for details of e.g. transmission mode or medium.

## W05-D07A [1992]

## For home automation

ncludes home bus systems. See also X27-V for home automation.

Heating, ventilating, air conditioning, water heater, lighting, intelligent home

## W05-D07B [1992]

#### For factory automation

This code covers transmission of measurement and control signals for factory automation applications. When internet-of-things (IoT) aspects are significant, e.g. in connection with Industry 4.0 data communications, W05-D06E1 codes are also assigned. Control systems-related data communications arrangements in general are also assigned T06-A11. Total factory control in general is covered by T06-A04A2A when based on numerical control and for non-NC systems by T06-A04B7.

Cyber-physical systems, digital manufacturing, FA, fieldbus, IEC 61158, inventory, process control, process monitoring, production line, smart factory, total factory control

## W05-D07C [1992]

## For building control

Includes systems for intelligent buildings. HVAC, heating, ventilating, air conditioning, environment control, computer, sensor interrogation, alarm

## W05-D07D [1992]

#### For vehicles

This application code is assigned for remote measurement and/or control of any vehicle equipment or systems. Codes relating to the specific type of vehicle and on-board equipment or system should also be searched. See also X21, X22 and X23 for land vehicles and W06 for aircraft, space vehicles or marine craft. Search with W05-D02 codes for multiplex systems and with W05-D06F for data network aspects (e.g. CAN bus).

## W05-D07E [1997]

#### For office automation

See S06 section for printer, facsimile and photocopier.

## W05-D07F [1997]

## For power generation and distribution

Includes power plant and systems control. See also X12-H codes.

## W05-D07G [1997]

## For utility meters i.e. electricity, gas, water

See also S01-B01 and X12-H04A for remote reading of electricity meters, and S02-K08A for remote meter reading in general.

## W05-D07H [2006]

## For earth drilling and well logging

(W05-D07X)

Prior to 2006 this topic was covered by W05-D07X. For mud pulse telemetry W05-D06M1 and W05-D08E are also assigned. See S03-C codes and X25-E02 codes for well logging in general, and class H01 for all aspects of oil and gas production.

#### W05-D07M [2011]

### For medical systems and equipment

S05 codes are also assigned to indicate specific details.

#### W05-D07N [2018]

## For agricultural systems and equipment; Farming

This code covers applications of remote measurement and control to agriculture and farming, including livestock aspects. X25-N codes are also assigned and should be included in searches for specific topics, e.g. X25-N01B for control or monitoring of irrigation and X25-N02A for animal feeding.

Automatic feeder, culture, fertilizing, harvesting, greenhouse, hen-house, milking, soil erosion

### W05-D07P [2022]

### Scientific analysis systems

Includes control or measurement signalling, for application systems such as weather measuring equipment, pollution level measurement, Chemical reaction or hazardous substance measurement, radiation measurement etc.

Pollution, weather, chemical reactions

## W05-D07X [1992]

## Other application of telemetry and telecontrol systems

From 2006 oil rig and drilling applications are transferred to W05-D07H.

### W05-D08 [2002]

#### **Function and mode**

These codes are intended to indicate, irrespective of transmission medium or application (respectively conveyed by use of W05-D06 and W05-D07 codes) the purpose of the system in terms of remote control or remote monitoring. They are also used to flag an analogue system, on the basis that the majority of inventions are likely to relate to switching or digital transmission, signal format and that transponders are involved.

#### W05-D08A [2002]

#### **Analogue system**

## W05-D08C [2002]

#### Remote control

Prior to 2002, see W05-D04A1 for radio-based remote control and W05-D04B5 for optical systems.

## W05-D08C1 [2002]

## Remote control and monitoring

This code takes precedence over W05-D08E when transmission of telecontrol **and** telemetry signals are involved.

## W05-D08E [2002]

#### Remote monitoring

For systems involving transmission of both telecontrol and telemetry signals, W05-D08C1 takes precedence over W05-D08E. For sensor networks search with W05-D06F codes, e.g. W05-D06F1 is assigned with W05-D08E to denote wireless sensor networks. (Prior to 2016 see W05-D06F and W05-D08E).

## W05-D08G [2002]

#### **Using transponders**

(W05-D04G)

RF transponder-based systems in general are assigned W02-G05 codes, which are also used here for **novel** aspects of radio-based systems. Transponder systems for identification purposes are assigned W06-A04B for radio signal systems, W06-A05B for sonar-type systems, and W06-A06B for optical systems.

#### W05-D08J [2002]

#### **Novel signal format or protocol**

This code is intended to highlight that the nature of signals used in a telemetry or telecontrol system is novel in some way. These aspects could include novelty in waveforms, voltage levels, modulation, protocols or the like, and are further highlighted by the assignment of codes in e.g. U21 or W01 as appropriate where their use conveys additional information. Systems involving multiplex and multiple access schemes are covered by W05-D02 codes, and signal coding for security by W05-D05B1. W05-D08J will not normally be assigned for these cases unless a specific signal format or protocol novelty exists.

## W05-D08L [2005]

## 'Learning' and 'universal' type remote controllers

(W05-D08X)

Covers remote controls capable of controlling different equipment types, e.g. after 'training' in signal format. Remote controllers for general audio or video entertainment systems with this property are covered by W03-G05A1A.

#### W05-D08N [2005]

## Constructional details of telemetry / telecontrol equipment

(W05-D08X)

Covers external aspects such as housings and internal details such as PCB mounting. See V04-S and V04-T codes for further details.

## W05-D08P [2009]

## Power supply for telemetry / telecontrol equipment

(W05-D08X)

This code covers power supplies specifically for remote measurement or remote control systems. Novel details of power supplies are also assigned relevant codes in U24, e.g. U24-D and U24-E codes.

#### W05-D08R [2009]

## Repeaters and extenders for remote control and remote monitoring

(W05-D08X)

This code covers arrangements for extending the range of remote control or remote monitoring systems, including devices such as 'remote control extenders', usually based on repeaters. Novel aspects of repeaters are also assigned codes depending on technology, e.g. W02-C04A5 for optical repeaters and W02-G05C for radio types. W05-D08R is intended for arrangements permitting increased separation between e.g. controller and controlled device. Modifications to codes or command sets to increase the scope of the controlled functions and the like are **not** included, being covered by W05-D08J. Remote control extenders specifically for use with AV equipment are covered by W03-G05A8.

## W05-D08X

[2002]

## Other function or mode aspects

#### W05-D09

## Other transmission systems for measurement or control signals

This code covers systems for transmitting or receiving remote control or remote measurement signals not fitting into any other W05-D subdivision code.

#### W05-E

### **Display arrangements**

W05-E codes include, in general, display aspects not catered for elsewhere and for specific applications and device technology relevant codes in other classes should be considered, such as T04 codes for computer monitors and W03 codes for television displays. However, note that from 2007, certain W03-A codes (nominally for TV receivers) are used in a general sense for application to displays capable of presenting video information. (See the note at the start of W03 class for further details). Therefore, those searching with W05-E codes are advised to also consider use of W03-A codes for equipment capable of video display where that aspect is significant. From 2007 W05-E10 is introduced for 'electronic paper'.

#### W05-E01

#### Forming character by selecting elements

Includes seven-segment types. *Matrix, row, column* 

## W05-E01A

#### **Drive circuitry**

Addressing, row/column/segment selection, decoder, driver, switching

## W05-E01B

### **Element arrangements**

Matrix, cell, alphanumeric display, filament, lamp, gas discharge, fluorescent, LED, LCD, Shutter, flap, electromagnetic actuator

## W05-E02

#### Arrays or layers of characters

Includes displays where characters are permanently fixed to e.g. moving band, or selectively uncovered, back-lit, etc.

Moving drum, disc, band, motor drive

#### W05-E03

## Advertising displays and systems

This code covers displays used for advertising and similar commercial purposes (in W05-E03A codes), e.g. building signs with company logos and the like, and also advertising via other media such as TV broadcasts and the internet, provided that some visual aspect is involved. These codes may be used alone, or in conjunction with W05-E01 to W05-E05 codes. Signs for indicating emergency exits and the like in buildings are not assigned W05-E03 codes and are covered by W05-A03 codes and other W05-E codes as appropriate.

Lighting control, sequencer, discharge tube, incandescent lamp, LED, animated mobile, rotating display

#### W05-E03A

## **Advertising displays**

These codes are assigned when some novelty in the actual means of presentation itself, is involved.

## W05-E03A1 [2002]

## Static illuminated signs and billboards

## W05-E03A3 [2002]

## Signs and billboards with moving parts

Covers arrangements for bringing a different advertisement into view and for moving part of an advertisement, e.g. animation.

#### W05-E03A5 [2002]

## Addressable or switchable advertising displays

These codes cover displays, generally using switched light sources or addressable back-lit elements, without physical movement of the display itself being involved. Codes specific to the display technology or elements involved are assigned as necessary from e.g. U12, U14, V05, or X26.

## W05-E03A5A [2002]

## With separately controllable or addressable display elements

This code covers displays with some electrically controllable or addressable aspect, e.g. to allow the appearance of limited movement of a portion of the display. W05-E05A5C takes precedence for matrix-type displays of video type in which there is no restriction on the information presented.

## W05-E03A5C [2002]

## Novel matrix-type display for advertising

This code takes precedence over W05-E03A5A and covers novel aspects of displays of video or analogous type allowing all display points in a matrix to be addressed as desired.

#### W05-E03A5E [2002]

## Video advertising using standard display

This code includes the use of standard video terminals, of 'TV set' or 'VDU' type arranged to present advertising messages, e.g. to persons in a queue or similar situation in a public area.

#### W05-E03A6 [2014]

## Advertising displays including additional information aspect

This code and its subdivisions cover display arrangements or signs for advertising or similar commercial purpose which include an additional, non-visual aspect.

#### W05-E03A6A [2014]

## Advertising displays including audio aspects

This code covers display arrangements, billboards, or signs for advertising or similar commercial purpose which include an audio aspect, e.g. using recordings. See also W04-E30A3 for audio players in general. W05-E03A6A is not assigned for advertising using standard video displays, as covered by W05-E03A5E which are normally expected to include an audio aspect. Audible advertising without any visual element is covered (from 2014) by W05-F.

#### W05-E03A6X [2014]

Advertising displays including other additional information aspect

#### W05-E03A7 [2002]

# Advertising displays involving synchronisation with movement of an observer

This code includes arrangements for presenting sequences of video or film type images so as to be viewable by an observer in a vehicle, e.g. a passenger on a train. Systems based on cine film or analogous methods are also assigned S06-B codes (e.g. S06-B05), and those using video projection are also assigned W04-Q01 codes.

### W05-E03A9 [2002]

## Other advertising display aspects

W05-E03C

[2002]

#### TV advertising

This code covers novel aspects of the creation and transmission of television advertising. For systems checking that commercial messages are actually transmitted, e.g. at a designated time, see W02-F04C5.

## W05-E03E [2002]

#### Internet advertising

Novel aspects of internet communication are covered by W01-A06B7 codes as appropriate, and internet advertising applications in general by T01-N01A2C.

#### W05-E03G

[2002]

## Telephone network advertising

This code covers text-based and similar systems involving visual presentation, and does **not** include purely audio messages.

#### W05-E03M

[2015]

#### **Mobile Advertising**

Includes advertising mounted on, or carried by vehicles and portable advertising displays and devices.

Advertising

#### W05-E05

[1987]

#### **General display details**

W05-E05 codes may be used alone, in conjunction with other W05-E codes or to highlight display aspects in conjunction with other classes. Note that from 2007, provision has been made to use W03-A codes (nominally for TV receivers) in a wider sense for displays capable of presenting video, thus the use of W03-A codes in a search in addition to W05-E05 codes should be considered for such displays.

## W05-E05A

[1987]

## **Filters**

From 2007, filters specifically for video displays are covered by W03-A08E1. W05-E05A will continue to be assigned to general or non-video cases.

Polarizer, anti-glare filter, diffuser, lens, fiber-optic

#### W05-E05B\*

[1987-2006]

#### Back lighting and analogous systems

\*This code is now discontinued. From 2007, the topics of back and edge lighting for displays are covered by new X26 codes, X26-U04A and its subdivisions, which are used in conjunction with other X26-D codes as appropriate, W05-E05B codes remain valid and searchable for records prior to 2007, and covered back and edge lighting of displays, especially LCDs, in which U14-K01A4C is also assigned, but also the lighting of any translucent or transparent information source, such as advertisements, also assigned W05-E03A1. Note that back lighting or similar for computer monitors or telephone displays was not included, being covered by T04-H03D and W01-C01A2A respectively. X26 codes were also assigned as appropriate for light sources and optical components for illumination.

Passive display, liquid crystal display module, illumination, lamp, light fitting

#### W05-E05B1\*

[2002-2006]

## **Back lighting**

\*This code is now discontinued.

#### W05-E05B3\*

[2002-2006]

## **Edge lighting**

\*This code is now discontinued.

#### W05-E05B5\*

[2002-2006]

#### Diffusers and light source filters

\*This code is now discontinued. X26-D01E1 is assigned for diffusers and X26-D01C for filters.

#### W05-E05B6\*

[2005-2006]

#### **Light guide**

\*This code is now discontinued. X26-D01F is assigned for this topic.

#### W05-E05B7\*

[2002-2006]

#### **Novel light sources**

\*This code is now discontinued but was normally used with a code specific to the light source itself, e.g. in X26.

#### W05-E05B9\*

[2002-2006]

## Other back lighting and analogous system details

\*This code is now discontinued.

## W05-E05C [1987]

## Composite display i.e. made up of several individual displays

Multiple CRT, discharge tube, matrix display, large screen, sports ground, stock market, truck-mounted display, passenger information, video wall

## W05-E05F [2020]

## Flexible/foldable/bendable displays

Includes the structural details of flexible or foldable displays as used in mobile phones and other portable display devices. See also U14 for liquid crystal and electroluminescent displays, and U12 for light emitting diode (LED) displays. Flexible display monitors for computers are coded under T04-H03N.

## W05-E05G [2006]

## **General constructional details**

This code is used with other W05-E codes or alone, as appropriate. It is not assigned for single applications covered elsewhere, such as for construction of a TV set display. From 2007, constructional details specific to video displays are covered by W03-A09 codes. W05-E05G will continue to be assigned to general or non-video cases.

#### W05-E07 [1997]

### **Head-mounted display**

This code is used for general or unspecified applications only, and not when a specific code exists elsewhere. Head mounted displays specifically for TV receiver and similar applications are coded in W03-A08E7, and for virtual reality in W04-W07E1A.

## W05-E08 [2002]

## Display technologies not covered elsewhere

This code is intended for electrical displays not covered elsewhere, and is normally used with codes from other sections as appropriate, e.g. with S06-A codes for electrophotographic displays. Specific display technologies such as EL, LED, LCD, PDP, CRT are not included, and are covered in U12, U14, or V05 as appropriate. Novel technology aspects of electronic paper which cannot be coded elsewhere are covered here, and from 2007 W05-E10 is also assigned.

## W05-E10 [2007]

## **Electronic paper**

This code is intended as a general reference for 'electronic paper', interpreted as the use of mainly flexible electronic displays to provide a re-writable medium for presenting information in a form resembling normal printed matter, no power supply being required once data is written. Novel technology aspects will continue to be covered in e.g. U14 codes or in W05-E08.

## W05-F [2014]

## **Audible advertising**

This code covers advertising involving audible communication only. Advertising involving audible and visual aspects is not included and is covered by W05-E03A5E for video advertising using a standard display, W05-E03A6A for other visual advertising displays that include audible information and in W05-E03C for TV advertising. W05-F includes audible advertising via the telephone network which is also assigned W01-C05B5G.

Audio Advertisement

### W06: Aviation, Marine and Radar Systems

#### W06-A

#### Radar, navigation, etc.

Includes analogous systems where principles are applicable to radar, sonar, etc. See also under application, e.g. for aircraft and ships where systems are specific.

#### W06-A01

#### **Beacon systems**

Includes aerials, receivers and transmitters, but see W02-B and W02-G codes also for specific features of RF systems.

#### W06-A01A [1992]

## Fixed beacon providing navigational reference

From 1992, airport/landing strip systems are also coded in W06-B02E.

Hyperbolic, Loran-C, Omega, aircraft landing aid, ILS, microwave landing system, MLS, optical, sonic, ultrasonic system

## W06-A01C [1992]

## Portable or vehicle-borne beacon for location

Survival craft, liferaft, distress

#### W06-A02

#### **Direction finders**

Bearing measurement, incident radiation angle measurement, DF

#### W06-A02A

#### **Using radio waves**

Antenna direction pattern changing is also covered by W02-B06 codes.

RDF, rotary antenna, antenna array, electronic beam steering, phase comparison, tracking

## W06-A02A1 [1992]

## **Automatic direction finder**

Includes systems resolving relative phases of signals from different antennae.

## W06-A02C [1992]

## **Using light**

(W06-A02X)

IR, UV, visible, light source location

## W06-A02C1 [1992]

## Tracking object with electronic imaging

See T04-D codes also, e.g. T04-D07D for detecting movement or position. Includes warehouse monitoring aspects.

Pattern recognition

#### W06-A02E

[1992]

#### Using sonic or ultrasonic waves

Sound source location, gunfire location

#### W06-A02X

#### Other

Nuclear radiation, Geiger counter

#### W06-A03

## **Position fixing**

Use with W06-A02 codes if direction finding aspect is present.

Multiple direction finding

#### W06-A03A

[1992]

## Satellite based system e.g. GPS

See W02-K05 codes for pseudonoise aspects. Global positioning system, NAVSTAR, coarse, fine, secure, military

## W06-A03A1

[1997]

#### **Novel aspects of GPS**

Includes novel details concerning the overall GPS infrastructure. Novel GPS receivers are not included here and are coded in W06-A03A5R.

Infrastructure

#### W06-A03A5

[1997]

## **GPS applications**

Includes **use** of GPS information without necessarily any novel aspect of GPS per se.

## W06-A03A5A

[2002]

## Includes systems using ground based transmitter of known accurate position to correct for GPS timing errors, e.g. due to ionospheric conditions, to provide more accurate positioning. Also includes use of pseudolites that transmit GPS format signals when line of sight to sufficient orbiting GPS

satellites is restricted.

#### W06-A03A5C

[2002]

## **Absolute position determination**

Differential and assisted GPS

Includes use of GPS purely as a navigation tool.

## W06-A03A5E [2002]

## Position determination for secondary purpose

Includes use of GPS position information for control of e.g. setting up of television channels, local information services accessing, etc., without necessarily presenting the geographical information to the equipment user.

[2002]

#### W06-A03A5G

## Use of GPS as a time standard

Includes use of GPS timing information, e.g. for time-stamping transmitted data.

## W06-A03A5J [2002]

## Use of GPS as a frequency standard

## W06-A03A5M [2007]

## **GPS Jamming/anti-jamming**

Includes arrangements for protecting GPS receiver from radio frequency (RF) interference to prevent GPS receiver code and carrier tracking from being effected, resulting in poor navigation performance, e.g. in weapons fire and control systems (see also W07 codes). See W02-L01 codes instead for jamming/anti-jamming of (non-GPS) communications in general.

## W06-A03A5R [2002]

#### **Novel GPS receiver**

Includes novel hand-held or vehicle-borne GPS receiver. This code is normally applied when there is some novelty in the receiver construction itself such as a novel housing or display. For general use of a GPS receiver for position fixing, see W06-A03A5C instead. W02-G03 codes (for communications receivers) are also assigned as appropriate.

## W06-A03A5X [2002]

#### Other GPS applications

## W06-A03B [2005]

## **Using radio waves**

Includes the use of a number of radio receivers to determine the position of a transmitted radio signal, e.g. by triangulation, and also determination of own position based on reception of broadcast signals, or other transmissions, from known locations. The use of dedicated beacons transmitting special signals is covered by W06-A01A

Base station, cell site, cellular, radio station, time-ofarrival, TOA, TV station

## W06-A03D [2005]

## **Using light waves**

## W06-A03F [2005]

#### Using sonic or ultrasonic waves

Includes use of omni-directional hydrophones to determine sound source location. See also W02-C07C for hydrophones per se

#### W06-A04

#### Radar systems

#### W06-A04A

#### **Primary radar systems**

Includes primary or passive target radar systems where a radar/radio signal is transmitted towards a target and the reflected signal is detected.

Non-cooperating/passive target systems

#### W06-A04A1

#### **Determining target position**

Includes radar based rangefinding (see also S02-B01) and position determination.

Monopulse, distance, height measurement, tracking system, aircraft radio altimeter, level sensing, ground penetrating radar

#### W06-A04A2

#### Using relative movement

Clutter suppression is covered by W06-A04E5. For Doppler intruder detector see W05-B01A codes also.

Frequency measurement, target discrimination/classification, MTI, velocity measurement, clutter suppression

#### W06-A04B

## Secondary radar systems

Includes secondary or active radar systems where a radar/radio signal is transmitted towards a target and then a reply signal is actively re-transmitted by the target back towards the originating transmitter/receiver. From 1997 remote reading of e.g. meters, etc., is excluded - see W05-D08G, W05-D08E and W05-D07G codes. All RFID transponder details and interrogation systems are also covered by T04-K codes, such as T04-K03B for novel RFID tags and T04-K02 codes for reading and writing aspects. See also W02-G05 codes for novel RF details such as antenna (W06-A04G7 also), associated with RFID systems. Analogous systems using other than radio waves are coded in the appropriate sections: e.g. W06-A05B codes for sonic/ultrasonic systems, and W06-A06B codes for light based systems.

Interrogation, response, reply, ID, code, sequence, security

## W06-A04B1

#### [1992]

#### For vehicle or aircraft identification

Includes radio frequency identification of vehicles and aircraft or parts of them, e.g. identification of tyres on a motor vehicle so that a specific deflated tyre can be identified. Also see T04-K03B for RFID transponders per se and T04-K02 codes for reading/writing aspects. See also W02-G05 codes for novel radio/RF details of RF transponders/tags such as antennae. See also W06-A04H1 for anticollision radar and W06-A04H7 for aircraft control aspects. Aircraft on-board navigation systems are also coded in W06-B01B1.

RFID, transponder, IFF, identification of friend or foe, air traffic control, ATC, flight identification

#### W06-A04B3

## [1992]

### Security and coding aspects

Includes coding to prevent errors, suppress interference, or for military security.

Squawk

#### W06-A04B5

## [1992]

## For object identification

Includes analogous industrial systems for monitoring livestock, people, workpieces, etc.

#### W06-A04B5A

## [2002]

#### **Animals and livestock**

Includes monitoring of livestock, pets and other animals. See also X25-N02 for monitoring livestock. See also X27-H03 for RF transponders used in pet access control collars and pet monitoring.

Dog, cat, pet, cattle, cow, sheep, horse, pig

## W06-A04B5C

## [2002]

## **People**

For monitoring and identifying people. Also includes monitoring of passport, business cards ID.

#### W06-A04B5E

## [2002]

### Workpieces

For monitoring industrial workpieces such as bottles on production line. See also T05-G02B1A for systems interrogating transponders attached to workpieces.

#### W06-A04B5G

### [2007]

#### Goods/cargo

Includes monitoring or identifying of goods or cargo, e.g. during shipment/transportation. See also X25-F11 for tracking of goods in e.g. warehouse. See also T04-K03B for transponder tags/labels, T04-K02 for reading and writing aspects, and T01-N01A2E for Internet based tracking. Also see W02-G05 codes for novel RF aspects of transponder tags/interrogation. Monitoring/identifying of goods/articles during their manufacture is covered by W06-A04B5E and T05-G02B1A instead.

#### Cold chain, logistics

#### W06-A04B7

#### [2005]

## Using different response medium

Includes secondary radar systems where transmitted and received signals take different forms, for example, when the transmitted signal is radio but the re-radiated signal received is e.g. acoustic.

#### W06-A04C

#### **Display arrangements**

Cathode ray tube, CRT, LCD, liquid crystal, solidstate, PPI, sector, Cartesian, selective brightening, electronic cursor, character generator, MTI

### W06-A04D

#### **Pulse system details**

See U22 for pulse generation and processing in general. TR switching is coded in W06-A04G5 also. Continuous wave radar systems are covered by W06-A04F.

Pulse generator, pulse shaping

#### W06-A04D1

[1992]

**Pulse generators** 

## W06-A04D3

[1992]

#### Pulse compression, 'chirping'

### W06-A04E

## Jamming; Anti-jamming; Monitoring; Transforming co-ordinates; Processing

Codes in this section are used for signal processing aspects of radar systems, either alone or with other codes in W06-A04 as appropriate.

## W06-A04E1 [1987]

## Jamming; Anti-jamming, including 'passive' systems

Includes e.g. 'passive' chaff systems. Jamming/antijamming in general is covered by W02-L codes. Passive reflectors and absorbers are coded in W02-B03 codes also. Signature modification and camouflage aspects, such as radar absorbing coating on aircraft, are coded in W06-A04X only (and in W07-F codes as appropriate).

Noise generator, pulse insertion, window dispersion system, steerable antenna, nulling, notching, cancelling, EW, electronic warfare

#### W06-A04E1A [1992]

### Jamming of radar

Includes electronic countermeasures for 'actively' jamming a radar signal. Passive countermeasures are coded in W06-A04E1 only.

#### W06-A04E1C [1992]

## Anti-jamming and countermeasures to jamming

Includes systems for overcoming an enemy's attempts to actively jam radar signal. Noise and clutter suppression in general is covered by W06-A04E5.

## W06-A04E3 [1987]

## Monitoring, testing, transforming coordinates

## W06-A04E3A [1992]

## Monitoring, testing, target simulation, calibration

Includes operator training.

Maintenance, repair, fault, monitor

#### W06-A04E3C [1992]

## Detecting existence, type, or position of radar

Hostile radar monitoring, police speed trap warning receiver, instantaneous frequency measurement receiver, IFM

#### W06-A04E3E [1992]

#### **Coordinate transformation**

Display systems per se are covered by W06-A04C. Video standards conversion in general is covered by W04-N05A.

Cartesian, polar

#### W06-A04E5 [1987]

#### Noise/clutter suppression

Moving target discrimination in general is covered by W06-A04A2. Suppression of deliberate interference for anti-jamming is covered by W06-A04E1C. See W06-A04E9 also for correlation signal processing. Noise reduction for receivers in general is covered by W02-G03B codes.

Signal-to-noise ratio improvement, S-N, SNR, velocity discrimination, anti-clutter gain control, ACG, selective blanking, Constant false alarm rate, CFAR

#### W06-A04E9 [1987]

## Other jamming; Anti-jamming; Monitoring; Transforming co-ordinates and processing aspects

Includes transformation and correlation processing. See T01-J04B1 for FFT and T01-J04B2 for data processing implementations of correlators.

Signal processing, angle correction, motion compensation, convolution

#### W06-A04F [1992]

#### Continuous wave radar

See U23-A codes for oscillators per se and U23-D codes for phase/frequency control.

CW, carrier, oscillator, FM, ramp, STALO, feedback, linearise

#### W06-A04G [1992]

## **General details of radar equipment**

Codes in this section are used alone or with other W06-A04 codes as appropriate.

#### W06-A04G1 [1992]

## **Transmitter circuitry**

Transmitters in general are covered by W02-G01 codes.

## W06-A04G3 [1992]

#### **Receiver circuitry**

Receivers in general are covered by W02-G03 codes.

## W06-A04G5 [1992]

## Transmit/receive switching

See also W06-A04D for pulse system aspects. Gas filled switching tubes are covered by V05-A03, electronic switching in general by U21-B codes.

TR

## W06-A04G7

#### Antennae and antenna control

See W02-B codes for details of antenna systems. Beam steering, phased array, active array, scanning, rotary mount, motor drive

[1992]

## W06-A04G9 [1992]

## Other radar equipment details

## W06-A04H [1992]

## **Radar systems and applications**

Codes in this section are used with other W06-A04 codes or alone, as appropriate.

## W06-A04H1 [1992]

## **Vehicle applications**

From 2005 radar anticollision systems have been transferred to W06-A04H1K. Prior to 2005, anticollision systems remain searchable in W06-A04H1.

## W06-A04H1A [2005]

#### Land vehicles

Includes radar systems used on-board motor vehicles and trains.

### W06-A04H1B [2005]

#### **Aircraft**

Includes planes and helicopters.

#### W06-A04H1C [2005]

#### Ships

Includes marine vessels, boats and submarines.

## W06-A04H1K [2005]

## Anticollision

Can be used in conjunction with above W06-A04H1 codes. Search with W06-B01B1 for aircraft based systems, and X22-J05A for motor vehicles. See W06-A04H1 for anticollision systems prior to 2005.

## W06-A04H2 [1992]

#### Weather radar

Includes on-board aircraft weather radar when used with W06-B01B1. See also S03-D05 for meteorology.

Meteorological

## W06-A04H3 [1992]

#### Mapping/imaging

Synthetic aperture radar per se is coded in W06-A04J.

## W06-A04H5 [1992]

## Tracking, target seeking

See also W07-A01C for missile radar target-seeking system.

## W06-A04H7 [1992]

## **Traffic control and monitoring**

Includes air traffic control, also coded in W06-B02E when based at airport. (Prior to 1992 not coded in W06-B02). See W06-A04B codes also for aircraft automatic ID systems.

ATC

## W06-A04H8 [1992]

### Industrial radar system

This code is used chiefly in conjunction with other W06-A04 codes to indicate an analogous system used in an industrial environment. For example, use with W06-A04A1 for monitoring levels in a container (also coded in S02-C06D5).

## W06-A04H9 [1992]

## Other radar applications

## W06-A04J [1992]

## Synthetic aperture radar

See also W06-A04H3 for mapping. *SAR* 

## W06-A04L [2005]

## Bistatic/Multistatic/Passive radar systems

(W06-A04X)

Covers radar systems where the transmitter and receiver(s) are positioned in different locations and includes multistatic radar. See also W06-A04H2 (and S03-D codes) for bistatic weather radar. Also includes passive radar systems that utilize third party signals from commercial broadcast or communications transmitters to detect and track objects based on e.g. time-of-arrival difference of direct and reflected signal paths, or measurement of the bistatic Doppler shift and direction of arrival of the echo.

Passive coherent location, passive covert radar

#### W06-A04X

### Other radar system aspects

Includes signature modification by e.g. absorber materials. For absorber materials per se, see W02-B03D. Includes radar absorbing coatings and paints.

## W06-A05 [1983]

#### Sonar systems

Does not include ultrasound equipment used purely for medical application. See appropriate codes in S05 and S03 only. Does not also include low range systems e.g. for determining material properties or flaws. See appropriate S03 codes only.

Ultrasonic/sonic measurement, object presence/size/thickness determination, Doppler measurement, transponder, locator

## W06-A05A\* [1983-2001]

### For air, sea, land vehicles

\*This code is now discontinued and transferred to W06-A05H codes from 2002 onwards. It remains searchable for 1983 to 2001. For **specific** cases, codes for vehicle type are also assigned. See W02-C07 for hydrophone systems. See also W06-C01B1 and X25-N02 for fish-locating equipment used in commercial fishing.

Depth measurement, contact/target detection and classification, echo detection, ultrasonic transmitter/receiver, piezoelectric transducer, fish finding equipment

## W06-A05B [1997]

#### Secondary sonar systems

Includes secondary or active sonar transponders for identification. From 1997 remote reading of measured values is excluded - see W05-D08G, W05-D08E, E05-D07G and W05-D06A5 codes. Interrogation, response, reply, ID, code, sequence, security

#### W06-A05B1 [2005]

#### For vehicle or marine craft identification

### W06-A05B3 [2005]

#### Security and coding aspects

Includes control of sonar/ultrasound signal to prevent detection by unauthorised persons. *ID, code, sequence, security* 

## W06-A05B5 [2005]

#### For object identification

Includes identification of persons, objects, workpieces etc.

## W06-A05B7 [2005]

#### Using different response medium

Includes secondary sonar systems where transmitted and received signals take different forms, for example, when the transmitted signal is ultrasound but the re-radiated signal received is e.g. radio.

W06-A05C [1992]

**Details of sonar systems and equipment** 

W06-A05C1 [1992]

**Transmitter circuits** 

W06-A05C3 [1992]

**Receiver circuits** 

W06-A05C3A [1992]

**Display arrangements** 

W06-A05C5 [1992]

**Sonobuoys** *Repeater* 

W06-A05C6 [2011]

Testing, monitoring, calibrating

W06-A05C7 [1992]

#### **Transducers**

Includes transducers per se, beam forming, and mounting arrangements. See V06-V01N and other V06 codes as appropriate.

Piezoelectric, casing, mounting

#### W06-A05C8 [2002]

#### Sonar jamming/anti-jamming

Includes equipment and methods.

W06-A05C9 [2002]

Other sonar equipment details

W06-A05D [2005]

#### **Primary sonar systems**

Includes primary or passive target sonar systems where a sonar signal is transmitted towards a target and a reflected signal is detected. This code is only applied when no specific sonar application or novel aspect is mentioned. For example, a novel primary sonar receiver will only be coded in W06-A05C3, with the fact that it is used in a primary sonar application, capable of being determined by the omission of any secondary sonar (W06-A05B) codes.

## W06-A05D1 [2005]

## **Determining target position**

Includes sonar distance or height sensing.

#### W06-A05D2 [2005]

#### Using relative movement

Includes sonar velocity sensing.

Doppler measurement, speed, velocity

W06-A05H [2002]

Sonar systems and applications

W06-A05H1 [2002]

**Vehicle applications** 

W06-A05H1A [2002]

**Land vehicles** 

Also see X22 codes for further vehicle details.

W06-A05H1B [2002]

**Aircraft** 

W06-A05H1C [2002]

**Ships** 

See W02-C07 for hydrophone systems. See W06-C01B1 and X25-N02 for fish locating equipment used in commercial fishing.

Depth measurement, fish finding equipment

W06-A05H1K [2002]

Anticollision

Can be used in conjunction with above W06-A05H1 codes. Search with X22-J05B for motor vehicle anticollision systems.

Anticollision

W06-A05H3 [2005]

Mapping/imaging

Includes sonar imaging of seabed (see also S03-C codes).

W06-A05H5 [2002]

Tracking, target seeking

Contact/target detection and classification, echo detection

W06-A05H8 [2002]

**Industrial sonar systems** 

W06-A05H9 [2002]

Other sonar applications

W06-A05J [2007]

Synthetic aperture sonar

See also W06-A05H3 for mapping/imaging. Includes improving the spatial resolution of an active sonar array by combining data coherently between pings (acoustic pulses) to synthesize a longer effective array.

W06-A06 [1983]

Non-radio e.m. wave, e.g. light, systems

Optical communication in general is covered by W02-C04 codes.

Lidar, distance measuring equipment, DME, transmitter/receiver, light beam modulation

W06-A06A\* [1983-2001]

For air, sea, land vehicles

\*This code is now discontinued and is transferred to W06-A06H codes from 2002 onwards. It remains searchable for records between 1983 and 2001. For **specific** systems, appropriate vehicle code is also assigned.

Anticollision system, target detection

W06-A06B [1997]

Secondary light-based systems

Includes secondary or active optical radar/LIDAR systems. Includes use of optical transponders for identification. From 1997 remote reading of measured values is excluded - see W05-D08G, W05-D08E, W05-D07G and W05-D06A3 codes.

Interrogation, response, reply, ID, code, sequence, security

W06-A06B1 [2005]

For vehicle or aircraft identification

W06-A06B3 [2005]

Security and coding aspects

ID, code, sequence, security

W06-A06B5 [2005]

For object identification

Includes secondary light-based systems for identifying and monitoring of people, objects, workpieces etc.

W06-A06B7 [2005]

Using different response medium

Includes secondary light-based systems where transmitted and received signals take different forms, for example, when the transmitted signal is optical but the re-radiated signal received is e.g. ultrasonic.

W06-A06C [2005]

Details of non-radio e.m. wave, e.g. light, systems and equipment

Can be used alone or in conjunction with other W06-A06 codes as appropriate.

W06-A06C1 [2012]

**Transmitter circuits** 

W06-A06C2 [2012]

**Receiver circuits** 

W06-A06C3 [2006]

### **Display arrangements**

Cathode ray tube, CRT, LCD, liquid crystal

W06-A06C5 [2006]
Monitoring; Testing; Calibrating

W06-A06C8 [2006]

## Jamming/anti-jamming

Includes countermeasures and counter-counter measures for optical targeting systems, such as laser designed to illuminate and confuse missile optical targeting sensor. See also W07-F03.

## W06-A06D [2005]

## **Primary light-based systems**

Includes primary or passive target optical radar or LIDAR (light detection and ranging) where a lidar/laser signal is transmitted towards a target and a reflected signal is detected. This code is only applied when no specific optical radar application or novel aspect is mentioned. For example, a novel primary LIDAR receiver will only be coded in W06-A06C, with the fact that it is used in a primary LIDAR application, capable of being determined by the omission of any secondary LIDAR (W06-A06B) codes.

## W06-A06D1 [2005]

## **Determining target position**

Includes light-based distance and height sensing. Prior to 2005 indeterminate-application distance sensing was covered in W06-A06.

W06-A06D2 [2005]

#### Using relative movement

Includes light-based velocity sensing.

W06-A06H [2002]

Non radio e.m. wave, e.g. light, system applications

W06-A06H1 [2002]

Vehicle applications

W06-A06H1A [2002]

**Land vehicles** 

Also see X22 codes for further vehicle details.

W06-A06H1B [2002]

Aircraft

W06-A06H1C [2002]

Ships

W06-A06H1K [2002]

#### **Anticollision**

Can be used in conjunction with above W06-A06H1 codes. Search with X22-J05C for motor vehicle anticollision systems.

Anticollision

#### W06-A06H2 [2006]

#### Weather lidar

Includes laser radar systems designed for meteorological use. See also S03-D codes for meteorology.

## W06-A06H3 [2005]

## Mapping/imaging

Includes LIDAR mapping of e.g. rain forest canopy. See S02-B04 only for photographic imaging/surveying.

## W06-A06H5 [2002]

## Tracking, target seeking

See W07-A01C only for missile heat seeking system.

Target detection, tracking, optical, IR

## W06-A06H8 [2002]

#### Industrial non-radio e.m. wave systems

Includes detecting presence of e.g. bottles to be filled on production line.

W06-A06H9 [2002]

Other non-radio e.m. wave, e.g. light, systems

W06-A06J [2017]

**Continuous wave Lidar** 

W06-A06K [2017]

Synthetic aperture Lidar

#### W06-A07

## **Gyroscopes; Inertial navigation systems**

From 2007 this code has been expanded to include inertial navigation systems (INS) using e.g. on-board linear accelerometers and rate gyroscopes to determine position/attitude of e.g. missile (see also W07 codes). Includes electrical aspects of gyroscopes used for navigational applications. Includes laser types (see V07 and V08 also). Non-electrical and non-electro-optical types are coded in S02-B07 only.

Optical, fiber, motor driven

## W06-A08 [1992]

# General or combination system for land navigation

See S02-B08. See T07-A05 also for roadside aspects. See X22-E06D only for on-board vehicles aspects. For purely satellite navigation see W06-A03A5 only.

Vehicle, guidance, beacon, satellite, dead-reckoning

#### W06-A09

### Other (incl. compasses)

Non-electrical aspects of compasses are coded in S02-B06 only.

Magnetic field measurement, heading/course indication

#### W06-B

## Aviation and aerospace systems

#### W06-B01

**Aircraft** 

#### W06-B01A

# Control systems for power plant, control surfaces, etc; Auto-pilots

Braking control, anti-skid system

#### W06-B01A1 [1983]

#### For power plant

Speed, power, flow, starting

## W06-B01A1A [2006]

#### IC engine power plant

Includes control of internal combustion engines e.g. driving propellers.

Propeller, IC

## W06-B01A1C [2006]

#### Gas turbine/jet engine power plant

Includes control of gas turbine jet engines such as turboprop, turbofan, turboshaft, RAMjet, SCRAM jet engines and pulse detonation engines. Also includes control of small gas turbines used as auxiliary power units (APUs) e.g. to generate power when aircraft is on the ground (see also X11-C01 for gas turbine driven electricity generation plant). Gas turbine engine control, Supersonic Combustion RAMJET

## W06-B01A1X [2006]

#### Other power plant

Includes control of aircraft power plant not already provided for.

## W06-B01A5 [1983]

# Affecting flight path, e.g. autopilots, control surfaces

See T06-B01 for course/attitude control in general. Flap/aileron/rudder controls, trim adjustment, course correction

#### W06-B01B [1997]

#### Instrumentation; Communications

## W06-B01B1 [1983]

### For navigation

See W06-A04H1 for anticollision radar systems, and W06-A04H2 for weather radar.

Instrument landing system, ILS, microwave landing system, MLS, beacon homing systems, radar navigation, collision-avoidance, course, heading attitude, altitude, air-speed, ground-speed measurement, stall warning devices, wind shear warning, turbulence detection

## W06-B01B3 [2002]

## Head-up displays/head mounted displays

Includes displays built into pilot's helmet or goggles. See X27-A02B1A for electrical aspects of helmets and goggles.

#### W06-B01B5 [1983]

### For vehicle/engine parameters

Engine speed, temperature, fuel gauges, cabin pressure, outside temperature/ pressure, ice build-up, weight on landing gear detector

#### W06-B01B6 [1992]

#### Black box recorder

See T03/W04 for dynamic recording aspects also.

#### W06-B01B7 [1992]

## **Communications equipment; Antennae**

See W02-B codes for antennae, W02-G codes for communication equipment such as transceivers, receivers, etc., and W01-C04 for intercoms. For (radio)telephone for use by passengers, search with W01-C07 codes. Public address systems are covered by W06-B01C7.

Aerial mounting, cabling, crew headsets, radio telephone installation

## W06-B01B8 [1992]

#### Data bus systems

See appropriate codes in T01, W01, and W05 (e.g. W05-D codes). This code is used for data bus aspects in general whether for control or instrumentation, (W06-B01A codes also assigned for specific control aspects).

#### W06-B01C

# Electrical equipment (incl. de-icing, lighting)

## W06-B01C1 [1992]

#### **Electrical installations**

Includes connectors, fittings, and wiring for general application to on-board electrical systems. (See V04 and X12-G codes also). Non-hardware aspects of data bus systems are covered by W06-B01B8.

## W06-B01C2 [2002]

# External lighting for signalling or navigational reference

## W06-B01C3 [1992]

## Electrical power generation, distribution and control

See X11, X12, X13 and X16 also.

Alternator, generator, invertor, battery, circuitbreaker

#### W06-B01C4 [1992]

## **De-icing equipment**

Includes thermal and electromechanical systems.

#### W06-B01C5 [1992]

# **Environmental control and internal lighting**

Includes pressurisation system, heating, etc.

#### W06-B01C6 [2007]

## **Electric propulsion**

See also X11 codes for high power electric motors per se and X13-F/G codes for high power electric motor control systems.

#### W06-B01C7 [1992]

## Public address and in-flight entertainment

PA, loudspeaker, amplifier, tape recorder, video, VTR, projection

## W06-B01C8 [2005]

#### **On-board security systems**

Includes anti-hijack systems and arrangements to subdue attackers. Use with W06-B01A5 for systems preventing attackers from piloting aircraft, e.g. into building, and W06-B02E for systems enabling remote flying of aircraft from the ground.

Terrorism, hijack

## W06-B01C9 [1992]

#### Other aircraft electrical equipment

Includes emergency escape equipment, food preparation equipment, toilets, etc. Also includes aircraft-mounted weather influencing systems (see also X25-X20) and camera arrangements for aerial imaging/photography.

Oxygen mask, escape hatch

#### W06-B02

#### Airport control systems and equipment

Passenger handling, security, ground equipment

#### W06-B02A [1992]

**Security systems** 

## W06-B02A1 [1992]

## For personnel

Includes detection of concealed weapons, suspicious behavior and detection of infectious diseases in people (see also S05-D codes) at airport. For passport checking see W06-B02R instead.

Magnetic, electromagnetic

## W06-B02A5 [1992]

## For baggage inspection or tracking

Includes use of transponder tags or bar-code reader. See S03-C03 and S03-E06B codes also for inspection.

X-ray, neutron, image, tracking, inspection, monitoring, smuggling

## W06-B02A5A [2006]

#### **Baggage inspection**

Includes detection of concealed articles such as guns and explosives or other illegal substances, e.g. using x-rays or neutron sensors. See S03-C03 and S03-E06B codes also for inspection.

Image, drugs, narcotics, guns

## W06-B02A5E [2006]

## **Baggage tracking and monitoring**

Includes all aspects of tracking and monitoring of location of baggage within airport, e.g. using transponder tags (see also W06-A04B5 and W02-G05 codes) or bar-code reader (see also T04).

#### W06-B02C [1992]

#### Passenger information equipment

Includes displays (see W05-E codes also), public address (see W04-S05 codes), passenger guidance robot, etc.

## W06-B02D

## **Ground equipment for servicing aircraft**

[1992]

Truck, empty, fill, refuel, power line, luggage, baggage

## W06-B02E [1992]

# Ground based navigation and communication equipment

See W06-A codes for details of beacons etc. Includes runway lights. Only coded here if specific to airports.

Air traffic control, runway lighting, approach lighting, ILS marker, outer marker, beacon

#### W06-B02L [2014]

# Aircraft launching/towing, landing, arresting and mooring

Includes catapult for launching military aircraft (Q25-P13) from aircraft carrier (Q24-P13) or launching/winch arrangements for gliders (see also Q25-P05). See Q25-R07 for mechanical details. Also includes arrangements for inflating, launching and mooring hot air balloons. Also includes electrical aspects of landing areas such as helipads that can't be covered elsewhere. See Q25-R02 for runways and helipads per se and W06-B02E for navigation-aiding markers and lights.

## W06-B02R [2007]

#### Check-in/reservation

Includes on-line seat reservation of booking of flights (see also T01-N01A2 codes), and check-in via e.g. mobile phone. See W06-B02C also for airport based information terminals/displays. Also includes ticket purchase authentication method for airport, and passport checking/control

## W06-B02S [2011]

## **Airport safety**

(W06-B02X)

Includes fire-fighting (see also X25-X05) and evacuation equipment. Also includes electrical details of bird and animal scaring equipment (see also X25-X02).

Fire fighting, sprinkler, evacuation, smoke alarm

## W06-B02T [2011]

## Airport terminal equipment

Includes airport specific equipment such as environmental controls including heating, airconditioning and internal terminal lighting. Includes transportation of passengers and baggage within terminal, such as travelators and bridges/gangways, baggage conveying/sorting. For baggage conveyors used to load aircraft see W06-B02D instead. Also includes general Wi-Fi and internet access terminals provided within airport (also see T01 codes and W06-B02R for terminals used for check-in/reservation).

Lift, escalator, travelator, baggage conveyor, lighting, heating, air conditioning, transportation, wi-fi

## W06-B02X [1992]

## Other airport systems

Only coded here if specific to airports. Includes electrical airport terminal equipment not covered elsewhere. For mechanical details of airport terminals see Q25-R instead. Includes airport taxi service priority scheduling arrangement.

#### W06-B03

## Space vehicles

Satellites, electrical system, solar panels, cooling, foldable antenna reflectors, space exploration vehicles, space suits, protection systems

## W06-B03A [1992]

#### **Propulsion systems**

Search with V05-E05A for ion beam thrusters. See also X14-F04 for plasma generators.

#### W06-B03A1 [2017]

#### **Engine/propulsion system control**

Engine fuel supply control.

#### W06-B03B [1992]

#### **Power supplies**

Includes solar power installations, also coded in X15-A codes, e.g. X15-A02 codes for solar panels.

## W06-B03C [1992]

## Space vehicle communications and connectivity

Includes antennae, antennae mountings, transceivers etc. - but not internal circuitry or general systems aspects of satellite repeaters which are covered by W02-G05 codes. Includes all space vehicle/space station and control center communications and data bus and network arrangements.

## W06-B03D [1992]

## Life support systems

Includes spacesuits.

Anti-G suit, cooling, heating, oxygen

## W06-B03E [1992

# Electrical systems for on-board experimentation or manufacture

### W06-B03F [2002]

## **Navigation and position control**

Includes attitude control of satellite or space craft. See also T06-B01 codes for position, attitude and altitude control.

Attitude control, navigation

## W06-B03H [2002]

#### **Electrical installations**

Includes connectors, fittings and wiring. *Electrical systems* 

## W06-B03J [2002]

#### Instrumentation

Includes on-board electrical instrumentation, and system status monitoring, testing and reporting.

Monitor, test, status, instrumentation

#### W06-B03L [2021]

**Spacecraft launching systems** 

## W06-B03M [2022]

Space vehicle docking and coupling arrangements

#### W06-B03X [1992]

## Other space vehicle aspects

Includes space exploration vehicles. Can be used to imply e.g. satellite-based aspect, e.g. to imply photographic imaging (S02-B04) takes place from satellite-mounted camera. See W06-B09 for aircraft based aerial photography.

## W06-B04 [1983]

#### Training equipment, simulators

(W06-B09)

See W04-W07 codes for training and educational equipment in general, and W04-W07A for simulators other than for aircraft or space vehicles.

## W06-B05 [1992]

## Testing of aircraft or space vehicles

See appropriate codes in section S. For in-flight testing also see W06-B01 codes for aircraft and W06-B03 for space vehicles.

## W06-B06 [2008]

## Design of aircraft and spacecraft

Includes all electrical details of aircraft/spacecraft design. Also see T01-J15 codes for computer aided design (CAD) per se.

#### W06-B08 [1997]

# Manufacture and maintenance of aircraft or space vehicle

Includes manufacturing process of electrical components only or substantial electrical equipment for manufacture or maintenance of any part of vehicle.

#### W06-B09

## Other aviation and aerospace systems

Includes other aircraft and space craft systems not covered elsewhere, such as antistatic or RF screening. From 2006, aircraft types are covered by W06-B15 codes, though other aircraft types such as balloons, airships, and gliders remain searchable in W06-B09 prior to 2006. Also includes aerial refuelling arrangements.

Protective coating for antistatic or RF screening purposes, aerial refuelling

## W06-B10 [2020]

# Salvaging, recycling and recovery of aircraft and space vehicles or equipment

Including salvaging, recovery and recycling of aircraft and space vehicles. Includes recovery of space vehicle propulsion systems such as reusable booster rockets (also see W06-B03A). Also includes systems for removal of space debris.

#### W06-B15 [2006]

## Specific aircraft types

(W06-B09)

### W06-B15A [2006]

## Lighter-than-air craft

Includes balloons and airships.

Blimp, dirigible

## W06-B15B [2006]

Helicopter; Rotorcraft

## W06-B15C [2006]

Glider

## W06-B15D [2006]

#### Commercial and civil aircraft

Only applied if specific to commercial or civil aircraft. Can be used in conjunction with other W06-B15 codes.

## W06-B15E [2006]

## Military aircraft

Only applied if specific to military aircraft. Can also be used in conjunction with other W06-B15 codes. See W07 also for military equipment per se.

W06-B15F [2006]

Microlight

W06-B15G [2006]

VTOL (Vertical Take-Off and Landing) aircraft

W06-B15H [2021]

## **Emergency services aircraft**

Includes fire fighting and disaster response aircraft and helicopters; police, law enforcement and border security helicopters and drones; and coastguard search and rescue helicopters (see also W06-B15B for helicopters and W06-B15U for drones and UAV).

#### W06-B15P [2024]

## Personal flying aids

Includes jet packs and flying suits worn by user. Use with other codes as appropriate such as W06-B15G for VTOL. Also see Q25-X01 for flying suits.

Flying hoverboard

#### W06-B15U [2007]

#### **Unmanned aerial vehicles**

Includes UAVs and micro UAVs used for geophysical surveying, imaging, military reconnaissance (see also W07-F04), logistics such as food and commodity delivery (see X25-F12), etc.

## W06-B15X [2006]

## Other aircraft types

(W06-B09)

Includes sea planes, motor vehicles convertible into aircraft, agricultural and crop dusting aircraft (see X25-N01 for insecticide and pesticide spraying per se) and electrical aspects of other aircraft such as hang gliders, ornithopters or parachutes.

#### W06-C

Shipping

#### W06-C01

Marine-craft

## W06-C01A

#### **Control systems**

Steering equipment, automatic pilot, bridge, helm

## W06-C01A1 [1992]

## **Engine control**

See W06-C01C9 for engine related hardware such as fuel pumps or ignition systems. Includes IC engine and gas turbine engine control, exhaust gas emissions reduction.

Power control, speed control, pollution control

## W06-C01A5 [1992]

## Steering, course control

See T06-B01A for course control in general. Automatic pilot, heading, rudder, trim

#### W06-C01B

#### Instrumentation; Communications

Includes aerials (search with W02-B codes) and radio communication equipment (with W02-G codes).

## W06-C01B1 [1992]

#### Instrumentation for navigation

See X25-N02 and W06-A05D1 for fish locating using sonar. See W06-A03A5 and S02-B08 codes for GPS navigation per se. See W04-X01D for sports fishing.

Navigation, compass, satellite, radar, sonar installations, speed, course, depth measurement, chart recorders, fish finding equipment, anticollision

## W06-C01B5 [1992]

## Instrumentation for monitoring ship condition

Includes engine monitoring. See also relevant S01-S03 codes.

## W06-C01B7 [1992]

### **Communications equipment**

Includes equipment for communication on-board and with other vessels or shore stations. See also W01 and W02 codes for telephone and radio communications per se.

## W06-C01B8 [1992]

#### **Data bus systems**

See appropriate codes in T01, W01, and W05 (e.g. W05-D codes). This code is used for data bus aspects in general, whether for control or instrumentation. (W06-C01A codes also assigned for specific control aspects).

## W06-C01C

#### **Electrical equipment (incl. lighting)**

Includes external lighting for general illumination of navigational reference (see also X26). See W06-C01C5 only for internal lighting.

## W06-C01C1 [1992]

#### **Electrical installations**

Includes wiring, connectors, etc. of general application to on-board systems. V04 and X12 codes are also assigned as appropriate.

Switch, plug, duct, trunking, cables, junction box, fittings

## W06-C01C3 [1992]

# **Electrical power generation and distribution**

See also U24/X12 for power generation/distribution, X15 for solar/wind power generation and X16 for battery/fuel cell aspects.

#### W06-C01C5 [1992]

# **Environmental control and internal lighting**

Includes heating, air-conditioning and demisting / defrosting of ship windows. Also includes internal ship lighting (see also X26 codes for illumination per se). For external lighting see W06-C01C. Climate control

## W06-C01C6 [2006]

## Public address and on-board entertainment

See also W04 codes for public address and gaming systems per se.

PA, loudspeaker, amplifier, tape recorder, video, VTR, projection, television, game

#### W06-C01C7 [1992]

#### **Electric propulsion**

See X11 codes also for motors per se, and X13 for motor control.

#### W06-C01C9 [1992]

#### Other electrical marine vessel equipment

Includes specific equipment such as electric fuel pump or ignition system, e.g. for outboard motor.

#### W06-C01S [2019]

## Ship emergency/safety equipment

Includes all aspects of ship safety such as roll-over prevention, ballast control to improve stability etc. Navigational equipment that can prevent grounding or collision can be covered in W06-C01B1. Also see Q24-B09 for mechanical details of ship emergency/safety equipment. See W06-C10 and Q24-X01 codes instead for lifesaving in water equipment.

## W06-C04 [1992]

## Simulators and training equipment

(W06-C09)

Simulators and training equipment in general are covered by W04-W07 codes.

#### W06-C05

[1992]

## Testing of ships or ship equipment

## W06-C06 [2008]

#### **Design of marine vessels**

Includes all electrical details of ship and marine craft design. Also see T01-J15 codes for computer aided design (CAD) per se.

#### W06-C07 [1992]

## Port equipment, buoys, beacons

Prior to 2016 buoys intended for use in a port, harbor, estuary, river or other waterway were covered by W06-C07 while those intended for use in open sea were covered by W06-C09. From 2016 electrical aspects of buoys for all applications are covered by W06-C07C.

## W06-C07A [2016]

## Port and mooring equipment

Includes electrical aspects of maintenance and dry dock facilities and also loading and unloading equipment such as cranes, hoists and the like, also covered by X25-F05 codes. Mechanical aspects of port equipment are covered by Q24-R codes and of cranes and other lifting equipment by Q38-B. Includes electrical details of onshore and offshore mooring equipment.

Cleaning, renovating, repairing

## W06-C07C [2016]

#### **Buoys and beacons**

This code covers electrical aspects of buoys and beacons irrespective of their location, i.e. open sea, harbour, inland waterway etc. (Previously buoys intended for use in a port, harbour, estuary, river or other waterway were covered by W06-C07 while those intended for use in open sea were covered by W06-C09, but now W06-C07C covers them all). Buoys in general (including those with no electrical aspects) are covered by Q24-P18. Beacon navigation systems are covered by W06-A01 codes.

Marker buoy, lighthouse, lightship, navigation marker, radio beacon

## W06-C07E [2016]

#### Marine traffic control

Includes offboard/port equipment for controlling marine vessels. Also includes communications between port/shore and vessels or between vessels for traffic control or prioritization purposes.

Marine traffic lights, sign, priority

## W06-C08 [2002]

# Marine vessel manufacture / assembly / dismantling

Includes electrical aspects of ship or boat manufacture, assembly or dismantling for recycling or disposal. For ship maintenance see W06-C07A. Shipbuilding, recycle, dismantle

#### W06-C09

## Other shipping details

Includes electrical aspects of diving equipment which in general is covered by Q24-X04. Pre-2016 this code covered buoys intended for use in open sea. From 2016 electrical aspects of buoys for all applications are covered by W06-C07C. Includes marine salvage systems (see also W06-C15F for environmental and salvage vessels per se).

Diving equipment, diver communication systems

## W06-C10 [2006]

#### Life saving equipment

Includes life jackets. See W06-C15C code scope note instead for emergency or survival craft per se. Buoyancy aid, life vest, light, alarm, beacon, distress

## W06-C15 [2006]

Specific marine vessel types

## W06-C15A [2006]

#### Personal/recreational watercraft

Includes jet-skis, kayaks and canoes. See W04-X codes for electrical aspects of sports equipment such as water skis.

W06-C15B [2006]

**Submarines; Submersible craft** 

## W06-C15C [2006]

#### **Emergency/rescue craft**

Includes life boats and life rafts. See W06-C10 instead for life saving accessories such as life jackets.

Survival craft, inflatable craft

## W06-C15D [2006]

#### Commercial vessels

Only applied if specific to commercial vessels. Can be used in conjunction with other W06-C15 codes.

#### W06-C15D1 [2006]

## **Fishing boats; Trawlers**

Includes electrical cranes, hoists, winches etc. for handling fish and whales.

## W06-C15D3 [2006]

#### **Tankers**

Includes oil tankers.

## W06-C15E [2006]

## Military vessels

Includes aircraft carriers, destroyers, frigates etc. Use with W06-C15B for military specific submarines or W06-C15F for military specific hovercraft. See also W07 for military equipment per se.

## W06-C15F [2012]

#### **Environmental and salvage vessels**

Includes vessels for collecting pollution/rubbish from open water or any other vessel helping to maintain the environment. Also includes salvage vessels in general (see also W06-C09 for salvage systems per se).

Oil spill, oil slick, salvage, floating refuse collection

#### W06-C15G [2017]

# Floating buildings, drilling platforms, workshops

Includes electrical aspects of floating vessels, towers, houses and buildings normally designed to be static at a fixed location.

#### W06-C15H [2006]

#### Hovercraft

See also W06-C15D or W06-C15E for commercial or military specific hovercraft respectively.

#### W06-C15U [2014]

**Unmanned vessels** 

## W06-C15X [2006]

#### Other marine craft types

Includes amphibious vessels and swamp boats. Includes marine vessels not already provided for.

## W06-T [2008]

## Other transportation systems

Includes all aspects of teleportation and time travel. Includes all transportation aspects not able to be covered by any other of the transport related EPI codes.

Time machine, space-time, theoretical

# W07: Electrical Military Equipment and Weapons

See W04-X01 codes for analogous equipment (e.g. for sports) corresponding to W07-B or W07-D codes.

#### W07-A

## Missile guidance, navigation and propulsion control

See T06-B01B for target-seeking control in general, and T01-J07D for data processing aspects.

Projectile/shell/torpedo target seeking, heat seeking, radar guidance, image/pattern recognition, aerials, radomes, sensors, optomechanical scanning, remote guidance by radio/light/wire/ optical fiber

#### W07-A01 [1992]

## **Guidance and target seeking system**

From 1997 propulsion control is covered by W07-A01G code.

## W07-A01A [1992]

## **Navigational aspects**

Covers position determination without reference to target, e.g. by dead reckoning, use of GPS (also coded in W06-A03A5), star recognition etc.

## W07-A01C [1992]

#### Target-seeking/tracking system

Includes heat-seeking and radar (or analogous). Use with W07-A01E1 for laser tracking. Also see W06-A codes for target tracking.

Target seeking, tracking, radar, IR, heat

## W07-A01C1 [2002]

## Laser targeting

Includes use of laser to mark target so that missile can home in on target using reflected light. Use of laser beam containing positional information about target, see W07-A01E1 only.

Laser marking, laser pointing, target designation

#### W07-A01E [1992]

## Remotely guided

Covers control by e.g. ground based operator. Remote control aspects are also coded in W05-D codes.

#### W07-A01E1 [1992]

#### By non-wire links

Includes radio and free-space optical systems.

Beam-rider

## W07-A01E3 [1992]

## By electric cable or optical fiber

See also appropriate codes in V07 for fiber-optic aspects, e.g. V07-H codes.

Reel, dispense, pay-out, tension, control

#### W07-A01G [1997]

#### **Propulsion control**

Prior to 1997 propulsion control was coded in W07-A01.

#### W07-A01H [2002]

## Missile stability/flight control

Includes control of fins e.g. to stabilise missile flight, control missile rotation or act as air brake to control missile range. For course correction see other W07-A01 codes.

## W07-A03 [1992]

#### Details of sensing systems per se

Includes on-board sensors normally associated with navigation/targetting. Codes in this section are used with W07-A01 codes or alone as appropriate.

### W07-A03A [1992]

#### **Antennae**

Includes antenna on-board missile and not ground based antennae. Radomes are covered by W07-A03D. For full details of radio antennae see W02-B codes.

## W07-A03B [1992]

## **Optical sensors and elements**

Includes optical detectors, lenses, filters, video cameras, etc. For solid-state sensor details see appropriate codes in U12, U13, or U14. Video cameras are also coded in W04.

#### W07-A03D [1992]

#### Radomes, protective enclosures

Includes covers transparent to RF and also optical range, e.g. IR.

#### W07-B

#### Weapon sights; Aiming

Includes mountings e.g. for fixing flashlight to barrel of rifle. See also X26 for torch per se. Laser range finding

## W07-B01 [1992]

## Weapon sights

Illuminated sights, image processing, laser sighting

## W07-B05 [1992]

#### Weapon aiming systems

Includes electrical systems for correcting weapon aim. Also includes electrical aspects of munitions such as rearward facing LED for tracer bullet used to covertly illuminate bullet trajectory to enable aim adjustment.

Aiming control, correction, compensation

### W07-C

#### Fuzes, arming

Detonate, mine, charge, explosive, missile

## W07-C01 [1992]

#### **Fuzes**

Fuzes for non-military application, e.g. blasting, are coded in X25-D codes. Includes detonator elements per se.

## W07-C03 [1992]

#### **Fuze actuation system**

The codes in this section relate to the actual means of actuating the fuze.

Ignition, impact switch

#### W07-C03A [1992]

#### Responsive to sensed vibration

Includes 'seismic' detection system for e.g. landmine.

## W07-C03C [1992]

#### Responsive to sensed proximity

Includes proximity fuzes working by e.g. radar or analogous system, also assigned W06-A codes as appropriate.

## W07-C03E [1992]

### Time delay actuation

Electronic time delay circuits are also coded in U21-B02A codes.

## W07-C05 [1992]

#### Arming/disarming systems

Covers electrical details of arming and disarming systems, including safety/security arrangements. *Safing* 

## W07-D [1983]

## **Training equipment**

Training equipment in general is coded in W04-W codes. Simulators for aircraft are coded in W06-B04, for ships in W06-C04.

W07-D01 [1992]

**Target practice systems** 

W07-D05 [1992]

Simulation systems

W07-E [1992]

**Electrically operated weapons** 

W07-E01 [1992]

#### **Electrical firing**

Includes electrically activated trigger for hand gun, or electric actuation of firing charge.

W07-E05 [1992]

#### Weapon launching systems

Rocket, grenade, launcher

#### W07-E05A [1992]

#### With electrical propulsion

Includes rail guns, also coded as electrical machines in X11, e.g. X11-H09.

## W07-E06 [2007]

#### **Munitions**

Includes electrical aspects of munitions such as projectiles, bullets, missiles, grenades that cannot be coded elsewhere. Also see K03-A codes for physical and mechanical aspects of explosives and ammunition. Includes e.g. arrangements for electronic interrogation and identification of artillery projectiles inside gun before firing.

#### W07-E07 [2002]

## **Laser weapons**

See V08 for novel laser details.

#### W07-E08 [2005]

#### Non-lethal electric weapons

Includes stun guns and electrical aspects of other non-lethal weapons. Also see W07-F codes for self-defence systems. Also includes electromagnetic weapons or EMP (electromagnetic pulse) weapons for disabling electronic circuitry in hostile weapons systems or degrading explosives.

## W07-E09 [2002]

### Other electrically operated weapons

## W07-F [1992]

# Protection for weapons, personnel or equipment

Includes camouflage aspects. For radar signature modification search with W06-A04X.

## W07-F01 [1992]

#### **Protection for personnel**

Includes fingerprint recognition e.g. for hand gun.

## W07-F01A [1992]

## Self defence equipment

Includes analogous system for use by e.g. law enforcement officer. Includes e.g. electrical aspects of mace/pepper spray or e.g. combined flashlight/spray. Anti-mugging alarms are coded in W05-B01D.

## W07-F01B [2012]

## Military specific clothing

Includes clothing, shoes and helmets with electrical content specifically for use by military personnel. Also see X27-A02B1 codes.

Wearables

#### W07-F03 [1992]

## **Protection for weapons or equipment**

Includes launching of countermeasures to protect aircraft from seeker missile or use of laser to confuse IR sensor on hostile missile. See also W06-A04E1 codes and W06-A06C8 respectively for radar and lidar jamming and countermeasures. Decoy, flare, anti-radar chaff, jamming, stealth.

## W07-F04 [2002]

#### Early warning and reconnaissance systems

Includes early detection of incoming missiles, and e.g. remote controlled unmanned vehicles for gathering front line video reconnaissance information about enemy forces. See also W02-F01 codes for CCTV aspects.

UAV, unmanned aerial vehicle, MAV, micro aerial vehicle, drone, autonomous

## W07-F05 [1992]

#### Mine sweeping; Weapon/bomb detection

From 2011 this code has been expanded to include all aspects of explosives and weapons detection, as well as systems for making explosives safe or clearing mines or depth charges. See W06-C01 codes for on-board ship aspects. Degaussing is covered by V02-D.

## W07-F05A [2011]

## Mine sweeping; Bomb detection

Includes all aspects of explosives detection and making safe. Includes detection of roadside improvised explosive devices or mine or depth charge detection and clearing. See W06-C01 codes for on-board ship aspects. Degaussing is covered by V02-D, W07-F03 and W06-C09. See S03 codes for novel sensing arrangements per se.

[2011]

## W07-F05C

## Weapon detection

(W07-F01)

Includes detecting the presence of weapons e.g. during security check at an airport (see also W06-B02A codes), school, hospital etc. See S03 codes for e.g. X-ray sensing per se.

Arms detector, metal detector, knife, gun, X-ray

## W07-G [1992]

#### Assisted/night vision equipment

From 2010 this code has been expanded to include all assisted vision systems as well as all night vision applications. See also V05 for image intensifier tube aspects. This code can be applied for vision enhancement systems such as daytime image enhancement and thermal or IR imaging (see also W04-M01E codes for thermal imaging camera details per se).

## W07-G01 [1992]

Goggles

### W07-H [1992]

# Military equipment testing, inspection and measurement

Includes evaluation of weapons and weapon systems, measurement of muzzle or projectile velocity, military equipment/installation inspection, etc. See also appropriate codes in e.g. S02 or S03 depending on the nature of test involved. See W07-A03 codes for on-board munitions measuring/sensing systems.

## W07-J [1992]

# General aspects of military electrical equipment

#### W07-J01 [1992]

#### Electrical installations, cables, connectors

See V04 and X12 codes for full details of cables, connectors, and electrical fittings.

## W07-J03 [1992]

### Power generation and distribution

Includes generators, battery power supplies, fuel cells and batteries per se, etc. See also U24, X12, and X16 codes as appropriate.

#### W07-J05 [1992]

#### **Electrical equipment constructional details**

See V04-S and V04-T codes also for casings and constructional details of electrical equipment in general.

## W07-J07 [2011]

## Manufacture of military equipment

(W07-X)

Includes all manufacturing aspects of weapons and equipment.

#### W07-J09 [1992]

## Other military electrical equipment details

#### W07-X

## Other military equipment

Includes equipment and systems with specific military application not covered elsewhere.

## W07-X01 [2002]

## Military vehicle systems

Includes electric equipment specifically for military vehicle. See also X22 if the electrical aspect relates to normal vehicle operation, e.g. ignition system, lighting, steering, braking.

Tank, personnel carrier

#### W07-X03 [2007]

#### Military/battlefield communications

Includes all communications equipment (but not radar - see W06-A codes instead) with specific military application. Includes all aspects of communications between troops on the battlefield and between troops and command centre. See also W01/W02 for telephone/radio communications per se.

## W07-X05 [2012]

# Military equipment management/maintenance

Includes management and tracking of military assets.

Inventory, tracking, record keeping, servicing

## W07-X07 [2007]

#### Soldier aids

Includes robotic exoskeletons to assist infantry in carrying heavy loads, and robotic "mules" (see also X25-F05A codes) controlled by soldier to carry military equipment or weapons.

# **Section X: Electric Power Engineering**

X11: Power Generation and High Power Machines	. 841
X12: Power Distribution/Components/Converters	. 847
X13: Switchgear, Protection, Electric Drives	. 863
X14: Nuclear Power Generator	. 879
X15: Non-Fossil Fuel Power Generating Systems	. 882
X16: ELECTROCHEMICAL STORAGE	. 888
X21: ELECTRIC VEHICLES	. 896
X22: AUTOMOTIVE ELECTRICS	. 903
X23: ELECTRIC RAILWAYS AND SIGNALLING	. 926
X24: ELECTRIC WELDING	. 932
X25: Industrial Electric Equipment	. 935
X26: LIGHTING	. 952
X27: DOMESTIC ELECTRICAL APPLIANCES	. 960

# X11: Power Generation and High Power Machines

#### X11-A

#### Steam turbine plant

Coal-fired power plant

#### X11-A01

#### **Turbines**

Impulse, reaction

#### X11-A01A

#### **Rotors**

Shaft, groove

## X11-A01A1

#### **Blades**

Includes constructional details, including materials, of blades per se. Constructional details of rotors other than blades are coded under X11-A01A2.

#### X11-A01A2

### Materials and mounting

Includes constructional details, including materials, of rotors, excluding constructional details of blades (which are coded under X11-A01A1). Also includes anti-vibration arrangements and mountings/supports of rotors, blade carriers, etc. *Anti-vibration, mounting, blade carrier* 

## X11-A01B

#### Stators; Seals

Nozzles, blades, fluid guide conduit, sealing fluid

#### X11-A01C

## Cooling; Bearings; Mountings; Casings

Includes details of cooling and de-icing arrangements, anti-vibrations and lubricating arrangements. Also includes details of bearings, mountings and supports, collection of condensation water and drainage.

Anti-vibrations arrangements and mountings/supports for rotors (including for the blades) are only coded under X11-A01A2.

## X11-A01D\* [1980-2010]

#### Regulation by flow control

\*From 2011 this code is transferred to X11-A10A, but remains searchable for records from 2010-2011

Valve control

#### X11-A01E\*

## [1980-2010]

#### Starting; Shutting down

\*From 2011 this code is transferred to X11-A10B, but remains searchable for records from 2010-2011.

Control systems, overspeed protection

#### X11-A01X

#### Other turbine details

Includes manufacture.

#### X11-A08

#### [2010]

#### **Environmental protection**

Includes arrangements for reducing carbon footprint and improving emissions, such as chimney smoke filters and scrubbers for capturing sulphur emissions from coal fired power stations, e.g. carbon capture arrangements.

Flue gas desulphurisation, carbon capture, waste gas scrubbing

#### X11-A09

#### [1983]

#### Other plant details

Includes plant layout and electrical aspects of steam generators. Also includes details of power plant boiler, condenser, feedwater pumps. Coal-conveyor, chimney smoke-filter, steam generator

## X11-A10

## [2011]

#### Monitoring, operation and control

Includes general monitoring, operation and control details. Also includes testing.

## X11-A10A

#### [2011]

#### Regulation by flow control

(X11-A01D) Valve control

# **X11-A10B**

## [2011]

## Starting, shutting down

(X11-A01E)

Control systems, overspeed protection

#### X11-B

#### **Hydroelectric plant**

Electric power generation produced from sea power, including wave power and tidal energy, is coded under X15-C codes instead.

Hydel

#### X11-B01

#### Turbines, Pelton wheels, water wheels

Vanes, buckets, nozzle, blades, rotors, stator, casing

## X11-B05 [1997]

#### Mini and micro plants

(X11-B09)

Run-of-river, streams

#### X11-B06 [1997]

## Pumped storage plant

(X11-B09)

#### X11-B09

#### Other details

Includes details of osmotic power or salinity gradient power (also covered by X15-C). From 2005, tidal flow base electric power generation is covered by X15-C codes.

## X11-B10 [1997]

## Monitoring, operation and control

(X11-B09)

#### X11-C

# Gas turbine; IC engine, Combined cycle and cogeneration plants; Other plants

For aircraft and ships see W06-B and W06-C codes, respectively.

#### X11-C01 [1997]

#### Gas turbine plant

(X11-C)

Includes electrical details of gas turbines and external combustion engines used for electric power generation.

## X11-C02 [1997]

## IC engine plant

(X11-C)

Includes electrical details of IC engine power plant.

## X11-C03 [1997]

## **Combined cycle plant**

(X11-A09, X11-C)

Includes electric power generation by combinations of gas turbine and steam turbine cycles, as well as gas and/or steam turbine cycles operating in combination with fuel cells, solar systems or any other power generation equipment.

Electric power generation using combinations of fossil and non-fossil fuel sources are also coded under X15-J.

Details of fuel cells are covered by X16-C codes, and solar systems and other systems using nonfossil fuel sources are covered by X15 codes. *Hybrid* 

## X11-C04 [1997]

## **Cogeneration plant**

(X11-A09, X11-C)

Includes combined heat and electric power generation. Combined heat and electric power generation using non fossil fuel sources are coded under X15-K.

CHP

## X11-C05 [2007]

## Rankine cycle plant

Involves the generation of electricity by heatevaporation of a working fluid that drives a turbine. For water/steam working fluids, see X11-A01 codes. Heat input sources include waste heat, solar (see also X15-A codes), etc.

#### X11-C08 [2010]

#### **Environmental protection**

Includes arrangements for reducing carbon footprint and improving emissions, e.g. catalytic converters for exhaust gases.

Catalytic converter

## X11-C10 [1997]

#### Monitoring, operation and control

Includes maintenance and repair of power plant.

## X11-C15 [2002]

## Microturbine plant

Note: Small machines are in V06.

#### X11-D

#### **Synchronous machines**

See also X11-H02B for details of linear synchronous motors.

Generator, motor, alternator

X11-D01 [1992]

Salient-pole rotor

X11-D02 [1992]

**Cylindrical rotor** 

X11-D03 [1992]

**Rotary exciter** 

X11-D03A [1992]

**Brushless exciter** 

Rotary rectifier

X11-D04 [1992]

**Static exciter** 

Static rectifier

X11-D05 [1997]

**Hybrid synchronous machines** 

(X11-D)

Includes combined permanent magnet and wound rotor type synchronous machines.

X11-E

**Asynchronous induction machines** 

See also X11-H02A for details of linear induction motors.

X11-E01 [1987]

**Wound rotor** 

Includes slip ring and pole-change winding type motors.

X11-E05 [1997]

Induction generator

(X11-E)

Inductor alternator

X11-F

DC mechanical-commutator and universal machines

Motors, generators, series-, shunt-, compoundexcitation

X11-G

Permanent magnet synchronous machines

Motors, generators

X11-G01 [2008]

Interior permanent magnet

X11-H

Other electric machines

X11-H01

Non-mechanical-commutator machines

Includes both AC/DC brushless motors. *Electronically-commutated, brushless* 

X11-H01A [1997]

Permanent magnet

(X11-H01)

For details of speed and torque regulation/control, see also X13-F03C1 and X13-G01C1.

PM AC/DC brushless

X11-H01B [1997]

Switched reluctance

For details of speed and torque regulation/control, see also X13-F03C2 and X13-G01C2.

SR AC/DC brushless

X11-H01C [1997]

**Sensorless** 

(X11-H01)

For details of speed and torque regulation/control, see also X13-F03C3 and X13-G01C3.

BEMF

X11-H02

Linear, sectional and rolling motors

X11-H02A [1997]

**Asynchronous** 

(X11-H02)

See X11-E for details of non-linear induction motors

Induction, LIM, AC

X11-H02B [1997]

**Synchronous** 

(X11-H02)

See X11-D for details of non-linear synchronous motors

LSM, AC

X11-H02C [1997]

**Direct current** 

(X11-H02)

DC

X11-H03

Clutches, brakes, gears; MHD generators and electrodynamic pumps

## X11-H03A [1987]

### Clutches, brakes, gears

This code covers electrodynamic type devices only. Electric or magnetic clutches, brakes and gears are in X25-L02.

## X11-H03B [1987]

# MHD generators and electrodynamic pumps

Includes details of electromagnetic pumps for high/medium power applications. Electromagnetic pumps for low power applications are coded under V06-M06K.

## X11-H03B1 [1997]

## **MHD** generators

(X11-H03B)

Magneto-hydro-dynamic

#### X11-H04

## Non-dynamo-electric machines

Includes electrostatic generators, motors, clutches or holding devices and thermal effect motors.

#### X11-H05 [1987]

## **Superconducting machines**

(X11-H09)

See X12-D06 for superconductors per se. *Cryogenic, heat insulation* 

## X11-H09

#### Other

Includes more than one rotor or stator-, DC interrupter-, AC mechanical commutator-, perpetual motion dynamoelectric- and acyclic-machines, and dynamoelectric converters, etc.

Torque motors, Schrage motors, motor-generator sets, amplidynes, metadynes

## X11-H20 [2002]

#### Starter-generator/motor-generator

#### X11-J

## **Constructional details of electric machines**

This code is used either alone or in conjunction with the different types of machines listed above. Magnetic materials are in V02-A02.

## X11-J01

## **Magnetic circuits**

#### X11-J01A

## Stationary parts

Includes means for mounting magnetic stationary parts to stator structure.

Slots, magnetic poles, cores, laminations, magnetic wedges, magnets, tooth, yokes

#### X11-J01B

## **Rotating parts**

Includes spider to mount or fasten magnetic part to rotor structure.

Cores, slots, magnets, magnetic poles laminations, magnetic wedges, tooth, yokes

#### X11-J01X

## Other magnetic circuits

#### X11-J02

#### Windings

#### X11-J02A

## Conductor shape, form, construction or layout

Includes twisted- or hollow-conductors; provision of cooling fluid ducts.

Coils, double-layer, strip or rectangular section

#### X11-J02B

#### Insulation; Shielding; Protection

Includes coil-, slot-insulation and materials, preventing or reducing eddy current losses, protecting against moisture or chemicals. *Corona protection* 

#### X11-J02C

#### Fastening windings

Includes wedges, end turn ties.

## X11-J02X

#### Other windings

From 2013, details of windings layout are coded under X11-J02A.

#### X11-J03

## **Current collection arrangements**

Includes commutators, slip-rings, brushes and their connections to windings, commutation improving arrangements (see also V04-L01).

Commutator segments

#### X11-J04

### **Association with electric components**

Includes devices for measuring or protecting machine, resistors, switches or RFI suppressor (see W02-H also), etc.

Direction/rotation detectors

#### X11-J05

## Mechanical energy handling arrangements (Structural association with)

#### X11-J05A

Clutches, brakes, gears, pulleys, mechanical starters

#### X11-J05B

Mechanical loads, driving or auxiliary machines

#### X11-J05X

# Other mechanical energy handling arrangements

Bearings, flywheels, balancing, shaft

#### X11-J06

## **Cooling or ventilating systems**

## X11-J06A

## Using liquid or solid cooling medium

Includes cryogenic coolers.

#### X11-J06X

## Other cooling or ventilating systems

Includes ambient air flow through the machine and use of fans.

Hydrogen cooling

#### X11-J07

## Casings, enclosures, supports

#### X11-J07A

#### Supporting brushes or bearings

Includes bearing shield mounting arrangement or end shield. Also includes cooling and greasing of bearings.

#### X11-J07X

## Other casings, enclosures, supports

Includes casings, enclosures, seals, ribs or fins to improve heat dissipation, noise/vibration reduction.

Machine mountings, housings, explosion-proofing, vibration-damping

## X11-J07X1

#### [2002]

## Connectors; Terminal boxes; Junction boxes

#### X11-J08

## Manufacture, testing, repair and maintenance

See also S01-G07 for electrical tests, and T01-J15 for simulation and design of motors and generators.

#### X11-J08A

# Stator/rotor bodies; Commutators; Brushes; Slip-rings

Includes brush wear indicator. See also V04-P02 for general commutators, brushes etc.

Cores, laminating, slotting, magnetic poles, magnetic circuits, casting, moulding

#### X11-J08B

## Windings

Includes direct winding of stator/rotor coils and laying of pre-wound coils.

Winding jigs, inserting wires, conductor bending, coiling

#### X11-J08C

# Insulating, impregnating, centring, balancing

Includes insulating of windings or core laminations and heating or drying of windings, rotors or machines.

Taping

## X11-J08M

## [1997]

## Testing, repair and maintenance

(X11-J08)

Includes analysis, diagnosis, monitoring, fault detection.

## X11-J08P

## [1997]

## Characterised by use of microprocessors

(X11-J08)

## X11-J08X

## Other manufacture, testing, repair and maintenance

Castings, enclosures, supports, end shields, bearings

## X11-J15

#### [2002]

#### **Materials**

## X11-J15A [2002]

#### **Conductive materials**

Includes details of materials for thermal or electrical conduction.

X11-J15B [2002]

**Magnetic materials** 

X11-J15C [2002]

#### Insulative materials

Includes details of materials for thermal or electrical insulation.

## X11-U [1997]

# Electric machines characterised by applications

These codes are used in conjunction with other X11 codes as appropriate.

X11-U01 [1997]

**Electric power generation** 

X11-U01A [1997]

## Steam turbine generator

See X11-A codes for details of steam turbine plants, and X11-J codes for constructional details.

Turbogenerator

## X11-U01B [1997]

## Hydrogenerator

See X11-B codes for details of water power generation, and X11-J codes for constructional details of generator.

## X11-U01C [1997]

## Gas turbine generator

See X11-C01 for details of gas turbine generator, and X11-J codes for constructional details.

## X11-U01D [1997]

## IC engine generator

See X11-C02 for details of IC engine plant, and X11-J codes for constructional details.

#### X11-U01E [1997]

## Wind turbine generator

See X15-B codes for details of wind power generation, and X11-J codes for constructional details of generator.

## X11-U01M [2002]

#### Microturbine generator

See X11-C15 for details of microturbine plants, and X11-J codes for constructional details.

X11-U02 [1997]

**Road vehicles** 

X11-U03 [1997]

Railways

X11-U04 [1997]

**Aviation and aerospace** 

X11-U05 [1997]

Ships and boats

X11-U06 [1997]

Military

X11-U07 [1997]

**Industrial machines** 

# X12: Power Distribution / Components / Converters

#### X12-A

#### **Power resistors**

Covers all high power resistors e.g. for lightning arrestors, electric motor loading, etc. Low power resistors are in V01-A. Also includes manufacture. *Voltage-, surge-arrestors, varistors, varistor stack* 

#### X12-B

## **Power capacitors**

Includes capacitors generally of the type used for power factor improvement,

transmission/distribution reactance compensation, super- or double layer-types for e.g. electric vehicle (see also X21-B04). Low power capacitors are in V01-B. V01-B codes can also be assigned in conjunction with X12-B to highlight the type and novel aspect of the power capacitor, including manufacture. See also X16-L02 for capacitive energy storage in general.

CVT, capacitor bank, ultra-capacitor

#### X12-C

Power transformers, reactors

#### X12-C01

Cores, coils, connections, bushings and terminals; Manufacture

X12-C01A [1987]

#### Cores

Includes magnetic circuit for transformer or reactor e.g. laminations, cores made from strips or sheets, yokes.

Core clamping plates, amorphous cores

X12-C01B [1987]

## Coils, windings, connections

Foil windings, insulation spacers, conductors, disc-, poloidal-, spiral-, toroidal-coils

X12-C01B1 [1987]

For reactor

X12-C01B2 [1987]

For transformer

X12-C01B2A [2002]

Using cables as windings

X12-C01C [1987]

#### **Bushings and terminals**

Glands, grommets, bulk heads

X12-C01D [1987]

#### Manufacture; Maintenance

Includes methods and apparatus.

X12-C01D1 [1992]

Cores

X12-C01D2 [1992]

#### Coils

Includes winding, insulating and connecting leads of coils for power transformers and reactors. Manufacture of insulating materials themselves when not part of the process of manufacturing windings is covered by X12-C01B codes and appropriate X12-E codes.

X12-C01D3 [1992]

**Testing** 

X12-C01D4 [1992]

Superconducting coils/magnets

X12-C01D5 [1992]

**Bushings and terminals** 

X12-C01D6 [1992]

### Casing

Also includes transportation packaging.

X12-C01D7 [2002]

#### Maintenance

(X12-C09)

Includes all aspects of repairs and maintenance, e.g. oil change, polychlorinated biphenyl disposal (see also X12-E02A).

X12-C01E [1992]

## Power and distribution transformers

(X12-C, X12-C01)

Also includes transformers for welding, electric furnaces, transmission lines, etc.

X12-C01F [1992]

## **Power reactors**

(X12-C, X12-C01)

Also includes short circuit current limiting-, saturable- reactors.

## X12-C01G [1992]

#### Instrument transformers

(X12-C, X12-C01)

Includes voltage and current transformers. For capacitive voltage transformers see X12-B. For electrical instrumentation see S01-D01 codes. *CT. PT. VT. IT* 

## X12-C01H [2005]

## Induction heating coils

See also X25-B02A codes.

## X12-C01X [1992]

## Other transformer/reactor aspects

Includes other details of transformer or reactor not covered elsewhere.

#### X12-C02

# Cooling, fault detection, control, and tap changing

## X12-C02A [1987]

## Cooling

Includes fans, gas cooling, evaporative cooling. Cooling channels or ducts, heat pipes

#### X12-C02A1 [1987]

#### Oil-cooling

Includes conservators, expansion chambers.

## X12-C02A2 [1987]

Water cooling

## X12-C02A3 [1992]

# Superconducting device/equipment cooling

Includes all superconducting-related cooling aspects.

#### X12-C02A3A [2005]

#### Cryostats

Cryogens, cryogenics

#### X12-C02A3C [2005]

#### Other

Includes, for example, thermoelectric cooling.

## X12-C02B [1987]

## Fault detection, monitoring, control

Constructional details of controllers are also included here. Includes for example moving a slider along a winding, etc to vary the output.

## X12-C02B1 [1987]

## Tap changing

Tap switches, no-load-, on-load-tap changer

## X12-C03 [1987]

# Casing, mounting, supporting or suspending transformers or reactors

(X12-C09)

Also includes noise/vibration reduction.

Tanks, containers, noise damper

#### X12-C04 [1987]

## Preventing or reducing unwanted electric/ magnetic effects

(X12-C09)

Includes electric or magnetic screens or shields, using auxiliary coils or cores.

#### X12-C05 [1987]

#### Superconducting coil

(X12-C01, X12-C09)

Includes coil for transformer or reactor. See X12-D06 for superconductors per se.

## X12-C05A [1987]

## For magnets

(X12-C09)

## X12-C06 [1992]

#### High power or large (electro) magnets

(X12-C09)

Includes magnets of the types typically used e.g. for lifting device (see X25-F05 also), accelerators (see X14-G also), etc.

## X12-C09

#### Other general transformer/reactor details

Includes oil cleaners, pressure relief, etc.

Corrosion protection, structural association with built-in electric component

## X12-D

#### Cables, conductors, conductive materials

Covers high power and low power cables/conductors, fibers and other structures.

## X12-D01

#### **Materials**

Superconducting materials are in U14-F01 and X12-D06B.

## X12-D01A

#### Metals or alloys

#### X12-D01B

**Oxides or sulphides** 

#### X12-D01C

Carbon, silicon, or other non-metallic material; Conductive polymers

X12-D01C1 [1992]

**Conductive polymers** 

X12-D01D [2005]

#### **Nano-materials**

Includes conductive materials of small dimensions. This code is used in conjunction with the other X12-D codes as appropriate.

Nanotube, carbon nanotube, single wall nanotube, multiwall nanotube, double wall nanotube, SWNT, DWNT, MWNT

#### X12-D01E [2005]

#### Ion/proton conductors

To be used in conjunction with other X12-D codes, as appropriate.

#### X12-D01F [2005]

#### **Conductive dispersions**

Generally used when a conductive material is within a dispersion.

X12-D01F1 [2005]

Organic vehicle

X12-D01F2 [2005]

Inorganic vehicle

## X12-D01X

#### Other materials

Includes conductive materials not covered elsewhere.

#### X12-D02

Non-insulated conductors; Conductive films and structures

#### X12-D02A

**Conductive layers on insulating supports** 

#### X12-D02A1 [1992]

#### **Transparent conductive film or electrodes**

See also U14-K01A1 for application to LCDs. *ITO*, indium titanium oxide

## X12-D02A2 [2005]

## **Anisotropic film**

For application to connectors, see V04-A11.

## X12-D02C [2005]

#### Non-insulated conductors

Includes only aspects of conductive part of wires and cables. For other details, such as sheaths, see X12-D03 codes. For manufacture of non-insulated conductors, per se, or forming part of insulated cables, see X12-D07E.

Conductors, wires, stranded conductors, bundled conductors

## X12-D02C1 [2005]

#### **High power conductors**

Includes conductive part of an insulated wire or cable, non-insulated overhead power line, etc. designed to carry high currents.

## X12-D02C1A [2005]

#### **Bus bars**

Bus bars, per se; installations are in X12-G03.

#### X12-D02C2 [2005]

## Low power conductors

(X12-D02X, X12-D05)

Includes conductive part of an insulated wire or cable or non-insulated wires designed to carry low currents

X12-D02C2A [2005]

Communication

X12-D02C2B [2005]

Audio/video

X12-D02C2C [2005]

**Control and instrumentation** 

## X12-D02C2D [2005]

#### **Conducting nanostructures**

Includes nanowires, nanotubes and nanofibers for general use. Specific applications to, for example, battery electrodes are also covered by X16-E codes. For normal size fibers, see X12-D02C2E. DWNT, SWNT, MWNT, carbon nanotube, CNT

#### X12-D02C2E [2005]

#### **Fibers**

For nanofibers, see X12-D02C2D.

#### X12-D02X

#### Other

Includes other conductive structures, such as, within a poorly conductive structure.

#### X12-D03

Insulated conductor construction

#### X12-D03A

Flexible, extensible or flat cables

X12-D03A1 [1992]

Flat or ribbon cables

X12-D03A2 [1992]

Flexible and extensible cables

#### X12-D03B

Sheaths, armouring; Reducing losses; Indicating defects

X12-D03B1 [1992]

#### Sheaths and armouring

Includes repair of sheaths for which the general 'cable repair' code X12-G01D is also assigned. Repair of a cable sheath in the sense of rectification during manufacture is covered by X12-D07A. *Jacket* 

## X12-D03B2 [1992]

#### **Indicating defects**

Includes sensors incorporated within the cable structure to indicate temperature rise, water ingress, etc.

## X12-D03B3 [1992]

#### **Reducing losses**

Includes arrangements to reduce losses in conductors, sheaths and armourings.

#### X12-D03C

#### Cable markings and heat protection

For flame retardants, see also X12-D03X for records prior to 1992.

## X12-D03C1 [2007]

#### **Heat protection**

Includes measures for improved heat dissipation, shielding or conduction from cables to, for example, operate within rated thermal limits. Also includes flame retardants.

## X12-D03C1A [2013]

#### Cooling

Includes all aspects of cable cooling such as cables per se with integral cooling channels, as well as installations for actively cooling cables and conductors.

Heat dissipation, fan, coolant, air cooling, liquid cooling

## X12-D03C2 [2007]

#### Cable markings

Includes printed markings, use of different color insulation, integral RF tags (also assigned T04-K and W02-G05 codes), and the like, to provide ratings and identification information and to distinguish wires and cables. Markings for security purposes and for deterring theft are also assigned X12-D10.

## X12-D03D [1992]

## Insulation and its disposition, materials

(X12-D03X)

See also X12-E01, X12-E02 codes.

#### X12-D03E [1992]

#### Screens

(X12-D03X)

Includes screens to avoid potential gradients, and to reduce interference. Covers both electrostatic and electromagnetic fields' shielding.

## X12-D03F\* [1992-2004]

## Composite optical fiber- and electric- cable

(X12-D03X)

\*This code is now discontinued. It has been transferred to X12-D08 from 2005 but remains searchable for records between 1992 and 2004.

## X12-D03G [1992]

#### **Lubricating layers**

(X12-D03X)

#### X12-D03H [1992]

## **Protection**

(X12-D03A, X12-D03X)

Includes protection against e.g. corrosion, termites, chemical attack, etc. Mechanical protection is in X12-D03B1.

## X12-D03J [1997]

#### Contact cable

(X12-D03,X12-D03X)

Sensor cable

## X12-D03K [1997]

## Floating and submarine cables

(X12-D03,X12-D03X)

## X12-D03L [1997]

## Rigid-tube cable

(X12-D03,X12-D03X)

## X12-D03M [2002]

#### Wire harness

(X12-D03,X12-D03X)

Includes harnesses per se, and is used in conjunction with other X12-D03 codes as appropriate.

## X12-D03N [2006]

#### **Drain wire**

(X12-D03X)

Includes the uninsulated wire located beneath, and in contact with, a grounded shield.

#### X12-D03P [2006]

## **Cable-strengthening core**

(X12-D03X)

Includes, for example, steel wire or core located within cable covering to impart strength.

## X12-D03Q [2006]

#### **Cable-connector combination**

Includes a combination of cable and connector where neither is, or both are, novel. See V04-M17 also.

## X12-D03R [2011]

Stranded conductors

## X12-D03X

Other insulated conductor aspects

#### X12-D04

## High power and low power cables

#### X12-D04A [2006]

## **High power**

Includes cables carrying power beyond the level of 110/220V mains. Also includes high power DC cables.

## X12-D04C [2006]

## Low power

Includes cables carrying power up to and below the level of 110/220V mains. Also includes low power DC cables.

#### X12-D05

#### Low power cables or wires

Conductive parts of cables are covered by X12-D02C codes. Other details are covered by X12-D03 codes. The codes in this subsection are used in conjunction with each other as appropriate. For example, a coaxial, RF communication cable would be coded in X12-D05A, X12-D05J and X12-D05M. A loudspeaker cable would be coded in X12-D05B and X12-D05K.

## X12-D05A [2005]

Communication

X12-D05B [2005]

Audio/video

X12-D05C [2005]

**Control and instrumentation** 

X12-D05J [2005]

HF

X12-D05K [2005]

LF

X12-D05L [2005]

**High speed data** 

X12-D05M [2005]

Coaxial

X12-D05N [2005]

#### **Twisted pair**

Includes twisted pairs of both shielded and unshielded type.

STP, UTP

## X12-D06

#### Superconducting cable/materials

Superconducting wire and line manufacture is covered by X12-D07E1C. Details of superconducting cables, such as sheaths, are covered by X12-D03 codes. Superconducting machines and reactive components are covered, respectively, in X11 and by X12-C codes.

#### X12-D06A [1992]

**Cables or lines** 

X12-D06A1\* [1992-2005]

## Manufacturing

\*This code is now discontinued and has been transferred to X12-D07 from 2006. It remains searchable for records prior to 2006.

X12-D06B [1992]

**Materials** 

Includes all aspects of materials (see also U14-F01 codes).

X12-D06B1 [1992]

**Metal Alloys** 

X12-D06B1A [1992]

Manufacturing and processing

X12-D06B2 [1992]

**Oxide Materials** 

X12-D06B2A [1992]

Manufacturing and processing

X12-D07

Manufacture, salvaging

X12-D07A

Sheathing, armouring, screening, etc.

Also includes impervious material coating.

X12-D07B

Insulating conductors or cables

X12-D07B1

By extrusion, by liquid bath, by spraying

X12-D07B9

Other (including winding on tape)

X12-D07C [1992]

Stranding-up

(X12-D07X)

X12-D07D [1997]

Cable harness manufacture

(X12-D07X)

See also V04-V02 code.

Wiring harness, wiring loom

X12-D07E [2002]

Non-insulated conductor or conductive part of insulated cable

(X12-D02X)

Includes manufacture and testing of non-insulated conductors. Other cable testing aspects are covered by X12-D07F.

X12-D07E1 [2005]

**High power conductors** 

X12-D07E1A [2005]

**Bus bars** 

X12-D07E1C [2006]

Superconducting line/wire

(X12-D06A1)

X12-D07E2 [2005]

Low power conductors

X12-D07E2A [2005]

Nano-wires; Nanotubes

X12-D07E2C [2005]

**Fibers** 

X12-D07E3 [2006]

**Conductive films** 

(X12-D07X)

X12-D07F [2007]

**Cable testing** 

(X12-D07X)

Includes testing of insulated conductors. Testing of non-insulated conductors is covered by X12-D07E codes. See also S01-G14 for electrical tests on wires and cables. For non-electrical tests, see S02 and S03 classes.

## X12-D07X

#### Other cable manufacturing aspects

Cable marking machine, cable reels, bobbins, spools, salvaging

X12-D08 [2005]

Composite optical fiber- and electric- cable

See also V07-F01B4 for optical fiber cables.

X12-D09 [2005]

Composite power- and signal- cable

Includes cables having a common outer covering that encloses low and high power cables.

## X12-D10 [2014]

#### **Cable security**

This code includes arrangements for preventing or deterring theft of cables, e.g. due to monetary value of conductor materials, based on features of the cable itself, and not features of fittings or installations which are covered by X12-G11. Other X12-D codes are also assigned as appropriate, such as X12-D01 codes for novelty in conductor materials or X12-D03C2 when markings applied to insulated cables enable identification of them after cable theft. Cables incorporating special features to trigger an alarm indicating attempted theft, e.g. by cutting, are also assigned W05-B01 codes.

Code, compound, etch, jacket, laser, marker, signature, trace, unique

#### X12-E

#### Insulators

For insulating materials used in general electronic equipment/device, see also V04-X01B from 1997 onwards. Prior to 1997, see also V04-S02. Materials for general electrical equipment are also coded here.

#### X12-E01

**Inorganic substances** 

#### X12-E01A

**Ceramics** 

#### X12-E01B

Mica, asbestos, metallic oxides, cements, gases

#### X12-E01C [2005]

#### Inorganic material within organic vehicle

Includes a mixture where the inorganic material is a major constituent.

## X12-E01D [2005]

#### Inorganic nanomaterials

Includes insulating materials of small dimensions. This code is used in conjunction with the other X12-E codes as appropriate.

## X12-E01X

#### Other inorganic insulating substances

Includes glass.

## X12-E02

#### **Organic substances**

#### X12-E02A

Liquids, asphalts, bitumens, pitches, natural rubbers

#### X12-E02B

Resins, waxes, synthetic polymers

#### X12-E02C

[2005]

## Organic material within an inorganic vehicle

Includes a mixture where the organic material is a major constituent.

#### X12-E02D [2005]

#### **Organic nanomaterials**

Includes insulating materials of small dimensions. This code is used in conjunction with the other X12-E codes as appropriate.

#### X12-E02X

#### Other organic insulating substances

Includes gases, fibrous materials, paper.

#### X12-E03

Insulators

#### X12-E03A

Suspension-, supporting-, pin-, lead-through insulators

#### X12-E03C [1997]

#### **Insulating bodies**

(X12-E03A,X12-E03X)

## X12-E03C1 [2005]

## Tapes, sleeves, tubes

Bead, bobbin

## X12-E03C3 [2005]

#### **Grommets**

See also X12-G04A3 for use of a grommet within an electrical installation.

#### X12-E03D [2005]

## **Insulating nanostructures**

Includes nanotubes and nanofibers.

DWNT, SWNT, MWNT, carbon nanotube, CNT

## X12-E03X

#### Other insulators

Includes e.g. measures for improving voltage distribution, composite insulators.

#### X12-E04

#### Manufacture

Also includes electrical and mechanical testing of insulators. See also S01-G codes for electrical tests.

#### X12-F

## Spark gaps; Circuits

Does not include spark plugs which are covered by the relevant codes for the motor, X22-A01E1 for land based vehicle motors and W06 for water based vehicle motors.

#### X12-F01

## Spark gaps

Electrodes, voltage-, surge- or lightning protectors/arrestors

## X12-F01A [1992]

### Overvoltage protection

Includes arcing horns. See also X13-C03.

#### X12-F02

Circuits

## X12-F03 [1992]

#### Ioniser, ozoniser

(X12-F09)

See also X27-E01B codes for domestic applications.

## X12-F04 [1992]

#### Corona discharge

Includes rings and pointed electrodes. See S06-A02 codes for copiers.

#### X12-F09

#### Other spark gap aspects

Includes manufacture.

#### X12-G

#### Cable or line installation and maintenance

See W01-D codes for telecommunications cable installation. Low power connectors are in V04.

### X12-G01

#### Methods and equipment

#### X12-G01A

### For installing lines or cables

Maintenance and repair of cable installations is covered by X12-G01D which can be assigned along with X12-G01A codes as necessary. X12-G01A codes are also assigned as appropriate for removal of previously-installed cables.

Laying cables, cable puller

## X12-G01A1 [1992]

#### Overhead installation

Includes transposing of conductors and stringingup lines and cables etc.

#### X12-G01A7 [1992]

Underground, building, and water installations

## X12-G01A7A [1992]

**Digging trenches** 

#### X12-G01A7D [1992]

#### Installing cables in ducts, ground

Ducts per se are in X12-G04A1. This code also covers removal of buried cables.

## X12-G01A7E [2022]

#### Installing cables on vehicles

Includes laying of cables on land/air/water vehicles.

## X12-G01A7G [1992]

**Submarine** 

## X12-G01A7J [1992]

## Cable marking for circuit identification

#### X12-G01B

## For removing cable insulation or armouring

See V04-P03 for electronic circuit application. Wire stripping

## X12-G01C [1983]

# Cable and fault locating; Cable/line installation measuring/testing

(X12-G01X)

See S01-G05 also for electrical fault location determination, and S03-C02 codes for cable location by, for example, magnetic fields. Also includes indicators/detectors/recorders for line/cable breaks, lightning strikes, line strain, tripped breaker, etc

## X12-G01D [1992]

#### Maintenance/repair

(X12-G01X)

Includes the use of unmanned vehicles, e.g. radio controlled helicopter for inspecting overhead transmission lines (see also W06-B15U), cleaning of insulators, de-icers, etc.

#### X12-G01E [1992]

## Joining or terminating

(X12-G01X)

Connections per se are in X12-G02.

# Crimping tools X12-G01E1

[1992]

## Superconducting wires/cables

(X12-G01X)

## X12-G01F [1992]

## **Safety arrangements**

(X12-G01X)

Includes lightning protection, earthing arrangements.

Earth wire, ground wire, earthing grids, lightning-conductors, lightning-rods

#### X12-G01X

## Other cable/line installing aspects

#### X12-G02

#### Cable or line connectors or fittings

#### X12-G02A

**Cable or line connectors** 

#### X12-G02B

#### **Cable terminations**

End connection, terminals, crimping, ferrules, cable glands

#### X12-G02C

## **Cable junctions**

Joints, splices, protective tubes

#### X12-G02C1 [1992]

## **Cold and Heat-shrinkable covers**

From 2014 this code is expanded to cover coldshrinkable covers (previously coded as X12-G02C and now specifically covered by X12-G02C1C) as well as heat-shrinkable covers (now specifically covered by X12-G02C1A).

Sleeve

#### X12-G02C1A [2014]

#### **Heat-shrinkable covers**

(X12-G02C1)

This code is intended for insulation sleeves which shrink around a cable junction on application of heat

Elastomer, heat gun, thermoplastic

## X12-G02C1C [2014]

## **Cold-shrinkable covers**

(X12-G02C)

This code is intended for insulation sleeves which shrink around a cable junction without application of heat, e.g. due to pre-stressing of the sleeve material.

Core, elastomer, rubber, support

#### X12-G02D [2005]

#### **Grounding connector**

For low power earthing connectors, see V04-A05.

## X12-G02E [2005]

## **Sliding connector**

Includes, for example, pantograph collectors for a train. Brushes, slip rings for electric motors are covered by V04-L, V06-M and X11-J codes.

## X12-G02F [2005]

#### Vibration dampers

Includes dampers for an overhead line.

#### X12-G02G [2007]

#### Superconductor cable connector/fitting

(X12-G02X)

High power superconducting cable connectors only are covered here. For low power superconducting wire connector, see V04-A10.

### X12-G02X

## Other cable/line connectors or fittings

Includes connectors or fittings for gas- or oil-filled cables.

Seals, clamps, cooling

#### X12-G03

## **Installations of bus-bars**

Power rail

#### X12-G04

## For buildings, in ground etc.

Vehicle installations from 1992 onwards are coded exclusively in X22-X01. However, individual items like wire or cable clamps or grommets, which are more generally applicable to other installations are also coded here and, if relevant, elsewhere in X12-E or W01-D or X22-X01. Also, floor structures especially designed to carry cabling is included in X12-G04A or X12-G04A1 depending on whether space between floors is left for cables or concrete ducting is incorporated.

#### X12-G04A

# In, on, or through walls, floors or ceilings, e.g. conduit

Wire harness

X12-G04A1 [1992]

Ducts, ladders, trays, conduits

Includes manufacture.

X12-G04A1A [2007]

Rigid

X12-G04A1C [2007]

Flexible

X12-G04A1E [2007]

#### **Fittings**

Includes fittings for joining ducts and distribution boxes, brackets, etc.

## X12-G04A2 [1992]

#### Clamps

Includes cable ties, clips and hooks and their manufacture. Cable ties for low-power cables used in e.g. electronic equipment are covered by V04-T01A.

## X12-G04A3 [1992]

### **Grommets, bushings**

Includes arrangements for leading cables through walls and manufacture.

#### X12-G04B

## Distribution and junction boxes

Ceiling roses and junction boxes are also coded in V04-B09, provided they are of low voltage and low power types. Distribution boxes are also in X13-E02 for industrial switchgear.

#### X12-G05

#### **Overhead installations**

Supports, suspensions, reinforced towers, pylons

## X12-G08 [1992]

# Cable or line for supplying relatively movable parts

(X12-G09)

#### X12-G09

# Other general cable/line installation aspects

Includes labels, signs and tapes warning of e.g. high voltage cable installations, or the presence of cables within a wall or below ground for which X12-G04A codes are also assigned.

## X12-G10 [2007]

## Cable dispensing reel

(X12-G09)

Includes details of automatic cord winders for headsets.

Cable drums, reels

## X12-G11 [2014]

## Cable or line installation security

This code includes arrangements for preventing or deterring theft of cables, e.g. due to monetary value of conductor materials, based on features of fittings or installations and not features (e.g. markings) of the cable itself which are covered by X12-D10. Other X12-G codes are also assigned as appropriate, such as X12-G04 codes for underground cable installations. Installations incorporating special features to trigger an alarm indicating attempted theft are also assigned W05-B01 codes.

#### X12-H

## Power supply or distribution

For installations and constructional details of substations see X12-G and X13-E codes, respectively. Note: X13-E is used for constructional details only of switchyards, switchboards etc. X12-H is used for all aspects of load monitoring, control, fault diagnosis, etc.

#### X12-H01

## Circuit arrangements for supply or distribution

## X12-H01A

#### Adjusting, compensating, balancing

Power control

## X12-H01A1 [1992]

#### Voltage control

X12-H01A1A [1992]

By load shedding

X12-H01A1C [1992]

By reactive power control

X12-H01A1E [2006]

## By using tap-changing transformer

See X12-C02B1 for tap changers per se.

X12-H01A2 [1992]

## (Re)active power compensation

From 2011 this code will cover both active and reactive compensation types.

Power factor controller, PFC, VAR compensation

X12-H01A2A [1992]

On transmission/distribution side

X12-H01A2B [1992]

On load side

X12-H01A2C [2002]

## Compensation implemented by series capacitors and shunt reactors

Also includes series/parallel capacitor banks, and synchronous capacitors. This code is used in conjunction with X12-H01A2A or X12-H01A2B whenever possible.

Saturable reactor, synchronous compensator, shunt capacitor

#### X12-H01A2D [2002]

## **Static VAR compensation**

Includes compensation obtained by the use of capacitors and reactors, respectively, to generate and absorb vars with at least one of them being variable. The variable capacitor or reactor may involve the use of, respectively, thyristor-switched capacitor compensator or thyristor-controlled reactor compensator. This code is used in conjunction with X12-H01A2A or X12-H01A2B whenever possible.

SVC, TCR, TSC

#### X12-H01A2E [2006]

#### **Power converter**

Involves the use of static converters to compensate for system reactance. See also X12-J for converters.

## X12-H01A3 [1992]

# Short circuit current or in-rush current limiter and over voltage limiter

Includes the use of series reactors/superconducting coils (see also X12-C codes), etc. Applicable only to power lines.

## X12-H01A4 [1992]

## Harmonics and ripple reduction

Filters in general are covered by U25-E codes. The use of this code is restricted for power lines. Filtering in converter systems is covered by X12-J01E. Also includes suppression of electromagnetic interference for which W02-H codes are also assigned.

## X12-H01A5 [1992]

Reducing or preventing power oscillations

## X12-H01A6 [1992]

Eliminating or reducing asymmetry in polyphase networks

#### X12-H01A7 [1992]

## Balancing network load by energy storage

(X12-H01A, X12-H09)

For general storage of electric energy, see X12-H06. This code involves the use of e.g. flywheels, batteries, pumped storage hydroelectric plants (see X11-B06, too).

## X12-H01A8 [2006]

Frequency regulation

## X12-H01A9 [2006]

## Load-shedding

Includes load shedding to maintain the balance between generated power and load demand. Also includes shedding to regulate system frequency (see also X12-H01A8). For load shedding to regulate voltage, see X12-H01A1A.

#### X12-H01B

## Multisource systems, system interconnections, power transfer

Generator synchronising, load sharing

## X12-H01B1 [1997]

## Distributed power generation system

(X12-H01B)

Includes connection to the utility mains of geographically-distributed solar power, wind power, fuel cell power, gas microturbines, etc. See also U24-J or X12-J codes for power converter details.

## X12-H01B2 [2005]

## **Bulk power transfer/interconnection**

Includes arrangements for parallel feeding of a single network by two or more generators, converters, or transformers and also controlling the sharing of output among them.

## X12-H01B2A [2008]

## Synchronising generator(s) with network

Includes arrangements to synchronise frequency, phase sequence, etc.

## X12-H01B3 [2005]

Interconnection of networks operating at different frequencies

## X12-H01B4 [2005]

## Aircraft and ships

See also W06-B/C codes.

## X12-H01B5 [2006]

## **Electric traction vehicles**

Includes high level power distribution system onboard a train, tram, electric vehicle, hybrid electric vehicle. Generally applicable to voltage buses in excess of 42V. Also includes on-board charging and charging control of vehicles. IC engine-driven vehicle systems are covered by U24-H and X22-F codes.

## X12-H01C [1992]

#### High power supply

(X12-H01X, X12-J)

Includes supplies for e.g. welding, induction heaters, etc. Static converters and their controllers are covered by X12-J and X13-G03 codes.

## X12-H01D [1992]

## **HVDC, DC systems**

(X12-H01X)

Converter stations, rectifiers, inverters

#### X12-H01E [2007]

## Non-contact power distribution

(X12-H01X)

Includes distribution of energy by electromagnetic waves (See X12-H09 for records prior to 1992). See X21-B01A1C and X16-G03 for non-contact electric vehicle battery charging. Low power non-contact power distribution is coded in U24-H02 codes. WPT, near-field

#### X12-H01E1 [2021]

#### Using capacitive coupling

## X12-H01E2 [2021]

## Using inductive coupling

See also X12-C codes for novel high power inductive components.

#### X12-H01E3 [2021]

## **Using radio waves or microwaves**

See also W02 codes for novel RF details such as directional array or Yaqi antennae.

## X12-H01E4 [2021]

## **Using light**

Includes use of off-board mains supply. See X16-G01 for mains battery charging.

#### X12-H01E5 [2021]

## **Using ultrasonic waves**

See also V06 codes for novel ultrasonic transducers.

#### X12-H01E8 [2021]

## Wireless power transmission control, monitoring and optimization

Includes optimizing position for non-contact power transfer, reducing electric, magnetic or electromagnetic leakage/interference, detecting foreign objects, as well as transmitting data during power transfer.

## X12-H01X

Other circuit arrangements for supply or distribution - including unspecified systems

## X12-H02

## **Emergency or auxiliary supplies**

Low power UPS systems are in U24-J. Standby supplies

## X12-H02A [1992]

**Diesel-generator rotary UPS** 

#### X12-H02B [1992]

Static UPS

## X12-H02C [1992]

**Rotary UPS** 

## X12-H03 [1983]

# Remote control and monitoring; Power system communications

(X12-H09)

## X12-H03A [1992]

### Remote control and monitoring

Includes network state monitoring, breaker tripping, relay/breaker tripping display. Also includes supervisory display of various system parameters. Constructional details of supervisory desks are in X13-E01. See also W05-D codes for transmission systems for measurement or control signals.

Remote load switching, mains-based switching

## X12-H03A1 [2005]

## Economics-driven inter-tie or multi-source control

Includes control of network power transfer based on generation costs and tariffs offered for buying and selling of energy. Also includes provision for considering pollution-related costs and setting off of pollution credits. See also X12-H07 and T01-J codes.

## X12-H03A3 [2007]

# Switching control for equipment connected to mains supply

Includes remotely generated signals to switch domestic equipment, e.g. air conditioner, fridge etc., on and off. For load shedding-related switching see X12-H01A codes. See also W05-D codes.

#### X12-H03E [1992]

#### **Power systems communications**

Includes e.g. power line carrier communications (PLCC) (see W02-C01A), mains-based load control signalling. Also includes pilot relaying (see X13-C01 codes).

#### X12-H03E1 [2005]

## High power transmission/distribution networks

Typically includes communication/control signals sent over high power lines.

#### X12-H03E1A [2005]

## Economics-driven inter-tie or multi-source communication

Includes control of network communication based on tariffs offered for buying and selling of energy. See also X12-H07 and T01-J codes.

#### X12-H03E3 [2005]

#### Low power mains network

Typically includes communication/control signals sent over mains wires to switch appliances.

X12-H03E5 [2005]

Radio network

X12-H03E7 [2005]

Internet/intranet

X12-H04 [1992]

#### **Utility load measurements**

(X12-H09)

Includes meters and metering/measuring arrangements relating only to electrical power systems covering generation, transmission and distribution. Also covers such measurements for domestic, commercial and industrial premises. See also S01 codes for all electrical measurements.

#### X12-H04A [1992]

## Remote metering

(X12-H09)

Includes arrangements for obtaining meter readings from the customer premises-based meters. Customers, in this context, include domestic, commercial and industrial users. Does not cover arrangements for metering/measuring power line electrical values for display at, for example, a load control centre. Such items are in X12-H04D. See also W05-D codes for transmission of measured values.

## X12-H04B [2005]

## Internet/intranet metering

#### X12-H04C [2006]

## Individual transmission/distribution/mains line meters

Includes current, voltage, power, energy, frequency, etc. meters, per se. Does not include meters not designed for the purpose of generation, transmission/distribution. Where the meter has the facility to be interrogated by a central station or electricity provider, see also X12-H04A.

#### X12-H04D [2006]

#### Metering/measurement systems

Includes arrangements/circuitry for obtaining measures of voltage, current, etc for power systems. Individual current/voltage transformers are covered by X12-C codes. By their nature, these are 'remote' measurements but are not coded in X12-H04A.

## X12-H04E [2006]

### Other metering/measurement systems

Includes recording of transients, harmonics, over voltages/current data, line fault parameters, lightning strikes, etc.

## X12-H04U [2005]

## **Applications**

To be used in conjunction with other H04 codes.

## X12-H04U1 [2005]

#### **Protection**

Includes metering arrangements for use with protection devices. See also S01, X12-C01G and X13-C for electrical instrumentation, instrument transformers and protection circuits.

## X12-H04U2 [2005]

#### **Network control**

See also X12-H03A codes for control and monitoring of networks.

## X12-H05 [1992]

#### **Network simulators**

(X12-H09)

Includes not only network simulation but also modelling of the system to manage load demand/generation, predicting power consumption and outcomes of operational parameter changes, etc. T01-J15 codes for computer-aided design and simulation are also assigned as appropriate.

#### X12-H06 [1992]

## **Electric energy storage**

(X12-H09)

For pumped storage hydroelectric systems, see also X11-B06 and X12-H01A7 codes. This code includes systems using superconducting coils, etc. See also X16-L. Storage for load-balancing purposes is in X12-H01A7.

#### X12-H07 [2005]

# Power trading across separate networks/generators

Includes computerised trading of power based on varying tariffs and pollution costs and credits. See also T01-J codes. To be used with other X12-H03 codes for communication and control aspects.

## X12-H08 [2013]

## **Smart grids**

Includes smart grids used for power transmission and management. Use with other X12-H codes as appropriate, such as X12-H03 codes for remote control and monitoring, X12-H04 codes for smart metering of power usage, X12-H01B codes for distributed power supply/control and X15-A08 and X15-B05 for solar/wind power control/monitoring. Also see other codes such as X27-V for home automation e.g. where smart grid automatically turns off household equipment, or manages use of off-peak power for domestic equipment. *Intelligent* 

#### X12-H09

## Other power supply/distribution aspects

#### X12-J

#### Power converters

See U24-D for low power converters.

#### X12-J01

#### **General converter details**

#### X12-J01A

## Generation of control voltages

See U21-B01 and U21-B05 codes for electronic switching.

X12-J01A1	[1992]
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For bipolar transistor

X12-J01A1A [1992]

For IGBTs

X12-J01A3 [1992]

For FETs

X12-J01A5 [1992]

For thyristors

X12-J01A7 [1992]

For control of other devices

X12-J01A9 [1992]

#### **Characterised by PWM**

See U22-E for PWM in general.

## X12-J01B [1983]

#### **Circuit protection**

(X12-J01X)

See also X13-C04D.

X12-J01C [2012]

**Power factor correction** 

X12-J01E [1992]

**Reducing harmonics and ripples** 

(X12-J01X)

See U25-E for filters in general.

X12-J01E1 [2006]

**Harmonics reduction** 

X12-J01E2 [2006]

Ripple reduction

X12-J01E5 [2014]

Reducing electromagnetic interference

(X12-J01E)

This code covers measures to reduce electromagnetic interference generated by the converter itself, e.g. based on circuitry or on constructional details such as screening for which V04-U codes are also assigned. W02-H01 codes (general codes for EMI/RFI reduction at source) are also assigned as appropriate.

Electromagnetic compatibility, EM, EMC, filter, harmonic, PWM frequency, radio frequency interference, RF, SMPS, switched mode, switching frequency, switching regulator, switching transient

X12-J01G [1992]

**General cooling details** 

(X12-J01X)

See also V04-T03 codes.

X12-J01J [2006]

Measurements/monitoring/testing

(X12-J01X)

See S01 for related electrical instrumentation.

X12-J01K [2007]

**Constructional details** 

(X12-J01X)

X12-J01X

Other converter aspects

X12-J02

**DC-DC converters** 

X12-J02A

Without intermediate AC

X12-J02B

With intermediate AC

X12-J03

**AC-AC** converters

X12-J03A [2005]

**Matrix converter** 

X12-J04

**AC-DC** converter

Rectifier

X12-J04A [1992]

Half-wave

X12-J04C [1992]

Full-wave

X12-J04C1 [1992]

**Bridge** 

X12-J04C1A [1992]

Characterised by diodes

X12-J04C1B [1992]

Characterised by thyristors

X12-J04E [1992]

Multiplier

X12-J05

**DC-AC** converter

Inverter

X12-J05A

Full- and half-bridge

X12-J05A1 [1992]

Characterised by bipolar transistors

X12-J05A1A [1992]

Characterised by IGBTs

X12-J05A3 [1992]

**Characterised by FETs** 

X12-J05A5 [1992]

**Characterised by thyristors** 

X12-J05A9 [1992]

**Characterised by other switches** 

## X12-J05B [2005]

#### Inverter-type

To be used in conjunction with other inverter codes such as X12-J05A.

## X12-J05B1 [2005]

Voltage source inverter

X12-J05B2 [2005]

**Current source inverter** 

## X12-J05B3 [2005]

## **Utility inter-tie inverter**

Includes inverters fed by solar/wind power/etc generators for connecting to a mains/utility supply. For low power inverters, see U24-D codes.

## X12-J06 [2005]

## Pulse voltage supply

See U24-D06 for low power pulse supply. See U22-A03 also for energy-storage pulse generation.

## X12-J09

#### Other converters

Includes dynamic converters.

## X12-J10 [2007]

## **Bidirectional converter**

This code is used in conjunction with other codes to indicate a bidirectional novelty.

# X13: Switchgear, Protection, Electric Drives

#### NOTES:

- (1) This class contains high power and indeterminate size apparatus. Low power mechanical and electromechanical switches are coded in V03 only, and electronic switches are coded in U21 only.
- (2) X13-A01 and X13-A02 codes are common to switches, circuit breakers and circuit protectors.

### X13-A

# Switchgear contacts; Special switch arrangements

#### X13-A01

Contact material, structures and manufacture

X13-A01A [1992]

**Materials** 

X13-A01B [1992]

**Structures** 

Shape

X13-A01C [2002]

**Contact manufacture; Testing; Monitoring** 

#### X13-A02

### Contact engagement techniques

Includes contacts details not covered by X13-A01 codes, e.g. details of contact engagement, heating or cooling of contacts, cleaning or lubricating of contact-making surfaces, increasing contact pressure, preventing vibration of contacts, etc.

# X13-A03

# Switch operating and driving mechanisms (general)

# X13-A03A

# **Operating parts**

Levers, pushbuttons, handles, rods

# X13-A03B

#### **Mechanisms**

Drives, springs, actuators, cams, gear motors

#### X13-A03C

# Interlocking; Arc control

Locking, latches

#### X13-A03X

#### Other

Includes casings.

Housing, cover

#### X13-A04

Special switch arrangements

#### X13-A04A

Snap-action and time delay

#### X13-A04B

Linearly movable operating parts

#### X13-A04B1

Slide switches

#### X13-A04B2

**Push-button switches** 

### X13-A04C

Rotary switches

#### X13-A04C1

# Unlimited or unspecified angle

Knobs

# X13-A04C2

#### Restricted angle

Lever-, toggle-operated, handles

#### X13-A04D

#### **Tumbler and lockable switches**

Rockers

#### X13-A04E

#### **Encased or on carriage**

See X13-E03A also. *Gas-insulated* 

# X13-A04F

Switch manufacture; Testing; Monitoring

X13-A04G [1987]

# Contactors

(X13-A04X)

# X13-A04G1 [1987]

# **Electromagnetic**

Electromagnets, arc control, cores

X13-A04G5 [1997]

Characterised by type of interrupting

medium

X13-A04G5A [1997]

Air gap

X13-A04G5B [1997]

**Gas-insulated** 

X13-A04G5C [1997]

Vacuum

X13-A04H [1987]

High power vacuum and gas-filled tubes

(X13-A04X)

See also V05-A09 and V05-B codes.

Thyratrons, discharge tubes

X13-A04X

Other switches

Includes explosively-actuated high power switches.

X13-B

**Circuit breakers** 

X13-B01

Air-break without arc control

Includes isolators, sectionalisers and fuse-switches. *Blades* 

X13-B02

Breaking incorporating arc extinguishing

Includes air and liquid circuit breakers.

Oil-break

X13-B02A [1987]

Vacuum circuit breakers

Contacts, electrodes, bellows

X13-B02B [1992]

**Gas circuit breakers** 

X13-B03

Breaking with separate arc extinguishing means

Oil-break

X13-B03A [1983]

Air/gas-blast circuit breakers

X13-B03A1 [1992]

Gas-blast circuit breakers

X13-B03A1A [1997]

SF6 circuit breakers

Sulphur hexafluoride

X13-B04

Arc extinguishing, prevention and detection

Includes use of magnets, auxiliary/multiple contacts, insulating body between contacts, impedances, arcing horns, etc.

Blow-out magnets, resistance-switching

X13-B05 [1983]

**Driving mechanisms** 

(X13-B09)

Includes fluid-, pneumatic-, hydraulic-, motorisedor EM-actuators.

Electromagnetic, springs, linkages, pistons, cranks, rods

X13-B08 [1992]

Manufacture, assembly, testing, maintenance

(X13-B09)

Measurements, monitoring

X13-B08A [1997]

**Optical fiber sensors** 

X13-B08B [1997]

Microprocessors

X13-B09

Other circuit breaker details

Includes interlocks, cases, ensuring operation at a predetermined point, vents for arc products, DC circuit breaker, etc.

X13-C

**Emergency protective circuit arrangements** 

This code is for power equipment protection. Low power electronic apparatus protection is in U24-D and U24-F. Exceptions: certain overcurrent and overvoltage protection aspects are in X13-C03 and its application e.g. telephone line protection is in W01-C.

#### X13-C01

# Disconnection responsive to electrical input

Note: X13-C01A to X13-C01X codes may be used together with X13-C04, X13-C10, X13-C15 and X13-C20 codes.

#### X13-C01A

#### **Excess current**

Overcurrent, short-circuits

#### X13-C01B

# Earth fault current or potential

Includes ELCB and RCCB. See also X13-D05. Earth leakage circuit breakers, residual current circuit breakers, leakage current

#### X13-C01C

# Excess, under- or no-voltage

#### X13-C01D

# Difference between magnitudes or phase of voltages or currents

Differential protection

# X13-C01E [2007]

#### Distance or impedance

Includes all aspects of distance/impedance relaying. See also S01-D05B for impedance measurements.

#### X13-C01F [2008]

#### Arc fault

For detecting and protecting against arcing faults.

# X13-C01X

# Other disconnection responsive to electrical input

Includes protection schemes responding to power reversal, impedance, loss of synchronism, frequency deviations, etc.; and also includes automatic disconnections and reconnections, indicating operation of fault clearing apparatus, protection CTs and PTs, etc.

Fault indicators, auto-reclosure

# X13-C02

# Disconnection responsive to non-electrical input

Includes disconnection responsive to temp., line rupture, overspeed of motor/generator etc.

Heat, thermal, line breakage

#### X13-C03

# Limiting excess current or voltage

See X12-A and X12-F codes also. Surges, transients

X13-C03A [1997]

**Overvoltage limiters** 

X13-C03A1 [1997]

SiC surge arresters

Silicon carbide

X13-C03A2 [1997]

**MOV** surge arresters

Metal-oxide varistors

X13-C03A3 [1997]

SF6 surge arresters

X13-C03B [1997]

Overcurrent or earth fault current limiters or suppressors

Peterson coil

X13-C03B1 [1997]

Superconducting current limiter

# X13-C04

Protection circuits characterised by applications

X13-C04A

Cable or line systems

# X13-C04B

Transformers, generators or sync. capacitors

#### X13-C04C

#### Motors

Includes means responding to excess current, voltage increase or reduction, phase interruption, increase or decrease of speed, wrong direction of rotation, etc.

# X13-C04D

### **Converters**

Includes rectifiers and inverters. See also X12-J01B.

#### X13-C04X

# Other protection circuits characterised by applications

Includes protection for distribution gear, static capacitors, busbars, etc.

#### X13-C09

# Other emergency protective circuit arrangements

Includes personnel protection.

X13-C10 [1992]

Solid-state (analogue) relay protection

X13-C15 [1997]

Digital or numeric relay protection

X13-C15A [1997]

Microprocessors

X13-C15B [1997]

**Artificial intelligence** 

X13-C15B1 [1997]

**Expert systems** 

X13-C15B2 [1997]

**Neural networks** 

X13-C15C [1997]

**Fuzzy logic** 

X13-C15N [1997]

Characterised by novelty of specific

components

X13-C15N1 [1997]

Signal conditioning

X13-C15N2 [1997]

A/D signal conversion

X13-C15N3 [1997]

**Protection algorithms** 

X13-C20 [1997]

**Testing of protection schemes** 

X13-C20A [1997]

**Programmable simulators** 

# X13-D

# Fuses; Moulded case circuit breakers; General circuit protectors

#### X13-D01

**Melting fuses** 

#### X13-D01A

#### **Electrical details**

Includes fusible member and its materials, caps, cartridge fillings.

Fuse-links, -elements, -strips, terminals

#### X13-D01B

#### **Constructional details**

Includes fuse operation indicators, holders, bases, distinguishing marks, etc.

Housing, body, cover

X13-D01C [1992]

Manufacture, assembly, testing

(X13-D06)

X13-D01T [1997]

Characterised by type of fuse

X13-D01T1 [1997]

**Semi-enclosed fuses** 

X13-D01T2 [1997]

**Cartridge fuses** 

X13-D01T3 [1997]

**Expulsion fuses** 

X13-D01T4 [1997]

**Striker fuses** 

X13-D01T5 [1997]

**Printed fuses** 

X13-D01T6 [1997]

**Fuse resistors** 

X13-D01T7 [1997]

**SMT fuses** 

X13-D01T8 [1997]

Vacuum fuses

X13-D01T9 [1997]

SF6 fuses

#### X13-D02

#### Overload circuit breakers

See X13-D03, X13-D04 and X13-D06 to X13-D09 codes for details.

# X13-D02A [1983]

#### Hand reset mechanism

Reset mechanisms include levers, tumblers, knobs, push-buttons.

# X13-D02B [1983]

#### Power reset mechanism

Includes reclosure types of reset mechanisms.

# X13-D02C [1983]

Separate resetting action

#### X13-D03

# Electrothermal or combined EM and electrothermal release mechanisms

Includes bimetal element, expanding rod, strip or wire. fusible mass.

#### X13-D03A [1997]

# Combined EM and electrothermal release mechanisms

#### X13-D04

# Electromagnetic release mechanisms; Reset mechanisms

Electromagnets, armatures, poles

#### X13-D04A [1992]

Reset mechanisms

#### X13-D05

# Protective switches actuated by abnormal electrical conditions other than solely by excess current

Earth fault currents, current falling below certain level, excess or under voltage, ELCB or RCCB.

### X13-D06

#### **Constructional details**

Includes housings, casings, bases, mountings, operation indicators, terminals, connections, distinguishing marks.

Terminal colour coding

# X13-D07 [1987]

#### Arc control

(X13-D09)

Arc extinguishing, arc chutes, arc splitters, blow out magnets, arc quenching

# X13-D08 [1992]

### Manufacture, assembly, testing

For monitoring malfunction of circuit breakers and harmful gases released from them. (X13-D06)

#### X13-D09

# Other fuses; Moulded case circuit breakers; General circuit protectors

Includes CT for MCCB, locking/interlocking, name or rating plate and the protectors not covered by X13-D01, X13-D02 and X13-D05.

Electrodynamic release, motor-driven

#### X13-D10 [2002]

#### Solid state circuit breakers

Contactless

# X13-D11 [2002]

#### Miniature circuit breakers

# X13-D12 [2005]

#### Thermal fuses

Includes one-shot thermal fuses, thermal protectors and thermal cutoffs.

# X13-D20 [2002]

# Circuit breakers characterised by novel mechanism

X13-D20A [2002]

Sensing mechanism

X13-D20B [2002]

Trigger mechanism

X13-D20C [2002]

Latching and release mechanism

X13-D20D [2002]

**Operating mechanism** 

# X13-E

#### Switchboards, switchyards

**Note:** This code covers switching devices in association with each other or with transformers, fuses etc. Also, includes mainly constructional details with electrical aspects of power distribution control in X12-H. Motor control centres are covered, with electrical aspects in X13-F and X13-G.

#### X13-E01

#### Boards, desks, frameworks

Includes mounting of switches thereon, mosaic or mimic diagrams for supervisory desks or panels. Rails, slides, building blocks

#### X13-E02

# Casings, boxes

Includes mounting of devices therein, switch box nameplate.

Switch cabinets

#### X13-E03

# Indoor, outdoor or board mounting arrangements

Includes pole mounted units, and transformer substations.

Switch yards

X13-E03A [1992]

**Switchgear carriage** 

X13-E03B [1992]

Switchgear cubicle

X13-E03C [1997]

### Characterised by use of SF6

GIS, gas insulated switchgear, sulfur hexafluoride aas insulated switchgear

#### X13-E04

# Wiring, circuit and safety arrangements

Shutters, guards, earth-pins, -plates, fuse arrangements, CT-, PT- arrangements, interlocks, earthing, racking

# X13-E04A [1987]

# Wiring; Bus-bars

Includes clamps, arrangements for bus-bars and wiring of units on boards or in boxes.

Arrangements, layouts

X13-E08 [1992]

Manufacture, assembly, testing, maintenance, repair

(X13-E09) Monitoring

X13-E08A [1997]

**Optical fiber sensors** 

X13-E08B [1997]

Microprocessors

#### X13-E09

#### Other switchboards, switchyards

Includes venting arc gases from cubicles, cooling, etc.

#### X13-F\*

# Starting, stopping or regulating electric machines

\*This code is now discontinued and transferred to X13-H from 201401, but remains searchable and valid for records prior to 2014.

Low power motor control is in V06-N.

#### X13-F01\*

# Starting electric motors or converters

\*This code is now discontinued and transferred to X13-H01A from 201401, but remains searchable and valid for records prior to 2014.

Includes details of star-delta starters, motor control centres, switches, EM contactors. Also includes starting of generators.

#### X13-F02\*

# Stopping or slowing electric machines

\*This code is now discontinued and transferred to X13-H01B from 201401, but remains searchable and valid for records prior to 2014.

Plugging, supply reversal, reversing motor, regenerative-, resistive-, dynamic-braking

# X13-F03\*

# Speed regulation of electric motors

\*This code is now discontinued and transferred to X13-H01 from 201401, but remains searchable and valid for records prior to 2014.

Involves measuring of speed and comparing with a reference to change motor speed; universal motor speed control.

#### X13-F03A\*

# Varying field or armature current in DC motors

\*This code is now discontinued and transferred to X13-H01C from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F03A1\*

# **Using tubes or semiconductors**

\*This code is now discontinued and transferred to X13-H01C1 from 201401, but remains searchable and valid for records prior to 2014.

Pulse modulation, chopper control, static converters

# X13-F03A1A\* [1992-2013]

# Field supply control

\*This code is now discontinued and transferred to X13-H01C1A from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F03A1B\*

#### [1992-2013]

# **Armature supply control**

\*This code is now discontinued and transferred to X13-H01C1B from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F03A9\*

#### Other

\*This code is now discontinued and transferred to X13-H01C9 from 201401, but remains searchable and valid for records prior to 2014.

Ward-Leonard sets, metadynes, amplidynes

#### X13-F03B\*

# Varying stator or rotor current in AC motors

\*This code is now discontinued and transferred to X13-H01D from 201401, but remains searchable and valid for records prior to 2014.

Brush shifting, transductor

#### X13-F03B1\*

#### [1992-2013]

#### **Using semiconductors**

\*This code is now discontinued and transferred to X13-H01D1 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F03B1A\*

# [1992-2013]

#### Frequency control

\*This code is now discontinued and transferred to X13-H01D1A from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F03B1B\*

# [1992-2013]

# Voltage control

\*This code is now discontinued and transferred to X13-H01D1B from 201401, but remains searchable and valid for records prior to 2014.

# X13-F03B1C\*

# [1992-2013]

# **Vector speed regulation**

\*This code is now discontinued and transferred to X13-H01D1C from 201401, but remains searchable and valid for records prior to 2014.

Field-oriented, flux-vector, direct-torque, control

# X13-F03C\*

# [1992-2013]

#### AC/DC brushless motors

(X13-F03X)

\*This code is now discontinued and transferred to X13-H01E from 201401, but remains searchable and valid for records prior to 2014.

### X13-F03C1\*

[1997-2013]

#### Permanent magnet

(X13-F03C)

\*This code is now discontinued and transferred to X13-H01E1 from 201401, but remains searchable and valid for records prior to 2014.

PM AC/DC brushless

#### X13-F03C2\*

[1997-2013]

#### Switched reluctance

(X13-F03C)

\*This code is now discontinued and transferred to X13-H01E2 from 201401, but remains searchable and valid for records prior to 2014.

SR AC/DC brushless

#### X13-F03C3\*

[1997-2013]

# Sensorless

(X13-F03C)

\*This code is now discontinued and transferred to X13-H01E3 from 201401, but remains searchable and valid for records prior to 2014.

**BEMF** 

#### X13-F03D\*

[1997-2013]

# **Asynchronous motors**

\*This code is now discontinued and transferred to X13-H01F from 201401, but remains searchable and valid for records prior to 2014.

Induction

# X13-F03E\*

[1997-2013]

#### Synchronous motors

\*This code is now discontinued and transferred to X13-H01G from 201401, but remains searchable and valid for records prior to 2014.

# X13-F03E1\*

[2006-2013]

#### With permanent magnet

\*This code is now discontinued and transferred to X13-H01G1 from 201401, but remains searchable and valid for records prior to 2014.

# X13-F03E2\* [2006-2013]

# Without permanent magnet

\*This code is now discontinued and transferred to X13-H01G2 from 201401, but remains searchable and valid for records prior to 2014.

### X13-F03F\* [1997-2013]

#### **Linear motors**

\*This code is now discontinued and transferred to X13-H01H from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F03F1\*

[1997-2013]

# **Asynchronous**

\*This code is now discontinued and transferred to X13-H01H1 from 201401, but remains searchable and valid for records prior to 2014.

Induction, AC, LIM

#### X13-F03F2\*

[1997-2013]

#### **Synchronous**

\*This code is now discontinued and transferred to X13-H01H2 from 201401, but remains searchable and valid for records prior to 2014.

AC, LSM

#### X13-F03F3\*

[1997-2013]

#### **Direct current**

\*This code is now discontinued and transferred to X13-H01H3 from 201401, but remains searchable and valid for records prior to 2014.

DC, linear

# X13-F03X\*

# Other speed regulation of electric motors

\*This code is now discontinued and transferred to X13-H01X from 201401, but remains searchable and valid for records prior to 2014.

Includes control for multi-motors, etc.

# X13-F09\*

# Other

\*This code is now discontinued and transferred to X13-H01X from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F10\*

[1997-2013]

# Microprocessor based starting, stopping or speed regulation

\*This code is now discontinued and transferred to X13-H05 from 201401, but remains searchable and valid for records prior to 2014.

# X13-F20\*

# [2005-2013]

# Starter-generator/motor-generator speed regulation

\*This code is now discontinued and transferred to X13-H07 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F25\*

[2005-2013]

# Speed regulation or starting/stopping of electrical machines or converters characterized by specific switching or control device

\*This code is now discontinued and transferred to X13-H10 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F25A\*

[2005-2013]

# Characterized by bipolar transistors and diodes

\*This code is now discontinued and transferred to X13-H10A from 201401, but remains searchable and valid for records prior to 2014.

# X13-F25B\*

[2005-2013]

# Characterized by IGBTs

\*This code is now discontinued and transferred to X13-H10B from 201401, but remains searchable and valid for records prior to 2014.

# X13-F25C\*

[2005-2013]

#### **Characterized by FETs**

\*This code is now discontinued and transferred to X13-H10C from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F25D\*

[2005-2013]

#### **Characterized by thyristors**

\*This code is now discontinued and transferred to X13-H10D from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F25E\*

[2005-2013]

# Characterized by combination of switching devices

\*This code is now discontinued and transferred to X13-H10E from 201401, but remains searchable and valid for records prior to 2014.

### X13-F25F\*

[2005-2013]

# Characterized by AC-to-DC converter

\*This code is now discontinued and transferred to X13-H10F from 201401, but remains searchable and valid for records prior to 2014.

# X13-F25G\* [2005-2013]

### Characterized by DC-to-AC converter

\*This code is now discontinued and transferred to X13-H10G from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F25H\*

[2005-2013]

#### Characterized by AC-to-AC

\*This code is now discontinued and transferred to X13-H10H from 201401, but remains searchable and valid for records prior to 2014.

#### X13-F25J\*

[2005-2013]

# Characterized by DC-to-DC converter

\*This code is now discontinued and transferred to X13-H10J from 201401, but remains searchable and valid for records prior to 2014.

# X13-G\*

### **Controlling electric machines or converters**

\*This code is now discontinued and transferred to X13-H from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G01\*

# Speed or torque of electric motors

\*This code is now discontinued and transferred to X13-H01 from 201401, but remains searchable and valid for records prior to 2014.

Includes universal motor speed control.

### X13-G01A\*

# Varying field or armature current in DC motors

\*This code is now discontinued and transferred to X13-H01C from 201401, but remains searchable and valid for records prior to 2014.

Ward-Leonard sets, amplidynes, metadynes

# X13-G01A1\* [1992-2013]

# **Using semiconductors**

\*This code is now discontinued and transferred to X13-H01C1 from 201401, but remains searchable and valid for records prior to 2014.

Pulse modulation, chopper control, static converters

# X13-G01A1A\* [1992-2013]

### Field supply control

\*This code is now discontinued and transferred to X13-H01C1A from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01A1B\* [1992-2013]

# **Armature supply control**

\*This code is now discontinued and transferred to X13-H01C1B from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G01B\*

# Varying stator or rotor current in AC motors

\*This code is now discontinued and transferred to X13-H01D from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01B1\*

# **Using tubes or semiconductors**

\*This code is now discontinued and transferred to X13-H01D1 from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01B1A\* [1992-2013]

### Frequency control

\*This code is now discontinued and transferred to X13-H01D1A from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01B1B\* [1992-2013]

#### Voltage control

\*This code is now discontinued and transferred to X13-H01D1B from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01B1C\* [2005-2013]

# **Vector speed control**

\*This code is now discontinued and transferred to X13-H01D1C from 201401, but remains searchable and valid for records prior to 2014.

### X13-G01B9\*

#### Other

\*This code is now discontinued and transferred to X13-H01D9 from 201401, but remains searchable and valid for records prior to 2014.

[1992-2013]

# X13-G01C\*

**AC/DC** brushless motors

(X13-G01X)

\*This code is now discontinued and transferred to X13-H01E from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01C1\* [1997-2013]

#### **Permanent magnet**

(X13-G01C)

\*This code is now discontinued and transferred to X13-H01E1 from 201401, but remains searchable and valid for records prior to 2014.

PM AC/DC brushless

# X13-G01C2\* [1997-2013]

#### Switched reluctance

(X13-G01C)

\*This code is now discontinued and transferred to X13-H01E2 from 201401, but remains searchable and valid for records prior to 2014.

SR AC/DC brushless

# X13-G01C3\* [1997-2013]

# **Sensorless**

(X13-G01C)

\*This code is now discontinued and transferred to X13-H01E3 from 201401, but remains searchable and valid for records prior to 2014.

**BEMF** 

#### X13-G01D\* [1997-2013]

# **Asynchronous motors**

\*This code is now discontinued and transferred to X13-H01F from 201401, but remains searchable and valid for records prior to 2014.

Induction

# X13-G01E\* [1997-2013]

#### **Synchronous motors**

\*This code is now discontinued and transferred to X13-H01G from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01E1\* [2006-2013]

#### With permanent magnet

\*This code is now discontinued and transferred to X13-H01G1 from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01E2\* [2006-2013]

#### Without permanent magnet

\*This code is now discontinued and transferred to X13-H01G2 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G01F\* [1997-2013]

#### **Linear motors**

\*This code is now discontinued and transferred to X13-H01H from 201401, but remains searchable and valid for records prior to 2014.

# X13-G01F1\* [1997-2013]

### **Asynchronous**

\*This code is now discontinued and transferred to X13-H01H1 from 201401, but remains searchable and valid for records prior to 2014.

Induction, AC, LIM

# X13-G01F2\* [1997-2013]

# **Synchronous**

\*This code is now discontinued and transferred to X13-H01H2 from 201401, but remains searchable and valid for records prior to 2014.

AC, LSM

# X13-G01F3\* [1997-2013]

#### **Direct current**

\*This code is now discontinued and transferred to X13-H01H3 from 201401, but remains searchable and valid for records prior to 2014.

DC. linear

#### X13-G01X\*

# Other speed or torque of electric motors

\*This code is now discontinued and transferred to X13-H01X from 201401, but remains searchable and valid for records prior to 2014.

Includes control for multi-motors, etc.

#### X13-G02\*

# **Electric generators control**

\*This code is now discontinued and transferred to X13-H02 from 201401, but remains searchable and valid for records prior to 2014.

See V06-N40 codes for speed control of low power generators.

# X13-G02A\*

### Varying field

\*This code is now discontinued and transferred to X13-H02A from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G02T\* [1997-2013]

# Characterised by type of prime mover or generator

\*This code is now discontinued and transferred to X13-H02T from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G02T1\* [1997-2013]

#### Steam turbine generator

\*This code is now discontinued and transferred to X13-H02T1 from 201401, but remains searchable and valid for records prior to 2014.

# X13-G02T2\*

[1997-2013]

### **Hydrogenerator**

\*This code is now discontinued and transferred to X13-H02T2 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G02T3\*

[1997-2013]

#### IC engine generator

\*This code is now discontinued and transferred to X13-H02T3 from 201401, but remains searchable and valid for records prior to 2014.

### X13-G02T4\*

[1997-2013]

### Gas turbine generator

\*This code is now discontinued and transferred to X13-H02T4 from 201401, but remains searchable and valid for records prior to 2014.

# X13-G02T5\*

[1997-2013]

# Wind turbine generator

\*This code is now discontinued and transferred to X13-H02T5 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G02T6\*

[2002-2013]

### Microturbine generator

\*This code is now discontinued and transferred to X13-H02T6 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G02T7\*

[2006-2013]

# Synchronous generator

\*This code is now discontinued and transferred to X13-H02T7A from 201401, but remains searchable and valid for records prior to 2014.

# X13-G02T8\*

[2006-2013]

# **DC** generator

\*This code is now discontinued and transferred to X13-H02T8 from 201401, but remains searchable and valid for records prior to 2014.

# X13-G02T9\*

[2006-2013]

#### Other generators' control

\*This code is now discontinued and transferred to X13-H02T9 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G02T9A\*

[2006-2013]

# Induction generator

\*This code is now discontinued and transferred to X13-H02T7B from 201401, but remains searchable and valid for records prior to 2014.

# X13-G02X\*

[1980-2013]

#### Other control details

\*This code is now discontinued and transferred to X13-H02X from 201401, but remains searchable and valid for records prior to 2014.

Includes control by varying prime mover speed, controlling clutch or other mechanical power transmission device, obtaining desired frequency or voltage in predetermined relation, capacitor variation for asynchronous generator.

Prime-mover control, frequency control

#### X13-G03\*

[1980-2013]

#### Static converters

\*This code is now discontinued and transferred to X13-H03 from 201401, but remains searchable and valid for records prior to 2014.

This code is used together with X12-J01A and converter-type codes. For low power converter control see U24-D codes.

#### X13-G03A\*

[1980-2013]

# **Controlling DC/AC stages or converters**

\*This code is now discontinued and transferred to X13-H03A from 201401, but remains searchable and valid for records prior to 2014.

Inverter control

# X13-G03B\*

[1980-2013]

#### Controlling AC/DC stages or converters

\*This code is now discontinued and transferred to X13-H03B from 201401, but remains searchable and valid for records prior to 2014.

Rectifier control

# X13-G03C\*

[2006-2013]

#### **DC-DC** converter

\*This code is now discontinued and transferred to X13-H03C from 201401, but remains searchable and valid for records prior to 2014.

# X13-G03D\*

[2006-2013]

#### **AC-AC** converter

\*This code is now discontinued and transferred to X13-H03D from 201401, but remains searchable and valid for records prior to 2014.

### X13-G03X\*

[1980-2013]

# Other converters' control

\*This code is now discontinued and transferred to X13-H03X from 201401, but remains searchable and valid for records prior to 2014.

# X13-G04\* [1980-2013]

# Dynamo-electric brakes or clutches; Nonstatic converters

\*This code is now discontinued and transferred to X13-H04 from 201401, but remains searchable and valid for records prior to 2014.

From 2006, controllers for reactors/transformers are covered by X12-C02B codes only. For static converters, see X12-J01A and X13-G03 codes only.

# X13-G10\* [1997-2013]

#### Microprocessor based control

\*This code is now discontinued and transferred to X13-H05 from 201401, but remains searchable and valid for records prior to 2014.

Includes details of DSP processor, ECU, PLC etc.

# X13-G15\* [2002-2013]

#### Remote motor control

\*This code is now discontinued and transferred to X13-H06 from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G20\* [2002-2013]

# Starter-generator/motor-generator control

\*This code is now discontinued and transferred to X13-H07 from 201401, but remains searchable and valid for records prior to 2014.

# X13-G25\* [2005-2013]

# Speed control of electrical machines characterized by specific switching or control device

\*This code is now discontinued and transferred to X13-H10 from 201401, but remains searchable and valid for records prior to 2014.

# X13-G25A\* [2005-2013]

# Characterized by bipolar transistors and diodes

\*This code is now discontinued and transferred to X13-H10A from 201401, but remains searchable and valid for records prior to 2014.

# X13-G25B\* [2005-2013]

#### **Characterized by IGBTs**

\*This code is now discontinued and transferred to X13-H10B from 201401, but remains searchable and valid for records prior to 2014.

# X13-G25C\* [2005-2013]

# Characterized by FETs

\*This code is now discontinued and transferred to X13-H10C from 201401, but remains searchable and valid for records prior to 2014.

# X13-G25D\* [2005-2013]

### **Characterized by thyristors**

\*This code is now discontinued and transferred to X13-H10D from 201401, but remains searchable and valid for records prior to 2014.

### X13-G25E\* [2005-2013]

# Characterized by combination of switching devices

\*This code is now discontinued and transferred to X13-H10E from 201401, but remains searchable and valid for records prior to 2014.

# X13-G25F\* [2005-2013]

# Characterized by AC-to-DC converter

\*This code is now discontinued and transferred to X13-H10F from 201401, but remains searchable and valid for records prior to 2014.

### X13-G25G\* [2005-2013]

# Characterized by DC-to-AC converter

\*This code is now discontinued and transferred to X13-H10G from 201401, but remains searchable and valid for records prior to 2014.

# X13-G25H\* [2005-2013]

# Characterized by AC-to-AC

\*This code is now discontinued and transferred to X13-H10H from 201401, but remains searchable and valid for records prior to 2014.

#### X13-G25J\* [2005-2013]

# Characterized by DC-to-DC converter

\*This code is now discontinued and transferred to X13-H10J from 201401, but remains searchable and valid for records prior to 2014.

# X13-H [2014]

# **Control of electric machines**

(X13-F, X13-G)

Low power motor control is in V06-N.

# X13-H01 [2014]

# Speed or torque regulation of electric motors or converters

(X13-F03, X13-G01)

Includes universal motor speed control.

#### X13-H01A [2014]

# Starting electric motor or converters (X13-E01)

Includes details of star-delta starters, motor control centres, switches, EM contactors. Also includes starting of generators.

X13-H01B [2014]

Stopping or slowing electric machines or converters

(X13-F02)

Plugging, supply reversal, reversing motor, regenerative-, resistive-, braking, dynamic braking

X13-H01C [2014]

Speed or torque regulation by varying field or armature in DC motors

(X13-F03A, X13-G01A)

Involves measuring of speed and comparing with a reference to change motor speed, universal motor speed control.

X13-H01C1 [2014]

**Using tubes or semiconductors** 

(X13-F03A1, X13-G01A1)

Pulse modulation, chopper control, static converters

X13-H01C1A [2014]

Field supply control

(X13-F03A1A, X13-G01A1A)

X13-H01C1B [2014]

**Armature supply control** 

(X13-F03A1B, X13-G01A1B)

X13-H01C9 [2014]

Other details of speed or torque regulation by varying field /armature current in DC motors

(X13-F03A9)

Ward-Leonard sets, metadynes, amplidynes

X13-H01D [2014]

Speed or torque regulation by varying stator or rotor current in AC motors

(X13-F03B, X13-G01B) Brush shifting, transductor

X13-H01D1 [2014]

**Using semiconductors** 

(X13-F03B1, X13-G01B1)

X13-H01D1A [2014]

Frequency control

(X13-F03B1A, X13-G01B1A)

X13-H01D1B [2014]

Voltage control

(X13-F03B1B, X13-G01B1B)

X13-H01D1C [2014]

**Vector speed regulation** 

(X13-F03B1C, X13-G01B1C)

Field-oriented, flux-vector, direct-torque, vector control

X13-H01D9 [2014]

Other details of speed or torque regulation by varying stator or rotor current in AC motors

(X13-G01B9)

X13-H01E [2014]

**AC/DC** brushless motors

(X13-F03C, X13-G01C)

X13-H01E1 [2014]

Permanent magnet

(X13-F03C1, X13-G01C1)

PM AC/DC brushless

X13-H01E2 [2014]

Switched reluctance

(X13-F03C2, X13-G01C2) SR AC/DC brushless

X13-H01E3 [2014]

Sensorless

(X13-F03C3, X13-G01C3)

**BEMF** 

X13-H01F [2014]

**Asynchronous motors** 

(X13-F03D, X13-G01D) Induction

X13-H01G [2014]

Synchronous motors

(X13-F03E, X13-G01E)

X13-H01G1 [2014]

Synchronous motors with permanent magnet

(X13-F03E1, X13-G01E1)

X13-H01G2 [2014]

Synchronous motors without permanent magnet

(X13-F03E2, X13-G01E2)

X13-H01H [2014]

**Linear motors** 

(X13-F03F, X13-G01F)

X13-H01H1 [2014]

**Asynchronous linear motors** 

(X13-F03F1, X13-G01F1) Induction, AC, LIM

X13-H01H2 [2014]

**Synchronous linear motors** 

(X13-F03F2, X13-G01F2)

AC, LSM

X13-H01H3 [2014]

**Direct current linear motors** 

(X13-F03F3, X13-G01F3)

DC, linear

X13-H01X [2014]

Other speed or torque regulation of electric motors

(X13-F03X, X13-F09, X13-G01X)

Includes control for multi-motors, etc.

X13-H02 [2014]

**Electric generators control** 

(X13-G02)

See V06-N40 codes for speed control of low power generators.

X13-H02A [2014]

Varying field

(X13-G02A)

X13-H02B [2014]

Frequency control

(X13-G02X)

X13-H02C [2014]

Voltage control

(X13-G02X)

X13-H02D [2014]

**Vector speed control** 

(X13-G02X)

X13-H02E [2014]

**Capacitor variation** 

(X13-G02X)

Asynchronous generators are coded under X13-H02T7B.

X13-H02T [2014]

Characterised by type of prime mover or generator

(X13-G02T)

X13-H02T1 [2014]

Steam turbine generator

(X13-G02T1)

X13-H02T2 [2014]

Hydrogenerator

(X13-G02T2)

X13-H02T3 [2014]

IC engine generator

(X13-G02T3)

X13-H02T4 [2014]

Gas turbine generator

(X13-G02T4)

X13-H02T5 [2014]

Wind turbine generator

(X13-G02T5)

X13-H02T6 [2014]

Microturbine generator

(X13-G02T6)

X13-H02T7 [2014]

Synchronous/Asynchronous generator

X13-H02T7A [2014]

Synchronous generator

(X13-G02T7)

X13-H02T7B [2014]

**Asynchronous generator** 

(X13-G02T9A)

Induction

X13-H02T8 [2014]

DC generator

(X13-G02T8)

X13-H02T9 [2014]

Other generators' control

(X13-G02T9)

#### X13-H02X [2014]

### Other electric generator control details

(X13-G02X)

Includes control by varying prime mover speed, controlling clutch or other mechanical power transmission device. From 2014, details of frequency control are coded under X13-H02B, voltage control under X13-H02C and by variation of capacitor under X13-H02E.

Prime-mover control

# X13-H03 [2014]

#### Static converters control

(X13-G03)

This code is used together with X12-J01A and converter-type codes. For low power converter control see U24-D codes.

# X13-H03A [2014]

# **Controlling DC/AC stages or converters**

(X13-G03A)

Inverter control

# X13-H03B [2014]

# Controlling AC/DC stages or converters

(X13-G03B)

Rectifier control

### X13-H03C [2014]

#### Controlling DC-DC converters

(X13-G03C)

# X13-H03D [2014]

# **Controlling AC-AC converters**

(X13-G03D)

### X13-H03X [2014]

# Other converters' control

(X13-G03X)

#### X13-H04 [2014]

# Dynamo-electric brakes or clutches; Nonstatic converters

(X13-G04)

From 2006, controllers for reactors/transformers are covered by X12-C02B codes only. For static converters, see X12-J01A and X13-H03 codes only.

#### X13-H05 [2014]

#### Microprocessor based control

(X13-F10, X13-G10)

Includes details of DSP processor, ECU, PLC etc.

# X13-H06 [2014]

#### Remote motor control

(X13-G15)

#### X13-H07 [2014]

# Starter-generator/motor-generator control

(X13-F20, X13-G20)

# X13-H10 [2014]

# Speed control of electrical machines characterized by specific switching or control device

(X13-F25, X13-G25)

These codes are used together with other X13-H codes as appropriate.

# X13-H10A [2014]

# Characterized by bipolar transistors and diodes

(X13-F25A, X13-G25A)

# X13-H10B [2014]

# **Characterized by IGBTs**

(X13-F25B, X13-G25B)

# X13-H10C [2014]

#### Characterized by FETs

(X13-F25C, X13-G25C)

# X13-H10D [2014]

# **Characterized by thyristors**

(X13-F25D, X13-G25D)

# X13-H10E [2014]

# Characterized by combination of switching devices

(X13-F25E, X13-G25E)

# X13-H10F [2014]

# Characterized by AC-to-DC converter

(X13-F25F, X13-G25F)

Rectifier

# X13-H10G [2014]

# Characterized by DC-to-AC converter

(X13-F25G, X13-G25G)

Inverter

#### X13-H10H [2014]

# Characterized by AC-to-AC converter

(X13-F25H, X13-G25H)

X13-H10J [2014]

**Characterized by DC-to-DC converter** 

(X13-F25J, X13-G25J)

X13-H99 [2014]

Other control details of electric machines

X13-U [1997]

# Characterized by application to specific equipment or industry

For records prior to 2005, these codes were used for applications of medium and high power electric machines control only. From 2005 onwards, these codes are used for applications of fuses, protectors, circuit breakers, and medium and high power switches and electric machines control. See V03 codes for low power electric switches and V06 codes for low power electric machines.

X13-U01 [1997]

**Road vehicles** 

X13-U02 [1997]

**Railways** 

X13-U03 [1997]

**Aviation and aerospace** 

X13-U04 [1997]

**Ships and boats** 

X13-U05 [1997]

Military

X13-U06 [1997]

**Industrial machines** 

#### X14: Nuclear Power Generation

See also section K for further details of nuclear reactors and nuclear power.

#### X14-A

#### **Reactor processes**

Includes all aspects of reactor processes.

#### X14-A01

#### **Fast fission**

Fast-breeder, fast neutrons

#### X14-A02

#### **Thermal**

Includes boiling-water reactor, pressurised water reactor.

Gas-cooled, PWR, BWR, AGR, thermal neutrons

#### X14-A03

# [1992]

#### **Fusion reactors**

Includes plasma confinement and generation. JET, Tokamak, toroidal-, poloidal-coils, plasma generation

# X14-A03A

# [1992]

# **Cold fusion**

(X14-A09)

Electrolysis, palladium

# X14-A09

#### Other reactor processes

Includes sub-critical reactors.

# X14-B

### **Reactor components**

Includes all aspects (electrical and non-electrical) of components except for cooling where certain items e.g. heat exchangers are excluded.

# X14-B01

#### Pressure vessels, containment

Concrete structures, seals, walls

# X14-B02

### Shielding; Emergency protection

Includes biological-, reflecting- and thermal-shields.

Neutron shield, emergency shut-down, neutron reflection, gamma radiation thermal shielding

#### X14-B03

#### Cooling

Includes pumping or circulating of coolant. Circulation pumps, liquid, sodium circulation, coolant flow control

#### X14-B04

#### **Fuel elements**

#### X14-B04A

#### Manufacture

Includes fuel element manufacture and materials for the fuel and its cladding.

# X14-B04X

### Fuel assemblies and other details

Includes bundles of pin-, rod- or tube-shaped fuel elements, spacer grids, casings, jackets.

Cladding, grids

#### X14-B05

#### Moderator or core structure

Includes locating or supporting of fuel elements, supporting complete structure.

Fuel supports, fuel grids, moderator composition, supporting core, grid supports, heavy water, graphite, core shroud

# X14-C

# **Nuclear power plant and control**

Documents are included in X14-C02 to X14-C06 only if some electrical aspects are disclosed. X14-C01 covers both electrical and non-electrical aspects.

# X14-C01

#### Control of nuclear reaction

Includes control or poison rods and their drive arrangements. Also includes control circuits.

Control material, neutron absorber, shut-down, hafnium, boron, cadmium, erbium, europium

#### X14-C02

# Monitoring and testing reactor

See also section S for general instrumentation e.g. S03-G codes covers nuclear or X-radiation.

Probes, measuring-temp, -reactivity, -radioactivity, -strain, -neutron-flux

#### X14-C03

#### **Fuel handling**

Includes fuel handling arrangements to load fuel elements into the reactor and discard used elements. Also includes storage and associated handling of unused fuel, prior to use in the reactor. Robots, lifting devices, discharging/dismantling irradiated fuel

#### X14-C04

#### Manufacture of reactor

#### X14-C05

**Power plant** 

#### X14-C05A

# Generation of electricity or mechanical energy

#### X14-C05B

#### Plant control

Regulating plant parameters, flow, level, feedwater control

#### X14-C05C [2002]

# Measurements relating to plant

(X14-C05X)

For in-situ reactor-related measurements, see X14-C02. Includes arrangements, for example, to check the integrity of welded joints. See also the relevant instrumentation codes in section S.

#### X14-C05X

# Other nuclear power plant aspects

Includes safety suits, personal radiation monitors, cabling, protection. Also includes electrical details of water desalination systems for producing potable water (see also X25-H03 for water treatment). If water is used for cooling the reactor, X14-B03 should be applied.

Cable inlets, plant simulator, dosimeter badge, nuclear desalination, hot cell

### X14-C06

[2013]

Maintenance, service, repair

# X14-C99 [2018]

#### Other nuclear power plant details

Includes arrangements to provide heat for purposes other than conversion into power, e.g. for heating buildings.

#### X14-D

# Radioactive waste treatment, power plant decommission, decontamination, etc.

Includes only electrical apparatus and methods for water disposal, decommission of power plant, decontamination of radioactive contaminants, e.g. safety wear (masks, clothes, etc.), etc.

Decontamination, disposal, storage, electrolytic waste disposal, decommission

#### X14-E

# **Energy from radioactive sources**

Includes only electrical apparatus and methods for radioactive/nuclear cells, etc.

# X14-F

# Plasma technique

Includes generation and handling of plasma for fusion reactors. For other uses, only electrical aspects are included.

# X14-F01 [1992]

#### For fusion

Magnetic confinement

# X14-F02 [1992]

# For integrated circuit manufacture

See also appropriate U11-C codes.

#### X14-F03 [1992]

#### For burners and torches

See also X24-D05. Plasma gun

# X14-F04 [2002]

# For propulsion

Covers plasma propulsion techniques for ordnance, space vehicles, etc. See also W06-B03 and W07 codes.

# X14-G

#### **Particle accelerators**

Documents are included in X14-G only if some electrical aspects are disclosed. See also K08-G and L03-H04D.

#### X14-G01 [1987]

#### Linear

Linac, magnets

X14-G02 [1987]

Cyclic

Synchrotrons, cyclotrons, betatrons, magnets

# X15: Non-Fossil Fuel Power Generating Systems

NOTES:

See X11-A, X11-B and X11-C codes for steam turbine plants, coal-fired power plants, hydroelectric plants, gas turbine plants, IC engine plants, co-generation plants, etc. Nuclear power generation details are covered by X14 only. See also X11-J codes for in-depth constructional details of the generators, e.g. stator, rotor, windings, insulation, etc. See also X12 codes for details of power distribution to e.g. power transmission networks (powergrids).

#### X15-A

### Solar power

X15-A codes cover all details of solar batteries, solar power, solar powered charging of batteries, when there is some novelty/importance regarding the solar aspect. Includes power generation from solar rays as well as other optical radiation, photoelectrochemical and thermophotovoltaic actions. If details about e.g. the semiconductor materials used in the cell (photolayers, etc.), the photoreceivers, the manufacture/packaging of the cells, etc., U12-A02A codes should also be applied. See also X15-A04 or X15-A05 to highlight small scale or large scale power generation, respectively.

Photoelectrochemical and dye-sensitized solar cells are also coded under X16-A04. Chargers using solar energy to charge a battery are also coded under X16-G02A.

Details of redox batteries, such as vanadium redox batteries, used for storing energy generated from solar farms to supply power during low generation periods, are coded under X16-C.

#### X15-A01

# Solar heat/radiation collection; Concentrators

Includes solar heat/radiation collection and concentration for both solar thermal energy conversion systems (see also X15-A01A) as well as systems using direct conversion of solar energy (see also X15-A02).

# X15-A01A [2005]

# Heat collecting panels; Heat collecting pipes

Includes panels provided with pipes carrying liquid that is heated by the sun. Direct conversion panel details are in X15-A02.

Collectors, heat pipes

# X15-A01A1 [2011]

# **Working fluids**

(X15-A01C4)

Includes arrangement details of working fluids such as water, molten salts etc.

Heat absorber

# X15-A01C [2005]

#### Concentrators

Includes arrangements to direct sun's rays onto the solar panels/heat pipes using reflectors, lenses and sun-tracking dishes. This code can be applied in conjunction with X15-A01A to highlight application to solar thermal energy conversion systems or X15-A02 to highlight application to direct solar energy conversion systems.

# X15-A01C1 [2010]

#### Mirrors

Focussing mirror, parabolic mirror, parabolic troughs

#### X15-A01C2 [2010]

#### Lenses

Focussing lenses, Fresnel lenses

#### X15-A01C3 [2010]

# Tracking arrangements

Includes heliostats.

# X15-A01C4\* [2010-2010]

#### Working fluids

\*From 2011 this code is transferred to X15-A01A1, but remains searchable for records in 2010. Includes arrangement details of working fluids such as water, molten salts, etc.

### X15-A01C9 [2010]

# Other concentrators details

#### X15-A02

# Direct conversion photovoltaic panel details; Solar/photovoltaic cells details

X15-A01C codes can be used in conjunction with X15-A02 codes to highlight the concentrators, e.g. mirrors, tracking arrangements, etc. See also U12-A02A codes.

# X15-A02A [1983]

# Single cells

Includes photovoltaic or solar cells (see also U12-A02 codes) and their manufacture. See U12-A02A7 for circuitry arrangements for solar cells.

# X15-A02B [1983]

#### Assemblies of cells

Includes details of interconnections between individual cells. Details of the solar panel or module are covered by X15-A02C.

#### X15-A02C [2002]

# Solar/photovoltaic panel details

Includes mechanical details of solar/photovoltaic panels, modules or tiles, including anti-reflective coating, glass cover to protect the cells from the elements, cleaning system for removing dust (sand) and dirt from the surface of the solar/photovoltaic panels. Also includes interconnections between panels. Mechanical details of roof structures are coded under X15-A02X only. Details of single cells and assemblies of cells (including interconnections between individual cells) are coded under X15-A02A and X15-A02B, respectively.

Solar cell modules, panels, tiles, anti-reflective coating

### X15-A02D [2002]

#### Photoelectrochemical cells

(X15-A02A)

See also X16-A04 and other X16 codes for more detailed breakdown of the details of such cells, and U12-A02 codes.

# X15-A02D1 [2005]

#### Dye-sensitised solar cells

Includes the use of an organic dye and electrolyte for absorbing solar energy and hole transport. DSSC, Gratzel cells

# X15-A02E [2002]

# Thermophotovoltaic cells

Includes cells where IR rays are converted to electricity. See also U12-A02 codes.

# X15-A02F [2005]

# **Organic solar cells**

Includes cells that use electron-acceptor and electron-donor organic materials.

# X15-A02X [2010]

# Other solar/photovoltaic panels/cells details

Includes mechanical details of roof structures. Mechanical details of solar/photovoltaic panels, modules or tiles are coded under X15-A02C only. Includes wiring to solar battery, details of junction boxes (also covered by V04-B09 and X12-G04B codes), cooling arrangements and solar module packaging. Packaging details of electronic goods are also coded under Q34-M02.

# X15-A04 [2002]

# Small scale solar power generation

Covers generation of electricity, for example, to power watches, calculators, etc. Also includes domestic or micro installations. This code is used in conjunction with other X15-A codes.

#### X15-A05 [2002]

# Large scale solar power generation

Covers high power systems, for example, for powering space crafts, vehicles, etc. Includes solar systems installed on roofs of buildings (see also X27-E01A5 for domestic solar heating systems). This code is used in conjunction with the above relevant codes.

Solar-powered vehicles, solar water heating system

# X15-A05A [2010]

# Solar tower; Solar chimney

Includes use of greenhouse structure to heat air to create updraft in tower containing turbines to generate power.

# X15-A05B [2010]

# **Solar Stirling engine**

Includes use of concentrated solar energy as heat source within engine.

#### X15-A05H\* [2010-2015]

#### **Hybrid/Combination plant**

\*This code is now discontinued and has been transferred to X15-A10 from 201601. It remains searchable for records prior to 2016.

Includes solar thermal plants that are combined with other (including fossil fuel-based) heat or electricity generating equipment to cope with overcast skies or night operation. Details of combination plants not involving solar power are coded under X15-J.

# X15-A05X [2010]

# Other large scale solar power generation

# X15-A08 [2010]

# Control, monitoring and testing

Includes control, monitoring and testing details of solar and photovoltaic cells, solar heat collecting devices and concentrators. This code is used in conjunction with other X15-A codes as appropriate. Also includes solar cell evaluation apparatus or solar simulator e.g. to measure theoretical outputs of solar panels.

Simulation

#### X15-A09

# Other solar power aspects

Includes use of solar energy to raise steam for driving generators. Excludes solar energy for heating water, which is covered by X27-E01A codes.

# X15-A10 [2016]

# **Hybrid/Combination plant**

(X15-A05H)

Includes solar thermal plants that are combined with other (including fossil fuel-based) heat or electricity generating equipment to cope with overcast skies or night operation. Also see X15-A05 for large scale solar combined plant. Also includes small scale combined solar and wind turbine power generation (also see X15-A04 for small scale solar combined power generators). Details of combination plants not involving solar power are coded under X15-J.

### X15-A15 [2019]

# Manufacture, servicing and maintenance (solar power)

Includes manufacture, servicing and maintenance details of solar power energy plants. This code is used in conjunction with other X15-A codes as appropriate.

# X15-B

# Wind power

Includes arrangements for electricity generation using wind power. Details of converters and interconnection to the utility mains are covered by, respectively, U24-D/X12-J and X12-H01B codes.

Details of redox batteries, such as vanadium redox batteries, used for storing energy generated from wind farms to supply power during low generation periods, are coded under X16-C.

#### X15-B01

#### Motors

Constructional details, e.g. gearing systems, clutches, cooling and ventilating systems, manufacture details, rotors and stators details, etc, are also covered by X11-J codes. Blade details are covered by X15-B01C.

# X15-B01A [1987]

# **Turbines**

Vanes, windmills, drives

### X15-B01A1 [2005]

# Large scale

# X15-B01A3 [2005]

#### Small scale

Includes microturbines, e.g. those located at the bottom of a chimney, vehicles, e.g. electric vehicles, etc. For small scale power plants, see X15-R04

# X15-B01A5 [2010]

**Horizontal turbines** 

X15-B01A6 [2010]

**Vertical turbines** 

X15-B01B [1987]

#### Generators

See also X11.

Asynchronous, synchronous

# X15-B01C [2010]

# Blade design; Blade material

Includes construction details of blades, including design, materials of blades per se, and attachments for connecting/supporting the blades.

Damping arrangement, de-icing

#### X15-B02 [2005]

### **On-shore systems**

This code is used in conjunction with other codes as appropriate.

#### X15-B03 [2005]

### Off-shore systems

This code is used in conjunction with other codes as appropriate.

#### X15-B04 [2006]

#### Small scale power plant

This code is used in conjunction with other codes as required to indicate the small scale nature, where disclosed, of the plant such as used in vehicles, within a chimney etc.

Small size

# X15-B05 [2006]

#### Control, monitoring and testing

Includes electrical aspects only. Includes blade pitch control, control of blade angle, noise emission monitoring, etc.

Speed control, simulation, speed prediction

#### X15-B06 [2006]

#### Support structures

Includes wind turbine tower and its manufacturing.

#### X15-B09

# Other wind power aspects

Includes details of lightning protection system, etc.

# X15-B15 [2019]

# Manufacture, servicing and maintenance (wind power)

Includes manufacture, servicing and maintenance details of wind power energy plants. This code is used in conjunction with other X15-B codes as appropriate.

#### X15-C

# Sea power

Includes use of heat differential between different depths. Hydroelectric power generation using water turbines driven by river flow or river falls is coded under X11-B only.

Details of power plant, e.g. turbines, blades, etc, are also covered under X11-B and X11-J codes.

Details of osmotic power or salinity gradient power are covered by both X11-B09 and X15-C.

Ocean currents, ocean thermal energy conversion, vortex power

X15-C01 [1983]

Wave power

X15-C01A [2010]

Wave energy capture methods

X15-C01A1 [2010]

#### Point absorbers: Buovs

Includes floating structure with components that move relative to each other due to wave action.

Salter duck \*, Edinburgh duck \*, buoyant moored device

# X15-C01A2 [2010]

# **Attenuators; Surface following**

Includes long multi-segment floating structures oriented parallel to the direction of the waves that flex at the segments and drive hydraulic pumps or other converters.

Hinged contour device, Pelamis ®

#### X15-C01A3 [2010]

# Terminator devices; Oscillating water columns

Includes devices that extend perpendicular to the direction of wave propagation and capture or reflect the power of the wave.

OWC

# X15-C01A4 [2010]

# **Overtopping devices**

Includes reservoirs that are filled by incoming waves to levels above the average surrounding ocean and where gravity causes the water released to fall back and drive hydro turbines.

X15-C01A9 [2010]

Other wave energy capture methods

X15-C01B [2010]

**Installation location** 

X15-C01B1 [2010]

On-shore installation

X15-C01B2 [2010]

Near-shore/Off-shore installation

X15-C01C [2010]

#### Power take-off

Includes details of power take-offs such as hydraulic ram, elastomeric hose pump, pump-to-shore, hydroelectric turbine, air turbine and linear electrical generator.

X15-C02 [2005]

Tide energy

Tidal, tides

X15-C02A [2010]

Tide energy plant type

X15-C02A1 [2010]

**Tidal stream systems** 

X15-C02A2 [2010]

**Barrages** 

X15-C02A3 [2010]

**Tidal lagoon** 

X15-C02A9 [2010]

Other tide energy plant type

X15-C02B [2010]

**Novel turbine arrangements** 

# X15-C03 [2010]

# Control, monitoring and testing

Includes control, monitoring and testing details of either wave power and/or tide energy plants. This code is used in conjunction with other X15-C codes as appropriate.

Simulation

# X15-C15 [2019]

# Manufacture, servicing and maintenance (sea power)

Includes manufacture, servicing and maintenance details of sea power energy plants. This code is used in conjunction with other X15-C codes as appropriate.

# X15-D [1997]

# Thermoelectric power generation

(X15-X)

Includes details of thermoelectric generators that convert heat directly into electricity, or generate power from temperature difference (Seebeck effect). Details of thermoelectric devices applied to refrigeration using the Peltier effect are coded under X27-F02B1 only. See also U14 codes.

Thermovoltaic elements, thermoelectric battery

# X15-E [1997]

# Biomass, biofuel and waste fuel combustion power generation

(X15-X)

Includes electrical details of power generation using biomass, waste fuel and biofuels. Biofuels, including their production, are covered by CPI codes. Also includes systems such as electrostatic precipitators for reducing nitrogen oxides, volatile organic compounds and particulate emissions. Waste-to-Energy

X15-G [2010]

#### **Geothermal power**

(X15-X)

# X15-G01 [2011]

# **Electricity generation**

Includes generation of electricity from steam produced by heating water pumped down to underground hot rocks.

Geothermal power

# X15-G02 [2011]

# Thermal power

Includes use of geothermal energy for water heating and provision of hot water to homes and buildings.

Geothermal heating

#### X15-H [2010]

#### Profiting from waste heat

Includes waste heat recovery arrangements, e.g. for recovering heat from sewage or waste water for use in water heating (see X27-E03) e.g. for shower or dishwasher. See X11-C04 instead for combined heat and power plants per se.

### X15-J [2011]

# **Combined cycle plant**

Includes electric power generation by combinations of different non-fossil fuel sources or combinations of non-fossil fuel and other fossil fuel sources such as gas turbines (see also X11-C01). Details of combination plants involving solar power are also coded under X15-A05H (pre-2016).

See X11-C03 only for electric power generation solely using fossil fuel sources.

Hybrid

# X15-K [2011]

# **Cogeneration plant**

Includes provision of combined heat and electric power using non-fossil fuel sources.

Combined heat and electric power generation using fossil fuel sources are coded under X11-C04. CHP

# X15-T [2011]

#### Power generation from traffic flow

(X15-X)

Includes using vehicular traffic flow, animal or human traffic flow etc. to generate electricity. Includes use of compressible hydraulic cylinders or piezoelectric generators buried beneath road that use weight of traffic passing over them to generate electricity.

Parasistic energy harvesting, hydraulic compressible speed bump

# X15-V [2011]

# Control, monitoring and testing

Includes control, monitoring and testing details of all X15 sections other than X15-A (solar power), X15-B (wind power) and X15-C (sea power). Control, monitoring and testing details for solar, wind and sea power are only coded under X15-A08, X15-B05 and X15-C03 respectively.

Simulation

#### X15-W

# [2011]

# Constructional details, manufacture, servicing and maintenance

Includes constructional, manufacturing, servicing and maintenance details for all X15 sections other than X15-A (solar power), X15-B (wind power) and X15-C (sea power). This code is used in conjunction with other X15-D to X15-X codes as appropriate.

# X15-X

# Other non-conventional power generation

Includes non-conventional power generation systems that can't be coded elsewhere, such as power generated from muscle contraction/relaxation, human exercise. From 2010, geothermal plants are transferred to X15-G. From 2011, generation of electricity from vehicular, animal or human traffic flow is transferred to X15-T.

# X16: Electrochemical Storage

NOTES:

- (1) Manufacture of a cell of a particular type is coded with the cell.
- (2) General details like lead acid battery cases are coded with the cell type and its relevant code e.g. X16-F01 and X16-B01B.
- (3) Electrode details are not coded with the cell type if specific provision is made in X16-E.

#### X16-A

# Non-rechargeable or primary cells

Cooling, heating and air-conditioning details are coded under X16-K codes, and also under one or more X16-A code(s) to highlight the type of primary cells/batteries. The same applies to battery charging (X16-G codes), battery measurements and testing (X16-H codes), and battery/cell materials recovery and recycling (X16-M).

# X16-A01

# With aqueous electrolyte

#### X16-A01A

### Dry cells

Button cells, Zinc-carbon battery

# X16-A01B [1992]

# Metal-air cell

(X16-A01X, X16-D)

See also X16-D.

Zinc-air

#### X16-A01X

Other primary cells

### X16-A02

With non-aqueous electrolyte

# X16-A02A [1987]

# Lithium-based cell

Lithium-copper oxide, lithium-thionyl chloride, lithium-chromoxide, lithium-manganese dioxide, lithium-sulphur dioxide, lithium-polycarbon monofluoride

# X16-A03 [1987]

#### Reserve cells

X16-A03A [1987]

Thermal cells

X16-A03B [1987]

Sea-water cells

(X16-A01X)

X16-A04 [1987]

# **Photoelectrochemical cells**

See also U12-A02A and X15-A02D codes.

# X16-A05

[2005]

# Micro- and printed-primary cell

To be used together with the battery electrolyte type e.g. non-aqueous cell.

#### X16-B

# Rechargeable or secondary cells

Cooling, heating and air-conditioning details are coded under X16-K codes, and also under one or more X16-B code(s) to highlight the type of secondary cells/batteries. The same applies to battery charging (X16-G codes), battery measurements and testing (X16-H codes), and battery/cell materials recovery and recycling (X16-M).

### X16-B01

Cells

#### X16-B01A

### Alkaline

Nickel-zinc, alkali

#### X16-B01A1 [1992]

Nickel-cadmium

# X16-B01A3 [1992]

#### Metal-hydrogen

(X16-B01A, X16-B01X)

Includes nickel-hydrogen, etc. cells.

# X16-B01B

# Lead-acid

Also includes recombination type and valve regulated lead acid (VRLA) type.

# X16-B01C

# Sodium-sulphur cells

X16-B01C1 [1992]

High-temperature sodium-sulphur cells

X16-B01C2 [2024]

Low-temperature / Room-temperature sodium-sulphur cells

RT-Na-S

X16-B01D [1987]

Metal-halogen

(X16-B01X)

See also X16-D02.

X16-B01F [1992]

Non-aqueous

(X16-B01X)

Includes organic electrolytes.

X16-B01F1 [1992]

Lithium-based

(X16-B01X)

Includes secondary lithium cells when the state of the electrolyte is not known.

X16-B01F1A [2005]

Lithium-based cells with liquid electrolytes

Includes lithium-sulphur batteries.

Li-S battery

X16-B01F1C [2005]

Lithium-based cells with solid electrolytes

Includes lithium based solid state batteries. See X16-B01S for solid state batteries in general.

SSB

X16-B01G [2005]

Micro- and printed-secondary cells

To be used together with any other battery electrolyte-type cell e.g. alkaline.

X16-B01S [2023]

**Solid State batteries** 

Includes batteries with solid electrolyte. Also see X16-B01F1C for lithium based solid state batteries. See also X16-J01 for solid electrolytes per se. For quasi solid-state electrolytes see X16-J01G instead. SSB

X16-B01X

Other secondary cells

Includes gas-tight accumulators.

X16-B09

Other secondary cells' aspects

Includes servicing, maintenance and battery/cell reconditioning. If recycling, see also X16-M and X25-W04.

X16-C

Fuel cells and associated components

Fuel cell electrodes, casings and electrolytes are coded under X16-E06A, X16-C18 and X16-J codes respectively. Cooling, heating and air-conditioning details are coded under X16-K codes, and also under one or more X16-C code(s) to highlight the type of fuel cells. The same applies to battery charging (X16-G codes), battery measurements and testing (X16-H codes), battery/cell materials recovery/recycling (X16-M) and manufacturing details (X16-S).

Redox cell, oxidants, VRB, Vanadium redox battery

X16-C01 [1992]

Solid oxide and solid polymer fuel cell

X16-C01A [1997]

Solid oxide fuel cell

Includes cells using e.g. zirconium oxide electrolyte.

SOFC

X16-C01A1 [2005]

**Tubular** 

Includes tubular solid oxide electrolyte with inner and outer electrodes.

X16-C01A3 [2005]

Monolithic

Includes planar and corrugated solid oxide electrolyte with electrodes on its major surfaces.

X16-C01C [1997]

Solid polymer fuel cell

PEM, SPEFC, SPE fuel cell, proton exchange membrane, solid polyethylene fuel cell, SPFC, PEMFC, direct methanol fuel cell, DMFC

X16-C02 [1992]

Molten carbonate fuel cell

**MCFC** 

X16-C03 [1992]

Alkaline fuel cell

**AFC** 

X16-C04 [1992]

Phosphoric acid fuel cell

**PAFC** 

X16-C06 [2005]

**Bio-fuel cell** 

Includes, for example, cells with electrodes having a 'bio' catalyst.

X16-C07 [2005]

Micro/flat fuel cell

Includes fuel cells using, for example, a small replaceable fuel tank. To be used together with the type of cell such as SOFC.

X16-C09 [1992]

Control

Includes catalyst temperature control using fuel and air flow, gas and air circulation, etc.

X16-C15 [1992]

Fuel/gas supply arrangements, storage facility; Combustion products/exhaust gas handling

X16-C15A [2005]

Fuel/gas supply arrangements

For supplying gas to electrodes.

X16-C15A1 [2005]

**Manifolds** 

X16-C15A2 [2005]

Flow plates
Bipolar plates

X16-C15A3 [2005]

**Fuel wicking** 

X16-C15A4 [2005]

Liquid and air transmission pump

X16-C15C [2005]

**Fuel storage facility** 

X16-C15C1 [2005]

**Bulk storage facility** 

X16-C15C2 [2005]

Replaceable fuel container

Cartridge, reservoir, cassette, tank

X16-C15C3 [2005]

Hydrogen storage/absorption material

X16-C15C3A [2005]

Nanomaterial/nanotube

X16-C15E [2005]

Exhaust/waste handling

X16-C16 [1997]

Anode and cathode gases separators or separating arrangements

(X16-F02)

See X16-F02 for other membranes and anode and cathode separators.

X16-C17 [1997]

**Fuel processing** 

X16-C17A [2005]

Hydrogen generation

Includes all aspects of hydrogen manufacture if for ultimate, stated use in fuel cells.

X16-C17A1 [2005]

Reformer

Includes extraction of hydrogen from hydrocarbons such as methanol, gasoline, etc.

X16-C17C [2005]

**Catalyst** 

For electrode catalyst, see X16-E06A5A.

X16-C17E [2005]

Heater

Includes heating arrangement for fuel processing. For battery and fuel cell heating, see X16-K02.

X16-C18 [2005]

Fuel cell housing, stack, and sealing arrangements

(X16-F01, X16-F01A, X16-F06) See X16-F codes for batteries.

X16-D

Hybrid cells, etc.

Includes fuel cell in combination with primary or secondary cell.

X16-D01 [1992]

Metal-air

X16-D02 [1992]

Metal-halogen

X16-E

**Electrodes** 

X16-E01, X16-E02 are either used on their own or in conjunction with the relevant battery type.

X16-E01

**Active materials** 

X16-E01A [1992]

**Organic compounds** 

X16-E01A1 [1992]

**Polymers** 

X16-E01C [1992]

**Inorganic compounds** 

X16-E01C1 [1992]

Oxides, complex oxides

X16-E01E [1992]

**Conductive material** 

X16-E01G [1992]

Manufacturing

X16-E01H [1992]

Characterised by active material size/structure

To be used together with X16-E01A/E01C codes.

X16-E01H1 [2005]

**Nanomaterials** 

To be used together with X16-E01A/E01C codes.

X16-E01J [2005]

Binders and fillers

(X16-E09)

X16-E02

Carriers, plates, collectors

Collectors, grids, supports

X16-E03

**Primary cell electrodes** 

X16-E03A [1992]

Non-aqueous electrolyte

X16-E03A1 [1997]

Lithium-based non-aqueous electrolyte

X16-E04

Lead-acid accumulator electrodes

X16-E05

Alkaline accumulator electrodes

X16-E05A [1992]

Nickel-cadmium

X16-E05C [1992]

Metal-hydrogen

(X16-E05, X16-E09)

Includes nickel-hydrogen, etc. cells. Also includes hydrogen storage alloys.

X16-E06

Fuel and hybrid cell electrodes

Also includes inert electrodes and catalysts.

X16-E06A [1992]

Fuel cell

X16-E06A1 [2005]

**Electrode materials** 

Includes all 'active' materials for the electrodes and catalysts. For fuel processor catalyst, see X16-C17C1.

X16-E06A1A [2005]

Nanomaterials/nanotubes

Nanocarbon

X16-E06A5 [2005]

**Electrode details** 

Includes constructional and arrangement details of electrodes.

X16-E06A5A [2005]

**Catalyst** 

For fuel processor catalyst, see X16-C17C1.

X16-E06A5C [2005

Membrane electrode assembly

MEA

X16-E06A5E [2005]

Gas diffusion layer

GDL

X16-E06C [1992]

Hybrid

(X16-E06,X16-E09)

X16-E06C1 [1992]

Metal-air

X16-E06C2 [1992]

Metal-halogen

X16-E07 [1987]

Depolariser

(X16-X)

X16-E08 [1992]

Non-aqueous electrolyte cell electrodes

(X16-E09)

X16-E08A [1992]

Lithium-based

(X16-E09)

X16-E09

Other electrode aspects

Includes electrodes not coded above and miscellaneous items relating to electrodes.

Surfactant

X16-E10 [1992]

Sodium-sulphur

(X16-E09)

X16-E11 [2005]

Photoelectrochemical cell electrode

See also U12-A02 and X15-A02 codes for solar cells.

X16-F

Constructional details of cells or batteries

X16-F01

Cases, seals, shapes

For battery holders, see X16-F06 codes.

X16-F01A [1987]

**Sealing arrangement** 

Gaskets

X16-F01C [2005]

Casing

Used in conjunction with X16-F01A and X16-F01F codes when appropriate.

Covers, containers, housings, walls, lids

X16-F01F [1992]

Characterised by shape of casing

Used when casing/sealing arrangement is novel.

X16-F01F1 [1992]

**Button/coin** 

X16-F01F2 [1992]

Cylindrical/tubular

X16-F01F3 [1992]

**Prismatic** 

X16-F01F4 [2005]

Micro- or printed-battery

X16-F02

Separators, membranes, spacers

Steam separators are not coded here but under X16-K01 only, and fuel cell separators are coded under X16-C16 only.

Cotton, nylon, polypropylene, cellulose-rayon, cellulose-nylon, cellulose-nylon paper, polyethylene, cellophane, polytetrafluoroethylene, woven, non-woven, diaphragm

X16-F03

Terminals, internal connections, vents, filler caps

X16-F03A [1987]

**Terminals; Internal connections** 

X16-F03A1 [2005]

**Terminals** 

Includes externally accessible terminals to contact any equipment being powered by the battery. See X16-F05 for connections used for grouping cells or batteries to form packs.

X16-F03A3 [2005]

Internal connections

Includes internal connections within cell or battery, inaccessible on the outside.

# X16-F03B [1987]

# Vents, filler caps

Includes arrangement for filling/topping-up with liquids (e.g. electrolytes), or for draining liquids from the casing.

Valves, safety devices, pressure relief

#### X16-F04 [1987]

# **Electrolyte circulating arrangement**

(X16-F09)

Includes arrangement for stirring the electrolyte.

#### X16-F05 [1987]

# **Battery connectors; Jumper cables**

(X16-F09)

Details of internal connections are coded under X16-F03A3. Includes connectors for connecting terminals of adjacent batteries or connecting cells outside a battery casing. See also V04 for connectors.

Clamps, interconnectors

#### X16-F06 [1992]

# Battery holder/compartment associated with electrical/electronic equipment; Battery packs; Charging pods

(X16-F09)

Grouped/stacked fuel cells are covered by X16-C codes

# X16-F06A [2005]

# **Battery packs**

Also covers individual batteries or cells grouped together by external connectors such as groups of batteries for electric vehicles, power station batteries, etc. Battery packs using a specific type of cell such as alkaline are also covered by X16-B01 codes.

Battery module

# X16-F06C [2005]

# Battery compartment/holder associated with electrical/electronic equipment

See also V04-S03 for casings incorporating such holders/compartments.

#### X16-F06E [2005]

# Charging pods; Cells or battery holder

Includes constructional details. For battery charging circuits, see X16-G codes.

#### X16-F06E1 [2005]

#### **Charging pods**

Includes battery-powered equipment holders designed for charging the battery.

# X16-F06E2 [2005]

# Cell or battery holder

Includes battery or cell, per se, holder for charging. For example, a mains plug adapter with charging circuit within and section for holding cells to be charged.

#### X16-F09

# Other cell constructional details

Includes getter, packaging carton, theft prevention, nameplate labels, vibration damping arrangements, protection against corrosion/dust/water, arrangement for preventing undesired use such as automatic interruption of current due to temperature change, shock, etc.

Guarantee label, waterproof, dustproof

#### X16-G

**Battery chargers** 

#### X16-G01

**Using AC mains** 

#### X16-G02

# **Using other sources**

Jumper cables are coded in X16-F05.

# X16-G02A [1983]

Using solar cells

# X16-G02B [2002]

Using another battery

#### X16-G02C [2002]

# **Using generator**

Includes battery charging using an electric generator.

Piezoelectric

#### X16-G02C1 [2008]

IC engine-driven

# X16-G02C2 [2008]

Wind power-driven

# X16-G03 [2005]

### Non-contact charger units

To be used in conjunction with other codes. For example, non-contact mains charger is also coded in X16-G01.

X16-H [1987]

**Battery measurements and testing** 

(X16-G)

Includes electrical and non-electrical measurements.

X16-H01 [1992]

Remaining charge

See also S01-G06 codes.

X16-H02 [1992]

# Measurements / testing associated with intrinsic / extrinsic properties

Includes sensing level, density or humidity of electrolytes, detecting leakage of electrolyte solution, measuring durability of electrolyte film, measuring fuel (e.g. hydrogen) level, concentration or density, measuring specific gravity of electrolytes, measuring membrane air permeability, etc. Temperature control / monitoring is coded under X16-H05 only. See also relevant S codes, e.g. S02-C06 codes for level measurements.

X16-H03 [2002]

Voltage/current

See also S01-D and S01-G06 codes.

X16-H04 [2002]

**Battery classification** 

Includes testing to classify battery into different types.

X16-H05 [2009]

**Temperature** 

Includes details of temperature control and monitoring. See also S03-B codes for temperature measurements.

X16-H09 [2002]

**Smart battery** 

This code is used where a battery provides power to an equipment and also stores status data and/or has the facility to transfer this data to the equipment.

X16-J [1987]

**Electrolytes** 

(X16-X)

Includes dendrite inhibitor, composition.

X16-J01 [1992]

Solid

Includes gel electrolyte as well.

X16-J01A [1992]

Organic

X16-J01C [1992]

Inorganic

X16-J01E [2005]

**Nanomaterials** 

To be used together with other appropriate X16-J codes.

X16-J01G [2005]

Gel

To be used together with other appropriate X16-J codes.

Quasi solid state

X16-J02 [1992]

Liquid

X16-J03 [1992]

Molten/fused salt

Includes electrolytes which are normally solid at room temperature but liquid at operating temperatures.

X16-J07 [1992]

**Aqueous** 

X16-J08 [1992]

Non-aqueous

X16-J09 [1992]

**Electrolyte holders or matrix** 

X16-K [1987]

Battery cooling, heating, etc.

(X16-X)

X16-K01 [2005]

Coolina

Water cooled, refrigeration, baths, coolant circulation, steam separator

X16-K02 [2005]

Heating

Includes, for example, heating to aid correct battery operation.

# X16-K03 [2005]

### Air conditioning

Includes humidification, such as moisture introduction within a fuel cell gas, PEMFC humidity control, etc

# X16-L [1987]

# Other types of electric energy storage

(X16-X)

Includes non-chemical and non-battery types of storage of electric energy. See also X12-H codes for storage of excess generated energy. Does not include pumped storage hydroelectric systems. Includes flywheel storage systems.

# X16-L01 [1987]

# Storage heaters

See also X27-E01A4.

# X16-L02 [1987]

# **Capacitors**

Includes capacitors of the type used for supplying power e.g. electrochemical double layer capacitor/supercapacitor (see also V01-B01D codes).

# X16-M [2002]

### **Battery materials recovery**

Includes recovery and recycling details. See also X16-A, X16-B, X16-C codes to highlight the type of batteries/cells. See also X25-W04 for electrical recycling details. Details of battery manufacturing are coded under X16-S.

# X16-S [2020]

# Battery manufacturing apparatus/method

Includes all apparatus, mechanisms and method used during the manufacture of battery parts. Details of battery materials recovery are coded under X16-M only. Manufacture of active materials is coded under X16-E01G only. See also other X16 codes as appropriate to highlight the type of batteries/cells manufactured. Prior to-2020, manufacturing details of batteries were coded in X16-X.

Modelling, simulation

# X16-X

# Other general battery aspects

From 2020, manufacturing details of batteries are coded under X16-S.

# **X21: Electric Vehicles**

# X21-A

# **Electric propulsion and braking**

#### X21-A01

#### **Electric propulsion**

Includes all aspects of electric traction for ridden vehicles except electric train/tram (see X23-A codes), electric luggage trolleys (see X25-F05 codes) and electric ship propulsion (see W06-C01 codes). Also, any application not catered for specifically is included. In general, this code will be used in conjunction with other claimed aspects e.g. heating systems.

# X21-A01A [1987]

#### Wheelchair

Includes invalid carriages and mobility vehicles for disabled persons. Also see S05-G02A for wheelchairs or S05-K01 for mobility aids. See Q22-C02 for novel mechanical details of wheelchairs.

# X21-A01B [1987]

#### Forklift truck

Includes electric motor driven forklift trucks (see also X25-F05A). See also X21-X for novel hydraulic fork assemblies. IC engine-driven trucks are instead coded in X22-P05F and X25-F05A, as well as other X22 codes as appropriate depending on the claimed aspects.

#### X21-A01C [1997]

#### **Electric bicycle**

Includes electric tricycle.

# X21-A01D [1997]

# **Hybrid vehicle**

Includes vehicles utilising electric traction motor and other power source, i.e. internal combustion engine. Can be used in conjunction with other X21-A01 codes such as X21-A01H for hybrid bus. HEV, PHEV, plug-in hybrid vehicle

# X21-A01D1 [2002]

#### Parallel hybrid vehicle

Includes vehicle whose wheels are driven by both electric motor and e.g. internal combustion engine, including four wheel drive type vehicles where IC engine drives front wheels and electric motor(s) drive rear wheels. Also see X22-P04A and other relevant X22 codes.

# X21-A01D3 [2002]

### Series hybrid vehicle

Includes vehicle with electric traction motor and battery that is charged e.g. by IC engine driven generator. See also X21-B04C for on-board IC engine driven generator. Previously coded as electric vehicle in X21-A01F and X21-B04C and not X21-A01D as only electric traction present.

#### X21-A01E [1997]

# **Electric golf cart**

Excludes electric golf trolley. See also W04-X01F codes.

# X21-A01F [1997]

#### Electric motor car

Includes electric vehicles (EV). Can also be applied to indicate general or unspecified electric vehicle application. See X21-A01J instead for fuel cell powered electric vehicles.

# X21-A01G [2002]

#### Electric scooter/motorcycle

See W04-X03E2 for child's electric toy scooter.

# X21-A01H [2002]

# Electric bus/lorry

Includes trolley buses. See X23 only for trams.

#### X21-A01J [2007]

#### Fuel cell vehicle

(X21-A01F)

Includes electric vehicles powered using fuel cell technology. Can be used in conjunction with other X21-A01 codes as appropriate, e.g. X21-A01H for fuel cell bus. See X21-A01F for battery driven electric vehicles. Unspecified vehicles using fuel cells are considered to be electrically-propelled vehicles rather than motor vehicles and are thus coded here.

FCV

# X21-A01L [2015]

### Driverless/autonomous electric vehicles

Includes electric vehicles that can drive themselves. Used with other X21 codes as required, e.g. X21-H for automatic steering and X21-A05 for safety/monitoring arrangements.

# X21-A01M [2002]

#### Other electric vehicles

Includes riding or ride-on type electrically propelled mowers (see also X27-A01A) as well as personal electric transportation devices such as self-balancing vehicle or electric skateboard. See W04-X03E2 for outdoor toys such as skateboards.

Segway®, hoverboard

# X21-A01R [2021]

#### Recreational electric vehicles

Includes electric recreational vehicles such as camper, go-kart, RV, ATV, electric snowmobile or electric ski cycle.

#### X21-A02

# Mounting of propulsion units; Gearing

### X21-A02A

[2002]

#### Transmission system and its control

Includes control of clutch, gear ratio and general transmission details.

Gearing, clutch, drive shafts

#### X21-A02C

[2021]

# Thermal management of transmission systems

Includes transmission cooling arrangements. See also X11-J codes for high power motor/transmission cooling.

# X21-A03

# Electrodynamic and (electro)mechanical brake systems

Includes electrical details of thermal management of electric braking systems. See also Q18-A05 for mechanical details and X11-J06 codes for cooling of motors used in

electromechanical/electrodynamic brake systems.

# X21-A03A [1997]

# (Electro)mechanical

Also includes mechanical friction brakes with additional electrical details.

ABS, anti-lock braking

# X21-A03C [1997]

# **Electrodynamic**

Includes regenerative, resistive and eddy current braking. See also V06-N06 and X13-F02 codes.

#### X21-A04

# Traction motor speed or torque control

See also V06-N, X13-F03 and X13-G01 codes. Includes control of motor output torque, e.g. to supplement torque delivered to wheels by IC engine of hybrid vehicle during gear shifting (see also X21-A01D1 and X22 codes as appropriate).

# X21-A04A [1997]

#### **Rectifier control**

See also U24-D, X12-J and X13-H03B codes.

#### X21-A04C

[1997]

#### Inverter control

See also U24-D, X12-J and X13-H03A codes.

#### X21-A05

# Safety; Monitoring; Instrumentation

From 2010 this code has been expanded to include general instrumentation, e.g. for vehicle dashboard. Includes protective arrangements, anticollision systems etc. Also includes overall arrangements for determining whether it is safe to operate in autonomous driving mode. See also X21-A01L for autonomous electric vehicles per se.

# X21-A05A [2013]

#### Safety systems

Includes electric vehicle safety systems such as cameras for internal/external view, airbags, seatbelts, horns, anti-collision systems, noise generators to make vehicle more noticeable to pedestrians etc.

# X21-A05A1 [2022]

#### Passenger and pedestrian protection

Includes airbags to protect vehicle occupants or pedestrians, seat belts, active head restraints etc.

# X21-A05A2 [2022]

# **External view and internal-view cameras**

Includes rear-view reversing cameras and 'enhanced' or 'assisted' vision cameras/display.

# X21-A05A3 [2022]

#### Horns, noise generators

Includes noise generators to make vehicle more noticeable to pedestrians etc.

Pedestrian awareness

# X21-A05A5 [2022]

# Anti-collision and parking systems

Includes radar, sonar and LIDAR. Also see W06-A04 for radar details, W06-A05 for sonar details and W06-A06 for LIDAR details.

# X21-A05E [2013]

# **Monitoring; Instrumentation**

Includes general instrumentation, e.g. for vehicle dashboard. Use in conjunction with X21-A06 codes to indicate the variable being monitored such as X21-A06D for monitoring remaining battery capacity.

# X21-A05E6 [2024]

# **Navigational aids**

Includes general navigation systems and information processing aspects of vehicle guidance systems.

GPS, GNSS, dead reckoning, beacons, inertial navigation

### X21-A05E7 [2024]

# Collision-imminence warning/alarm

Includes lane deviation or crossing alarms, and distance to obstacle indicator. For control of systems to prevent collision, see X21-A05A5.

Road marking sensor, lane marking sensor, deviation, collision warning display

# X21-A05E9 [2024]

# Service-need/vehicle system malfunction displays

Includes lights and alarms for indicating faults/problems with any onboard systems. Fault, failure

# X21-A06 [1997]

# Measurements

(X21-A05)

Includes battery remaining charge indicators (see also S01-G, X16-H and X21-B01 codes), maximum distance before need for recharging, speed, novel sensors, etc.

# X21-A06A [2021]

#### Speed and slip sensor

Includes sensing of wheel speed or general vehicle speed.

# X21-A06B [2021]

# Acceleration and shock sensor

Includes measurement of acceleration, deceleration and shock or impact sensing.

# X21-A06C [2021]

#### **Temperature sensor**

Includes measurement of battery, motor and other system temperatures.

# X21-A06D [2021]

### **Current and voltage sensors**

Includes remaining battery capacity measurement, and other electrical apparatus parameters measurement. See also X16-H codes and S01-G06A.

#### X21-A06F [2021]

#### Distance and deviation sensors

Includes measurement of distance to object and distance between vehicles to maintain safe distance. Also includes lane deviation measurement. See also X21-A05 codes for safety and monitoring per se.

# X21-A06H [2021]

# Position or angle sensors

Includes rotary or angular position sensing (see also S02-A10D codes), resolvers, encoders (see also U21-A03J).

# X21-A06X [2021]

#### Other vehicle measurements

# X21-A07 [1997]

# **Electric traction motor; Motor-generator**

Includes details of the traction motor per se. See also V06-M and X11 codes for further detailed breakdown of motor details. Also includes motorgenerator. See X11-H20 for motor-generators per se. See X11-J06 for motor cooling details.

#### X21-B

# Power supply and related aspects

# X21-B01

# **Battery and fuel cell arrangements**

Includes traction batteries and fuel cells, and their charging (see also X16).

# X21-B01A [1997]

#### Traction battery; Fuel cell

Includes novel battery and fuel cell details and their grouping to attain higher operating voltage. See also X16 codes for a more detailed breakdown of batteries and fuel cells (X16-C), per se.

# X21-B01A1 [1997]

# **Charging arrangements**

See also X16-G codes. Includes battery discharging arrangements, e.g. to fully discharge battery before recharging.

# X21-B01A1A [1997]

## **On-board charging systems**

Includes charging battery using onboard device such as generator. Also see X16-G02C for battery charging using generator.

#### X21-B01A1C [1997]

# Off-board charging systems

Includes use of off-board mains supply. See X16-G01 for mains battery charging. Also see X16-G03 for wireless battery charging and X12-H01E codes for non-contact power distribution.

Wireless, inductive

## X21-B01B [2002]

# Battery/fuel cell management system

Includes battery/fuel cell control, charging control, on-board power supply systems, over-voltage and short-circuit protection. See U24 / X12 codes for further power supply details.

Power control, voltage, current, power conversion

# X21-B01B1 [2021]

# **Battery thermal management**

Includes heating and cooling arrangements for batteries and fuel cells. Also see X16-K01 and X16-K02 for battery cooling and heating respectively.

#### X21-B01E [2012]

# Battery exchange/leasing

Includes arrangements for enabling a depleted battery to be removed from a vehicle and replaced with a fully charged battery. Also includes battery leasing.

Lease, exchange, replace

# X21-B02

# Power supply lines; Power feed

Includes off-board power supply aspects, such as overhead lines for trolley buses (see also X12-G codes).

Power supply cables, overhead lines

#### X21-B03

# **Current collectors**

Overhead pick-up shoes, brushes

# X21-B04 [1997]

#### Combination of battery and other source

Includes e.g. additional use of electrolytic capacitor, mechanical flywheel, secondary battery.

# X21-B04A [1997]

# Wind turbine or solar cell array

See also X15-B and X15-A codes for wind and solar power generation respectively.

#### X21-B04C

[1997]

# On-board IC engine-driven generator

#### X21-B04C1

[2002]

#### IC engine control

Control of internal combustion engine driving generator in series hybrid vehicle. This code is not applied for parallel hybrid vehicles, since novel engine control can be adequately highlighted by the application of X22-A codes.

Fuel injection control, ignition timing control, pollution control, series hybrid

# X21-B05 Power converter

[1997]

Includes details of DC-DC converters, power rectifiers and inverters (see also U24-D and X12-J codes depending on power level). Converter control is covered by X21-A04 codes.

#### X21-C

[1997]

# **Electric vehicle accessories**

(X21-A01)

#### X21-C01

[1997]

# Passenger compartment heating systems

#### X21-C02

[1997]

# Passenger compartment air conditioning/ventilation systems

Includes passenger compartment air-conditioning, cooling, ventilating and air treatment arrangements.

#### X21-C03

[2020]

# Passenger accommodation; Passenger cabin

Includes passenger accommodating arrangements such as seats, beds, seat belts, tables, electric blinds, electric windows. See Q14-C codes for mechanical details.

#### X21-C12

[2020]

#### In-car office/information equipment

Includes systems to allow working from in-car "office" such as email, internet browsing for booking tickets, hotel reservations, local information, navigation systems etc. For internet gaming see X21-C13 instead.

#### X21-C13 [2020]

## In-car entertainment systems

Includes all in-car entertainment devices such as television (including streamed TV services) and games machines powered from vehicle supply. *DVD, TV, MP3, MP4, game* 

#### X21-C20

#### [1997]

# Other electric vehicle accessories

Includes electric vehicle accessories not covered by other X21-C codes.

# X21-D

#### [1997]

## **Electric connectors and wiring installations**

See V04 codes for electric connectors and X12-G04 codes for common installation features like wiring clamps.

# X21-E

#### [1997]

#### **Electric switches**

Includes all switches associated with electric vehicles. See also V03 codes. See U21 for electronic switching.

# X21-F

[1997]

# Lights

Includes internal and external vehicle lighting. See also X26 codes or more details.

Headlamp, taillamp, ambience lamps

#### X21-H

[2002]

# Steering systems

Includes electric steering arrangements and automatic steering.

Power steering, automatic steering

#### X21-J\*

# [2012-2013]

## Servicing and testing

\*This code is now discontinued and transferred to X21-X16 from 201301, but remains searchable for 2012 patents. Includes electric vehicle maintenance and servicing equipment. For arrangements for exchanging depleted battery with fully charged one, see X21-B01E instead.

# X21-K [2010]

# Electric vehicle communications and connectivity; Multiplexing; Networking; V2X

(X21-X)

Includes vehicle to everything communications (V2X; C-V2X). Includes all communications, connectivity, networking and multiplexing, including cellular (also see W02-C03C1L) and dedicated short range communication (also see W01-A06C4E). Includes communication within an electric vehicle (intra-vehicle), communications between vehicle and other vehicles (inter-vehicle), roadside (V2I), pedestrians (V2P) etc. Includes electric vehicle telephones and hands-free systems. See W01 and W02 codes for telecommunications per se.

Multiplex, DSRC, 5G, cellular, data transmission, LAN, local area network, WAN, wide area network, Bluetooth®, CAN bus, controller area network, bus, Ethernet, VAN, UART, universal asynchronous receiver/transmitter

# X21-K02 [2021]

# Electric vehicle to network; Vehicle to cloud communications

Includes electric/hybrid vehicle to cloud (V2C) communication that uses V2N access to broadband cellular mobile networks to enable data exchange with the cloud (also see T01-N codes). Includes over the air (OTA) updates to vehicle software; Remote vehicle diagnostics (also see X22-X16). V2N, V2C, IoT

#### X21-K03 [2021]

# Intra-vehicle; Vehicle to device communications networking/connectivity

Includes in-car high speed, integrated communications networks and multiplexing arrangements for interconnecting various vehicle systems e.g. using wireless LAN, serial data bus, Bluetooth® etc. (see also W01 codes), avoiding the need for dedicated point-to-point wiring. Includes vehicle to device (V2D) and cellular V2D (C-V2D) communications to e.g. connect tablet, smartphone or wearable to e.g. vehicle infotainment system. Includes app for controlling vehicle locking. V2D, C-V2D, App, mobile phone

# X21-K05 [2021]

#### Inter-vehicle communications; V2V

Includes communication between different electric/hybrid vehicles to enable them to wirelessly exchange information about their speed, location, and heading. Includes DSRC V2V and C-V2V communication providing 360 degree awareness of other vehicles. Includes vehicle to motorcycle communication.

Platooning, cooperative adaptive cruise control, V2M, C-V2M

# X21-K06 [2021]

# Electric vehicle to pedestrian communications

Includes communication between vehicle and persons, pedestrians or cyclists including V2P and cellular V2P communication. Includes warning pedestrian, cyclist or electric scooter rider of danger e.g. approaching vehicle and for warning drivers of presence of other road users.

V2P, C-V2P, cyclist, e-bike, bicycle, scooter

# X21-K08 [2021]

# Electric vehicle to offboard/infrastructure communications; V2I

Includes communication between electric/hybrid vehicle and offboard infrastructure, roadside units or traffic signals (also see T07-B codes) or device. Includes cellular vehicle-to-infrastructure (C-V2I) communications. Also includes dedicated short range communication (DSRC) based V2I.

Infrastructure, offboard, V2I, C-V2I, traffic signal

# X21-K08G [2021]

# Electric vehicle to grid communications; V2G

Includes communication between vehicle and grid (V2G) to enable plug-in hybrid and electric vehicles to supply vehicle electric power to electricity grid for peak load levelling or to stabilise intermittent renewable power supplies. Also see X12-H codes for power distribution and X21-B01A1C for smart charging, e.g. charging vehicle battery at night while supplementing grid load during the day. Also includes vehicle to home (V2H) power transfer e.g. for emergency power supply (see X12-H02) or supplementing renewable wind/solar power. Sell electricity, load-levelling, bidirectional V2G, unidirectional V2G, V1G, smart charging, backup power

# X21-M [2012]

#### Suspension systems and control

Includes electrical control of mechanical springs and dampers, electrical springs and dampers. For electrical suspension control of IC engine vehicle refer X22-M only.

#### X21-N [2012]

#### Noise/vibration/Harshness reduction

Includes all electrical details of arrangements to reduce noise, vibration and harshness in the vehicle. For mechanical NVH reduction see Q17-N instead.

# X21-R [2018]

#### Rider assist

Includes systems for assisting riding of vehicles such as motorcycles or mono-wheel vehicles. Includes balance-aiding and self-balancing systems e.g. using gyroscopes or automatic steering correction to keep motorcycle upright.

Gyroscope, balance, balancing

# X21-U [2005]

# Electric vehicle rental, hiring and sharing systems

Includes overall system associated with electric vehicle hiring and rental with some on-board vehicle aspect, e.g. enabling user to book vehicle on-line (see T01-N and T01-J05 codes) while central controller provides authorisation and remote access to allocated vehicle. Also includes car pooling arrangements with some on-board vehicle aspect. Also see T01-J05A2N for business processes related to the transportation industry.

# X21-W [2020]

# General By-wire/(Semi)Autonomous

Includes general by-wire control systems including 'total' electric vehicle by-wire control and specific controllers not covered elsewhere. Also includes general (semi)autonomous electric vehicle control but specific system control codes can also be applied such as X21-A04 for electric motor control and X21-B01B for on-board electric power supply control. For systems for determining whether it is safe to operate in autonomous driving mode see X21-A05. See X21-A01L for driverless/autonomous electric vehicles per se and Q19-L for mechanical aspects of an autonomous vehicle.

# X21-X [1997]

#### Other electric vehicle features

Includes electrically operated fork assembly on forklift truck (also see X21-A01B and X25-F05A for forklift per se).

# X21-X03 [2018]

# **Anti-theft and Anti-hacking**

Includes anti-theft arrangements with some kind of immobilisation of electric vehicle and systems for preventing hacking or overriding of electric vehicle systems. Includes devices for preventing door lock/motor start signal jamming, code grabbing, 'App' (application) hacking etc. See W05-B codes for theft alarms per se. See X21-K for electric vehicle communications/networking per se.

Door lock, hack, steal, immobilizer

#### X21-X05 [2024]

# Electrical aspects of doors, boots, windows

Includes electrical door opening/closing devices. Also includes electrical aspects of streamlining devices such as spoilers.

Roof spoiler, boot spoiler aerodynamic, sliding door, remote control tailgate opening, electrochromic glass, privacy glass

## X21-X16 [2013]

# Electric vehicle maintenance and testing

Includes electric vehicle servicing equipment. See X21-B01E for battery exchange equipment. Also includes arrangements for testing electric vehicle systems. See X21-J instead from 2012-2013.

# X21-X20 [2013]

# Electric vehicle design/manufacture/assembly

Includes electric details of design, manufacture and assembly of electric/hybrid vehicles and their components. See X25-X14 for manufacturing/assembly plant per se. Also includes systems for dismantling vehicle to enable recycling of materials (see also X25-W04). See X16-M and X21-B01 codes also for recycling of batteries and their materials. See T01-J15 codes for computerised design.

#### **X22: Automotive Electrics**

#### X22-A

#### For internal combustion engines

#### X22-A01

#### Ignition

Includes spark modification arrangement, obtaining ignition using laser.

### X22-A01A

# Ignition systems (using)

Includes ignition coil and cable, accessories e.g. connectors.

# X22-A01A1

Magneto- or dynamo-electric generators without subsequent storage

[1987]

#### X22-A01A2

Inductive energy storage

# X22-A01A3

Glow plug heating

(X22-A01A9)

Diesel engine, compression ignition

# X22-A01A5 [1992]

# **Automatic ignition disablement**

(X22-A01A9)

Includes disabling ignition e.g. after crash to prevent fire (also see X22-A01A7). Ignition disablement for anti-theft purposes is covered by X22-A08C only.

## X22-A01A7 [1992]

#### Safety

(X22-A01A9)

#### X22-A01A9

#### Other ignition systems

Includes capacitive energy storage, ignition noise reduction circuits (see W02-H also). For ignition noise reduction associated with spark plugs, see X22-A01E1J.

RFI suppression

#### X22-A01B

# Advancing or retarding ignition

Ignition control, ignition timing, pre-ignition

X22-A01B1 [1983]

## Dependent on knock detection

Pinking or detonation detection

X22-A01B2 [1992]

**Advancing** 

X22-A01B3 [1992]

Retarding

#### X22-A01C

Distributors; Circuit makers/breakers; Pick-up devices

# X22-A01C1 [1992]

#### **Distributors**

See V04-L09 for distributors in general. Distributor rotor, distributor cap

# X22-A01C2 [1992]

#### **Circuit-makers or -breakers**

# X22-A01C3 [1992]

#### **Pick-up devices**

Pick-up devices, e.g. sensor wheel in distributor, adapted to sense particular points of timing cycle. For sensing points of timing cycle, e.g. using cam shaft sensor, see X22-A05C instead.

#### X22-A01D

## Testing ignition installations or timing

Includes ignition mis-fire detection. See also S02-J01A.

Strobes, timing light

#### X22-A01E

# Spark and glow plugs

Includes plasma plugs, connectors, covers.

X22-A01E1 [1987]

#### Spark plugs

Spark gaps, discharge

X22-A01E1A [1992]

**Electrodes** 

X22-A01E1C [1992]

Insulators

Ceramic

X22-A01E1E [1992]

Manufacture

X22-A01E1G

[1992]

Ignition coil/spark plug combinations

X22-A01E1J

[1992]

Ignition noise reduction/spark plug combination

#### X22-A01E3

# **Glow plugs**

Includes glow plugs for pre-heating compression ignition diesel engines (see also X22-A20C).

#### X22-A02

Fuel systems

X22-A02A [1983]

# **Fuel injection apparatus**

Electromagnets, injectors, piezoelectric, ultrasonic, common rail, direct injection

# X22-A02A1 [2005]

#### **Fuel injection valve**

Includes atomiser, EM fuel injection valve (also see V02 codes, e.g. V02-E02A1 for electromagnetic valve per se), and injectors.

Electromagnetic, piezoelectric, EM, valve, atomiser

[2005]

#### X22-A02A3

# **Common rail arrangements**

Includes fuel injection systems using a common rail fuel assembly. Also see X22-A20C for diesel engine applications.

Common rail

#### X22-A02A5 [2005]

# Non-diesel direct injection

Includes direct injection arrangements, e.g. for use in petrol engine.

Homogeneous, stratified, direct

# X22-A02B [1987]

#### **Fuel filters and heaters**

(X22-A02, X22-A09)

Diesel fuel heaters, electric heaters, PTC element, preheaters

X22-A02C [1987]

#### Carburettors

Atomisers

# X22-A02D [1987]

#### **Fuel pumps**

See X22-A03A3 for fuel pump control.

# X22-A02E [1992]

# Fuel vapour recovery system; Fuel purging

See X22-A03A4 for fuel purging control.

#### X22-A02F

[2005]

# Fuel additive/treatment systems

Fuel additive/treatments to improve combustion. Includes water/steam injection and fuel ionising arrangements.

Steam, water, magnetic, ultrasonic, economiser, urea

# X22-A02R [2013]

# Fuel pressure regulator

Includes electronic pressure regulators and electromagnetic valves for controlling fuel pressure. Also see X22-A02A3 if regulator is used in a common rail fuel system.

#### X22-A03

**Engine control** 

#### X22-A03A

**Fuel control** 

X22-A03A1 [1983]

# **Fuel-injection**

Valve controllers

#### X22-A03A1A [1992]

Injection timing

# X22-A03A1C [1992]

Injection quantity

#### X22-A03A2

Air-fuel ratio; Exhaust gas recirculation

X22-A03A2A [1992]

#### Air-fuel ratio

Mixture control

#### X22-A03A2B [2021]

# Variable compression ratio

Includes control of engine compression ratio so that lower ratios are used at higher loads to increase power and higher ratios are used at lower loads to increase fuel efficiency.

#### X22-A03A2C

[1992]

#### **Exhaust gas recirculation**

**EGR** 

# X22-A03A3 [1997]

# **Fuel pump control**

(X22-A02D, X22-A03A)

See X22-A02D for fuel pumps, per se.

# X22-A03A4 [1997]

# **Fuel purging control**

(X22-A02E, X22-A03A)

See X22-A02E for fuel purging systems, per se.

# X22-A03A5 [2013]

# **Fuel pressure regulation**

Includes fuel pressure regulator control to limit high pressure of fuel. For novel fuel pressure regulators per se, see X22-A02R. For fuel pump control see X22-A03A3 instead.

# X22-A03B [1983]

# Speed

(X22-A03X)

Includes throttle valve and air control.

#### X22-A03B1 [1992]

#### Cruise control

(X22-A03B, X22-G)

This code is used for general cruise control systems either on its own or in conjunction with X22-G03A (transmission based cruise control) or X22-C02D4 (brake based cruise control).

Adaptive cruise control

# X22-A03B1A [1992]

#### By throttle control

Includes the use of servomechanisms operated electrically or fluidically.

# X22-A03B1C [2007]

# Active cruise control

Includes adaptive cruise control and inter-vehicle distance or vehicle spacing/separation control, e.g. using radar distance sensing (see also W06-A04 codes).

Automatic distance regulation, ADR

#### X22-A03B2 [1992]

#### Drive-by-wire/electronic throttle control

Includes 'drive-by-wire' type controllers e.g. using servomotors to control throttle position.

#### X22-A03B3 [1992]

# **Idling speed control**

# X22-A03B5 [1992]

# **Exhaust braking control**

Engine braking

## X22-A03C [1987]

# **Turbocharging, supercharging**

(X22-A03X)

## X22-A03D [1987]

#### Power

(X22-A03X)

Includes multi-cylinder in/out of operation control. Load control, multi-cylinder switching, torque

# X22-A03D1 [1992]

#### Traction control

Used alone or in conjunction with X22-C02C1, or X22-G03B depending on variable being controlled. Wheel slip control, ASR

# X22-A03E [1987]

#### Stop-start

Includes automatically stopping engine while waiting at level crossing to reduce fuel consumption.

(X22-A03X)

# X22-A03F [1992]

#### Complete engine management

Includes, generally by using a computer, simultaneous control of several aspects of the IC engine e.g. ignition, fuelling, EGR, etc. Also includes integrated engine/transmission control. See also X22-G.

#### X22-A03F1\* [1992-1996]

#### **Fuzzy** control

\*This code is now discontinued and transferred to X22-A03K. It is still searchable and valid for records from 1992 to 1996.

#### X22-A03G [1992]

## Inlet/outlet valve control

(X22-A03X)

Includes control of intake and exhaust valve timing. Also includes cam control in which multiple, selectable cam lobes can be selected to adjust valve timing, deviation and lift.

#### X22-A03H [1997]

#### **Temperature control**

(X22-A03X)

#### X22-A03I [2005]

#### **Swirl control**

Includes control of air motion in combustion chamber e.g. to enable stratified or ultra-lean burn combustion.

#### X22-A03J [1997]

#### Pollution control

(X22-A03A,X22-A03X,X22-A07)

Exhaust gas recirculation and cleaning systems, per se are in X22-A07.

# X22-A03K [1997]

#### **Fuzzy control**

Fuzzy logic systems per se are covered by T01-J16B where novel technology details are given. See X22-A03F1 codes for records from 1992 to 1996. See also X22-Q for fuzzy control applied to nonengine systems.

#### X22-A03L [1997]

# Secondary air control

(X22-A03B,X22-A03X)

Includes secondary air introduction control for air intake and exhaust passages. It is used on its own or together with other relevant codes e.g. X22-A03J if secondary air control is performed with a view to reducing pollutants.

#### X22-A03W [2006]

#### **Engine-related by-wire control**

Includes engine-based by-wire controllers not covered elsewhere. Drive-by-wire for vehicle/engine speed control is coded in X22-A03B2 instead. See X22-W for general non-engine based by-wire control. Also see X22-K codes for novel vehicle networking/communications systems that enable the by-wire control.

## X22-A03X

# Other IC engine control aspects

Includes vibration suppression control.

#### X22-A04 [1983]

#### Starting motors

Includes motor per se and associated gearing. See X11 for further details of high power motors. Starter solenoid is included in X22-A08 only. For combined starter/generator also see X22-F02 and X11-H20 (or X13-G20 for starter/generator control).

# X22-A05 [1983]

# Engine related measurements and sensors

(X22-A09)

Only includes on-board measurement or off-board diagnostics interfacing with on-board system. General measurement systems are included in section S, and vehicle testing systems are coded in S02-J. Includes electrical sensors per se as well as their mounting arrangements.

#### X22-A05A [1983]

# **Knock detectors; Pressure; Vibration**

(X22-A09)

See also S02-F codes for further details. Includes combustion chamber pressure measurement.

# X22-A05A1\* [1992-2004]

#### **Ambient pressure**

\*This code is now discontinued and transferred to X22-A05A4, but remains searchable and valid for records from 1992 to 2004.

#### X22-A05A2 [2005]

#### **Knock detection**

Includes pinking and pre-ignition detection.

## X22-A05A3\* [1992-2004]

#### **Negative pressure**

\*This code is now discontinued and transferred to X22-A05A4, but remains searchable and valid for records from 1992 to 2004.

# X22-A05A4 [2005]

# **Pressure detection**

Includes detection of both ambient and negative pressure.

#### X22-A05A6 [2005]

# Vibration/noise detection

#### X22-A05B [1983]

#### **Gas sensors**

(X22-A09)

See also S03-E03 codes for gas sensors per se. Exhaust gas, oxygen, lambda, air, emissions, CO, NOx

#### X22-A05C [1987]

# Engine rotation or speed sensors; TDC position sensors

For ignition point sensing see X22-A01C3. Crankshaft angle/position, rpm counter

X22-A05D [1987]

Fuel, gas and air flow sensors

X22-A05E [1992]

Throttle position sensor

(X22-A09)

X22-A05F [1992]

**Temperature** 

X22-A05F1 [1992]

**Exhaust** 

X22-A05F3 [1992]

**Engine** 

X22-A05G [1992]

**Engine torque** 

X22-A05H [1992]

Multi-fuel proportion measuring

X22-A05L [2012]

#### Fuel/oil level sensing

Includes fuel and oil level sensors. For dashboard warning of fuel/oil level see X22-E01A and X22-E01C respectively.

X22-A05N [2005]

# **Engine related diagnostics**

Includes diagnostic devices interfacing with engine management system.

X22-A05X [1992]

Other IC engine measurements/sensors

X22-A06 [1987]

#### Air treatment; Air filters

(X22-A09)

From 2009 the scope of this code has been widened to include all electrical aspects of intake air treatment and filtering, such as: air filters with integral clogging detectors (see also X22-A05X for clogging detection and maybe X22-E10 and X22-E01 for driver warning), and e.g. photochemical treatment of intake air with UV light to create ozone to improve combustion. Control of intake air flow using a standard throttle valve should instead be coded in X22-A03B instead under speed control. For novel mechanical aspects of intake air treatment and filtering see Q51-H05 and Q17-E codes.

X22-A07 [1987]

# Catalytic converters, exhaust gas cleaning

(X22-A09)

Includes pollution reduction hardware such as particle burner, exhaust gas particle trap clogging detector, exhaust gas recirculating valve and system. For control of EGR, see X22-A03A2C. For pollution control see X22-A03J instead.

Filters, catalysts, electric heaters, EGR, valve

X22-A08 [1987]

# Starters, ignition switches, relays

(X22-A09)

Includes starter solenoid. Further details of switches and relays are in V03-C and V03-D. Novel gearing and starter motors per se are coded in X22-A04. X22-A08 can also be applied to indicate "engine starting" when dealing with engine control patents, where the control is specifically implemented while trying to start an engine.

Solenoids

X22-A08A [1992]

# Remote/keyless IC engine starting

X22-A08C [1997]

#### IC engine immobiliser

For general anti-theft devices see X22-X03.

# X22-A09

#### Other IC engine aspects

Includes lubricating, engine braking, etc. *Exhaust braking* 

X22-A10 [1992]

# **Engine cooling**

(X22-A09)

Fans, pumps

X22-A11 [1992]

#### Inlet/exhaust valves

(X22-A09)

X22-A12 [1992]

# Engine noise/vibration reduction and damping

(X22-A09)

Includes active noise and vibration suppression devices such as electrically controlled engine mounts. See X22-A03X for general engine noise/vibration control. See W04-V07 codes also for active audible noise cancelling.

# X22-A13 [1992]

## **External heating to assist starting**

Includes electric resistance heater built into engine block or off-board heater slid under engine block, both powered by e.g. off-board mains supply.

#### X22-A14 [1992]

# Turbo- and super-charger

Turbo- and super-charger control is coded in X22-A03C only.

# X22-A15 [1992]

# Intake air heaters; Engine/cooling water heaters

(X22-A09)

# X22-A16 [2002]

# Vehicle engine servicing equipment

Includes electrical aspects of oil change/reconditioning apparatus. Includes onboard systems that burn dirty oil in combustion chamber and replenish engine with clean oil. Oil change

# X22-A17 [2010]

# Waste heat recovery

(X22-A09)

Includes engine exhaust heat recovery systems, e.g. for passenger compartment heating. See X22-F03 also if exhaust heat is being converted into auxiliary supply of electric power.

# X22-A20 [1992]

#### Type of engine

This code relates to type w.r.t fuel used. Petrol- and indeterminate fuel-types are NOT covered.

# X22-A20A [1992]

#### Mixed fuel

Includes e.g. alcohol and petrol dual fuel type engines. Also includes engines combusting e.g. petrol and oxyhydrogen (HHO).

Brown's gas

X22-A20C [1992]

Diesel

X22-A20E [1997]

#### Single unconventional fuel

Includes e.g. alcohol burning engines and bio-fuel engines.

# X22-A20E1 [2007]

#### Gaseous fuels

Includes engines running on LPG (liquefied petroleum gas), natural gas, hydrogen or liquid nitrogen. (See X21 codes for vehicles using hydrogen in a fuel cell arrangement). See Q51-D07A for mechanical aspects of gaseous fuelled engines.

# X22-A20E3 [2007]

#### **Bio fuels: Alcohol**

Includes engines running on free fatty acid methyl ester ("bio diesel") or alcohol such as methanol or ethanol. See Q51-D07C for mechanical aspects of bio fuel/alcohol fuelled IC engines.

#### X22-A20G [2010]

#### Air

Includes engines that are capable of being driven completely or partially by compressed air.

#### X22-A20T [2007]

#### Two-stroke

Includes IC engines operating on two-stroke cycle, e.g. used in moped (see also X22-P02).

# X22-A20X [2011]

#### Other engines

Includes implosion engines using e.g. HHO (Brown's gas) made e.g. from electrolysis of water to produce hydrogen and oxygen which when combusted contracts to suck up piston rather than push it down.

Oxyhydrogen

#### X22-B

# Lighting or signalling

See also X26 for further details. Vehicle lamp circuitry and mounting arrangements are coded in X22 only.

#### X22-B01

#### Main lights

Headlamps, light control, fault detection, fog lamps

# X22-B01A [1987]

#### **Bulbs; Light sources**

Includes novel light sources such as headlight bulbs per se.

# X22-B01A1 [1992]

#### Discharge lamps

Includes Xenon and High Intensity Discharge (HID) tubes. See also X26-A codes.

# X22-B01A3 [1992]

#### **Incandescent lamps**

See also X26-B codes. Halogen lamps

# X22-B01A5 [2008]

#### **LEDs**

Includes novel light emitting diodes used for vehicle headlamps. See also U12-A01 codes and X26-H for LEDs per se.

#### X22-B01B [1987]

#### **Fixtures**

Includes lenses, reflectors, bulb holders. *Parabolic reflectors, sockets* 

# X22-B01C [1987]

**Washers** 

# X22-B01D [1987]

#### **Switches**

See also V03 codes for mechanical switches per se. Electronic switching is covered by U21 only.

# X22-B01E [1992]

# Position control/beam aiming arrangements

Includes mechanical and motorised arrangements for adjusting headlamp position, and controlling movement of e.g. reflector to adjust headlamp aim e.g. to follow curve as vehicle negotiates a bend. See also X26-L.

Tilt control, aim, direction

#### X22-B01F [2002]

#### **Headlight control circuitry**

Includes control of headlamp or front fog/driving lamp illumination and automatic dimming.

#### X22-B02

#### **Indicators**

For indicating intention or presence of vehicle to other road users.

# X22-B02A

#### **Braking indicators**

From 2005, direction and braking indicators are separated, with turning indicators transferred to X22-B02D and braking indicators remaining in X22-B02A. Prior to 2005, X22-B02A remains searchable for both turning and braking indicators.

Switches, centre, high level brake lamp, stop lamp

# X22-B02A1 [1992]

# Slowing/accelerating indication

Includes activation of vehicle brake lights in response to driver removing foot from accelerator pedal. See X22-B02A for brake lighting in response to depression of brake pedal.

Slowing, decelerating, accelerating

#### X22-B02A2

# [2002]

# Indicating level of braking intensity

Includes selective illumination of array of LEDs to indicate braking severity.

#### X22-B02B [2005]

#### **Fixtures**

Includes reflectors, lenses and bulb holders (see also X26-D01 codes).

Lens, reflector, refractor, diffuser, filter

# X22-B02D [2005]

#### **Turning/direction indicators**

See X22-B02A for records prior to 2005. Switches, direction, flasher, repeater, indicator

#### X22-B02R [2005]

#### **Reversing indicators**

Includes reversing lights and audible reversing warnings.

Backing, reverse, beep

#### X22-B02X

# Other vehicle indicator arrangements

Includes side lights, tail lights, hazard lights and warning lights. Reversing lamps and novel fixtures such as reflectors, are coded also in X22-B02R and X22-B02B respectively, from 2005.

#### X22-B03

Interior lighting; Horns; Portable emergency signal devices

# X22-B03A\*

# [1992-2004]

# Audible reversing warning

\*This code is now discontinued and transferred to X22-B02R from 2005 onwards. It remains searchable and valid for records up to 2004.

#### X22-B03B

#### [2005]

# Interior lighting

Includes courtesy lights, dashboard lights and lighting for other compartments such as vehicle boot.

# X22-B03E [2005]

## **Emergency signalling devices**

Includes portable emergency services flashing lights and emergency sirens, search- or spot-light mounted on vehicle roof and electrical details of warning triangle (see also T07-X) to be placed on the road before scene of an accident or broken down vehicle. For mechanical details of emergency signalling devices see Q14-C05 instead.

# X22-B03H [2005]

#### Horns

For mechanical details of vehicle horns see Q14-C04 instead.

# X22-B05 [1992]

# Illuminated displays for other drivers

(X22-B09)

Includes illuminated number plates and displays conveying e.g. "Thank You", "Assistance required" or other messages, e.g. to help diffuse road rage situation. Also includes illuminated hub caps and decorative emblems and displays for advertising. (See also W05-E03A codes).

Bus destination sign, illuminated licence plate, number plate, emblem, decoration, advertisement

#### X22-B09

#### Other vehicle lighting arrangements

Includes general use light switches and door-lock lights. Also includes illumination not intended to warn other road users of vehicle presence/intentions, such as flood light to warn driver of puddle when exiting vehicle.

# X22-C\* [1980-1996]

#### Braking, steering

\*This code is now discontinued. The 'braking' aspect of the code is transferred to X22-C02 from 1997 onwards but remains valid and searchable for documents from 1980 to 1996. The 'steering' aspect of the code is valid and remains searchable for records from 1980 to 1982. However, since 1983 steering systems have been located in X22-C05, which will remain in force.

Hand brakes, dual-circuit, servo, steering

#### X22-C01\* [1983-1996]

#### Anti-skid and anti-lock arrangements

\*This code is now discontinued and transferred to X22-C02C from 1997 onwards. It is still searchable and valid for records from 1983 to 1996.

Modulating brake pressure

# X22-C01A\* [1992-1996]

#### **Braking for traction control**

\*This code is now discontinued and transferred to X22-C02C1 from 1997 onwards. It is still searchable and valid for records from 1992 to 1996. This code was previously used either on its own or in conjunction with X22-A03D1 and X22-G01B. It normally included sensing of wheel acceleration to control braking.

ASR, traction control braking, anti-slip braking

#### X22-C01B\*

[1992-1996]

#### **Anti-lock braking**

\*This code is now discontinued and transferred to X22-C02C3 from 1997 onwards. It is still searchable and valid for records from 1992 to 1996. It previously included sensing of wheel deceleration to control braking pressure.

ABS, anti-lock braking

# X22-C02 [1997]

# **Braking**

(X22-C)

See X22-C for records from 1980-1996. See Q18-A codes for mechanical aspects of vehicle brake systems.

# X22-C02A [1997]

# **Parking brakes**

(X22-C)

Includes electrical aspects of hand brakes and foot actuated parking brakes. See X22-G codes also for transmission based parking brakes. See X22-C for records from 1980-1996.

# X22-C02C [1997]

#### **Braking force controller**

(X22-C,X22-C01)

See X22-C and X22-C01 for records from 1983 to 1996.

#### X22-C02C1 [1997]

#### Anti-slip brake regulation

(X22-C01A)

This code is used either on its own or in conjunction with X22-A03D1 and X22-G03B. Normally includes sensing of wheel acceleration to control braking force for the wheel that has lost its grip. See X22-C01A for records from 1992 to 1996. ASR, traction control braking

# X22-C02C3 [1997]

#### Anti-lock brake system

(X22-C01B)

Normally includes sensing of wheel deceleration to control braking pressure to then prevent any wheel from locking. See X22-C01B for records from 1992 to 1996.

ABS, anti-skid braking system

# X22-C02C5 [2005]

# **Electronic stability control**

(X22-C02C)

Includes control of braking to enhance vehicle stability, e.g. to control vehicle yaw. See X22-M for vehicle suspension based electronic stability control.

X22-C02C7 [2002]

**Brake-by-wire** 

X22-C02D [1997]

# **Automatic brake initiation**

(X22-C,X22-C01)

Involves braking without any driver intervention. See X22-C for records from 1980 to 1996.

#### X22-C02D1 [1997]

### **Collision prevention**

(X22-C)

See also X22-J05 codes. See X22-C for records from 1980 to 1996.

# X22-C02D1A [2013]

#### **Brake safety**

Includes arrangements for detecting inadvertent depression of accelerator pedal instead of brake pedal and automatically applying brakes in response. For novel pedal position sensing see X22-X06L.

# X22-C02D2 [1997]

#### Automatic hill stop brake

Includes brake that is released when the clutch or accelerator pedal is depressed. See X22-C for records from 1980 to 1996.

# X22-C02D3 [1997]

## Theft prevention

(X22-C)

See also X22-X03. See X22-C for records from 1980 to 1996.

# X22-C02D4 [2002]

#### **Cruise control**

Includes brake activation to maintain distance between vehicles.

Automatic distance regulation, ADR, cruise control

# X22-C02X [2012]

#### Other braking arrangements

#### X22-C05 [1983]

# Steering

Includes electrical aspects of steering wheel details. See Q18-B codes for mechanical aspects of vehicle steering systems.

# X22-C05A [1992]

#### Power steering

Includes speed responsive power-assisted steering. Includes motor/gearing arrangements and power steering control.

Power assist

# X22-C05A1 [1992]

#### Four-wheel steering

Includes electrical aspects only. See Q18-B09 instead for mechanical passive four wheel steering systems.

## X22-C05A3 [2002]

Steer-by-wire

# X22-C05A3A [2005]

# Steering feedback/'feel' control

Includes arrangements for controlling e.g. torque feedback to steering wheel to improve or adjust driver 'feel', e.g. due to lack of mechanical linkage between wheels and steering wheel.

Feel, feedback

#### X22-C05B [1992]

#### **Automatic steering**

See T06-B01A, and T07-D01 codes.

#### X22-C05C [1992]

#### Displays, controls, switches, etc

Includes connectors also when specifically used with steering system. See also X22-X01A.

#### X22-D

## Lockable switches; Locks; Theft alarms

Includes key, and lock heaters for de-icing.

# X22-D01 [1992]

#### Locks and keys

Includes electrically-operated central locks. Also includes door lock heaters (see also X25-B codes for electric heating per se, and possibly X22-J02C prior to 2007). See Q14-H01 for mechanical aspects of vehicle locks.

# X22-D01A [1997]

# Remote-controlled and keyless entry

# X22-D01A1 [2005]

#### Remote-controlled

Includes radio control. Also see W05-D codes for remote control aspects.

Radio-controlled, IR, infrared, remote-locking

# X22-D01A2 [2005]

# **Keyless entry**

Includes use of radio frequency (RF) transponders for keyless door (un)locking (see also T04-K03B and W06-A04B and W02-G05B codes as appropriate).

#### X22-D01A2A [2005]

#### **Biometric access**

Includes fingerprint and voice recognition or retinal scanning (see also S05-D01C5A).

# X22-D01A2C [2005]

## Card/keypad access

Includes smart/magnetic strip card reader or keypad code entry devices (also see T04 codes).

[1992]

# X22-D02 [1992]

#### Lockable switches

Includes lockable cover of switch panel.

#### Theft alarms/theft monitoring

See also W05-B codes.

# X22-D03A [2005]

#### Theft alarms

X22-D03

Includes audible and visual alarms (see also W05-B01 codes), e.g. sirens or flashing vehicle hazard lights (see also X22-B codes).

# X22-D03C [2005]

#### Theft monitoring

Includes remote monitoring/indication of vehicle theft, e.g. to central station or vehicle owner (see also W05-B05 codes). Also includes GPS tracking of stolen vehicle (see also W06-A03A5 codes). For incar camera systems capturing image of thief for onboard recording or remote transmission, see also W02-F01 codes.

#### X22-E

# Instrumentation for dashboard and steering wheel

Includes touch-sensitive screens (see also T04-F codes). Also includes internal display for passengers e.g. in a bus indicating approaching stops (see also T07-A05D). For more details about general instrumentation for vehicles, section S codes must be searched. For example, S01-G06 for battery charge indicator, S02-G codes for speed sensors, S02-J codes for brake and transmission testing, and S02-K06 for recording or indicating in general. Also includes control of all information/warnings presented to driver according to driving situation, e.g. to prioritise important warnings and prevent driver from being distracted by display of minor warnings during emergency situations. For haptic feedback also see W05-A01A1 and for voice warnings see W04-V04C codes. For mechanical aspects of dashboard construction or mechanical instrumentation, see Q17-A11 instead.

Displays, panels, instruments

# X22-E01 [1983]

# **Engine performance and operation indicators**

# X22-E01A [1992]

#### Fuel

Includes specific fuel consumption, filter clogging, fuel contamination, level.

# X22-E01B [1992]

#### **Temperature**

Includes engine radiator/coolant temperature.

# X22-E01C [1992]

#### Oil

Includes pressure, level, contamination.

#### X22-E02 [1983]

Brakes, tyres, transmission, steering

# X22-E02A [1992]

#### **Brakes**

Includes brake wear indicator, brake oil contamination and level indicators, parking brake failure detector.

#### X22-E02B [1992]

#### Wheels and tyres

Includes tyre pressure measurement (see also S02-F04C1A).

# X22-E02C [1992]

#### **Transmission**

Includes gear change indication.

#### X22-E02D [2005]

# Steering

Includes indication of information directly relating to vehicle steering system, e.g. steering angle display. For indication of failure of steering angle sensor also see X22-E10 and X22-X06H. This code is not used for general displays mounted on steering wheel. E.g. for speedometer mounted on steering wheel, see X22-E05 and X22-C05C only.

#### X22-E03 [1987]

## **Battery charging/condition indicators**

From 2006 this code has been expanded to include all vehicle battery warning/indicating aspects. See X22-E and X22-F01 codes prior to 2006. Includes indication of remaining battery capacity (see also S01-G06A and X16-H01), or battery charging/discharging indication. Also includes warning that battery is connected to off-board charger, to prevent vehicle driving off while connected.

# X22-E04 [1987]

# Driver/passenger alertness alarms; driving behaviour sensing/warning

From 2014 this code has been expanded to include all driver/driving behaviour/condition analysis and warning. Includes driver reflexes/breath tester up to the end of 2013.

# X22-E04A [2014]

#### Driver/passenger alertness alarms/tester

Includes driver reflexes/breath tester, e.g. for preventing driver from driving if drunk or under the influence of drugs. Includes alerting driver through vibration alert through steering wheel or seat (also see W05-A01A1 for vibration based annunciation). Also includes vital sign monitoring for driver or passengers to check on condition of health of vehicle occupants.

Intoxication detector, drowsiness detector, haptic indication, vital signs, remote monitoring

# X22-E04D [2014]

#### Driver/driving behaviour analysis

Includes systems for monitoring driving behaviour, especially of young persons, e.g. to enable reduction in price of car insurance when safer driving is confirmed.

#### X22-E05 [1987]

# Vehicle or engine speed; Mileage indicators

Includes tachographs (see T05-G also), rpm counter. Accident data recorders which give more details like acceleration, brake application, etc. are coded in X22-E12.

Odometers, milometers, taximeters, tachometer

# X22-E06 [1987]

# **Navigational aids**

See W06-A and S02-B08 codes also for general navigation systems. Information processing aspects of vehicle guidance systems are covered by T01-J07D3.

Vehicle position sensors, information display, direction indicators, head-up display, HUD

# X22-E06A [1992]

# Using dead reckoning systems

Includes use of map information stored in e.g. CD-ROM, and compass and wheel turn angle sensors.

X22-E06B [1992]

**Using GPS** 

X22-E06C [1992]

Using roadside beacons

#### X22-E06D [1992]

#### Using combination of methods

From 2002, W06-A08 is no longer applied for combination navigation systems specifically for motor vehicles.

# X22-E06F [2002]

# **Navigation information updating system**

Includes system for updating map information e.g. for area in which vehicle travels, using information from off-board centre. Also used when off-board traffic centre provides driver with alternative route to destination to avoid congestion/accident (see also X22-E11, T07-G01 and T07-A05C codes).

# X22-E07 [1992]

# **Head-up display**

Includes general projection displays, e.g. for head-up display of current vehicle speed (see also X22-E05) or head-up display of e.g. navigational data (see also X22-E06). See also W04-Q01K for head-up video displays.

Projection, windscreen, head-up

#### X22-E08

[1992]

#### Radar surveillance detector

See W06-A04E3C also.

#### X22-E09

[1992]

#### TV/video camera for all round view

Only used when camera image is presented to driver. For video image recognition of e.g. road signs or obstacles, see X22-E13A only. Also see W04-M01 codes for novel video cameras per se, and W02-F01E for CCTV systems where image is presented to driver.

#### X22-E09A

[2006]

#### For external view

Includes rear-view reversing cameras and 'enhanced' or 'assisted' vision cameras/displays, such as IR imagers for assisting driver when driving at night or in poor weather conditions (see also W07-G and W04-M01E codes as appropriate). Also see W02-F01E for vehicle external view CCTV system.

## X22-E09C

[2006]

#### For internal view

Includes video camera for enabling driver to view interior of vehicle, e.g. to enable bus driver (also see X22-P05A) to see if passenger wants to alight or to monitor vandalism. Can also be used for antitheft purposes, e.g. to capture image of thief inside vehicle (see also X22-D03C).

#### X22-E10

[1992]

# Service-need/general accessories malfunction displays

Includes faulty lights, oil-change alarms, etc. For indicating faults/problems with any onboard systems.

#### X22-E11

[1992]

# Traffic management/driver information systems

Includes presentation of all types of traffic, weather and road information to driver (see also T07-G codes for off-board traffic and weather information provision aspects). See X22-E06F instead for systems for updating vehicle navigational route information.

Congestion, accident, flood, pot hole, road surface repairs

## X22-E12

[1997]

#### Accident data recorder

(X22-E05)

Includes automatic recording of speed, acceleration, brake application, direction indicator position, headlight on/off status, etc. Tachographs are only coded in X22-E05.

ADR, drive recorder

#### X22-E13

[1997]

# Collision-imminence warning/alarm

(X22-E

Includes lane deviation or crossing alarms, and distance to obstacle indicator (see also X22-X06 codes). For systems detecting imminence of collision, see X22-J05 codes. For systems preventing collision by e.g. automatic brake application, see X22-C or other appropriate codes. Road marking sensor, lane marking sensor, deviation, collision warning display

#### X22-E13A

[2002]

# Image recognition

Includes video image recognition of obstacles or road signs, e.g. to identify change of speed limits or hazards, road edges. See also T01-J10B/T04-D codes for image recognition. For systems presenting actual video image of road to driver display, see X22-E09 instead.

#### X22-E14

[2002]

# Warning of approaching emergency vehicle

Includes detection of siren and activation of dashboard light or muting vehicle radio.

Ambulance, police car, fire engine

#### X22-E99

[2008]

#### Other instrumentation

Includes dashboard instrumentation and warnings not covered previously.

#### X22-F

# Power supplies; Batteries; Alternators; Charging

Includes solar cell panels.

# X22-F01 [1987]

#### **Batteries**

Includes vehicle battery, per se. Other battery details are in X16.

Connectors, cut-off switch

#### X22-F01A [1987]

# Charging

Includes chargers per se (see also X16-G) and charging control.

X22-F01A1 [1992]

**Jumper cables** 

X22-F01A2 [1992]

Off-board chargers

X22-F02 [1987]

# **Alternators; Dynamos**

Includes vehicle alternator per se (with further details in X11), output controllers (see also X13-G02). For combined starter/generator also see X22-A04 and X11-H20 (or X13-G20 for starter/generator control). Also includes dynamos used as a primary power source on bicycles. Rectifiers, regulators, dynamo, AC generator, DC generator

#### X22-F03 [1997]

#### **Auxiliary supply**

(X22-F,X22-X)

Includes power supply arrangement for external apparatus, e.g. welding equipment, and encompasses additional battery or generator, including roof mounted wind turbines or solar panels (see also X15 codes). Also includes power supply for microprocessor used e.g. for engine or other controllers. Includes power generated from exhaust heat recovery (see Q51-J02F for mechanical details of exhaust heat recovery).

Wind turbine, solar panel, back-up battery

# X22-F04 [2002]

#### Vehicle power supply control systems

Includes prioritisation of supply of power to specific or essential vehicle systems.

# X22-F05 [2002]

# Use of cigar lighter socket or auxiliary output as power supply, e.g. for vehicle accessories

Includes kettle, perfume dispenser, portable light and other devices that are powered from cigar lighter socket. Includes Non-contact charging pad to charge mobile phone (also see U24-H02 and W01-C01E5E codes). Used in conjunction with other X22 and cross-reference codes as appropriate.

[1997]

Mobile phone charging, wireless charging

# X22-F09

# Power supply or battery circuit disablement; Switches

(X22-F, X22-X)

Includes automatic disabling of power from electrical circuits to prevent fire risk upon sensing of crash. Also includes hidden switches for power cut-off for anti-theft purposes.

# X22-G [1983]

#### Power train

Includes power take-off arrangements used to drive auxiliary devices. Also see X22-P09 and X25 for tractor power take-off.

# X22-G01 [1992]

# Transmission/clutch/gear systems

Includes electrical aspects of powertrain hardware such as novel solenoid valves used in the hydraulic system, electric aspects of differentials (See X22-G05 only for four-wheel drive aspects), motor gearing etc. that are used in an unspecified type of transmission system. Use X22-G01C/X22-G01E instead if type of transmission is detailed.

Automatic transmission, manual transmission, CVT, differential

# X22-G01A\* [1992-2004]

#### Cruise control

\*This code is now discontinued and transferred to X22-G03A. It is still searchable and valid for records from 1992-2004. This code is used either on its own or in conjunction with X22-A03B1 or X22-C02D4 depending on variables being controlled.

#### X22-G01B\* [1992-2004]

#### **Traction control**

\*This code is now discontinued and transferred to X22-G03B. It is still searchable and valid for records from 1992-2004. This code is used either on its own or in conjunction with X22-A03D1 or X22-C02C1 depending on variables being controlled.

# X22-G01C [2005]

#### **Automatic transmission systems**

Includes continuously variable transmission (CVT).

## X22-G01D [2009]

#### Semi-automatic transmission systems

Includes manually shifted transmissions in which all the operations normally performed by the driver when changing gear are performed by electronically controlled actuator assemblies. Includes clutchless transmissions and paddleshift transmission control arrangements.

# X22-G01E [2005]

#### Manual transmission

#### X22-G03 [2005]

# Powertrain/transmission control systems

Includes integral engine/transmission control (also see X22-A03F). Search with T01-J07D1A for microprocessor controlled transmission. See also X22-G01 for records prior to 2005.

# X22-G03A [2005]

#### Cruise control

This code can be used on its own or in conjunction with X22-A03B1 or X22-C02D4 depending on the variables being controlled. See also X22-G01A for records prior to 2005.

# X22-G03B [2005]

## **Traction control**

This code can be used on its own or in conjunction with X22-A03D1 or X22-C02C1 depending on the variables being controlled. See also X22-G01B for records prior to 2005.

# X22-G03G [2005]

# Shift-by-wire

Includes steering wheel mounted gear change arrangements. Paddle-shift.

#### X22-G03N [2005]

# Transmission noise/vibration/harshness control

Includes arrangements for reducing shift-shock. see also X22-A03F for integral engine/transmission control aspects. See also X22-X08 for passenger compartment noise and vibration reduction in general and X22-A12 for engine noise reduction.

# X22-G05 [1992]

#### Four wheel-drive systems

Includes electrical aspects of four, six and all wheel drive systems, such as electrically lockable differentials and electrically locking hubs.

# X22-G07 [2012]

#### Lubrication/cooling arrangements

Lubrication and cooling aspects of transmission systems. For mechanical aspects refer to Q13-A20 and Q13-A22.

#### X22-H

[1983]

#### Window winders

(X22-X)

Electric window, power window

#### X22-H01

[1987]

#### **Control**

See also V06-N.

Control circuits, obstruction detection

#### X22-H02

[1987]

#### Motors

Includes motors per se. See V06-M codes for further motor details.

# X22-J [1983]

#### Vehicle accessories

(X22-X

Includes electrical aspects of motor vehicle accessories. See Q14 for mechanical details of vehicle accessories.

#### X22-J01

[1983]

[1983]

# Windscreen wipers

Includes screen washers, motors per se and their controllers (with details in V06-M and V06-N). Also includes snow and ice removal e.g. by using vibrators. For rain or moisture sensors see X22-X06E codes and S03-F09, and S03-E codes.

Switches, position detection, washers

#### X22-J02

# Heating, ventilating, air-conditioning

Includes electrical aspects of overall passenger compartment HVAC system.

Control, motors, temp sensors, fans, blowers

#### X22-J02A [1987]

#### **Demisters**

For windscreens, mirrors, See also X25-B01C1C.

# X22-J02C [1992]

#### Heating

Includes heating for passenger compartments. See X25-B01 codes for electrical heating per se.

# X22-J02D [2005]

#### Ventilating

Includes electrical aspects of passenger compartment ventilating. See X22-J02E instead if ventilator/blower is part of an air-conditioning/climate control system. See X22-J03A5 instead for ventilated seats.

# X22-J02E [1992]

# Air conditioning; Climate control

For novel temperature or humidity sensing arrangements see X22-X06X and S03 codes. Compressors, refrigeration

X22-J02E1 [2005]

Climate control

X22-J02E3 [2005]

#### Air treatment arrangements

Includes de-odorisers, perfume dispensers and air ionisers etc. Also includes sterilisation arrangements for killing microorganisms, e.g. using UV radiation.

De-odorisers, perfume dispenser, ioniser

# X22-J03 [1983]

#### Seats, seat belts

(X22-X)

Control, motors

X22-J03A [1992]

**Seats** 

X22-J03A1 [1992]

Heaters

X22-J03A2 [1992]

**Massaging devices** 

X22-J03A3 [2002]

#### Headrest

Includes automatic adjustment of vehicle headrest according to driver preference. From 2005 active head restraints are transferred to X22-J03A3A.

# X22-J03A3A [2005]

#### Active head restraint

Includes active control of seat headrest to place it in optimum position to protect occupant's head/neck during a collision. Prior to 2005, active head restraints were coded in X22-J03A3 and X22-J11.

# X22-J03A5 [2007]

# Cooling

(X22-J03A, X22-J02)

Includes ventilating and air-conditioning systems used to cool motor vehicle seats. See X22-J03A and X22-J02 codes prior to 2007.

X22-J03B [1992]

**Belts** 

Inertia sensors

X22-J03B1 [1992]
Automatic release, retraction

X22-J04 [1983]

Mirrors

(X22-X)

Includes mirrors with heaters, loudspeakers, lights, aerials.

Motors, rear-view mirrors, adjusting, wing mirrors, positioning, demisters

#### X22-J05 [1983]

## Anti-collision and parking aids

(X22-X

These codes are used either on their own or in conjunction with other codes for related anticollision aspects. The latter include:

- (a) imminence of collision warning systems (see X22-E13);
- (b) controlling vehicle automatically to avoid collision e.g. automatic application of brakes (see X22-C02D1);
- (c) measuring and indicating distance to obstacle or preceding vehicle (see X22-X06F); and
- (d) detecting deviation from lane or road marking (see X22-X06G).

Distance sensing, warning alarm

#### X22-J05A [1992]

## Radar systems

For more details on radar see W06-A04.

# X22-J05B [1992]

# Sonar systems

See W06-A05 also.

Ultrasonics

# X22-J05C [1992]

# **Optical systems**

Includes e.g. laser rangefinder. See W06-A06 codes also.

Lidar

# X22-J05M [2021]

# **External sensor mountings; Cleaning**

Includes external environmental sensor motorized mountings and positioning systems. Includes sensor cleaning arrangements such as wipers or washers for LIDAR (see also X22-J05C), SONAR, or camera (see also X22-E09A).

# X22-J06 [1983]

# Lighters

Socket, heater coil

# X22-J07 [1987]

# Air bags

Includes inflatable side curtains and knee bolsters.

# X22-J08 [1987]

# Sun visors; Sun roof; Convertible soft top roof

Includes obstruction detection and roof open/close motors.

Controllers, convertible tops, vanity mirror lights

# X22-J09 [1992]

#### Sun screens, curtains

(X22-J, X22-X)

#### X22-J10 [1992]

#### **Accessories remote starting arrangements**

# X22-J11 [2002]

# Passenger safety systems

Includes anti-submarining seats, flip-up roll over bars and roll over control arrangements. For airbags and seatbelt pre-tensioners see X22-J07 and X22-J03B1 only. From 2005 active head restraints are coded in X22-J03A3A only. Also includes general passenger safety aspects such as systems preventing driver from using mobile telephone or viewing movie whilst driving. Fire extinguishers, bumpers

#### X22-J11A [2002]

# **Emergency signalling**

Includes manually activated signalling and automatic mayday signalling or automatic activation of locating beacon after vehicle accident (also see W06-A01C for vehicle borne locating beacon). Automatically illuminated 'assistance required' sign (also see X22-B05).

# X22-J11B [2002]

#### **Pedestrian protection systems**

Includes vehicle mounted apparatus such as exterior bonnet airbag to protect other road users in event of collision.

# X22-J11C [2010]

#### Vehicle specific clothing

Includes electrical details of all vehicle specific clothing. See X22-P01 and X22-P02 for bicycle and motorcycle wearables. See Q14-C16 for mechanical details of vehicle specific clothing. Helmets, jackets, gloves, electric heating, LED, lighting, wearable

# X22-J12 [2002]

# In-car office/information equipment

Includes e-mail, facsimile equipment powered by vehicle supply and on-board aspects such as novel displays and user interfaces used to view e.g. Internet information. From 2007 general Internet browsing e.g. for downloading local tourist information, map information, restaurant menus and shop opening times or for making hotel reservations and booking tickets, is transferred to X22-K08.

## X22-J13 [2002]

#### In-car entertainment systems

Includes television and games machine powered from vehicle supply. Includes monitors e.g. mounted in rear of headrest (see X22-J03A3 also). VTR, DVD, TV, MP3, game

# X22-J14 [2012]

# License plates

Includes license plates with RFID transponder (also see W06-A04B and T04-K codes). Illuminated number plates are also codes in X22-B05.

# X22-J15 [2012]

#### **Passenger display arrangements**

Includes prompter for reminding passenger of approaching destination point, and for reminding passenger to not forget personal items when disembarking.

# X22-J19 [2013]

#### Steps and running boards

Includes automatically controlled retractable steps (see also X22-X19 and S05-K if for disabled person assistance) and illuminated running boards. See Q14-I instead for mechanical details.

# X22-J20 [2010]

# Vehicle stands, supports, jacks

(X22-J99)

Includes on-board kick-stands for bicycles or motorcycles (see also X22-P01 or X22-P02 respectively), as well as electrical details of off-board stands and supports for parking cycles. For mechanical details of e.g. cycle stands see Q14-J instead. For parking fee charging details see T05 codes. Also includes electrical details of on-board jacks. See X22-X16 for off-board servicing equipment.

Holder, support, rack, stand, kickstand, parking, lock

#### X22-J99

[2007]

#### Other vehicle accessories

(X22-J)

Includes electrical accessories not covered elsewhere such as refrigerated cool box (see also X27-F codes) powered from cigarette lighter socket (see also X22-F05). See Q14 instead for mechanical vehicle accessories.

Ash trav

# X22-K [1987]

# Vehicle communications and connectivity; Multiplexing; Networking; V2X

(X22-X)

Includes vehicle to everything communications (V2X; C-V2X). Includes all communications, connectivity, networking and multiplexing, including cellular (also see W02-C03C1L) and dedicated short range communication (Also see W01-A06C4E). Includes communication within a motor vehicle (intra-vehicle), communications between vehicle and other vehicles (inter-vehicle), roadside (V2I), pedestrians (V2P) etc. Includes vehicle telephones and hands-free systems. See W01 and W02 codes for telecommuncations per se.

Multiplex, DSRC, 5G, Fcellular, data transmission, LAN, WAN, wide area network, Bluetooth®, CAN bus, controller area network, bus, ethernet, VAN, UART, universal asynchronous receiver/transmitter, V2X, C-V2X

# X22-K01\* [2007-2008]

#### **Multiplex control system**

\*This code is now discontinued and combined with X22-K03 from 2009 onwards since current vehicle networking and multiplexing are essentially the same thing. It is still searchable and valid for records from 2007 to 2009. See W05-D02 also for multiple access and multiplexing control signals transmission, and T01-J07D1B for multiplex control system using microprocessor technology. Used to highlight multiplex control of distributed (electrical) loads via single electric cable/bus and fiber-optic systems.

#### X22-K02 [2021]

# Vehicle to network; Vehicle to cloud communications

Includes vehicle to cloud (V2C) communication that uses V2N access to broadband cellular mobile networks to enable data exchange with the cloud (also see T01-N codes). Includes over the air (OTA) updates to vehicle software. Remote vehicle diagnostics (also see X22-X16). Includes browsing and downloading information such as navigation data (see X22-E06F), local tourist information, shop opening times (see X22-J12), restaurant menus, music files (see X22-J13) and making hotel reservations or booking tickets using in-car connectivity to the cloud. See X22-K08 for connectivity to e.g. wifi hotspot in service station. V2N, V2C, IoT

#### X22-K03

[2007]

# Intra-vehicle; Vehicle to device communications networking/connectivity; Multiplexing

(X22-K01)

Includes in-car high speed, integrated communications networks and multiplexing arrangements for interconnecting various vehicle systems, e.g. using wireless LANs or serial data buses, Bluetooth® etc. (see also W01 codes), avoiding the need for dedicated point-to-point wiring. For enabling internal communications between previously standalone vehicle control systems such as engine and braking systems. Includes DSRC vehicle to device (V2D) and cellular vehicle to device (C-V2D) communications to e.g. connect smartphone, tablet or wearable to vehicle infotainment system. Includes app for controlling vehicle locking/starting.

CAN bus, CAN 2.0, LAN, LIN, Ethernet, wireless, UART, VAN, ABUS, SAE J1850, local interconnect network, controller area network, universal asynchronous receiver/transmitter, V2D, C-V2D, mobile phone

# X22-K05 [2007]

#### Inter-vehicle communications: V2V

Includes communication between different vehicles to enable them to wirelessly exchange information about their speed, location, and heading. Includes DSRC V2V and C-V2V communication providing 360 degree awareness of other vehicles. Also includes systems such as Bluetooth (RTM) ad-hoc networks for allowing communication between different vehicles, e.g. for passing traffic or navigation data between vehicles (see also X22-E06F, for informing vehicle of presence of nearby vehicles e.g. by transmitting GPS position data between vehicles, or for automatic collision avoidance (see also X22-J05 codes) or other safety purposes.

Platooning, cooperative adaptive cruise control, wireless, piconet, cellular V2V

# X22-K06 [2021]

# Vehicle to pedestrian communications; V2P

Includes communication between vehicle and persons, pedestrians or cyclists including DSRC V2P and cellular V2P communication. Includes warning pedestrian or cyclist of dangers such as approaching vehicle and for warning drivers of presence of other road users.

V2P, C-V2P, cyclist, bicycle

# X22-K08 [2007]

# Vehicle to offboard/infrastructure communications: V2I

(X22-J12)

Includes communication between motor vehicle and offboard infrastructure, roadside units or traffic signals (also see T07-B codes). Includes cellular vehicle-to-infrastructure (C-V2I) communications. Also includes dedicated short range communication (DSRC) based V2I. Includes systems for communication between vehicle and external systems such as wifi hotspot in service station for downloading information via offboard system that provides connectivity.

Infrastructure, offboard, V2I, C-V2I

# X22-K11 [2008]

#### Vehicle telephone

Includes all aspects of car phones, including handsfree arrangements. Also see W01 codes for telephones and cellular communication per se. Also see X22-X02B for novel phone mounting arrangement.

#### X22-K99 [2007]

# Other multiplexing/networking/communications

# X22-L [1987]

# Speech synthesizers; Speech recognition units for various applications; Gesture control

(X22-X)

From 2020 this code has been expanded to cover other forms of non-touch control mechanisms such as gesture control. See W04-V codes also for speech analysis/synthesis per se. Includes systems for recognizing hand movements, facial expressions or eye movements used to control vehicle functions (also see S05-D01C5A). For microphones etc. used for car telephone see X22-K11 instead.

Microphone, gestural, eye tracking, gaze

#### X22-M [1987]

# Suspensions

(X22-X)

Includes control of suspensions.

Dampers, height controllers, shock absorbers, spring vibration control, levelling

# X22-M01 [2006]

# Suspension systems

Includes electrical aspects of motor vehicle suspension hardware.

#### X22-M01A [2008]

#### Mechanical springs/dampers

Includes electrical aspects of motor vehicle suspensions using mechanical/pneumatic/fluid springs and dampers.

#### X22-M01C [2008]

## **Electrical springs/dampers**

Includes suspensions that utilise linear electromagnetic motors (LEMs) at each wheel in place of conventional shock absorbers and springs. See also V06 codes for linear electric motors per se.

## X22-M03 [2006]

#### Suspension control

Includes suspension control arrangements such as active suspension, electronically controlled dampers, body roll control etc.

#### X22-N [1987]

# Switches for general application

(X22-X)

See also V03 for mechanical switches per se. Electronic switching is covered by U21 codes only. X22-P [1992]
General vehicle types

X22-P01 [1992]
Bicycle

**Bicycle** *Tricycle* 

X22-P02 [1992]

Motorcycle

Moped

X22-P03 [1992]

External combustion e.g. gas turbine

X22-P04 [1992]

Hybrid

Includes vehicles with electric motor- and IC engine-prime movers. Also see X21-A01D and other X21 codes as appropriate.

Parallel hybrid

X22-P04A [2007]

**Hybrid-electric** 

Includes series/parallel/mixed hybrid-electric and hybrid-fuel cell vehicles

X22-P04E [2007]

**Hybrid-mechanical** 

Includes electrical details of hybrid-flywheel and hybrid-pneumatic or hybrid-hydraulic vehicles.

Petro-hydraulic, petro-air, compressed air

X22-P05 [1992]

**Commercial vehicles** 

Includes non-specific delivery vehicles

X22-P05A [2002]

**Bus/coach** 

X22-P05B [2002]

Lorry/truck

Includes articulated trucks/heavy goods vehicles.

X22-P05C [2002]

Taxi

X22-P05F [2005]

**Forklift truck** 

See also X25-F05A. Electric forklift trucks are coded in X21-A01B only.

X22-P05H [2010]

Road cleaning vehicles

(X22-P05X)

Includes road sweepers and snow ploughs (see also X25-U05).

X22-P05R [2010]

Refuse collection vehicles

(X22-P05X)

Includes rubbish trucks.

X22-P05X [2002]

Other commercial vehicles

Includes commercial vans and tow trucks.

X22-P06 [1992]

Military

X22-P07 [1992]

Construction

Bulldozer

X22-P08 [1992]

Recreation

Go-kart, caravan, RV, snowmobile, ATV

X22-P09 [1992]

Agricultural

See also X25-N codes.

X22-P10 [1992]

**Emergency services** 

Includes ambulances, fire engines, police cars.

X22-P11 [2002]

**Towed trailers** 

Includes electrical aspects, e.g. lights on rear of trailer towed by vehicle (see X22-B02 codes also) or trailer of heavy goods vehicle (see X22-P05B also).

X22-P12 [2012]

**Amphibious vehicles** 

Also see W06-C15X or Q24-P30 as appropriate.

X22-P15 [2015]

#### **Driverless/autonomous vehicles**

Includes vehicles that can drive themselves. Used with X22-C05B, X22-C02D, X22-A03B codes and X22-J05 codes as required for automatic steering, braking, speed control and radar type anti-collision systems.

#### X22-Q [1992]

#### Non-engine related fuzzy control

This code is used either on its own or in conjunction with other related codes, e.g. X22-M for suspension systems. Fuzzy logic systems, per se, are covered by T01-J16B where novel technology details are given.

# X22-R [2018]

#### **Rider assist**

Includes systems for assisting riding of vehicles such as motorcycles or mono-wheel vehicles. Includes balance-aiding and self-balancing systems e.g. using gyroscopes or automatic steering correction to keep motorcycle upright.

Gyroscope, balance, balancing

#### X22-U [2005]

# Motor vehicle rental, hiring and sharing systems

Includes overall system associated with motor vehicle hiring and rental with some on-board vehicle aspect, e.g. enabling user to book vehicle on-line (see T01-N and T01-J05 codes) while central controller provides authorisation and remote access to allocated vehicle. Also includes car pooling arrangements with some on-board vehicle aspect. See also T01-J05A2N for business processes related to the transportation industry. Hiring, leasing, rental, car-pool, car sharing, internet

# X22-W [2006]

booking

# Non-engine related by-wire control

Includes general by-wire control systems, including 'total' vehicle by-wire control and specific controllers not covered elsewhere such as by-wire headlamp beam aiming controller (see also X22-B01E and X26-L). By-wire brake (X22-C02C7), shift (X22-G03G) and steer (X22-C05A1) controllers are coded in their relevant sections ONLY. See X22-A03W only for general engine based by-wire controllers. Also see X22-K codes for novel vehicle networking/communications systems that enable the by-wire control. Also includes overall systems for determining whether it is safe to operate in autonomous driving mode and for switching between manual and (semi)autonomous driving modes. See also X22-P15 for autonomous vehicles per se and other codes as appropriate. Includes vehicle intelligent adaptive control systems. Driver-profile auto adaptation

#### X22-X

#### Other vehicle aspects

Includes static electricity (see also X25-S) and cathodic protection (see also X25-R06), driving instruction simulators (see also W04-W07A), etc.

#### X22-X01 [1987]

# Wiring harnesses; Electrical connectors in general

See V04 also for connectors and harnesses. Includes all wiring/cabling installations.

# X22-X01A [1997]

#### **Electric connectors**

See also V04 codes.

# X22-X01B [1997]

# Wiring or cable installations

Includes also wiring harnesses, see V04-V02 and X12-D07.

#### X22-X01B1 [1997]

#### Clamps

For general cable clamps, see also X12-G04A2.

#### X22-X01B2 [1997]

#### **Grommets or bushing**

See also X12-E03C and X12-G04A3.

# X22-X01C [2012]

## Fuse box/wiring box

Includes fuse boxes and their covers (see also X13-D codes), and wiring boxes.

# X22-X02 [1987]

# Aerials; Radio and loudspeaker mountings, etc.

See W02-B and W03-B codes for further aerial and radio details.

Antenna, window aerials, automatic aerial retraction

X22-X02A [1992]

**Aerials** 

X22-X02A1 [1992]

**Roof/body mounted** 

X22-X02A3 [1992]

Glass-mounted

# X22-X02B [1992]

# Radio, cassette player, CD player, minidisk player, and loudspeaker mountings; etc.

Includes mounting for other electronic devices such as mobile phone, handheld navigation device or computer.

Car telephone mounting

# X22-X03 [1992]

#### **Anti-theft and Anti-hacking**

Includes anti-theft arrangements with some kind of immobilisation of vehicle (see X22-A08C for engine based immobilisers) and systems for preventing hacking or overriding of vehicle systems. Use with X22-D codes such as X22-D01A for arrangements for preventing jamming, code grabbing, App hacking etc. to illegally gain vehicle access. See W05-B codes for theft alarms per se. See X22-K codes for vehicle communications per se.

Steal, theft, override

#### X22-X04

#### [1992]

[1992]

# Refrigeration for container trucks

See also X27-F for refrigeration per se.

#### X22-X05

# Electrical aspects of doors, boots, windows

Includes electrical door opening/closing devices (see X22-D01 instead for door locking arrangements and X22-H codes for window winders). Also includes electrical aspects of streamlining devices such as spoilers.

Roof spoiler, aerodynamic, sliding door, remote control tailgate opening, electrochromic glass, privacy glass

#### X22-X06 [1992]

# Non-engine related measurements/sensors

These codes are used on their own or in conjunction with other codes depending on claimed aspects. For general instrumentation, S01, S02, and S03 codes should also be searched. Includes electrical sensors per se and their mounting arrangements. These codes are generally applied when the sensor is novel per se or when a standard sensor is used in an unusual way.

# X22-X06A [1992]

# Wheel speed and slip sensors

Includes sensing of wheel speed or general vehicle speed. Measurement of engine speed is coded in X22-A05C only.

# X22-X06B [1992]

#### Acceleration or shock sensors

Includes measurement of acceleration, deceleration and shock or impact sensing. See also S02-G03.

#### X22-X06C [1997]

#### Road friction sensor

See also S03-F08.

# X22-X06D [1997]

## **Seat occupation sensor**

Also includes child seat presence or absence detector to then inhibit or trigger e.g. air bag. See also S03-C06.

# X22-X06E [1997]

#### Rain or moisture sensor

(X22-J01.X22-X06)

See S03-F09 and S03-E codes. Includes humidity sensor.

#### X22-X06F [1997]

#### Distance to obstacle measurement

See also X22-E13 or X22-J05 codes and S02-B01.

## X22-X06G [1997]

# Lane deviation sensing arrangement

Includes optical recognition of white line.

# X22-X06H [1997]

#### Steering angle/torque sensor

From 2010 this code has been expanded to include steering torque sensing. Prior to 2010 see X22-X06(X).

# X22-X06J [1997]

#### Yaw sensor

Measuring angular rotation or movement around yaw axis/direction of heading.

Centre of gravity, vertical axis accelerometer, gyroscope

#### X22-X06K [1997]

# **On-board weighing system**

See X22-P05B for lorry on-board load/cargo weighing arrangements.

#### X22-X06L [1997]

# Control pedals' position sensors

# X22-X06M [2002]

## Submergence sensing arrangement

For detecting submergence of vehicle in water, e.g. for control of vehicle windows to allow escape from sinking vehicle.

Sinking detection

# X22-X06N [2005]

# Non-engine related diagnostics

Includes diagnostic devices interfacing with vehicle control devices. See also S02-J codes for testing per se.

# X22-X06T [2010]

# **Temperature sensor**

Includes non-engine temperature sensing e.g. for control of vehicle air conditioner (see also S03-B codes). For engine related temperature sensing see X22-A05F codes instead.

#### X22-X06X [2005]

# Other non-engine related measurements/sensors

Includes other specific measurements and sensors such as suspension height sensor (see also X22-M), gear shift and gear position sensors (see also X22-G). Includes coupling sensor.

Ground clearance measurement

# X22-X07 [1992]

# **Road toll devices**

See also T07-A03E for roadside charging aspect.

#### X22-X08 [1992]

#### Noise/vibration/harshness reduction

Includes general noise, vibration and harshness (NVH) control for improving comfort of vehicle occupants. For transmission based NVH control see X22-G03N only, and for engine based vibration and noise reduction see X22-A12 or X22-A03X as appropriate. See also W04-V. See Q17-N for mechanical NVH reduction arrangements.

# X22-X09 [1992]

# On-board tyre inflator

#### X22-X10 [1992]

#### **Electronic components**

Includes components e.g. ASICs for vehicles but with no mention of its specific use. See also appropriate U codes. Also includes general electronic control units where specific function being controlled is not detailed. See X22-A03 for general engine based ECUs where specific engine system being controlled is not detailed.

# X22-X11 [2002]

# Agricultural implements and their control

Includes electrical aspects of implements attached to tractor and driven by power take-off.

#### X22-X12 [2002]

# **Pedal arrangements**

Includes pedals that are electrically positioned according to driver's requirements and other electrical arrangements connected to pedal operation or adjustment. See X22-X06L for control pedals' position sensors per se.

Electronic accelerator pedal

# X22-X16 [2005]

# Vehicle maintenance equipment and service monitoring; Vehicle testing

Includes on-board aspects associated with e.g. fleet maintenance, vehicle servicing equipment (see X22-A16 for engine servicing equipment) and remote service monitoring (see X22-E10 for on-board service required warning). Includes off-board arrangements for testing/measuring vehicle wheel alignment (see also S02-J02A), vehicle rolling roads and engine dynomometers (see also S02-J01A). See X22-X06 codes for on-board vehicle measurement systems.

#### X22-X18 [2007]

#### Vehicle (un)loading arrangements

Includes tail lifts used on lorries (see also X22-P05B), vehicle mounted cranes and other loading/unloading ramps/fixtures. See Q15 codes for mechanical (un)loading aspects.

#### X22-X19 [2007]

# Disabled people aids

(X22-X)

Includes all systems or vehicle adaptations for helping physically challenged persons drive or travel in motor vehicle. Includes wheelchair lifting arrangements and ramps. See also S05-K01. For mechanical aspects see Q15-B13 instead.

#### X22-X20 [2008]

# Vehicle design/manufacture/assembly

Includes electrical details of design, manufacture and assembly of vehicles and vehicle components. See Q16-D codes for mechanical aspects of vehicle design and manufacture.

# X22-X20A [2008]

# Vehicle

# manufacture/assembly/dismantling

Includes manufacture and assembly of motor vehicles and their components. See X25-X14 for manufacturing/assembly plants per se. Also includes systems for dismantling vehicles e.g. to enable recycling of materials (see also X25-W04). Spray painting, end-of-life disposal

# X22-X20E [2008]

# Vehicle design

Includes all electrical details of vehicle design. Also see T01-J15 codes for computer aided design (CAD).

Simulation testing

# X23: Electric Railways and Signalling

**Note:** Also includes non-electric traction railways with substantial electrical content in the disclosure. See Q21 instead for mechanical aspects of railways.

#### X23-A

#### **Electric railways**

#### X23-A01

#### Propulsion, braking, suspension

# X23-A01A [1983]

# **Propulsion**

Includes transmission of mechanical power. *Drive system, mountings* 

# X23-A01A1 [1987]

#### **Electric motor**

Includes motors per se, with further details in X11. Linear motors, induction motors, dc motors, coils, magnetic circuits

#### X23-A01A2 [1987]

# **Engines**

Includes engine control and electrical hardware aspects of railway vehicle engines.

Diesel-electric locomotive, diesel, petrol, fuel

#### X23-A01A2B [2016]

#### **Engine control**

Includes general combustion engine control such as speed, fuel and ignition control. For pollution control see X23-A01A2C instead.

#### X23-A01A2C [2014]

# **Exhaust gas cleaning systems; Pollution reduction**

Includes electrical details of locomotive engine exhaust gas cleaning systems and pollution reduction arrangements. For mechanical aspects see Q21-C01C and Q51-J02 codes.

Catalytic converters, EGR, catalyst electric heating

# X23-A01A3 [1997]

#### **Power converters**

See X23-A02A for converter control for train/tram motors. See also X12-J and X13-G03 codes.

# X23-A01A4 [1997]

# **Magnetic levitation arrangements**

Includes superconducting magnets/coils for levitation or suspending of railway car. See also X12-C05 codes.

# X23-A01A5 [1997]

#### **Transformers**

Includes supply step-down and converter transformers. See X12-C codes for further transformer details.

#### X23-A01B [1983]

#### **Braking**

Includes train brakes as well as track brakes.

#### X23-A01B1 [1997]

## (Electro)mechanical brakes

Includes electromagnetic and electrically-operated mechanical brakes (see X25-L02 also) as well as electro-pneumatic and electro-hydraulic brakes.

Electro-magnetic, electrohydraulic, electropneumatic

#### X23-A01B3 [1997]

#### **Electrodynamic brakes**

Includes resistive, eddy current and regenerative brakes (see also X13-F02).

#### X23-A01B5 [1997]

#### **Automatic braking**

Includes ATP(automatic train protection)-triggered braking to prevent accidents. See also X23-B02.

# X23-A01C [2005]

#### Suspension

Includes electrical aspects of railway vehicle suspension systems, such as carriage/ride tilt control. Magnetically levitated suspension/propulsion systems are coded in X23-A01A4 only.

# X23-A01L [2012]

# **Lubrication arrangements**

Electrical aspects of train/locomotive lubrication.

# X23-A02

# Motor control; Monitoring operation

Includes motor protection, safety interlocks e.g. dead man's handle, operating data monitoring. Also see X13-C.

#### X23-A02A [1987]

#### **Motor control**

See also X13-F or X13-G.

# X23-A02C [1997]

#### **Automatic train control**

See also X23-A01B5 for automatic braking. Includes train door opening, vehicle status reporting, speed limiting, etc.

#### X23-A02E [1997]

#### Data bus

Includes the bus, per se, and associated hardware for communications (see also W05-D06F) between sub-systems and the main system on the train. Also, allows remote monitoring and control on multiple unit trains. Carries signals from ATP and ATC systems for various controls and status reporting.

#### X23-A02G [2002]

# **On-board monitoring systems**

Includes on-board radio communication, e.g. between head and end of train, and general on-board system monitoring. Includes on-board camera and image analysis to prevent collision.

#### X23-A03

# **Power supply aspects**

# X23-A03A [2002]

# Power supply lines; Off-board supply

Includes all power supply aspects i.e. track side poles, insulators, (see also X12-G codes) etc., supply protection (see also X13-C codes), substations for feeding power to the railway network (see also X13-E codes).

Electric overhead supply, power rails

# X23-A03C [2002]

# On-board power supply systems; Power supply control

Includes on-board generators per se, with further details in X11 or X13 if its control is part of the invention, and power supply or conversion arrangements etc.

Battery, fuel cell

# X23-A04

#### **Current collectors**

Pick-up, pantograph, brushes, shoes

#### X23-A05

# Measuring; Testing

Includes brake monitoring sensors, track straightness determination, etc.

#### X23-A08 [2012]

# Shunting or short distance haulage devices

Electrical aspect of shunting or short distance haulage devices.

#### X23-A09

# Other on-board (electric) railway train details

Includes connectors for cables passing between carriages etc. Includes refrigerated compartment for transporting cargo. For other offboard railway system details see X23-S99 instead.

# X23-A09A\* [2002-2009]

## Off-board/railway station systems

\*This code is now discontinued and transferred to X23-S. It is still valid and searchable for records prior to 2010. From 2005 major electric track laying equipment is transferred to X23-X. For station based passenger information/communications systems see X23-C02.

# X23-A09A1\* [2005-2009]

# **Security systems**

\*This code is now retired and transferred to X23-S01. It remains searchable and valid for records prior to 2010.

# X23-A09A1A\* [2005-2009]

#### For personnel

\*This code is now discontinued and transferred to X23-S01A. It is still valid and searchable for records prior to 2010. Includes detection of concealed weapons. Also includes all aspects of passenger tracking and monitoring, including authorisation/access control for passengers (see T05-D codes also).

#### X23-A09A1E\* [2005-2009]

## For baggage

\*This code is now discontinued and transferred to X23-S01E. It is still valid and searchable for records prior to 2010. Includes all aspects of baggage inspection, monitoring and tracking. Includes use of transponder tags (see also W02 codes) or barcode reader (see also T04 codes). See S03-C03 and S03-E06B codes for inspection.

# X23-A09A3\* [2005-2009]

# Station safety systems

\*This code is now discontinued and transferred to X23-S03. It is still valid and searchable for records prior to 2010. Includes fire-fighting arrangements and automatic platform-edge doors control. Prior to 2005, platform edge doors control was coded in X23-A09.

# X23-A09A9\* [2005-2009]

#### Other station details

\*This code is now discontinued and transferred to X23-S99. It is still valid and searchable for records prior to 2010. Includes transportation of baggage and passengers, and railway station specific heating and air-conditioning.

# X23-A10 [1997]

# **Environmental control and lighting**

(X23-A09)

Includes on-board train heating and airconditioning systems, internal and external train lighting.

# X23-A13 [2002]

#### On-board train accessories

Includes electrically adjustable seats, electric windows, electric door locks etc. Also used for intrain entertainment systems.

#### X23-A15 [2013]

# Passenger safety systems

Includes seat belts, airbags and fire-fighting equipment on-board the train. For station based passenger safety systems see X23-S03 instead. See X25-X05 also for fire-fighting equipment per se.

#### X23-A16 [2014]

# Cargo (un)loading arrangements

Includes train mounted cranes and other loading/unloading ramps/fixtures. See Q21-J06 for mechanical (un)loading aspects. For station side equipment see X23-S99 instead.

# X23-A17 [2014]

# **Traction increasing equipment**

Includes dispensing of particulate matter such as sand under train wheels on track to prevent wheel slippage and increasing grip. For mechanical aspects see Q21-D10A

#### X23-B

# Signalling; Safety

#### X23-B01

On route devices controlled by passage of train

#### X23-B01A [1997]

# Axle counters; End-of-train passage detection

Includes null flux detector and eddy current detector.

# X23-B01C [1997]

#### **Track circuits**

Includes associated transmitter and receiver circuits (see also W02 codes e.g. W02-C02 codes for near field systems, W02-C03 codes for radio systems, and W02-G codes for radio equipment per se).

AC-, DC-, audio frequency-, track circuits

#### X23-B02

# On route devices controlling vehicle device

For ATP and ATC signalling to control brakes and train operation see X23-A01B5 and X23-A02C codes.

Cab-, ATP-, automatic train protection-, ATC-, automatic train control-, signalling

# X23-B02A [1997]

# **Magnetic and inductive transponders**

Includes train-mounted detector coils to pick-up safe passage tone, speed monitor tone and proceed tone from track-side equipment.

# X23-B02C [1997]

#### Radio communication link

Includes provision of communications (see also appropriate W02-B, W02-C and W02-G codes) between the driver and signal centres. Also includes RF beacons to provide track data like speed limits, gradients, speed and braking commands, destination, stopping patterns, etc.

#### X23-B02C1 [1997]

# Radio communications system for speech

Includes speech radio for train dispatching and safety-critical operational messages. On-board public telephones are coded in X23-C01 only.

#### X23-B03

#### Points and signal operation; Signals

Lamp details are in X26. Road/rail traffic intersection signalling is also in T07. Switching, lamps, relays

# X23-B04

Station blocking; Interlocking between points and signals; Warning devices along route

# X23-B04A [1997]

# Signals and points interlocking

Includes relay interlocking.

# X23-B04A1 [1997]

#### Solid state interlocking

Includes processor-based interlocks. SSI, solid state interlocking, electronic

# X23-B04C [1997]

# Station blocking; Track blocking

Includes track blocking for preventing two trains from entering same track block, for anti-collision purposes.

#### X23-B04E [1997]

# Warning and safety devices along route or between trains

From 2006 this code has been expanded to include warning devices operating between trains as well as warning devices along train route.

#### X23-B04E1 [2002]

# Signalling to portable alarm unit

Includes transmission of on-coming train warning to portable unit carried by track maintenance personnel. Also see W05 codes.

#### X23-B05

# Traffic control; Classification yards

Includes marshalling of trains. Used for local control of trains e.g. in shunting yard. For control of entire railway network see X23-B05C only.

# X23-B05A [1997]

#### Rail/road crossing systems

Includes level crossings.

#### X23-B05C [1997]

#### Integrated central control

Includes system for automated transit control, automatic train scheduling and supervisory system. Also includes vehicle movement, power distribution, alarms for faults, system status information.

#### X23-B09 [1997]

# Other signalling aspects

Includes e.g. track conductors for improved signal transmission compared with use of the rails in track circuits.

#### X23-C [1997]

# Passenger information/communications systems

(X23-A09,X23-B)

Railway/train information

# X23-C01 [1997]

# On-board PA system; Displays; Telephones

(X23-B02C1)

Includes automatically triggered, e.g. by train or signalling, systems. See W04-S05 and W05-E codes, respectively, for PA systems and general displays. See also W05-A codes for warning tones. Also includes on-board public telephones (also see W01 codes), systems for enabling use of passenger's mobile phone e.g. while in tunnel, and passenger information arrangements e.g. allowing on-board internet browsing (see also T01 codes).

#### X23-C02 [1997]

# Off-board platform/station systems

Includes automatically triggered, e.g. by train or signalling, systems. Also includes station based timetable displays, internet browsing systems, computerised ticket reservation systems and other station based information/communications systems.

#### X23-D [2014]

# Type of carriage or wagon

Includes electrical details of specific types of carriages. For mechanical aspects see Q21-C03 codes.

# X23-D01 [2014]

# Wagon/freight car

Includes electrical details of wagons, vans or freight cars.

#### X23-D02 [2014]

# Hopper car

Includes electrical details of e.g. wagons for carrying particulate material with dispensing openings at bottom of wagon.

# X23-D03 [2014]

#### Tanker wagons

Includes tankers carrying fluids.

# X23-D04 [2014]

#### Mine cars

Includes electrical aspects of mine locomotives and cars. Also see X25-D for mining.

## X23-D05 [2018]

#### **Passenger carriages**

Includes electrical aspects of passenger carriages. See Q21-C03A for mechanical details.

# X23-D09 [2014]

#### Other railway vehicles

Includes electrical details of rail vehicles convertible for use on road (see also Q19-R02).

# X23-P [2014]

# **Railway Type**

Includes electrical details of special railway types.

# X23-P01 [2014]

#### **Elevated railways**

Includes electrical details of elevated railways with or without suspended vehicles.

#### X23-P02 [2014]

#### Monorail

Includes electrical details of monorail aspects.

# X23-P03 [2014]

# **Cableways**

Includes electrical aspects of aerial ways, cableways.

# X23-P05 [2014]

# Magnetically levitated railways

For novel MAGLEV train suspension/ propulsion details see X23-A01A4 also.

# X23-P06 [2014]

# **Underground railways**

Includes electrical details of underground railways/Metro

Subway, metro

# X23-P09 [2014]

#### Other railway types

Includes rack railway.

# X23-N [2012]

#### Noise/vibration/Harshness reduction

Includes all electrical details of arrangements to reduce noise, vibration and harshness in the train. For mechanical NVH reduction see Q21-N instead.

# X23-S [2010]

# Station/off-board railway systems

(X23-A09A)

Includes electrical aspects of all offboard/station/platform details. From 2005 major electric track laying equipment has been transferred to X23-X. For station based passenger information/communications systems see X23-C02 instead. See Q21-A codes for mechanical details of offboard railway stations and tracks. For offboard power supply systems see X23-A03A instead.

# X23-S01 [2010]

# **Security systems**

(X23-A09A1)

Includes off-board systems for protecting railway passengers and cargo.

# X23-S01A [2010]

# For personnel

(X23-A09A1A)

Includes detection of concealed weapons. Also includes all aspects of passenger tracking and monitoring, including authorisation/access control for passengers (see T05-D codes also).

# X23-S01E [2010]

#### For baggage

(X23-A09A1E)

Includes all aspects of baggage inspection, monitoring and tracking. Includes use of transponder tags (see also T04-K03B, W06-A04B and W02-G05 codes) or bar-code reader (see also T04-A03B1). See S03-C03 and S03-E06B codes for inspection.

#### X23-S03 [2010]

# Station safety systems

(X23-A09A3)

Includes fire-fighting arrangements (see also X25-X05) and automatic platform-edge doors control (see also X25-U01). Prior to 2005, platform edge doors control was coded in X23-A09.

# X23-S05 [2010]

# **Tunnels**

(X23-A09A5)

Includes electrical details of tunnel construction and maintenance, as well as tunnel lighting arrangements (see also X26 codes). See Q21-A codes for mechanical details of railway or subway tunnels.

# X23-S99 [2010]

# Other offboard/station details

(X23-A09A9)

Includes transportation of baggage and passengers (see also X25-F codes), and railway station specific heating and air-conditioning (see also X27-E codes).

# X23-X [2005]

# Other railway system details

Includes major electric railway track laying equipment and track maintenance equipment (coded in X23-A09A prior to 2005). See Q21-A01 for mechanical details of track maintenance/construction.

Track repair, track-laying

# X23-X16 [2014]

# Maintenance; Servicing; Testing

Includes locomotive/train servicing and testing equipment.

Service, maintain, test, diagnostics

# X23-X20 [2014]

# Rail vehicle design/manufacture/assembly

Includes electric details of design, manufacture and assembly of railway trains and their components. See X25-X14 for manufacturing/assembly plant per se. Also includes systems for dismantling vehicle to enable recycling of materials (see also X25-W04). See X16-M for recycling of batteries and their materials. See T01-J15 codes for computerised design.

## X24: Electric Welding

Note: Patents are coded in X24 only if the soldering or welding equipment is useful in the electrical or electronic industry e.g. PCBs, electric motors, or if substantial electrical content is disclosed.

#### X24-A

# **Electric soldering**

#### X24-A01

# Solder, soldering methods, flux

Solder wire

# X24-A01A [1992]

#### Solder, flux

Includes details of solder manufacture. See also P55-D01.

#### X24-A01C [1992]

**Soldering methods** 

#### X24-A02

# (De)soldering equipment, irons, bits, baths

Includes soldering equipment and systems. Tinning, heaters

#### X24-A02A [1992]

(De)soldering irons, bits

## X24-A02C [1992]

Wave soldering baths

# X24-A02E [1992]

Reflow soldering using laser, hot gas, electric heating, etc.

(X24-A09)

For use of laser, see also X24-D03B.

# X24-A02X [2007]

#### Other soldering equipment

Includes spray soldering systems using solder droplets in stream of hot gas to build up solder deposit, e.g. for fixing conductor wires to semiconductor circuit (see also U11 codes). Also includes ultrasonic and laser soldering equipment.

# X24-A04 [2006]

#### Soldering accessories

Includes solder feeding devices and dispensers.

#### X24-A09

#### Other electrical soldering aspects

Includes brazing, control and measurements. Also includes cooling details of soldering, soldering simulators and recycling of solder. From 2006, solder feeding devices have been transferred to X24-A04...

#### X24-B

# Arc welding or cutting

#### X24-B01

Seam and built-up arc welding

#### X24-B02

**Arrangements or circuits** 

#### X24-B02A

# Generating ignition voltage; Stabilising and magnetic control of arc

Arc ignition, moving arc

#### X24-B02X

#### Other circuit details

Includes protective circuits, remote controls. Power supplies, pulse supply

#### X24-B03

#### Automatic feeding of electrodes or work

Includes welding robots, motor control. Robot control, positioning, guiding

#### X24-B04

# **Electrodes and accessories**

Includes welding rods, electrodes, materials and media. Also includes all aspects of cables and connectors, and other accessories with significant electrical content. Includes protective mask (see also X27-A02B1A).

# X24-B05

#### Submerged-arc welding, stud welding

Includes shielded metal-arc welding using a covered electrode stick, and submerged arc welding where weld area is protected by granulated flux. Also includes electroslag and flash butt welding.

#### X24-B06

# **Using shielding gas**

Includes WIG (Wolfram inert gas), GMAW (gas metal-arc welding) or MIG (metal inert gas), TIG (tungsten inert gas) or GTAW (gas tungsten-arc welding) and associated shielding gas feed control. Also includes plasma-arc welding/cutting (PAW) where heat for melting is provided by arc formed between non-consumable tungsten electrode and constricting orifice of torch itself.

WIG, MIG, TIG, GMAW, GTAW, plasma-arc

#### X24-B09

# Other arc welding or cutting aspects

Includes welders using insulated electrodes, percussion welding, testing.

Inspecting, measurements

#### X24-C

#### Resistance welding or cutting

#### X24-C01

# **Electric supply or control circuits**

Monitoring

# X24-C04 [2006]

#### **Electrodes and Accessories**

#### X24-C09

# Other resistance welding or cutting aspects

Includes spot welding, resistance seam welding (forming a series of overlapping spot-welds), resistance butt welding and projection welding (where the flow of current is confined to protrusions embossed on surface of material to be welded). For robotic spot welding see also X25-A03E1.

Spot welder, seam, projection

# X24-D

## Other welding, cutting or boring

#### X24-D01

# Welding by induction heating

#### X24-D02

#### **Electron-beam welding or cutting**

See V05-F02 also for electron beam equipment. Beam focussing, melting, cutting, etching, trimming, hole punching, shaping, beam control, multiple beam

#### X24-D03

#### Laser beam welding or cutting

See appropriate V08 codes for laser control details. Shaping, optical system, control

#### X24-D03A [1992]

#### For metal working

Covers all aspects of working metal using laser beam (and having sufficient electrical content) e.g. cutting, trimming, hole forming etc. Also see appropriate corresponding codes in X25-A codes e.g. for cutting per se. Also includes laser-hybrid welding combining laser welding and e.g. shielded arc welding (also see X24-B06), and robotic laser welding.

Laser-hybrid

# X24-D03B [1992]

# For electrical and electronic components

Covers etching of PCBs see V04-R01C5 also, cutting substrate see U11-C07A4 also, trimming resistor valve see V01-A04H3 and trimming capacitor valve see V01-B04C3 also. For reflow soldering using laser see X24-A02E also.

#### X24-D03X [1992]

# Other laser beam welding/cutting aspects

Includes details of laser cutting through other materials, such as glass, ceramics, etc.

#### X24-D04

#### Welding of plastics materials

See also X25-A06 and maybe T06-D13 for plastics working. Includes dielectric welding, RF welding and high frequency welding to fuse plastics together.

Electric resistance heaters, HF welding

# X24-D05 [1987]

# Flame or gas welding/cutting

From 2006, details of plasma welding are covered by X24-B06 only.

Blow torch

#### X24-D06\*

[1992-2005]

#### Ultrasonic

(X24-D09)

\*This code is now discontinued and transferred to X24-D08A. It is still searchable for records from 1992-2005.

# X24-D07\*

#### **Friction welding**

(X24-D09)

\*This code is now discontinued and transferred to X24-D08C. It is still searchable for records from 1992-2005.

# X24-D08 [2006]

# Solid state welding

Includes low temperature welding processes not involving fusion. Includes hot pressure welding and roll welding.

Cold welding, HPW, ROW

#### X24-D08A

[2006]

[1992-2005]

# **Ultrasonic welding**

Involves applying ultrasonic vibrations parallel to interface of surfaces being joined, which are under compressive force, so that welding is reached through a solid state process involving atomic movement and diffusion. Also see X24-D04 for ultrasonic welding of plastics.

USW

#### X24-D08C

[2006]

#### **Friction welding**

Includes friction stir welding, and inertia welding. *FRW* 

# X24-D08E

[2006]

[2006]

#### Magnetic pulse welding

Includes cold welding of electrically conductive metals in the total absence of fusion.

Cold welding, inductor coil, capacitor discharge

#### X24-D08G

# **Diffusion bonding**

Involves solid state diffusion by application of pressure and temperature to a joint surface for a prescribed period of time.

Aerospace, titanium, loading press, cladding, diffusion welding, DFW

#### X24-D08X

[2006]

# Other solid state welding/bonding

Includes explosive welding and forge welding processes.

EXW, FOW

#### X24-D09

# Other welding, cutting or boring aspects

(X24-B09)

Includes non-specific welding apparatus with substantial electrical content, electrolytic welding and high frequency welding used on non-plastic materials. High-frequency welding used on plastic materials is coded under X24-D04 only.

#### X24-D10

[2006]

#### Welding, cutting, boring accessories

Coverage is restricted to all aspects of cables and connectors, with other accessories requiring significant electrical content.

Welding mask, goggles

# X24-D11

[2020]

#### **Testing of weld**

Includes testing, monitoring aspects of welding.

#### X24-E\*

[1980-2005]

# Welding rods, electrodes, materials or media

\*This code is now discontinued, but remains searchable for records prior to 2006. Novel welding rods, electrodes, cables, connectors etc. are now covered by the electrode/accessory codes in the relevant areas, e.g. X24-B04, X24-C04 and X24-D10.

# X24-F

#### **Electro-erosion**

#### X24-F01

Apparatus, devices, electric circuits

# X24-F01A

# For electro-erosion in an electrolytic medium

Electrochemical, ECM

# X24-F01B

[1992]

# **Electrical discharge machining**

(X24-F01X)

Includes arc or spark discharge.

Discharge machining, EDM, discharge wire cut, EDWC

#### X24-F01X

# Other electro-erosion/machining apparatus

# X24-F02

# **Electrodes**

Includes moving and spacing of electrodes.

# X24-F04 [2006]

# **Electro-erosion accessories**

Includes cables and connectors for electro-erosion and electrical discharge machining equipment. See also V04 codes for connectors and X12 codes for cables.

# X24-F09

# Other electro-erosion details

# X24-G

Welding generators/motors or transformers/inductors

See also X11, X12.

# **X25: Industrial Electric Equipment**

This class, apart from the exceptions below, includes only those patents with substantial electrical content. Appropriate control aspects relating to various codes in this class are in T06-D. For example, general machine tool control is represented by X25-A03F and T06-D06. EXCEPTIONS: Electric furnaces and heating, components (e.g. pumps) and electrolysis apparatus.

#### X25-A

#### Working materials

#### X25-A01

# **Casting metals**

Includes all electrical aspects of casting e.g. EM stirrer. Control see T06-D05B also.

Moulding, continuous-, centrifugal-casting, ingot, foundries, die, ladles

#### X25-A02

# Shaping (excluding cutting)

Control see T06-D05A also.

Forming, extruding, corrugating, seaming, folding, squeezing, blanking, electromagnetic forming, electro-hydraulic forming

# X25-A02A [1983]

#### **Presses**

Control details see T06-D20. *Baling, rams* 

# X25-A02B [1983]

# Rolling

Control details see T06-D05A1.

Mills, sheets, foils, tubes, strips, bars, rods

#### X25-A02C [1992]

#### **Forging**

Control details see T06-D05A.

#### X25-A02D [1992]

#### Hammering, bending, punching

For control details see T06-D05A. See X25-X10 instead for engraving systems Stamping

# X25-A02E [1992]

#### Wire drawing

Control details see T06-D05A.

# X25-A02F [2018]

# Straightening/stretching; Edge/Metal Flanging

Covers electrical details only. Mechanical details are covered in P52 class. Also includes finishing details such as attaching head to a drawing-pin, and metal shaping using fluid pressure, shock waves, etc.

Chemical explosives, edge-curling, edge armoring

#### X25-A03

#### **Tools**

Includes screw tighteners and general aspects of tools. For general control of machine tools see T06-D06 also. For systems for cleaning of work space, e.g. combined sanding and dust extracting machine, also see X25-H05.

Workpiece positioning, work tables, tool changing, chucks, turret

# X25-A03A [1983]

#### **Turning**

Includes lathes.

#### X25-A03B [1983]

Boring, drilling, cutting

#### X25-A03B1 [2002]

# Boring, drilling

Centre-point

# X25-A03B2 [2002]

# Cuttina

Includes cutters, saws, trimming, grooving. See also T06-D07 for control apparatus.

#### X25-A03C [1983]

#### Milling, grinding, polishing

(X25-A09)

Control details T06-D07A also.

# X25-A03C1 [1992]

# Milling

Broaching, nanometer milling machine

# X25-A03C2 [1992]

# Grinding, abrading, honing, lapping

Blasting, planing, sanding, sander

# X25-A03C3 [1992]

### Polishing, burnishing

# X25-A03D [1983]

#### **Handheld tools**

Used in conjunction with the above codes if applicable. For example, handheld drills are also coded in X25-A03B.

#### X25-A03E [1983]

#### **Manipulators**

Control details see T06-D07B also and for CAM/CAD robot programming see T01 also. Robots, grappling, gripper, programmable

# X25-A03E1 [1992]

# Applications e.g. welding

# X25-A03E2 [1992]

# Assembling

Covers robots used in car manufacturing plants when robot details are claimed. See also X25-F01 for conveyor details.

# X25-A03F [1983]

#### **Control**

Used in conjunction with above codes for different tool types. Also includes details of industrial automation system.

Monitoring, simulation

# X25-A03R [2019]

#### Riveting

See also T06-D06A and X25-A03F for riveter control. See X25-X prior to 2018.

# X25-A04

# **Cathodic sputtering**

Mainly apparatus for sputtering and chemical vapour deposition included. For methods, substantial electrical details must be disclosed. See U11-C09 for sputtering and CVD apparatus used for integrated circuit manufacture and appropriate T03/W04 codes for magnetic head manufacture. Non-cathodic, e.g. general plasma (laser) deposition is not included - see X25-A09 and X14-F codes.

Cathodes, targets, coating, deposition, anodes, evaporation

# X25-A05 [1983]

# Working glass

(X25-A09)

Forming glassware, gob

# X25-A06 [1983]

# **Working plastics**

(X25-A09)

Includes welding (see also X24-D04), fusing, extruding, moulding, injecting etc. For control details, see T06-D13 also.

# X25-A07 [1987]

# Working rubber

(X25-A06)

Tyre manufacture

# X25-A08 [2006]

# 3D/4D/5D printing; Additive manufacturing

Details of 3D scanners are coded under T04-M05. See also X25-A06 for electrical aspects of working plastics.

3D replicator, rapid prototyping, solid freeform fabrication, SFF, 3D modelling, active origami

# X25-A08A [2016]

# Method for 3D/4D/5D printing and additive manufacturing

# X25-A08B [2016]

# Apparatus for 3D/4D/5D printing and additive manufacturing

Computer control details of 3D printing/additive manufacturing machines are coded under T01-J07B3 and T06-D17. For details of 3D scanners see T04-M05. For ink-jet printhead details see S06-G03. *Extruder* 

#### X25-A08C [2016]

# Types of 3D/4D/5D printing and additive manufacturing

# X25-A08C1 [2016]

Stereolithography

SLA

#### X25-A08C2 [2016]

# Fused deposition modelling/3D/4D/5D printing using inkjet technology

Inkjet technology is also coded under S06-G10. FDM®, extruders, extrusion tips, fused filament fabrication, FFF

# X25-A08C3 [2016]

#### Selective laser sintering

SLS

X25-A08C4 [2016]

Laminated object manufacturing

LOM

X25-A08C9 [2016]

Other types of 3D/4D/5D printing and additive manufacturing

X25-A08M [2016]

# 3D/4D/5D printing and additive manufacturing materials

Codes in X25-A08M section indicate the type of material used to produce the printed object. For novel material compositions, see the relevant codes in classes A-M.

X25-A08M1 [2016]

Metals

X25-A08M2 [2016]

**Plastics** 

X25-A06 should also be applied.

X25-A08M3 [2016]

# **Organic materials**

Includes organic materials used to produce biological products such as human tissue replacements. See also X25-A08U2.

X25-A08M4 [2018]

Food

See also X25-A08U7 and X25-P01X. *Chocolate* 

X25-A08M8 [2020]

#### **4D-compatible materials**

Materials which are compatible with 4D printing techniques. This code is used in conjunction with other X25-A08M codes.

Programmable matter

X25-A08M9 [2020]

# Other 3D/4D/5D printing and additive manufacturing materials

Includes specific materials not covered by other X25-A08M codes, e.g. concrete, silica sand, magnesium sand, chromite sand, etc.

X25-A08U [2016]

# 3D/4D/5D printing and additive manufacturing applications

Codes in X25-A08U section are used in conjunction with other X25-A08 codes to highlight what is manufactured using the 3D/4D/5D printing and additive manufacturing systems.

X25-A08U1 [2016]

#### **Domestic and personal items**

See also P21-P28 classes.

Watch, clothes, footwear, jewellery, kitchen equipment, tableware

X25-A08U2 [2016]

### Pharmaceutical: Medical

See also B class codes for pharmaceutical applications; P32 for prosthetics.

Bio-printing, prosthetics, pills, tissue engineering

X25-A08U3 [2016]

#### Vehicles; Aerospace

See Q24/Q25/W06 classes for aerospace and shipping; Q11-Q19/X21/X22 for land vehicles and Q21/X23 for railway vehicles.

X25-A08U4 [2016]

### Industrial

Includes manufacture of components not covered by other X25-A08U codes. Includes manufacture of components used in the construction and building industry. See X25-A06 for electrical aspects of working plastics.

Tool, robotics, television, phone, oil/gas industry

X25-A08U5 [2016]

# Sports, toys, entertainment and arts

Includes art pieces, figurines, action figures, etc. For manufacture of sports equipment, toys and novelty items see also P36 class.

X25-A08U6 [2016]

#### Defence

See also Q79/W07 classes for military weapons etc. Weapons, ammunitions, military

X25-A08U7 [2016]

### Food industry

See also X25-P codes for electrical aspects of food processing.

X25-A08U9 [2016]

Other specific 3D/4D/5D printing and additive manufacturing applications

#### X25-A08X [2016]

# Other details of 3D/4D/5D printing and additive manufacturing

#### X25-A09

#### Other material working aspects

Includes metallic coating, e.g. plasma deposition, plasma spray coating or plasma transferred arc hardfacing, e.g. for applying wear-resistant metallic material such as Stellite® to steel. For other coating, such as painting, see X25-K05.

Cement, ceramic, concrete

# X25-A10 [2007]

## Working wood

Includes arrangements for working wood. See other X25-A codes to highlight the action being carried out, e.g. X25-A03A for wood turning. For felling of timber or processing lumber see X25-X01 instead.

Turning

#### X25-B

# **Electric heating**

All domestic applications are also in X27.

# X25-B01

#### Ohmic resistance heating

Includes protective arrangements, IR heaters e.g. quartz lamps.

# X25-B01A

#### **Electrodes**

# X25-B01B

# Heater element materials or conductor arrangements

#### X25-B01C

#### **Plate heaters**

Includes resistance heaters having extended surface area substantially in a two-dimensional plane.

#### X25-B01C1

#### Non-flexible elements

X25-B01C1A [1992]

**Panels** 

## X25-B01C1B [1992]

### Hotplate; Cooker hob

Covers all aspects of resistance heating in cookers, see X27-C02 also.

# X25-B01C1C [1992]

#### Windscreen heater, demister

Includes windscreen and wing mirror heaters. See also X22-J02A for vehicle windscreen demister.

[1992]

#### X25-B01C3

#### Flexible elements

(X25-B01C9)

Includes heating nets or webs.

# X25-B01C3A [1992]

#### **Electric blanket**

See X27-E02 also for electric blanket.

# X25-B01C3B [1992]

# **Under carpet, wall heating elements**

See X27-E01A3 also, for wall, carpet and underfloor heating.

#### X25-B01C3C [1992]

#### Pads, seats

See X22-J02 and X22-J03 also for vehicle seat. See X27-E02 also for domestic application. See X27-A also for domestic seat application.

Mattress

#### X25-B01C9

# Other plate heaters

Foils

#### X25-B01D

# Rod or tube elements

Also includes heating cables.

Electric bar heater

#### X25-B01E

# With granular, powdered or fluid current path, furnace elements

# X25-B01E1 [1992]

### **Furnace elements**

See X25-C01 also for ohmic resistance furnace.

# X25-B01E2 [1992]

# Water, immersion heaters

See X27-E03A also for domestic water heating.

#### X25-B01F [2005]

#### **Positive Temperature Coefficient heaters**

PTC, self regulating

X25-B01H

Infrared heaters (includes lamps)

[1992]

Halogen, IR

X25-B01H1 [1992]

Cooking apparatus

See also X27-C02A for cooker.

X25-B01H3 [1992]

**Industrial applications** 

Includes dryers, etc.

X25-B02

Electric-, magnetic- or electromagneticfield heating

Laser heating

X25-B02A

**Induction heating** 

Power supply, control

X25-B02A1 [1983]

**Inductors** 

See X12-C also.

Coils

X25-B02A2 [1992]

Cooking appliances

See also X27-C06 for induction cooker.

X25-B02B

Microwave heating

Details of microwave power tubes per se are in V05, waveguide devices in general in W02-A. Includes circuits, feed lines, waveguides, mode stirrers and door seals.

Control, antenna, magnetrons, chambers

X25-B02B1 [1992]

Cooking; Oven

Aspects of cooking vessels are only in X27-C01. Microwave oven, chambers, magnetrons, antenna, control

X25-B02B3 [1992]

Industrial scale heating; Drying

For large scale food processing etc. see X25-P01 and X27-C also, for drying see X25-G also.

X25-B02D [1992]

Dielectric heating

Includes radio frequency (RF) heating where alternating electric field causes molecules to repeatedly align with field creating heat similar to friction.

X25-B02F [2011]

Thermoelectric/Solid state heating

(X25-B)

Includes thermoelectric heating using an applied voltage to cause a temperature difference across the thermoelectric module, e.g. a sandwich formed from two ceramic plates with N and P type bismuth telluride in between. Charge carriers, i.e. electrons and positive holes absorb heat on one side of the thermoelectric module and transport it to the other side where it is used for heating. See X27-F02B1 for thermoelectric cooling.

Peltier heater, thermoelectric heat pump, solid state

X25-B02X

Other electric-, magnetic- or electromagnetic-field heating aspects

Includes electron beam heating, etc.

X25-B03

**Electric discharge heating** 

X25-B03A

**Electrodes or electrode arrangements** 

X25-B03B

Arc discharge or glow discharge

X25-B03X

Other electric discharge heating aspects

Includes power control, power supplies.

X25-B04

Automatic switching for heating equipment

Control, thermostats

X25-C

Industrial furnaces

Elements for the various heater types are in X25-B. Other details are coded in relevant places in X25-C. Incinerators for industrial waste disposal are also coded under X25-W01A. Mechanical details of general solid waste disposal are coded by P43-E codes.

Cremation

#### X25-C01

#### Ohmic resistance

Resistance element, temp control, power supply, charging/discharging, crucible, hearth

#### X25-C02

# **Electric discharge**

Includes arc furnaces.

Electrode, power supply, crucible, hearth

#### X25-C03

#### Monitoring, control

#### X25-C05 [1992]

#### Induction furnace

(X25-C09)

Zone melting, coreless, core-type, coil

#### X25-C07

#### **Gas Furnaces**

Includes electrical aspects of gas furnaces. Electrode, power supply, crucible, hearth

#### X25-C09

#### Other industrial furnaces

# X25-D

# Soil-shifting; Mining

# X25-D01 [1983]

# Soil shifting, excavators

Includes fuzes and blasting using explosives (see W07-C codes for military applications). See T06-D08E also, for control details.

Dredger, bulldozer

# X25-D02

# Mining

Covers rock or ground testing (see also specific S03 codes e.g. S03-E14E which includes investigation methods of soil, rock etc.). Use T06-D11 also, for control details.

Dust removal, roof condition monitor, rock hardness testing, powered support, quarries, miner's helmets, blasting, detonator, mineshaft ventilation

# X25-D02A [1983]

#### Handling material, e.g. lift, conveyor

See also X25-F.

Vehicles, mine locomotives

# X25-D02B [1983]

#### **Tools**

Shears, drills, picks, cutters

#### X25-D02C [1992]

# Intrinsically safe power supply/equipment; Testing

#### X25-E [2020]

#### Earth-drilling, well logging

Also includes pumping and heating to aid oil recovery. Control details see T06-D12 also. Also see H01-A, H01-B and H01-C codes respectively for well logging, drilling and producing.

Cables, connectors

# X25-E01 [1983]

# **Drilling equipment**

Covers large-scale deep-well drilling e.g. oil, gas, water, etc. For drilling in the construction industry, see X25-U, and for drills used in the mining industry, see X25-D02B.

# X25-E02 [1983]

#### Well logging

Geophysical prospecting in general is in S03-C.

# X25-E02A [1992]

#### Measuring arrangements

Sondes, sampling, penetration depth, measuring, testing, surveying

#### X25-E02A1 [1992]

#### **Transmission details**

See appropriate W05-D codes for transmission details.

#### X25-E03 [2006]

# Well production; Extraction of oil, gas, water, etc.

Includes pumping assemblies. Also see X25-L03A for novel electric pumps per se.

# X25-F

# Conveying, lifting, hauling, handling materials

Includes filling materials, labelling, tagging, e.g. electronic tagging using e.g. radio frequency ID tags to track goods/items during conveyance (see also W06-A04B5 and W02-G05 codes), etc. General control details are also coded in T06-D08 as appropriate.

Tagging machines, weighing

# X25-F01 [1983]

#### Conveyors

Includes vibratory feeders and detecting articles on conveyor.

Belts, transporting goods, shelving and retrieving, locating, addressing

# X25-F01A [1983]

#### Conveyor control

See also T06-D08C for control.

#### X25-F02 [1983]

# Web/strip/coil handling

See T06-D08A also for control details dealing with web-advancing apparatus, and T06-D08B also for control of article feeding or tension regulation.

Rolls, sheets, tension-control, filaments, winding, coiling, wrapping, tension control

#### X25-F02A [1992]

Paper or envelope handling

X25-F03 [1983]

Packing; Dispensers

#### X25-F03A [1987]

# Packing; Bottling; Packages; Labelling/tagging

Includes all electrical details of packaging plant and methods as well as electrical details of packages/bottles per se. For packaging of TV receivers, AV equipment or electronic components in general, see W03-A19C, W03-G10G and V04-X01A respectively. From 2012, mechanical details of packaging processes and equipment are coded under Q31, details of container/closure and transit packaging under Q32, details of packaging container and closure materials under Q33, and the types of goods packages, bottled, labelled, etc, under Q34

# X25-F03A1 [2011]

### Packing/Bottling plant and methods

Includes methods for filling and sealing packages as well as bottling and tinning plants. Also see other X25 and X27 codes as according to what is being packaged, e.g. see also X25-P01X for canning food, X25-P01C for bottling milk and X27-A02 for packaging beauty treatments. Also includes unpacking and bundling details.

Wrapping, stapling, stapler, canning, filling

# X25-F03A3 [2011]

# Electrical aspects of packaging; Smart packages; Labels and tags

Includes electrical details of packages/bottles per se such as packages with built in sensors, displays, expiry or deterioration indicators or tags. See X25-F11 and T05-G02 for systems for tracking of packages or goods being shipped. If the package is intended for a specific use, also see other X25 and X27 codes as appropriate, e.g. X25-P01X for food, X25-P01C for milk and X27-A02C for packages for stationery.

Carton, box, bottle, pouch, lid, sensor, display

# X25-F03A3A [2011]

## **Smart packages**

Includes packages/bottles containing smart devices such as RFID tags or electric time-temperature or food quality indicators. Novel aspects of tags and labels are also assigned X25-F03A3C. Also see T04-K and W02-G05 for novel transponders/labels attached to package, and X25-F11 and T05-G02 for systems for tracking of packages or goods being shipped. If the package is intended for a specific use, also see other X25 and X27 codes as appropriate, e.g. X25-P01X for food, X25-P01C for milk and X27-A02C for packages for stationary. See X27-F05 for intelligent refrigerators that monitor smart food items.

Sensor, alarm, warning, display

# X25-F03A3C [2011]

#### Labels and tags

(X25-F08)

Includes novel labels or tags applied to smart packages for which X25-F03A3A is also assigned. Also includes methods and systems for the attachment of labels or tags to goods, or the printing of a label on a package (also see S06-G codes for printing using inkjet technology). Also see T04-K and W06-A04B5 codes for labelling/tagging using a smart or RFID tag/label and also W02-G05 codes when novel RF details are involved, such as receiver or transmitter circuitry or antennae. See T03-H02A codes for labelling of record carriers such as CDs or cassettes. Productidentifying tags providing electronic article surveillance (EAS) capability are also assigned W05-B01A2 codes depending on the technology use. Also see X25-F11 for tracking of tagged/labelled goods and X25-F07 for automated warehousing utilising tagged goods.

Bar code, smart label, transponder, RF-ID, transponder, passive tag, battery-assisted passive tag, BAP, active tag

# X25-F03B [1992]

#### **Dispensers**

Dispensing measured volumes in general is covered by S02-C04 codes.

Stamps

# X25-F03B1 [1992]

#### **Dispensers for comestibles**

Includes vending machines for food/drink etc, see relevant T05-H codes also. See X27-X for stock control in pub e.g. optics etc.

Beer, water, dispensing

### X25-F03B2

### **Forecourt dispensers**

Includes petrol pump, air dispenser in garage for vehicle tyres, etc.

[1992]

# X25-F04 [1983]

#### Lifts

Includes details of passengers lifts and goods lifts. Electrical details of doors are also coded under X25-U01.

Elevators, floor indicators, door operation, escalators

# X25-F04A [1983]

#### **Control**

See also T06-D08D for control details. Floor-call, speed/acceleration control, motor control, dispatching

### X25-F05 [1983]

#### Cranes, hoists, winches, trucks

Includes lifting magnets, cable car, jack, ski lift, vehicle mounted equipment (see X22-also). For control details see T06-D08E also. Details of passengers lifts and goods lifts are included under X25-F04.

# X25-F05A [1987]

# Trucks, goods or robotic vehicles

Includes IC engine and electric forklift trucks, vehicles mounted with lifting platform (also see X22-X18 or Q15-A codes), and walk behind trucks (also see X22-P05F or X21-A01B for IC engine and electric fork lifts respectively). See T06-D08F for forklift control. See Q19-C06 instead for mechanical aspects of forklift trucks. Also includes walking robots and electrical aspects of shopping trolleys such as electric drive arrangements and advertising displays/bar-code readers. See Q22-A02 for mechanical aspects of trolleys and Q38-B for mechanical details of trucks and robotic vehicles.

Fork lift, walking robot, electric shopping trolley, climbing robot, inspection robots, autonomous,

# X25-F05A1 [1987]

# **Running on tracks**

Includes robotic vehicles/trucks running on tracks or following painted lines on factory floor using e.g. optical sensors or image processing (see also T01-J10B/T04-D codes). See also T06-B01A and T06-D08F for 2D position control of goods conveying vehicles.

Factory automation vehicles, automatic guided vehicle, AGV

# X25-F06 [1987]

#### Sorting

(X25-F)

See also X25-W04 for recycling, and T05-K.

#### X25-F07 [2002]

#### Automated warehousing

Includes shelving and retrieving arrangements. See also T06-D08 for control, X25-F01 for conveyors, X25-F05A for conveying trucks and X25-F03A3C for warehousing of tagged goods. Electrical details of manipulators used to grab goods are also coded under X25-A03E.

Three dimensional warehouse, stereoscopic warehouse, intelligent warehouse

## X25-F08\*

[2002-2010]

#### Labelling/Tagging

\*This code is now discontinued and transferred to X25-F03A3C but remains searchable and valid for codes from 2002-2010. Includes details of the actual attachment of the label or tag to the item, or printing of the label on the item (also see S06-G codes for printing using inkjet technology). See X25-F03A codes if the labelling/tagging is part of the packing/bottling arrangement, and X25-F11 for goods tracking arrangements. See also T04-K, W06-A04B5 and possibly W02-G05 codes for labelling/tagging using a smart or RFID tag/label. See T03-H02A codes for labelling of record carriers such as CDs or cassettes.

# X25-F09

[2007]

#### **Inventory/Stock management**

Includes inventory management and monitoring of materials/articles being removed/replaced from storage area. See T01-J05A2 for non-networked inventory monitoring or T01-N01A2 for network, e.g. Internet, based systems.

Stock control

#### X25-F11

[2007]

# **Goods tracking**

Includes arrangements for monitoring location of goods containers or individual articles being moved. For use of radio transponders attached to goods, also see X25-F03A3C and T04-K03B for transponder tags/labels and T04-K02 for reading and writing aspects. See also T01-N01A2E for Internet based tracking. Novel RF details of transponder tags/interrogation are also covered by W02-G05 codes and W06-A04B5 codes cover RF transponder identification. See W05-B01A2 codes instead for theft alarms triggered by transponder tags.

# X25-F12 [2016]

# **Delivery methods and equipment**

Includes use of drones to deliver articles in remote or difficult locations (also see W04-X03E1M and W06-B15U for unmanned aerial vehicles used for commercial/industrial application). Also see S02-B04 for aerial photographic surveying and W07-F04 for aerial reconnaissance.

Delivery, drop, package, post, supplies, logistics, quadcopter, rotorcraft

#### X25-G

# **Drying**

See T06-D20 for control details also.

Heater control, air flow control, microwave heaters, infrared heaters, electric heaters

#### X25-H

# Separating materials, cleaning, sterilizing

#### X25-H01

## **Magnetic separation**

Coils, electromagnets

#### X25-H02

**Electrostatic separation** 

#### X25-H02A

From gases or vapour

#### X25-H02A1

#### Plant or installations

Electrostatic precipitation, power supply, controllers

#### X25-H02A2

**Constructional details** 

#### X25-H02B

From liquids or solids

# X25-H03

[1983]

## Water and sewage treatment

(X25-H09)

Includes water distillation, water sterilization e.g. using ultraviolet radiation, desalination plant, aerator, swimming pool cleaning (see X25-X06 also). Water recycling is also coded under X25-W04.

#### X25-H04

# **Ground/soil decontamination**

Includes cleaning of contaminated soil, e.g. from pollution by petroleum or heavy metal spills.

#### X25-H05

[2006]

[2006]

# **Industrial workspace cleaning**

Includes e.g. vacuum systems for dust extraction or removing swarf etc. during machining of materials. Can be used in conjunction with X25-A codes as appropriate. See X27-E01B only for general airconditioning of industrial work spaces.

Vacuum, dust, extraction

#### X25-H06

[2011]

# **Mechanical separation**

Includes separation by mechanical means such as centrifugal separators and separation by floatation.

#### X25-H09

# Other material separation and cleaning aspects

Includes electrodialysis, dry cleaning plant (see X27-D09 for domestic scale dry cleaning), general disinfection and sterilization, etc. From 2011, separation by floatation is coded in X25-H06. Details of industrial laundry equipment are also coded under X25-T05.

Fractional distillation, general cleaning

#### X25-H09A

[2002]

#### Ultrasonic cleaning

Includes ultrasonic bath and ultrasonic sterilizers. See X27-D07A for domestic ultrasonic mixed mode cleaning.

#### X25-H09C

[2002]

#### Vehicle washer

Includes electrical aspects of vehicle washing equipment.

Car wash

#### X25-J

# Mixing, crushing

Includes centrifuges, magnetic mixing, ore crusher. See T06-D04 for control details. Includes large scale shredders. Small size shredders, e.g. used in offices to shred confidential documents, are coded under X27-A02C only.

Pulverising, grinding, milling, ball mills, cyclone

### X25-K

# Spraying and coating equipment

# X25-K01

**Electrostatic spraying equipment** 

X25-K05

[1987]

# **Coating equipment**

#### X25-K09

# Other spraying and coating equipment

Includes atomisers.

# X25-L

#### Components

Includes novel electrical components per se, and mechanical parts of these components, e.g. a mechanical impeller used in an electric pump. To be coded in the X25-L section, the electrical components themselves need to be novel. Therefore, a novel electrohydraulic system using off-the-shelf solenoid valves will be coded in X25-L09 but X25-L01A will not be applied as well since the valves are not novel. Motor vehicle applications are excluded from this section - See X22 instead.

#### X25-L01

#### **Valves**

Includes electro hydraulic valves.

Motorised valves, electric actuators, position

monitor, fluid-pressure actuator (electrical)

# X25-L01A [1983]

#### **Electromagnetic**

Details of electromagnets are in V02-E. *Solenoids, control, coils* 

#### X25-L02

### Electric brakes, clutches, gears

Electromagnets, EM coupling, transmission

### X25-L03 [1983]

# **Pumps, compressors**

(X25-L09)

Electrically-driven, controllers

# X25-L03A [1992]

**Pumps** 

#### X25-L03B [1992]

### Compressors

See X27-F02C1 for compressor used in refrigeration.

### X25-L04 [1983]

# Blowers, fans

(X25-L09)

Electrically-driven, controllers

# X25-L05 [1987]

#### **Vibrators**

(X25-L09)

Electromagnetic, motorised, coils, electrodynamic

# X25-L06 [1987]

#### Seals, magnetic bearings

(X25-L09)

Magnetic seals

# X25-L07 [1987]

# Heat exchangers, heat pipes

(X25-X)

Includes heat exchanger comprising built-in electric resistance heater to supplement heat exchange or solenoid flow control valve.

# X25-L09

#### Other electrical components

Includes shock absorbers, electroviscous actuators, etc. Electrohydraulic valves are coded under X25-L01 only. Novel details of electrohydraulic systems other than valves are coded under X25-L09.

Dampers, electrorheological fluid

#### X25-M

#### Locks

Alarm systems are in W05-B. See also T04-A and T05-D for card readers and access control systems, respectively.

Keys, alarms

# X25-M01 [1983]

#### **Electronic**

Codes, keyboard-operated, magnetic card, memory

# X25-M02 [1983]

#### **Electric/magnetic**

Electromagnets, solenoids, slides, bars, coil, bolts

#### X25-N

# **Agriculture**

#### X25-N01 [1983]

#### **Arable**

Includes insecticide spraying, bird scarers, greenhouse. See also X25-X02 for vermin/insect extermination. Also includes details of rice polishing/milling and flour polishing/milling (see also X25-P01X for general food processing).

Seed treatment, grain silos, ventilation, parasite/vermin extermination, agricultural produce grading/sorting, hay baling, weeding

# X25-N01A [1983]

#### Soil working, sowing, harvesting

Includes tractors. For control see T06-D01A. From 2015, mechanical details of soil working and planting are coded under P11, and mechanical details of harvesting are coded under P12.

Ploughs, depth control, combine harvesters, threshers

# X25-N01B [1987]

# Fertilising; Irrigating; Culture

See T06-D01B for control details. Includes rain influencing systems for agricultural reasons (see also X25-X20 code).

Sprinklers

# X25-N02 [1983]

#### Livestock

Includes branding, bee-keeping, egg incubator, horse training (see W04-X01 also). For control details see T06-D01C also.

Poultry-, cattle-, fish-farming, trawler fishing gear, eggs grading

# X25-N02A [1987]

### Feeding and drinking

Also includes manufacture of animal feed (also coded under X25-P01X).

Automatic feeders, dispensers, compound feed

# X25-N02B [1987]

#### Milking

See also X25-P01C for milk processing, and X25-F03A for milk bottling.

Milking control, metering, monitoring

# X25-N02C [1987]

#### **Housing; Fencing**

Includes heating and air conditioning. For electric fence see X25-X11 also.

# X25-P

# Foodstuff industry, tobacco, pharmaceuticals

#### X25-P01 [1983]

#### **Bulk food processing**

See T06-D02 for control details also.

Industrial cooking, bread baking, food sorting

# X25-P01A [2002]

# Industrial cooking/baking equipment

Includes industrial scale food processing such as mixing bread dough and kneading, and also industrial cooking/baking systems such as large scale ovens. For domestic cooking/baking see X27-C codes instead.

# X25-P01B [2002]

# Industrial beer brewing/alcoholic beverage production equipment

Includes electrical aspects of large scale beer or wine making equipment, and - since 2006 - this code also covers electrical details of equipment for producing all type of alcoholic beverages, including spirits, etc. See X27-X02 only for small scale domestic brewing/wine making. Also includes packaging/bottling of beverages. See also X25-F03A1 for bottling.

Distillery, winery

# X25-P01C [2002]

# Milk processing

Includes pasteurisation. See X25-N02B for milking control, metering and monitoring for livestock. See X25-F03A for bottling of milk.

# X25-P01X [2002]

### **General food processing**

Includes meat slicing, food packing/canning (also see X25-F03A for food packing/tinning). Also includes food/packaging sterilization/disinfection e.g. using mechanical cleaning, chemicals, heat, radiation or electricity. See e.g. X27-D10 for general domestic scale sterilizing/disinfecting. Also includes details for milling and polishing rice or other seeds, manufacturing of animal feed, and 3D printed food. Details of 3D printing are also included under X25-A08M4 and X25-A08U7. Manufacturing of animal feed is also coded under X25-N02A.

Packing, canning, tinning, sterilising, UV, microwave, ultrasonic, plasma, flour/rice polishing/milling, oil pressing

#### X25-P02 [1987]

#### **Pharmaceuticals**

For control details see T06-D02A also.

# X25-P03 [1997]

# **Tobacco**

(X25-P)

Cigarette manufacture, perforating filter paper, cigarette packing

#### X25-Q

# **Metallurgic processes**

For control details see T06-D09 also. For industrial furnaces per se, see X25-C. Also includes electrical details of powder metallurgy process (see also M22-H).

# X25-Q01 [1983]

#### Iron and steel manufacture

Furnace control, arc furnaces, blast furnaces, cupola

# X25-Q02 [1983]

#### Heat treatment, cold working, etc.

Annealing, quenching, hardening, tempering

#### X25-R

# Electrolysis, electrophoresis

#### X25-R01

#### For production of non-metals

**Terminals** 

#### X25-R01A

**Cells** 

#### X25-R01B

### **Electrodes**

Anodes, cathodes

#### X25-R01C

### **Separators**

Membranes, ion exchange separators, diaphragms

#### X25-R01D

**Control** 

#### X25-R02

#### For metal refining, etc.

Cells, electrowinning, baths

# X25-R03

# **Electroforming**

#### X25-R04

### **Electroplating**

Does **not** include electroless (e.g. nickel) plating via a chemical reduction process without use of electrical energy (see M13-B codes instead).

Electrodeposition

#### X25-R04A

#### Cells

Electrodes

#### X25-R04B

#### **Control**

Current control, measurements, monitoring

#### X25-R05

### **Anodising**

Coating

#### X25-R06

# Electrolytic cleaning, etching, polishing; Sacrificial anodes

Corrosion protection, cathodic protection

#### X25-R07

[1983]

# **Electrophoretic coating**

Includes anodic and cathodic coating of electrode with non-conductive organic coating, where colloidal particles suspended in a liquid medium migrate under the influence of an electric field and are deposited onto the electrode.

Electropainting, E-coating, electrocoating, EP

### X25-S

# Static electricity prevention

Includes lightning rods (see also X12-G) and materials.

Antistatic coatings, discharging

#### X25-S01

[1992]

# Clean room; Computer installation

See also T04-L08 when used with computer installations e.g. data centers, and U11-C15 when the clean room is used during semiconductor manufacturing.

# X25-T

[1983]

#### **Textile and paper industries**

(X25-X)

# X25-T01\*

[1983-2005]

#### Fiber, yarn, etc. manufacture

(X25-X)

\*This code is now discontinued and transferred to X25-T04A from 2006. It is still searchable and remains valid for records from 1983-2005. See T06-D03B for control details also.

Spinning, winding, bobbins, twisting, combing, carding, crimping

#### X25-T02\*

[1983-2005]

#### Fabric manufacture

(X25-X)

\*This code is now discontinued and transferred to X25-T04B from 2006. It is still searchable and remains valid for records from 1983-2005. From 2006 embroidery machines have been transferred to X25-T04C. See T06-D03C for control details also.

Knitting machines, tension-control, embroider, looms, wefting machines, warping machines

#### X25-T03\*

[1983-2005]

# **Sewing machines**

(X25-X)

\*This code is now discontinued and transferred to X25-T04C from 2006. It is still searchable and remains valid for records from 1983-2005. See T06-D03D for control details also.

# X25-T04

[2006]

# **Textile industry**

Bleaching, binding

#### X25-T04A

[2006]

#### Fiber, yarn, etc. manufacture

See T06-D03B also for control details.

Spinning, winding, bobbins, twisting, combing, carding, crimping

# X25-T04B

[2006]

# **Fabric manufacture**

See T06-D03C also for control details. Tension-control

#### X25-T04B1

[2006]

# Weaving machines

Looms, wefting, warping machines, tension-control

# X25-T04B2

[2006]

#### **Knitting machines**

Weft knitting

# X25-T04B3

[2006]

# Non-woven fabric production machines

Includes production of non-woven fabrics such as wadding, felt or fleece, and the production of fabrics, e.g. by welding together thermoplastic fibers (see also X24-D04).

Cotton wool

#### X25-T04C [2006]

# Sewing machines; Embroidery machines

See T06-D03D also for control details of sewing and embroidery machines.

Sew. embroider

#### X25-T04D [2007]

# **Textile printing; Textile dyeing**

See also S06-G10 if using inkjet printing. See also F03-F codes for dyeing/printing.

#### X25-T04G [2006]

# Other textile industry aspects

Includes industrial scale fabric pressing/ironing, fabric cutting, industrial electric scissors etc.

#### X25-T05 [2017]

# **Industrial laundry equipment**

Includes commercial and industrial laundry washing and drving equipment. Also includes industrial dry-cleaning plants (see also X25-H09), laundry feeders (see also X25-F01), folders, industrial ironing equipment, stackers and garment baggers (see also X25-F03A).

Drying details are also coded under X25-G, and cleaning details are also coded under X25-H codes. Domestic scale laundry washing and drying equipment is coded under X27-D only.

Batch dryer, washer extractor, batch washing system

#### X25-T09 [1987]

#### Paper industry

(X25-X)

See T06-D03A also for control details.

#### X25-T09A [2002]

Paper manufacture

X25-T09B [2002]

Cardboard manufacture

#### X25-T09C [2002]

# Paper shredding/cutting

See X27-A02C also for domestic size shredder and business equipment.

#### X25-T09G [2002]

# Other paper industry aspects

See also X25-W04 for paper recycling, X25-A02A for paper press, and X25-F02A only for paper and envelope handling. Includes book binding (see also S06-C05).

Binding, printing

#### X25-U [1983]

#### **Building, construction industry**

(X25-X)

Concrete mixers, pile-drivers, stone cutters

#### X25-U01 [1983]

#### **Doors and windows**

(X25-X)

Includes gates, skylights, Also includes lift doors. Lift doors are also coded under X25-F04.

Doors control, drive motors, garage door, road barrier, electrochromic covering

#### X25-U02 [1997]

# Car Parks; Car storage and retrieval (X25-X)

#### X25-U05 [1987]

# Road construction; Road maintenance e.g. road cleaning, gritting

Includes electrical details of road tunnels, e.g. ventilation system. Also includes monitoring of road condition, e.g. damage of road surface. If road condition is transmitted to the driver of a vehicle. T07-G02 should also be applied. If the monitoring system is mounted on the vehicle, see X22 only. De-icing, snow ploughs

#### X25-V [1987]

# Cryogenics

(X25-X)

Includes electrical aspects of cryogenics producing very low temperatures (i.e. below -150 degrees Celsius).

#### X25-W [1997]

# Industrial waste disposal, recycling; **Electric steam boilers**

(X25-X)

#### X25-W01 [1997]

#### **Industrial waste disposal**

(X25-X)

Includes details of large scale garbage disposal control systems and large non-domestic bins. Domestic waste disposal, such as kitchen waste disposal units and electrical rubbish bins, are coded under X27-K only. Recycling processes/systems are coded under X25-W04 only. Does not include radioactive waste disposal (see K07-B or X14-D).

### X25-W01A [2002]

#### **Incinerators**

Electrical details of furnaces are coded under X25-C.

# X25-W02 [1997]

#### **Electric steam boilers**

(X25-X)

# X25-W04 [2002]

# **Recycling processes/systems**

Includes recycling processes for plastics, paper and aluminium, as well as retrieval and sorting of waste for recycling. See also X25-F06 for sorting, and X25-T09 for paper industry. For recycling of copier and printer components also see S06-K04C. Water recycling is also coded under X25-H03.

# X25-X

# Other

Includes fume cupboard, ventilators etc. For riveting see X25-A03R.

# X25-X01 [2002]

# **Timber industry**

Includes tree felling and transporting equipment, wood drying (see X25-G also) and sawing of lumber. For wood working such as wood turning, see X25-A10 instead.

# X25-X02 [2002]

# Vermin/insect extermination, repulsion or trapping

Includes devices for killing, trapping and deterring/scaring pests such as rats or flies. See X27-X for domestic insecticide dispenser, and X25-N01 for arable insecticide spraying.

# X25-X03 [2002]

# Killing and stunning of animals

Includes abattoirs (see also X25-N02 for livestock animals). Also includes animal deterrent/repulsion systems, e.g. for preventing wild animals from straying into specific area. Also see X25-N02 for deterring livestock and X25-X11 for electric fences per se. For vermin/insect deterrent systems see X25-X02 instead.

Abattoir, stun

# X25-X04 [2002]

#### Ozone manufacture

Also see X27-E01B2 for air-conditioning, and X12-E03

# X25-X05 [2002]

# Fire fighting equipment

Includes details of early fire warning systems e.g. in buildings. W05-B02 codes are also assigned for fire alarms. Mechanical details of fire fighting equipment are coded by P35-C codes.

Sprinklers, fire extinguishers

# X25-X06 [2002]

# **Swimming pools**

Includes electrically operated covers, lights, heaters, etc. See X26 for lighting and X27-E03/X25-B for electric water heating.

# X25-X07 [2002]

# Leather working/cutting

See X27-A02B1B also for footwear manufacture.

# X25-X08 [2002]

## Stirling engines

Includes engines used in refrigeration systems. See X27-F for refrigeration.

#### X25-X09 [2002]

Lubricating systems

# X25-X10 [2002]

### **Engraving systems**

Includes engraving using mechanical means as well as laser marking. Also includes stamping. See X25-A02D for punching/stamping.

Laser coding

# X25-X11 [2002]

# **Electric fence**

See also X25-N02C for livestock fencing.

# X25-X12 [2002]

#### **General industrial safety systems**

Used in conjunction with other X25 codes as appropriate.

# X25-X13 [2005]

#### Industrial combustion

Includes boilers using solid, liquid or gaseous fuels and involving electrical aspects. Domestic scale combustion, e.g. central heating gas boiler, is not included - see X27-G.

# X25-X14 [2005]

# Manufacturing/assembly plants

Includes assembly line systems and general manufacturing plants. For novel assembly/manufacturing devices, such as manipulators or conveyors, see X25-A03E and X25-F01, respectively. Control details of manufacturing processes using 5G technology are also covered by W02-C03C1L.

Industry 4.0, vehicle assembly line, car manufacturing plant

# X25-X20 [2008]

#### Weather influencing/manipulation

Includes all electrical aspects of systems for controlling weather conditions such as using artificial lightning to produce rain or disperse clouds. Also includes electrical aspects associated with dispersing materials for cloud seeding. For measurement of weather conditions see S03-D codes. See W06-B01C9 for aircraft-mounted weather influencing systems, and X25-N01B if rain is being influenced for agricultural reasons.

X25-Y [1997]

**Pipelines** 

X25-Y01\* [1997-2004]

## **Toilets**

\*This code is now discontinued and transferred to X27-L from 2005. It is still searchable and remains valid for records from 1997-2004. Public and domestic toilets and urinals. Includes toilets with integral bidets (see also X27-A02A).

# X25-Y02 [1997]

# **Pipelines**

Includes flow control valves, sensors and other electrical components, e.g. for large scale oil, sewage and water pipes. See also X25-L01 for valves per se, and X25-H03 for water and sewage treatment.

# X26: Lighting

NOTES:

(1) Also includes illumination obtained by unconventional sources like LED, EL devices. However, such devices used for displays and signalling are not included.

(2) Vehicle lamp circuitry / control and mounting arrangements onto vehicle body are coded in X22 only. X26 codes are applied to highlight the type of lamp (e.g. LED, incandescent, etc.), or novel details of fixtures (e.g. lenses, refractors, etc.).

#### X26-A

# Discharge (including arc) lamps

Discharge tubes for purposes other than lighting are in V05.

X26-A01

Lamps

X26-A01A

# Multi-discharge path, arc, electron-stream and external electrode lamps

Xenon lamp

X26-A01B [1987]

#### Electrode-less, microwave lamps

(X26-A01X)

Waveguides, antennae, EM coils, field generation, inductive coupling, travelling wave discharge, microwave discharge, capacitive discharge, sulphur lamp

# X26-A01B1 [2008]

# Plasma lamps

Includes electrode-less lamps using plasma discharge.

X26-A01C [1997]

# Dielectric barrier discharge lamps

(X26-A01X)

X26-A01D [2002]

#### High pressure discharge lamps

Covers metal halide, sodium vapour, etc lamps. *HID, high intensity discharge* 

# X26-A01E [2002]

#### Low pressure discharge lamps

Covers mercury, sodium, etc lamps operating at fractional pressures. Low pressure electrodeless and fluorescent lamps are in X26-A01B and X26-A01E1, respectively.

Deuterium arc lamp

X26-A01E1 [2002]

**Fluorescent lamps** 

X26-A01X

Other discharge lamps

X26-A02

Construction

X26-A02A

**Containers; Seals** 

Includes end caps.

X26-A02A1 [1987]

# Seals; Leading-in conductors

Leads, cement, cermet seals

X26-A02A2 [1992]

**Containers** 

Bulb, envelope, chamber, tube

X26-A02A2A [2002]

Inner envelope

X26-A02A2B [2002]

Outer envelope

X26-A02B

Electrodes, shields, screens

X26-A02C

**Fillings** 

Metal halides, mercury, sodium, iodides

# X26-A02D

#### Filters, phosphors

Fluorescent coatings, luminescent coatings

[2002]

#### X26-A02E

Inductor or HF coil (X26-A02X)

Includes coil and toroidal core for operating electrodeless lamp. Coil arrangements, e.g. for impedance matching, are also covered by the

relevant V02-F and U25 codes.

# X26-A02F [2005]

# Integral light source and reflector

For reflectors as part of a light fixture, see X26-D01A.

#### X26-A02G [2005]

# Integral operating circuit/envelope

Includes constructional details of the combination. Electrical details of the operating circuits are covered by X26-C01 codes.

#### X26-A02X

# Other discharge lamp constructional details

Includes pressure maintenance, gettering, tubeshatter prevention, cooling, etc.

Amalgams

#### X26-A03

#### Manufacture

Also includes testing, phosphor recovery, packaging, etc.

X26-A03A [1992]

Welding end caps

X26-A03B [1992]

Container

Includes coating of films.

X26-A03C [1992]

**Electrodes** 

#### X26-B

#### **Incandescent lamps**

# X26-B01

#### Lamps

Includes photo-flash bulbs (see also S06-B03B). *Photoflash arrays, primers* 

X26-B01A [2005]

#### **Halogen lamps**

Tungsten lamp

X26-B01B [2005]

# **Heating lamp**

See X25-B/X27-C codes, respectively, for industrial/cooking/heating applications.

#### X26-B02

#### Constructional details

#### X26-B02A

# Envelopes, seals, filament mountings, connections

# X26-B02A1 [1987]

#### **Envelopes, seals**

Includes end caps, filters e.g. coated onto the inside of the envelope.

Bulbs

### X26-B02A2 [1987]

# Filament mountings, connections

Also includes lead wires, lead-in conductors.

# X26-B02A3 [2005]

**Filaments** 

(X26-B02X)

# X26-B02B [2005]

# Integral light source and reflector

For reflectors as part of a light fixture, see X26-D01A.

#### X26-B02X

# Other incandescent lamp constructional details

Includes fillings, getters, etc.

#### X26-B03

# Manufacture

Also includes testing, packaging etc.

#### X26-B03A [1992]

**Incandescent bodies** 

X26-B03B [1992]

Vessels

# X26-C

# Lamp operation and control

Vehicle lamp circuitry and control are coded in X22-B01F only. LED circuitry and control are coded in X26-H03 only.

# X26-C01

#### Discharge (including arc) lamps

For unspecified lamp-type controllers, see X26-C03 codes.

#### X26-C01A

# **Operating and controlling flashlamps**

For camera flash see S06-B03A also. Strobes

#### X26-C01B

Lamp operating circuits; Starters

X26-C01B1 [1992]

# Inductive ballast; Inductive components; Starter switches

Includes normally non-electronic starting aids.

X26-C01B1A [2005]

Inductive ballast

Includes inductive starting circuit.

X26-C01B1C [2005]

# Inductive components

Includes novel inductors/transformers specifically for use in (non)electronic ballasts. See V02-G codes for further details for reactors and transformers.

X26-C01B2 [1992]

**Electronic ballast** 

Ignition circuit

X26-C01B2A [1992]

Inverters

See also U24-D05 codes for further details.

X26-C01B3 [1992]

# For electrodeless lamps

This lamp-type code is used with the above 'ballast' codes, as appropriate.

X26-C01B4 [2002]

# For high pressure discharge lamps

This lamp-type code is used with the above 'ballast' codes, as appropriate.

X26-C01B5 [2002]

# For low pressure discharge lamps

This lamp-type code is used with the above 'ballast' codes, as appropriate.

X26-C01B5A [2005]

Fluorescent lamp

CCFL, cold cathode fluorescent lamp

X26-C01C

**Controlling lamp intensity** 

Dimming

X26-C01D [2005]

#### Current/power/voltage control

For general low power control circuits for voltage and current. See also U24-D/E codes.

On-Off

X26-C01E [2005]

Remote control

See also W05-D codes for remote controllers.

#### X26-C01X

Other discharge lamp operation/control

#### X26-C02

# **Incandescent lamps**

For unspecified lamp-type controllers, see X26-C03 codes.

X26-C02A [2005]

**Halogen lamps** 

X26-C02B [2005]

#### **Heating lamp**

See X25-B/X27-C codes, respectively, for industrial/cooking/heating applications.

X26-C02C [2005]

#### Dimmer

See also W05-D codes for remote controllers.

#### X26-C03

### Lamps (general)

See also V04-Q30U and other V04-Q codes for details of printed circuits.

Transformers, wiring, PCB

### X26-C03A

Regulating voltage or current; Controlling intensity

X26-C03A1 [1992]

Regulating voltage or current

X26-C03A5 [1992]

#### Controlling intensity

Dimming

# X26-C03C [1992]

# Remote-controlled switching

(X26-C03X)

Includes all aspects of remotely controlling the light, including remotely adjusting the brightness (also coded in X26-C03A5) and remotely switching the light on/off (also coded in X26-C03E). See also W05-D codes. Also includes real-time monitoring of street lamps.

### X26-C03E [1992]

# **On-off switching**

(X26-C03X)

Includes use of person presence/absence detection.

#### X26-C03X

# Other general lamp circuit arrangements

Includes circuitry to detect lamp failure.

# X26-D [1983]

#### **Fixtures**

Arrangement details for supporting, suspending or attaching the light/lamp to e.g. a wall, ceiling, floor, etc, not involving details of light distribution are coded by X26-R. For vehicle lighting, see also X22-B codes.

# X26-D01 [1992]

# Reflectors, refractors, diffusers, filters, screens

Generally, includes items considered to be part of the light fitting structure. So, excludes optical systems that are at some distance from the light source.

X26-D01A	[2002]
Reflectors	

X26-D01B [2002]

Refractors

Lens

X26-D01C [2002]

**Filters** 

X26-D01D [2002]

**Screens** 

Gobo, "Goes-Before-Optics"

# X26-D01E [2002]

### **Diffusers**

A diffuser in the form of a cover for a light fitting is also coded in X26-D03.

# X26-D01E1 [2002]

# For displays

Includes diffusers for back- and edge-lighting arrangements for displays (see also X26-U04A1 and X26-U04A2 respectively). See also W05-E05B codes (only for records prior to 2007) and U14-K01A codes, respectively, for general display and LCD back-lighting.

#### X26-D01F [2002]

# **Light guides**

Includes light guides such as a plate, glass block, optical fibre, etc. used locally within a light fitting. For guiding of light over some distance, see X26-G. Where the light guiding aspect relates to the backlighting of an LCD, see also U14-K01A and W05-E05B (only for records prior to 2007) codes.

X26-D01G [2002]

**Polarisers** 

X26-D02 [1992]

#### Cooling

For cooling arrangements associated with the lamp itself, see X26-A02X and X26-B02X.

#### X26-D03 [2002]

# Housing or case for light fitting

Includes protective fittings such as a cage, etc. Also includes cover glasses, globes and bowls as part of the housing for the light fitting. This code is used in conjunction with other codes as appropriate, e.g. X26-D01E for a globe with diffusing property.

#### X26-E [1983]

#### **Portable lights**

(X26-X)

Includes lights which can be carried around personally or moved around.

X26-E01 [1987]

Portable battery-powered lights

X26-E01A [2005]

**Torches** *Flashlights* 

X26-E01A1 [2005]

LED-based

X26-E01B [2005]

Lanterns

X26-E01C [2005]

**Penlights** 

X26-E01D [2005]

**Key ring lights** 

X26-E01E [2005]

# Portable lights using renewable/green energy resources, e.g. solar lights

From 2006, this code has been expanded to include all small solar powered lights, such as garden/path lights, etc. From 2020, this code has been expanded further to include all portable lights using renewable/green energy resources, including wind powered lights or combinations of different green energy resources. Details of the solar cells are covered by X15-A codes and details of wind power are covered by X15-B codes. Nonportable lights using renewable/green energy resources are coded under X26-S.

# X26-E01F [2005]

#### Wearable

Includes portable lights mounted on clothing, shoes, jewellery, etc.

Watch, helmet mine lamp

X26-E02 [1987]
Portable mains-powered lights

X26-E02A [2005]

**Table lamps** 

X26-E02B [2005]

Floor lamps

X26-E02C [2005]

#### **Emergency**

Includes portable and fixed emergency lights, e.g. exit lights with batteries previously charged by the mains, and emergency lights in e.g. an operating theatre when the main power is off.

# X26-E02D [2005]

# **Night lights**

Includes light/mains plug combinations used in, say, children's rooms.

# X26-F [1987]

#### Lamp holders

(X26-A02X, X26-B02X)

See also V04-K01.

Bayonet, screw holder

# X26-G [1987]

# Illumination using optical guiding structures

(X26-X)

Includes, in general, the use of guides such as optical fibers, rods, etc in leading light from a source to a distant location. For light guiding structures within a light fitting or for 'local' use, see X26-D01F. For optical fiber-based illumination, see also V07-N03. Guiding of solar/sun light is not included unless a space is illuminated with a combination of natural and electric lights with, for example, the latter controlled to supplement or supplant natural light depending on ambient conditions.

# X26-H [1992]

#### **Light emitting diodes (LEDs)**

(X26-X)

Includes all LEDs only when used for illumination. OLEDs or organic LED-based lighting is covered by X26-J **only**.

#### X26-H01 [2008]

# LEDs; Details of P-N junctions and semiconductor structures

Includes semiconductor P-N junction type LEDs, per se, when used for illumination. See also U12-A01 codes for more details of the diodes.

#### X26-H02 [2009]

#### **Constructional details of LED lights**

Includes constructional details of LED lamps such as envelopes, lead wires, lead-in conductors, reflectors, etc. See also X26-D codes for cooling arrangements (X26-D02), reflectors (X26-D01A), housing (X26-D03), etc.

Leading-in conductor, seal

# X26-H03 [2008]

LED circuits/control

### X26-H03A [2011]

# **LED** circuits

Includes circuits for driving/operating LEDs. See also U12-A01A5 codes.

# X26-H03C [2011]

#### **LED** control

Includes voltage control, intensity control, remote switching, on/off control, etc. LED control is only coded here and does not need an X26-C03 code to be applied.

Dimming

# X26-J [1992]

# **Electroluminescent devices (EL)**

(X26-X)

Includes electroluminescent devices - such as OLEDs - and their circuits, when used for illumination. Does not includes EL/OLED (organic LED) displays. See also U14-J codes for all electroluminescent light sources and displays. Manufacture of electroluminescent light sources are not covered by X26 codes, but by U14-J codes only. LED-based lighting is covered by X26-H **only**.

#### X26-K

[1992]

# **Stage Lighting**

(X26-X)

Gobo, "Goes-Before-Optics"

### X26-L

[2002]

### Beam aiming arrangement

(X26-X)

Includes motorised movement of, for example, a reflector to vary beam direction. See X22-B01E also for vehicle applications. Also includes movement of the light, per se, as in stage lights, etc.

Searchlight positioning

# X26-M [2002]

#### Decorative or special-effects lighting

(X26-X)

Includes lighting for Christmas decorations, decorative light strings, etc. See also W04-X03C for novelties and ornamental lights, and X26-X for light strings.

# X26-N

[2002]

#### Laser

(X26-X)

Includes arrangement of lasers for illumination. See V08 codes for claimed details of lasers.

# X26-P

[2002]

#### **Shades**

(X26-X)

# X26-Q

[2008]

#### Lamps with non-visible output

Includes lamps that primarily produce illumination outside of the visible spectrum.

# X26-Q01 [2008]

# **IR lamps**

Includes all lamps that produce IR illumination, e.g. IR LEDS (see also X26-H codes) used for night vision/surveillance system illumination. Can be used in conjunction with other X26 codes as appropriate, such as X26-U03 for infrared lamps used for heating/curing. See also X25-B01H for infrared heating lamps, and X27-C02A for domestic cooking hobs using infrared lamps.

# X26-Q03 [2008]

# **UV lamps**

Includes all lamps that produce UV illumination, e.g. fluorescent back-lights (see also X26-A codes) and sun tan lamps (see also X26-U01).

Ultraviolet

#### X26-R [2010]

# Supporting/suspending arrangements for light fitting

(X26-X)

Includes arrangement details for supporting, suspending or attaching the light/lamp to e.g. a wall, ceiling, floor, inside a refrigerator, in a vehicle, etc. Includes wall, ceiling or floor attachments, lamp posts, clips, clamps, suction or magnetic attachments, details of pendants, hand grips, etc. Details of light distribution, e.g. reflectors, refractors, filters, polarisers, etc, are covered by X26-D codes.

# X26-S [2017]

# Lights using renewable/green energy resources, e.g. solar lights

Covers all kinds of non-portable lights powered by renewable/green energy, such as solar or wind powered lights, or combinations of different green energy resources. Portable lights using renewable/green energy resources are coded under X26-E01E. Details of solar panels are coded under X15-A, and details of wind power under X15-B.

#### X26-U [2005]

#### Lighting applications

To be used with other relevant X26 codes. See also appropriate classes e.g. S05 for medical applications.

### X26-U01 [2005]

#### Cosmetic

Includes lights for sun tanning, and (flashing) lights for toothbrushes, vanity/compact mirrors, etc. See also X27 codes.

#### X26-U02 [2005]

#### Medical

Includes lights used during treatment of acne, jaundice, psoriasis, etc., during photo-chemistry, colour and light therapies, in surgical instruments (e.g. endoscope), etc.

# X26-U03 [2005]

# Heating/curing, disinfection/sterilisation

Includes e.g. IR heat lamps or UV lamps used for curing adhesives or inks. Not used when X26-B01B/C02B are applied. See also X25-B01H for infrared heating lamps. Also includes disinfection and/or sterilisation using UV or IR light sources see also X27-D10.

#### X26-U04 [2005]

# Displays/signs

For back- and edge-lighting.

# X26-U04A [2007]

#### **Displays**

Includes light sources and fittings for lighting of displays. For LCDs see also U14-K01A codes, and T04-H03D if LCD is also for computer monitors.

#### X26-U04A1 [2007]

#### **Back-lighting**

See also U14-K01A4C for LCD back-lighting. For records prior to 2007, see also W05-E05B1.

# X26-U04A2 [2007]

#### **Edge-lighting**

For records prior to 2007, see also W05-E05B3.

# X26-U04B [2007]

#### Signs

Includes the lighting of any translucent or transparent information source, such as advertisements (see also W05-E03A1), trafficrelated signs (see also T07-B codes and X26-U06 for street signs) etc.

# X26-U05 [2005]

# **General lighting system**

Includes general lighting systems on building sites. GLS

# X26-U05A [2005]

#### **General commercial lighting**

Includes general lighting arrangements used specifically in commercial/business applications such as office lighting.

#### X26-U05B [2009]

# **General domestic lighting**

Includes general lighting arrangements used in domestic settings, e.g. ceiling pendant lights, wall lights, bathroom mirror lights. Also includes lighting arrangements in domestic appliances (e.g. refrigerator, oven, hood, furniture, etc.), and garden lighting. Lights for toothbrushes are coded under X26-U01 only. Domestic applications are also coded under X27 codes.

#### X26-U06 [2005]

#### Street

Includes street lighting (e.g. lamppost), illuminated traffic bollards (also see T07-X), and lighted signs, such as road signs (also see T07-B codes). Illuminated road signs are also coded under X26-U04B and T07-B codes. Also includes lighting details of traffic lights (see T07-B05A for traffic signalling per se). Includes tunnel and bridge lighting details.

Lamppost, bollard, road markings

# X26-U07 [2005]

# Vehicles

Includes lighting for motor vehicle, electric vehicle and train.

# X26-U08 [2005]

#### Marine vessels

Includes beacon lights and ship navigation lights. See also W06-C01C (lighting equipment for marine vessels) and W06-C07C (buoys and beacons).

#### X26-U09 [2005]

#### Aircraft/space craft

# X26-U10 [2006]

#### **Projectors**

Includes display projectors and cine projectors. See also W04-Q01 and S06-B, codes respectively.

X26-U11 [2006]

Cameras

#### X26-U11A [2006]

# **Digital cameras**

See also W04-M01 codes.

# X26-U11B [2006]

#### Film-based cameras

See also S06-B codes.

# X26-U12 [2016]

#### Plant growth

Includes LEDs or any other lighting arrangements for plant growing purpose.

Greenhouse

# X26-U99 [2006]

# Other lighting applications

Includes light arrangement in reptile houses, aquaria, vivaria, umbrellas, vases, sewing machines, screwdrivers, keys, handbags, clothes, rucksacks, walking stick lights, etc. Cosmetic items, e.g. toothbrushes, are coded under X26-U01 only. See also X27 codes for domestic/personal items. Also includes teaching equipment using training and simulation aids i.e. for illustrating light refraction etc.

# X26-V [2020]

#### Maintenance, repair and cleaning of lamps

This code is used in conjunction with other X26 codes as appropriate.

# X26-X

# Other light sources and details

Covers lighting details not involving light emission (X26-A, etc.), light distribution (X26-D) or light/lamp attachments. Includes light strings/garland etc. Light strings for Christmas lights or other decorative or novelty lights are also coded in X26-M. From 2010 see X26-R only for supporting/suspending arrangements for light fitting. Also includes water-tight and gas-tight arrangements.

Insect repellent

# **X27: Domestic Electrical Appliances**

Also includes industrial cooking, space heating, refrigeration and combustion, with significant electrical content. Non-electrical domestic appliances with some electrical aspects are also covered here.

#### X27-Δ

# **Garden and personal articles**

# X27-A01 [1983]

# **Garden equipment**

Includes electrical aspects only e.g. power distribution, motor, switch, etc. Includes potted plants.

# X27-A01A [1987]

# Lawn mower, hedge clipper

Includes hedge trimmers, Strimmers®, tree and shrub clippers and also robotic type lawn mowers (T06-B01A may also be required for 2-D position control).

Electric motor, switch, cable, IC engine, protective cut-out

# X27-A01B [2006]

#### **Garden furniture**

Includes garden furniture such as patio heaters, patio umbrellas etc. incorporating some electrical content, such as built-in lights (see also X26 codes).

# X27-A02 [1983]

#### **Personal articles**

Includes e.g. calorie counter, wristwatches are not included - see S04, bathroom scales, hair thickening device, umbrella, beauty treatment, powder compact, pill timing/warning device, also W05-A and S05-X, key finder (see W05-A also depending on transmission details). From 201501, non-electrical details of umbrellas are coded under P24-A02

Facial steamer

# X27-A02A [1983]

# **Personal hygiene**

Includes articles for washing - e.g. foot washers, bidets, contact lens steriliser, incontinence detector, weighing scales, roller towel.

# X27-A02A1 [1987]

#### Driers, hair curlers

Includes drier for hair, hands, feet, nail polish and body. Also includes hair extension apparatus and hair straighteners etc. From 201501, non-electrical details of hair curlers, etc, are coded under P24-C01.

Heating element, hair brush, smoothing tongs

#### X27-A02A2 [1987]

#### Massaging devices, sunbeds

Includes light sources. See also S05-A and X26-A. Solarium, ultraviolet, lamp, tan, UV, sunbed

#### X27-A02A3 [1987]

**Electric toothbrushes; Electric razors** 

# X27-A02A3A [1992]

#### **Electric toothbrushes**

Includes electric toothbrushes and toothpaste dispensers. From 201501, non-electrical details of manual toothbrushes are coded under P24-E.

Motor, switch, head, brush, battery

### X27-A02A3B [1992]

# Electric razors; Hair clippers; Depilatory tool

(X27-A02A)

Includes all aspects e.g. blades, foil, handle. Also includes electric hair clipper. From 201501, non-electrical details of shaving equipment are coded under P24-C02.

Head, motor, switch, brush, battery, wet, dry

#### X27-A02A4 [1997]

#### Bath; Shower; Washbasin

(X27-X)

Includes electrical aspects such as electric mixer tap or presence detector. For electric water heating aspects of e.g. showers or baths, see X27-E03A1 only.

Sink, tap, detector, EM valve

# X27-A02B [1983]

# Clothing, jewellery

Includes electrical aspects only, flashing badges, shirts, buttons etc. See also W05-A as appropriate.

# X27-A02B1 [1987]

# Clothing

Includes electrical aspects only. X27-A02B1 codes can be used alone or in conjunction with one another depending on claimed aspects.

Backpack, rucksack

# X27-A02B1A [2002]

#### Garments

Includes electrical aspects of e.g. shirts, buttons, protective helmets, heated gloves, life jackets. Non-electrical details of garments are coded by P21 codes.

# X27-A02B1B [2002]

#### Footwear and its manufacture

Includes safety boots and shoes (see X25-X07 for electrical aspects of leather cutting). Non-electrical details of footwear are coded by P22 codes.

# X27-A02B1E [2005]

#### With integral electrical parts

Includes clothing in which e.g. lighting, sensors, wiring, heating elements (see-X25-B01 codes), actuators and other electrical parts are integrated into fabric. E.g. includes electrical elements such as resistive heating elements woven into fabric, flexible electrical coatings applied to fabric or fibers, or e.g. LEDs moulded into plastic sole of shoe. Also see X25-T codes for fabric manufacture per se.

#### X27-A02B1F [2005]

#### With attachable electrical parts

Includes electrical parts that are attachable to clothing. E.g. includes LED fixed to cap by clip, or LED incorporated in button that is sewn onto e.g. shirt fabric.

# X27-A02B2 [1987]

### **Jewellery**

In general includes jewellery with electrical devices e.g. flashing LEDs to create eye-catching effect. Brooch, clip, jewel

### X27-A02C [1987]

# Stationery and business equipment

Includes electrical aspects only of pens, briefcases, diaries, files incorporating computer, note pads, etc. For notepad computers and PDAs see T01 only, and for electronic blackboards and other conference equipment see W04-W05 only. Bag, magnetic clasp or button, suitcases

#### X27-A02D

# Spectacles, goggles

Includes electrical aspects only, e.g. liquid crystal light valve for welding goggles, see X24 also. For the manufacture of glasses see also X25-A03C2 and X25-A05 for glass lenses or X25-A06 for soft, plastic lenses.

# X27-A02E [2007]

#### Walking sticks

Includes sticks with integral electrical components. Also see S05-K01 for walking sticks used by physically challenged person. From 201501, non-electrical details of walking sticks are coded under P24-A01.

# X27-A02F [2014]

#### **Electronic cigarettes**

Includes details of atomizer, cartridge, disposable cartomizer. Packaging details are coded under Q34-M02. Electrical details of tobacco cigarettes (including their manufacture) are coded under X25-P03.

E-cigarette, personal vaporizer, PV, electronic nicotine delivery system, ENDS

# X27-A03 [1997]

#### **Furniture**

(X27-A)

Electrical aspects only of mattresses, beds, chairs, tables, seats, sofas, pillows (including travel pillows), cushions etc. Heaters for seats, beds, pillows, etc. are coded under X27-E02. See also X25-B codes for novel electrical heating elements per se. See also X26 codes for novel lighting elements.

Mattress, chair, table, cupboard

#### X27-B

# Kitchen appliances

Includes all aspects of electrical kitchen appliances. Tableware, glassware and cutlery (with no electrical content) are coded under P27-B03.

Other non-electrical kitchen equipment, such as spice racks, egg slicers, coffee grinder, vacuum flasks, etc. are coded under P28-A.

# X27-B01 [1983]

#### Tea/coffee machines, kettles

Includes water reservoir, flow heater, jug, jug funnel etc. Excludes paper filters and funnels for cups. Large size coffee/tea machine, see X25-P01 also.

Percolator, cappuccino machine, espresso maker

# X27-B02 [1987]

# Pop-up toasters

# X27-B03 [1987]

#### Food processors/mixers

Includes juice extractor, food processor tools, ice-cream manufacture, blenders, fruits and vegetables peeling machines. See X27-C08 instead for bread makers. Small handheld fruit and vegetable peelers are coded under X27-B04.

Motor, beater, grinder, chopper, blade, churner

# X27-B04 [1987]

# Knives, tin openers etc.

Includes bottle openers, and handheld fruit and vegetable peelers.

Can opener

### X27-B05 [1997]

#### Extractor hoods

(X27-B)

For extractors for use in toilets, see X27-L. For ventilators per-se see X27-E01B1.

#### X27-B09 [2007]

# Other kitchen appliances

Includes electrical details of food warmer for serving trolley, soda mixer, beverage dispenser for e.g. carbonated drinks, kitchen tap, milk frother (see X27-B01 instead if part of cappuccino machine), buffet food container with automatic lid etc. Also includes cutlery or drinking vessels (cups, glasses, etc.) with electrical content, such as integrated lights, temperature displays, etc. Also includes baby bottle sterilisers and baby food warmers. Food warmers, bottle sterilisers, and cutlery specially made for children/babies are also coded under X27-X01.

#### X27-C

#### Cooking appliances

Includes all aspects of apparatus using electrical heating, and electrical aspects only of gas cooker. Excludes discardable hob covers e.g. metal foil.

# X27-C01 [1983]

#### Microwave ovens

See also X25-B02B for microwave heating in general. Covers all aspects, including heater for browning, switches, fans, lamps, etc. Microwave-transparent cooking-ware is included only if the patent bears an 'H' IPC.

#### X27-C01A [1987]

# **Constructional details**

Includes chamber/cavity, door, seal, interlocks etc.

X27-C01B [1987]

Magnetron, control, waveguide, turntable

X27-C01B1 [1992]

Magnetron, waveguide, turntable

Antenna

X27-C01B3 [1992]

Control and power supplies of microwave oven

Timer, programmer

X27-C02 [1983]

Electric ovens, hobs

Ceramic, plate, glass, hotplate

X27-C02A [1987]

Using lamps

Lamps are also in X26-B.

Filament, halogen, incandescent, infrared, tungsten

X27-C02C [2002]

Fan assisted electric ovens

X27-C03 [1987]

**Electric grills and electric fryers** 

(X27-C09) Air fryer

X27-C03A [1992]

Electric deep-fat fryers

Rotofryer, twin fryer

X27-C03B [1992]

Electric grills; Oven toasters; Electric roasters

X27-C03C [1992]

**Electric ariddles** 

Includes sandwich maker, steak griddle etc.

X27-C03D [2009]

#### Electric frying pans; Electric woks

Includes standalone electric frying pans and electric woks. Electric deep-fat fryers are coded under X27-C03A only.

# X27-C04 [1987]

# Electric steamers; Electric pressure and rice cookers

(X27-C09)

Includes cooking by steam using self-contained vessel with heater.

Rice cooker, egg steamer, pressure cooker

# X27-C05 [1987]

#### Gas cookers

(X27-C09)

Includes electric aspects only. Gas igniters are in X27-G01 only, unless forming part of cooker construction, e.g. pilot lighter.

Hob, burner, valve

#### X27-C06 [1987]

#### Induction cookers

(X27-C09)

See also X25-B02A for general aspects of induction heating.

#### X27-C07 [1992]

#### Combination ovens

Includes joint cooking apparatus such as resistance, microwave, convection. See appropriate X25, X27 codes for claimed heating.

# X27-C08 [2006]

#### **Breadmakers**

For specific electric heating details also see appropriate X25-B codes.

# X27-C09 [1983]

# Other cooking appliances

Includes electrical devices inserted into food to measure temperature, cooking time estimation. Also includes slow cookers, and other cooking vessels with electrical content not covered by other X27-C codes. Non-electrical cookware and ovenware are coded under P28-A02 only.

#### X27-D

# Cleaning and disinfecting appliances

Includes all aspects of domestic cleaning. Commercial and industrial laundry washing and drying machines are coded under X25-T05 only. General cleaning is also in X25-H09.

# X27-D01 [1983]

# Washing machines

Includes all aspects, e.g. feet, doors, water inlet/outlets pipes etc. Excludes kitchen 'furniture' aspects such as worktop under which machine is kept.

Control, programme timer switch, cam, pump, detergent dispenser, motor, laundry machine, drum, packaging for machine

#### X27-D01A [1983]

#### **Clothes washers**

Also see X27-D07 codes for mixed mode cleaning, e.g. using ultraviolet radiation to kill bacteria. Also includes details of washing machines specifically made for washing shoes.

X27-D01A1 [2007]

**Machine types** 

X27-D01A1A [2007]

#### Vertical axis washers

Includes vertical axis top loader machines.

#### X27-D01A1B [2007]

# Front loading horizontal axis washers

Includes drum type washer.

X27-D01A1C [2007]

Top loading horizontal axis washers

# X27-D01A1D [2007]

### Tilt axis washers

Includes fixed and variable tilt axis washers.

# X27-D01A1X [2007]

# Other machine types

Includes twin tub machines.

#### X27-D01A3 [2007]

Component parts/constructional details

#### X27-D01A3A [2007]

#### Providing mechanical energy to clothes

Includes drums, lifters, agitators, pulsators.

# X27-D01A3B [2007]

# **Drive arrangements**

Includes drive motors, drive belts and transmissions. See also V06-M codes for novel motors/transmissions per se.

Contra rotation

# X27-D01A3C [2007]

#### **Casings**

Includes machine housings, doors, seals, feet, wheels, insulation etc.

# X27-D01A3D [2007]

# **Dispensing systems**

Includes soap powder and fabric conditioner dispenser trays and from 2007 ball type dispensers placed in the washing machine drum.

# X27-D01A3E [2007]

#### Liquid management systems

Includes water supply/discharge pipes, valves, pumps, pump seals, water heaters, water recirculation/recovery and spray systems. Details of steam generating arrangements are also included under X27-D07E.

#### X27-D01A3F [2007]

# Vibration damping systems

Includes active suspensions and counter weights for reducing machine noise and vibration.

# X27-D01A3X [2007]

### Other component parts

Includes packaging such as boxes and transit bolts. Also see Q32-A08 and Q32-T for boxes and transit packaging per se.

#### X27-D01A5 [2007]

# **Control systems of clothes washers**

Includes all electrical control aspects such as programme timer switches. Also see T06-A05C for use of control algorithms to optimise wash cycle according to sensed parameters. For control of mechanical variables such as liquid flow or level, also see T06-B codes.

# X27-D01B [1983]

# **Dishwashers**

Also see X27-D07 codes for mixed mode cleaning, e.g. using ultrasonic vibration to enhance cleaning action.

X27-D01B1 [2007]

**Machine types** 

# X27-D01B1A [2007]

# **Built-in or wheeled**

Includes front loading traditional type full size or slimline dishwashers.

Free-standing

# X27-D01B1B [2007]

#### **Drawer type**

Includes twin drawer dishwashers.

# X27-D01B1X [2007]

### Other configurations

Includes top loading or portable, small size 'counter top' dishwashers.

# X27-D01B3 [2007]

### Component parts/constructional details

X27-D01B3A [2007]

Racks

# X27-D01B3B [2007]

#### **Drive arrangements**

Includes pump drive motors, belts, transmissions etc.

## X27-D01B3C [2007]

#### Casings

Includes machine housings, doors, seals, tubs, feet, wheels, insulation etc.

# X27-D01B3D [2007]

# **Dispensing systems**

Includes salt and cleaning powder/tablet dispensers.

#### X27-D01B3E [2007]

# Liquid management systems

Includes water supply/discharge/recirculation, valves, water heaters, pumps, pump seals and spray arms.

# X27-D01B3F [2007]

# **Drying systems**

Includes heater elements (see also X25-B01 for electrical resistance heating per se), heat exchangers, air flow arrangements, vents, condensing arrangements etc.

#### X27-D01B3G [2007]

#### Soil collection and management

Includes filters, screens, sizers and choppers.

# X27-D01B3X [2007]

#### Other component parts

# X27-D01B5 [2007]

# **Control systems of dishwashers**

Includes all electrical control aspects. Also see T06-A05C for use of control algorithms to optimise cleaning cycle according to sensed parameters. For control of mechanical variables such as liquid flow, also see T06-B codes.

# X27-D01C [1987]

#### Combined washer/driers

This code can be used in conjunction with X27-D01A or X27-D02 codes as appropriate to highlight the novel aspects.

# X27-D02 [1983]

### **Laundry driers**

Includes clothes and shoe driers.

Drum, spin, tumble, condenser

X27-D02A [2007]

Machine types

X27-D02A1 [2007]

**Electric vented tumble driers** 

X27-D02A2 [2007]

Gas vented tumble driers

X27-D02A3 [2007]

Heat pump tumble driers

X27-D02A4 [2007]

Condensing tumble driers

X27-D02A5 [2007]

Microwave tumble driers

X27-D02A6 [2007]

#### Non-tumble driers

Includes cabinets, bags, drying rooms and drawers for drying flat or hanging clothes. See also X27-D07E for use of stream to assist in removing creases from hanging clothes during drying.

X27-D02A9 [2007]

Other driers

X27-D02B [2007]

**Component parts/constructional details** 

# X27-D02B1 [2007]

#### Providing mechanical energy to clothes

Includes drums and lifters.

#### X27-D02B2 [2007]

#### **Drive arrangements**

Includes drive motors, drive belts, gears etc. See also V06-M codes for details of motors/transmissions per se.

Contra rotation

# X27-D02B3 [2007]

# **Heating systems**

Includes electrical heaters (see also X25-B codes), combustion aspects (see also X27-G codes) and heat exchangers.

# X27-D02B4 [2007]

#### Air moving systems

Includes blowers, ducts, vents, valves and air recirculation arrangements.

# X27-D02B5 [2007]

#### **Casings**

Includes housings, doors, seals, feet, wheels, insulation etc.

# X27-D02B6 [2007]

# **Dispensing systems**

Includes deodoriser/conditioner (see also X27-D07M) dispensers.

# X27-D02B7 [2007]

# **Vibration damping systems**

Includes damping arrangements to reduce machine noise

# X27-D02B8 [2007]

# Lint management systems

Includes mechanical lint/fluff filters.

#### X27-D02B9 [2007]

#### Other component parts

# X27-D02C [2007]

#### Control systems of laundry driers

Includes all electrical control aspects such as programme/temperature control switches. Also see T06-A05C for use of control algorithms to optimise drying performance according to sensed parameters such as load weight. For sensing of temperature or moisture content, see also S03-B and S03-E02C1 codes respectively.

# X27-D02L [2007]

#### **Clothes lines**

See X27-D06 prior to 2007. Includes motorized arrangements for raising and lowering line or for rotating rotary washing line. Details of purely mechanical clothes lines are coded under P28-C05.

# X27-D02X [2007]

# Other laundry driers

For electrical aspects of mangles, see X27-D09 instead

# X27-D03 [1983]

#### Irons

For electrical aspects of ironing boards search X27-D09 also.

Steam, sole plate, heater

# X27-D04 [1983]

#### Vacuum cleaners

Includes constructional details of vacuum cleaner, e.g. casing. Details of replaceable items, e.g. nozzles, tools, are coded under X27-D04A only. Also see X27-D07 for mixed mode cleaning, e.g. using ultraviolet radiation to kill mites or bacteria. For combined vacuum cleaner and e.g. carpet washer, also see X27-D08.

Motor, suction, fan

#### X27-D04A [1992]

#### **Accessories**

Includes all aspects e.g. paper bag, wheels, attachments, tools, nozzles etc.

Hose, nozzle filter, brush, bag

# X27-D04B [1992]

#### Motors

Includes vacuum cleaner motors per se. See also V06 codes for a more detailed breakdown of motors per se.

#### X27-D04B1 [1992]

# **Control systems of vacuum cleaners**

#### X27-D04C [2002]

#### Cyclone type

Includes dual and multi-cyclone type vacuum cleaners.

#### X27-D04R [2006]

#### **Robotic vacuum cleaners**

Includes autonomous vacuum cleaners. Also see X27-U for domestic assistance robots per se.

Automatic guidance

# X27-D05 [2002]

#### Floor cleaners/washers/polishers

From 2006 this code has been expanded to include all floor sweeping, washing and polishing machines. Also includes robotic floor cleaning machines (T06-B01A may also be required for 2-D position control). For carpet cleaning see X27-D08 only. Sweeper

# X27-D06\* [2002-2006]

#### **Clothes lines**

\*This code is now discontinued and transferred to X27-D02L from 2007. It is still searchable and valid for records from 2002-2005. Includes motorised arrangements for raising and lowering line or for rotating rotary washing line.

# X27-D07 [2005]

# Mixed mode cleaning

Includes cleaning systems with secondary cleaning, disinfecting, deodorising or sterilising function. This code can be used in conjunction with other X27-D codes to specify the primary cleaning function.

# X27-D07A [2005]

### **Using vibration**

Includes use of ultrasonic vibrator to provide enhanced cleaning action.

#### X27-D07C [2005]

# **Using radiation**

Includes use of ultraviolet or microwave radiation e.g. to kill germs.

UV, microwave

#### X27-D07E [2007]

#### Using steam/vapour

Includes steam generation arrangements and vapour generation from a liquid/solid. Includes use of steam in refresh cycles to deodorise and remove creases from unwashed clothes.

Anti-wrinkle, de-crease, non-iron, refresher

# X27-D07F [2007]

#### **Bubble systems**

Includes water aeration arrangements and air bubble generators for improving cleaning.

### X27-D07K [2007]

# Using chemicals

Includes anti-microbial generators, chemical coatings for machine components and spray systems to deliver disinfectant to the clothes.

# X27-D07K1 [2007]

#### **Chemical coatings**

Includes drums (see also X27-D01A3A for washing machines) coated with anti-microbial substance e.g. nano-silver (see also D09-A01 and E35-B chemistry codes).

# X27-D07K3 [2007]

#### **Chemistry generation**

Includes silver/copper/zinc/ozone/ions generated inside the machine using e.g. electrolysis systems (see also X25-R codes), photocatalysts etc.

Anti-microbial, ionisation, ozoniser

# X27-D07K5 [2007]

### **Dispensing systems**

Includes systems for dispensing/spraying e.g. antimicrobial/sterilising chemicals to the clothes.

#### X27-D07M [2007]

#### **Fabric enhancement**

Includes electrical aspects of systems for treating clothes with stain resistance or water and insect repellency chemicals. See also X27-D01A3D and X27-D02B6 for fabric conditioner dispensers used in clothes washer and drier respectively.

# X27-D07X [2005]

#### Using other medium

Includes use of other systems to provide a secondary cleaning/deodorising action.

## X27-D08 [1992]

#### Carpet cleaners/ shampoo machines

#### X27-D09

# Other cleaning appliances

Includes mangles, trouser press and domestic scale dry cleaning (for commercial dry-cleaning, see X25-H09 and X25-T05 only). Also includes electrical aspects of ironing boards and clothes pegs. Details of ironing boards with no electrical details are coded under P28-C05.

# X27-D10 [2006]

#### Disinfection and sterilization arrangements

Includes general disinfection and sterilization systems not covered elsewhere, e.g. using ultraviolet/microwave radiation or heat. For mixed mode cleaning/sterilizing see X27-D07 codes only. For air treatment arrangements see X27-E01B2 only. Industrial food processing sterilization is covered by X25-P01X only, and medical sterilization is covered by S05-G01 codes only.

# X27-D11 [2024]

#### Eco features of cleaning appliances

This code can be used in conjunction with other X27-D codes to highlight the type of cleaning appliances, e.g. X27-D02 for tumble dryers, X27-D01B for dishwashers. Details of water recovery in washing machines are also coded under X27-D01A3E. Also includes energy recovery systems that improve operating efficiency. Also see U24-K for power supply unit power-saving mode/operation.

Green, power reduction

#### X27-E

# Heating, ventilating, air conditioning

Includes all aspects of electric heating and electrical aspects only of other types of heating e.g. gas or oil combustion. See also X27-G for details of domestic combustion. Details of electric heaters are also in X25-B.

#### X27-E01

# Space heating and air conditioning systems

For heating combined with cooling i.e. air conditioning, e.g. by using refrigeration systems, see also X27-E01B.

Room, building

#### X27-E01A [1983]

# Heating systems (incl. control)

Includes control circuits, thermostat, heating cost measurement and calculation, storage heater control system.

# X27-E01A1 [1987]

# Circulating water, warm air

Includes central heating systems pump or fan.

#### X27-E01A2 [1987]

Electric radiant bar and fan-heaters, oil filled electric heaters

# X27-E01A3 [1987]

Electric underfloor, electrically-heated carpets

#### X27-E01A4 [1987]

#### **Electric storage heaters**

See also X16-L.

# X27-E01A5 [1987]

#### Solar heating

Includes electrical aspects only e.g. combination solar and electric heating.

Collector

# X27-E01B [1983]

# **Air-conditioning**

Includes only electrical aspects of air conditioners (e.g. mechanical heat exchangers are excluded), control systems, refrigeration systems (see also X27-F). Vehicle air-conditioning is only in X22-J02E.

# X27-E01B1 [1987]

#### **Electric fans, ventilators**

Motor, ceiling, blade, table, portable

# X27-E01B2 [1987]

# Ozoniser, air cleaner and freshener, (de)humidifier

Details of air cleaning for computer rooms or laboratories are also coded in T04-L08, and clean rooms are also coded in X25-S01.

Electrostatic, filter, purification, atomiser, ion generation

# X27-E01C [2010]

# **Climate control**

Includes systems that automatically maintain room temperature by e.g. automatic window opening (see X25-M01 for novel electric windows per se), usage of waste heat etc.

# X27-E02 [1987]

# Electric blankets, heating pads

(X27-E09)

See also X27-A if part of bed construction. If pad is portable, see also X27-A02.

#### X27-E03 [1987]

#### **Water heaters**

Includes electric details of gas and solar water heaters.

Temperature-control

#### X27-E03A [1987]

#### **Electric**

Includes through-flow heater, water bed heater.

# X27-E03A1 [1987]

#### Shower, whirlpool bath, sauna

Includes Jacuzzi $^{\circ}$  and Turkish bath, which is also coded in X27-A02A.

#### X27-E09

# Other heating, ventilating, air conditioning aspects

Includes foot warmer.

### X27-F

# Refrigeration

Includes all domestic and industrial systems, e.g. cold rooms and components, display cabinets, water coolers, heat pump systems (for airconditioning, see X27-E01B also), refrigerated containers for lorry (see also X22-X04). Cryogenics is in X25-V. Also includes refrigerant per se. From 2006 ice manufacture is transferred to X27-F04, though ice manufacture remains searchable in X27-F prior to 2006.

#### X27-F01 [1983]

#### Constructional details

Includes door, seal, feet, cabinets, ice tray.

# X27-F02 [1983]

# Refrigeration/heat pump systems/components

Includes air circulation e.g. by fan.

#### X27-F02A [1987]

# **Refrigeration systems**

Includes details of overall refrigeration system.

#### X27-F02A1 [2005]

# **Magnetic cooling**

Includes magnetic fridge and freezers that utilise magnetocaloric effect of some metals that become hot when magnetised and cool when demagnetised.

Magnetic, magnetocaloric

# X27-F02B [1987]

#### **Heat pump systems**

Also includes heat recovery using refrigerant.

# X27-F02B1 [2005]

#### Solid state heat pumps

Includes thermoelectric cooling, e.g. for mini fridge and freezers and picnic coolers. See V04-T03C instead for thermoelectric cooling used in electronic devices, and U14-E05A2 for thermoelectric devices. Also includes electrocaloric effect cooling using e.g. thin film perovskite PZT (PbZrTiO3) to provide cooling under an applied electric field. See X25-B02F for thermoelectric heating.

Thermoelectric, Peltier effect

# X27-F02C [1987]

#### **Components**

Includes heat exchangers, expansion valve absorbers, adsorbers, condenser, evaporator, etc.

### X27-F02C1 [1987]

# Compressors, electric motors, pumps

Screw, rotating vane, scroll, centrifugal, rotary, swashplate, reciprocating

#### X27-F02C2 [1987]

# Frost/temp. sensors, interior lights, switches

See also S03-B codes for temperature sensors, X26 codes for lighting and V03 codes for switches per

Thermostat

# X27-F02X [2007]

# Other refrigeration components

# X27-F03 [1983]

#### **Refrigeration control**

Includes defrost activation, ice monitoring, leak detection.

# X27-F04 [2006]

### Ice manufacture

Includes domestic and industrial ice manufacture. For ice cube trays per se, see X27-F01 only. Also includes working/handling of ice and production of ice or snow for winter sports etc. See also P36-A08C for ice rinks.

# X27-F05 [2007]

# Intelligent refrigerators

Includes reader-writer equipment to know the content of the fridge (see also T04-K codes), or screen display on fridge door displaying a list or an image of the fridge content. This code does not include details on refrigeration per se, see X27-F03 for refrigeration control details.

# X27-G

# **Domestic combustion**

Includes domestic boilers using solid, liquid or gaseous fuels and involving electrical aspects. Exhaust gas sensors per se are not included, see e.g. S03-E02, S03-E03. Combustion processes for central heating are also coded in X27-E03. See X25-X13 instead for industrial combustion aspects such as gas fired furnaces.

# X27-G01 [1983]

#### **laniters**

Includes cigarette lighters using piezoelectric crystal (also see X27-A02 and V06-M06D).

Ignition, light spark, fuel

#### X27-G02

# [1983]

#### **Combustion control: Flame monitors**

Includes fuel/air supply control.

# X27-H [1987]

# **Domestic pets**

(X27-X)

Includes electrical aspects only.

Dog, cat, fish, budgerigar, tortoise, rabbit, guinea pig

### X27-H01 [1987]

# Aquarium, vivarium

Covers electrical aspects such as air conditioning, heating, lighting systems, etc. of aquaria and vivaria. Other environment-controlled housings, such as kennels, dog houses, aviaries etc, are coded under X27-H04.

Heater, pump, lighting, air

# X27-H02 [2005]

#### Feeding and drinking

Includes heated food bowl and timed food dispenser.

Timer, dispenser

# X27-H03 [2005]

#### Control and training

Includes electrical or electromagnetic shocking apparatus for the control/training of pets, e.g. dogs. Also includes ultrasonic deterrent devices for confining pets within a specific area. Includes pet searching systems, transponder collars for controlling pet access e.g. through cat flap, and RFID or identification tags. Transponders and RFID are also coded under T04-K codes and W06-A04B5 and W02-G05B codes as appropriate.

Control, train, shock, deterrent, behaviour, identification tag, pet searching system

## X27-H04 [2009]

#### **Environmental control; Housings**

Includes electrical aspects, such as air conditioning, heating, lighting systems, etc. for kennels, aviaries, etc. Details for aquaria or vivaria are coded under X27-H01 instead. Electrical details of pet transporting bags/boxes or carriers are coded under X27-H09 only.

Dog house, kennel, aviary

# X27-H09

[2007]

# Other domestic pet aspects

Includes heated pet transporting bags/boxes.

#### X27-K

[1997]

# **Domestic waste disposal**

Includes only electrical aspects of domestic waste disposal, such as kitchen waste disposal units and electrical rubbish bins. Large non-domestic bins are coded under X25-W01 only.

# X27-L

[2005]

#### **Toilets**

Includes all electrical aspects of public and domestic toilets and urinals. Includes toilets with integral bidets (see also X27-A02A). Prior to 2005, toilets were coded in X25-Y01.

#### X27-T

[1997]

#### **Curtains, blinds**

(X27-X)

Includes electrical aspects, e.g. remote curtain opening/closing device.

#### X27-U

[2006]

#### **Domestic assistance robots**

Includes e.g. humanoid robots which carry out general housework, nursing (see also S05 codes) and other duties. For task-specific robots also see relevant codes elsewhere, e.g. X27-D codes for cleaning robots. For industrial scale robots see X25-A03E or X25-F05A only.

# X27-V

[2006]

#### Home automation

Includes systems for automatically controlling/programming multiple pieces of domestic equipment, e.g. using internet or telephone communication. For remote control of individual domestic devices, use the appropriate device code only (see also W05-D codes), and for individual robotic/automated equipment, such as a robotic vacuum cleaner, use the appropriate code (e.g. X27-D04R) only.

Total home control

#### X27-X

# Other domestic electrical appliances

Includes ash tray, insecticide dispenser for house, wallpaper stripping iron, mail box, paper towel dispenser (also X25-F03), pill bottle warning alarm indicating lid removal (also W05-A02) etc. Can also be used for indicating general domestic appliance "white goods" application, including mechanical aspects of unspecified or general white goods.

Mosquito repeller, doorbell

# X27-X01

[2002]

### **Baby equipment**

Includes equipment for babies, toddlers and young children. Includes baby monitoring alarms, babies prams, nappy wetting alarm, baby chamber pot (see X25-L also), etc. Also includes cutlery and cups with electric contents, such as lights or temperature displays. Cutlery and cups with electric contents are also coded under X27-B09.

Baby food/bottle warmer, baby bottle sterilizer

#### X27-X02

[2002]

# Domestic beer brewing/alcoholic beverage production equipment

Includes beer brewing plant (domestic scale), beer mat, beer dispenser (see also X25-F03B1). Also includes domestic wine production equipment. Industrial beer brewing/alcoholic beverage production equipment is coded under X25-P01B. Also include electrical details of wine cellars. Refrigeration details of wine cellars are coded under X27-F codes.

#### X27-X03

[2007]

# White goods with built-in secondary function

Includes white goods such as refrigerators and microwaves having additional built-in device providing secondary function, e.g. television, video display, computer for e.g. Internet browsing. This code can be used in conjunction with other X27 codes to highlight the primary function of the device. For example, a refrigerator with a built-in TV display will be also coded in X27-F01 and W03-G03A/W03-A codes.

# **PART 2: Subject Index and Appendices**

## **Subject Index**

This index provides a detailed listing of technologies and indicates the corresponding manual codes. While the intention has been to produce a comprehensive index, it is not possible to include entries for all possible variations in particular technological fields without the result becoming very unwieldy.

Thus, in cases where a desired subject heading cannot be found as an index entry, alternatives such as abbreviations, terms in full, or synonyms should be considered.

## 3

#### 3D (3-D) printing/additive manufacturing

	X25	5-A08
3D scanner	T04	I-M05
apparatus	X25	5-A08B
applications	X25	5-A08U
computer control	T01	-J07B3
•	T06	5-D17
inkjet printing technology	S06	5-G10
material used to produce objects	X25	5-A08M
material used, concrete	X25	5-A08M9
material used, food	X25	5-A08M7
material used, metals	X25	5-A08M1
material used, organic materials	X25	5-A08M3
material used, plastics	X25	5-A06
.,	X25	5-A08M2
material used, programmable mat	ter	X25-A08M8
methods	X25	5-A08A
types of 3D printing/additive manu	ufact	turing
fused deposition modelling	X25	5-A08C2
laminated object manufacturing	X25	5-A08C4
selective laser sintering	X25	5-A08C3
stereolithography	X25	5-A08C1
<b>9</b> , ,		

# **3D (3-D)** printing/additive manufacturing, applications X25-A

olications	X25-A08U
aerospace	X25-A08U3
art	X25-A08U5
defence	X25-A08U6
domestic item	X25-A08U1
food	X25-A08U7
industrial	X25-A08U4
medical	X25-A08U2
military	X25-A08U6
personal item	X25-A08U1
pharmaceuticals	X25-A08U2
sport item	X25-A08U5
toy	X25-A08U5
vehicles	X25-A08U3

#### 4

4D	(4-D) printing	X25-A08
	active origami	X25-A08
	4D compatible materials	X25-A08M8
	apparatus	X25-A08B
	applications	X25-A08U
	computer control	T01-J07B3
		T06-D17
	material used to produce objects	X25-A08M
	method	X25-A08A
4D	(4-D) printing, applications	X25-A08U
	aerospace	X25-A08U3
	art	X25-A08U5
	defence	X25-A08U6
	domestic item	X25-A08U1
	food	X25-A08U7
	industrial	X25-A08U4
	medical	X25-A08U2
	military	X25-A08U6
	personal item	X25-A08U1
	pharmaceuticals	X25-A08U2
	sport item	X25-A08U5
	toy	X25-A08U5
	vehicles	X25-A08U3

#### 4G (Fourth generation)

- ( a g a,	
4G mobile phones system	W02-C03C1H
Long Term Evolution (LTE)	W02-C03C1H
LTE-U	W02-C03C1H
	W02-C03H
PDSCH	W02-C03C1A
	W01-B05A1A
PUSCH	W02-C03C1A
	W01-B05A1A
PDCCH	W02-C03C1A
	W01-B05A1A
PUCCH	W02-C03C1A
	W01-B05A1A

#### 5

5D (5-D) printing	X25-A08
apparatus	X25-A08B
applications	X25-A08U
computer control	T01-J07B3
	T06-D17
material used to produce objects	X25-A08M
method	X25-A08A
5D (5-D) printing, applications	X25-A08U
aerospace	X25-A08U3
art	X25-A08U5
defence	X25-A08U6
domestic item	X25-A08U1
food	X25-A08U7
industrial	X25-A08U4
medical	X25-A08U2
military	X25-A08U6
personal item	X25-A08U1
pharmaceuticals	X25-A08U2
sport item	X25-A08U5
toy	X25-A08U5
vehicles	X25-A08U3
5G (Fifth generation)	W02-C03C1L
5G direct	W01-B05A1D
new radio	W02-C03C1L
NR-U	W02-C03C1L
	W02-C03H
physical downlink control channel	W02-C03C1A
	W01-B05A1A
physical uplink control channel	W02-C03C1A
	W01-B05A1A
physical downlink shared channel	W02-C03C1A
	W01-B05A1A
physical uplink shared channel	W02-C03C1A
	W01-B05A1A

## 6

# **6G (Sixth generation) communications technology** W02-C03C1M

A		substrates, for electrode formation	า
A-D conversion - see Analogue-	U21-A03		U11-C05F3B
digital converter		substrates, for insulating layer dep	osition
A/V - see Audio/video equipment (	neneral)		U11-C05B8C
• •	general)	Abattoir	X25-X03
All-BVI compounds		Abrading	X25-A03C2
crystal growth	U11-B03B	control	T06-D07A
doping	U11-C02J1B	Control	X25-A03F
etching	U11-C07C4B		A23-A031
heat, electrical, radiation treatmer		Abrasive materials	
layer deposition	U11-C01J3B	for semiconductor manufacture	U11-C06A1A
LED structure	U12-A01A1B	ABS, vehicle	X22-C02C3
photodiode, phototransistor,		•	
photothyristor structure	U12-A02B5A	Abseiling	P36-A06
semiconductor material manufact			W04-X01K9
	U11-A01C	Absolute position encoder	U21-A03J5
semiconductor structure (with)	U12-E01A2	Absorber, RF	
solar cell structure (with)	U12-A02A2A	antenna and general purpose	W02-B03D
substrate, electrode manufacture		antenna and general purpose mat	
	. U11-C05F3D	3 1 1	W02-B03D1
substrate, insulating layer deposit		waveguide	W02-A04B
	U11-C05B8B	Absorption spectrometry	S03-A02B
AIII-BV compounds			
crystal growth	U11-B03A	AC bridges	S01-F01
doping	U11-C02J1A	AC machine (see Electric machine al	lso)
etching	U11-C07C4A	alternator, aircraft application	W06-B01C3
heat, electrical, radiation treatmer	nt U11-	alternator, vehicle application	X22-F02
C03J8A		asynchronous, induction	V06-M02B
layer deposition	U11-C01J3A		X11-E
LED structure	U12-A01A1A	brushless (general)	V06-M03
photodiode, phototransistor,			X11-H01
photothyristor structure	U12-A02B5B	brushless, permanent magnet	V06-M03A
semiconductor material manufact	ure		X11-H01A
	U11-A01B	brushless, sensorless	V06-M03C
semiconductor structure (with)	U12-E01A1		X11-H01C
silicon substrate	U11-C01J8B	brushless, switched reluctance	V06-M03B
solar cell structure (with)	U12-A02A2B		X11-H01B
substrate, electrode formation	U11-C05F3A	commutator type	V06-M02B
substrate, IC component isolation			X11-H09
	U11-C08B1	synchronous, hybrid	V06-M01C
substrate, insulating layer deposit			X11-D05
	U11-C05B8A	synchronous, with permanent mag	gnet
AIV elements and their compounds			V06-M01A
crystal growth	U11-B03C		X11-G
doping	U11-C02J1C	synchronous, without permanent i	•
etching	U11-C07C4C		V06-M01B
heat, electrical, radiation treatmer	nt		X11-D
	U11-C03J8C	AC mains network	X12-H01X
layer deposition	U11-C01J4A	AC-AC converter - see Converter	
LED structure	U12-A01A1C		
photoconductive devices	U12-A02B5D	AC-DC conversion current/voltage	004 50405
photodiode, phototransistor,		measurement	S01-D01C5
photothyristor structure	U12-A02B5X	Acceleration control	T06-B09
semiconductor material manufact	ure	auxiliary non-electric power-type	
	U11-A01D		T06-B09A
semiconductor structure	U12-E01A3	electric	T06-B09B
solar cell structures	U12-A02A2C	without auxiliary power	T06-B09A
substrate, electrode formation	U11-C05F3B	Acceleration measurement	S02-G03
substrate, IC component isolation		calibration	S02-G07A
	U11-C08B3	compensation	S02-G07C
substrate, insulating layer deposit	ion	•	
	U11-C05B8C		

		Ī.	
testing	S02-G07E	loudspeakers	V06-V04A1
vehicle	X22-X06B	cones	V06-V02A
Acceleration switch	V03-C06C	diaphragms	V06-V02A
		transducers	V06-V01
Access control	\A(O4 AO7E4	magnets	V06-V02C
data network	W01-A06E1	magnetisable-diaphragm type	V06-V01X
data transmission contention (pro		magnetostrictive	V06-V01D
	W01-A06F1	manufacture - see <b>Acoustoelect</b>	ric transducer
personnel	T05-D01	manufacture	
vehicles	T05-D02	megasonic	V06-V01N
Accessories for musical instruments	P86-A30	microphones	V06-V04A2
Accordion (instrument)	P86-A01C1	microtransducer	V06-V01K1
	10070101	miscellaneous type	V06-V01X
Acoustic	50/ 5054	nanotransducer	V06-V01K2
coupling (general)	P86-E05A	monitoring	V06-V03B
damping (general)	P86-E05E	moving-armature type	V06-V01A2
emission, for breaking strain		moving-arriature type	V06-V01A1
measurement - see also Fatigue			
testing	S03-E08A	moving-magnet type	V06-V01A2
emission, for flaw detection	S03-E08A	moving-strip type	V06-V01A3
feedback prevention, general	W04-G03C	moving-wire type	V06-V01A3
feedback prevention, hearing aid,		optical-effect type	V06-V01X
constructional features	W04-Y01A1	pick-ups	V06-V04A3
feedback prevention, hearing aid,		piezoelectric	V06-V01B
DSP	W04-Y03G7	multilayer	V06-V01B1
		Rosen	V06-V01B2
feedback prevention, hearing aid,	-	resonator	V06-V01E
gain control	W04-Y03A1A	resonator,	
feedback prevention, telephone	W01-C01C3E	bulk acoustic wave	V06-V01E2
imaging	S03-E08E	resonator.	V00 V01L2
impedance matching	P86-E05X	electric wave	V06-V01E
microscope	S03-E08G		V00-V01L
noise cancelling (electronic)	W04-V07	resonator,	\/O / \/O4 E2
noise reduction, computer	T01-L02F	magnetostatic wave	V06-V01E3
prospecting	S03-C01	resonator,	
stethoscope	P31-A05	surface acoustic wave	V06-V01E1
transmission (general)	P86-E05A	sonar	V06-V04B
=			V06-V04G1
Acoustoelectric transducer	V06-V01		W06-A05C7
applications - see	V06-V04	styli, gramophone	V06-V04A3
Acoustoelectric transducer ap	plications		W04-A02
bone conduction type	V06-V01P	telephone applications	V06-V04B1
calibration	V06-V03B		W01-C01M
capacitive	V06-V01C	testing	V06-V03B
circuits	V06-V02S	ultrasonic	V06-V01N
coils	V06-V02C	ultrasonic, communication	V06-V01N
combined-principle type	V06-V01X	ultrasonic, communication	
contact microphones	V06-V04A2		V06-V04B
cutters, gramophone	W04-A01	variable-resistance type	V06-V01X
details - see Acoustoelectric	VV04-A01	wireless	V06-V01M
transducer, details	V06-V02	Acoustoelectric transducers	
•		applications	V06-V04
digital	V06-V01L	alarms	V06-V04N
earphones	V06-V04A4	audio equipment	V06-V04A
electrets	V06-V01C	communication	
electromagnets	V06-V02C	equipment	V06-V04B
electrostatic	V06-V01C	computers	V06-V04B
electrostrictive	V06-V01B		
gramophone pick-ups	V06-V04A3	delay lines	V06-V04D2
· · · ·	W04-A02	displays	V06-V04Q
gramophone styli	V06-V04A3	domestic	V06-V04S
3 r	W04-A02	earphones	V06-V04A4
headphones	V06-V04A4	filters	V06-V04D1
hydrophones	V06-V04A4	games	V06-V04R
пушторнонез	V06-V04B V06-V04G1	headphones	V06-V04A4
	V 00-V 04 G I	industrial	V06-V04L

instrumentation	V06-V04G	casings	V06-V03A5
loudspeakers	V06-V04A1	coils	V06-V03A3
measurement microphones	V06-V04G3	cones	V06-V03A1
mechanical work	V06-V04C	diaphragms	V06-V03A1
medical	V06-V04K	electrodes	V06-V03A2
microphones	V06-V04A2	electromagnets	V06-V03A3
microphones, measurement	V06-V04G3	layers	V06-V03A4
military	V06-V04G3	magnets	V06-V03A3
PA systems	V06-V045	micromachining, apparatus	V06-V03A3
1 A systems	V00-V04A3	micromachining, apparatus	V06-V03A7 V06-V03A7
personal	V06-V04P	micromachining, method micromachining, process	V06-V03A7 V06-V03A7
pick-ups	V06-V04A3	miscellaneous	V06-V03A7
radio communication	V06-V04A3 V06-V04B2	mountings	V06-V03A9
	V06-V04B2 V06-V04G2		V06-V03A6
resonant sensor	V06-V04G2 V06-V04G	supports	
sensor	V06-V04G V06-V04N	Actinometer	S03-A03
signalling sonar, audio/voice	VUO-VU4IN	Active antenna (aerial)	W02-B08C1
communication	V06-V04B	Active noise control (ANC)	W04-V07
	V06-V04B V06-V04G1	headphones	V06-V04A4
sonar, instrumentation	V06-V04G1 V06-V04R	neadpriories	W04-V07C1
sports			
switching, contactless	V06-V04E	Active origami	X25-A08
telephone handsets transformers	V06-V04B1	Actuator	
	V06-V04F	addressing, telecontrol/telemetry	W05-D02J
toys	V06-V04R	control - see Actuator, control	V06-N
vehicle	V06-V04H	electromagnetic	V02-E02A
vibrators	V06-V04C	electrostatic	V06-M06F
video equipment	V06-V04A	electrostrictive	V06-M06D
Acoustoelectric		magnetic recording head position	ing
transducer details	V06-V02		T03-A05C5
cabinets	V06-V02F	magnetic-fluid	V06-M06K
casings	V06-V02E	magneto-optical recording head	
circuit leads arrangement	V06-V02H	focussing/positioning	T03-D01D
coils	V06-V02C	magnetostrictive	V06-M06H1
cones	V06-V02A	manufacture	V06-M11
dampers	V06-V02G	microactuator	V06-M06G
diaphragms	V06-V02A	microelectromechanical - see also	
directional (desired) characterist		Microelectromechanical actuato	r V06-M06G
arrangements for	V06-V02G	multidimensional	V06-M06P
earpiece-attachments	V06-V02X	nanoactuator	V06-M06G9
electric circuitry, structural		optical recording head focussing	T03-B02A1A
association with enclosures	V06-V02F	optical recording head positioning	T03-B02A3A
electromagnets	V06-V02C	piezoelectric	V06-M06D
frequency (desired) characteristic	CS,	piezoelectric, ultrasonic	V06-M06D1
arrangements for	V06-V02G	shape memory alloy	V06-M06M
housings	V06-V02F	solenoid, linear	V02-E02A3
hygienic devices	V06-V02J	solenoid, rotary	V02-E02A4
leadthroughs, earphones	V06-V02E	testing	V06-M11M
	V06-V04A4	thermomagnetic	V06-M06
magnets	V06-V02C	ultrasonic, non-piezoelectric	V06-M06R
mountings	V06-V02F	ultrasonic, piezoelectric	V06-M06D1
mouthpiece-attachments	V06-V02X	Actuator, control	
sanitary devices	V06-V02J	electromagnetic	V02-E02A
strain relief for circuit leads	V06-V02H	electrostatic	V06-N08
supports, music pick-up	V06-V02F	electrostatic	V06-N07
	V06-V04A3	magnetic-fluid	V06-N07 V06-N14
	W04-U02A	magnetostrictive	V06-N14 V06-N09
throat-mountings,		microactuators	V06-N09 V06-N22
microphones	V06-V02F	nanoactuators	V06-N22A
	V06-V04A2	piezoelectric	V06-N2ZA V06-N07
Acoustoelectric transducer		shape memory alloy	V06-N07 V06-N16
manufacture	V06-V03A	thermomagnetic	V06-N 10
cabinets	V06-V03A6	ultrasonic	V06-N V06-N36
300010	. 00 . 00/10	นเนลรบาเด	V 00-1100

Acupuncture	S05-A05D	Advertising and signs (general)	P85-E
Acyclic machine	X11-H09	advertising on other items billboard	P85-E01G P85-E01A
Ad-hoc data network	T01-N02A1B	business signs	P85-E01C
	W01-A06B8E	commercial signs	P85-E01C
ADSL subscriber interface	W01-C01L3	display cases and stands	P85-E03
ADSL system	W01-C05B8A	electrical aspects	W05-E03
Adaptive control system	T06-A05	hoarding print media advertising	P85-E01A P85-E01J
Adaptive filter (electric) - see Elect		shop signs	P85-E01C
analogue	U25-A	wind-driven signs	P85-E01E
digital	U22-G01A5	Advertising (mobile)	W05-E03M
Adaptor for different-size tape cas	sette	Advertising (protection)	T01-N02B1C
	T03-H01B6	Advertising (visual)	W05-E03
	T03-N03	additional information aspects	W05-E03A6
ADC - see Analogue-digital conver	ters	addressable or switchable advertising displays	W05-E03A5
Adding, subtracting	T02 A04D0	audio aspects	W05-E03A6A
analogue computing data processing	T02-A04B9 T01-E02A	billboards (static) with illumination	
Address selection for memories		billboards with moving portions	W05-E03A3
address selection		checking TV transmission of com	
	U14-A08A		W02-F04C5 W05-E03C
Additive, magnetic materials	V02-A09	data processing	T01-J05A2C
Additive manufacturing - see 3D p	rinting X25-	displays	W05-E03A
A08		image substitution in TV systems	W04-N05C5E
Address allocation, telecontrol or telemetry			W05-E03C
actuators	W05-D02J	internet-based	W05-E03E
	W05-D08C		T01-N01A2C
sensors	W05-D02J	near field link for additional information	\A/O1 A O7112NI
	W05-D08E	iniormation	W01-A07H2N W05-E03A6X
Address mapping	W01-A06E1N	preventing recording of commerc	
Address translation	W01-A06E1N		W04-E04C5C
Addressing, network	T01-N02A1A	telephone network-based	W05-E03G W01-C05B5G
Addressing circuitry, memories	U14-A08	transponder for additional inform	
Adhesives	Paratas	E03A6X	
semiconductor manufacture app	U11-A09	TV broadcast-based	W05-E03C
testing	S03-F08	TV monitor-based	W05-E03A5E
Ad-hoc network	T01-N02A1B	Aerial - see Antenna	W02-B
Adjustable crank	Q62-B01A	Aerodynamic testing	S02-J07
Administration		Aerosol testing	S03-F06A
computer data processing syster	nsT01-J05A2	Aerospace systems	Q25 W06-B
medical information systems	T01-J06A1	ACC (automatic frances are control)	VVUO-D
health care	T01-N01E1 S05-G02G2	AFC (automatic frequency control) broadcast radio receiver	W03-B01B
health insurance	S05-G02G2	communication receiver	W02-G03A7A
hospital patient records	S05-G02G1	general	U25-J05
medical, hospital	S05-G02G	television receiver	W03-A02A
Admittance measurement	S01-D05	AFM - see Atomic force microscope	!
Admittance spectroscopy	S03-E02C5	AGC	1104 604 4
ADR	X22-E12	analogue (general) broadcast radio receiver	U24-C01A W03-B02A
Adsorbing coating in disk drive	T03-F02G1	communication receiver	W02-G03D
Advertising (audible)	W05-F	comms receiver, novel AGC	W02-G03D1
telephone network-based	W05-F	comms receiver, IF AGC	W02-G03D5
	W01-C05B5G	comms receiver, RF AGC comms receiver, other AGC	W02-G03D3 W02-G03D9
		1 Commis receiver, other AGC	., 02 00007

control signal derivation digital (general) general	U24-C01C U24-C01B U24-C01	weeding Agriculture, harvesting - see also Ha	X25-N01 arvesting P12
optical communication receiver	W02-C04A3C	constructional details of machiner	–
television receiver	W03-A03A		P12-T
Agglutination properties measure	ment -	control	T06-D01A
see also under Biological materi	als analysis		X25-N01A
	S03-F08	machinery/instruments	P12-A
Aging testing	S01-G09	tobacco	P15-L01
AGR	X14-A02	type of produce	P12-C
	717 7102	Agriculture, livestock	X25-N02
Agriculture - see also Horticulture			P14-E02A
	X25-N	apiary	X25-N02
arable	X25-N01	artificial insemination (AI)	X25-N02
baling	X25-N01	automatic feeder, control	T06-D01C
baling, control	T06-D01	automatic feeding and drinking	X25-N02A
1 • 1	X25-N01	branding	X25-N02
bird scarer	X25-N01	cattle farming	X25-N02
business model	T01-J05A4	fencing, general	X25-X11
control	T06-D01A X25-N01A	fencing, livestock	X25-N02C
aulturin a	X25-N01A X25-N01B	C. I. C.	P14-A01A
culturing culturing, control	T06-D01B	fish farming	X25-N02
culturing, control	X25-N01B	feed manufacture	X25-N02A
fertilising	X25-N01B	horse shoeing	P14-A06
fertilising, control	T06-D01B	housing	X25-N02C P14-A01A
rerunanty, control	X25-N01B	housing, air conditioning	X25-N02C
grading produce	X25-F06	nousing, an conditioning	X27-E01B
grading produce	X25-N01	housing, heating	X25-N02C
grain silo	X25-N01	nousing, neuting	X27-E01A
greenhouse	X25-N01	killing and stunning of animals, ab	
influencing weather	X25-X20A	land or annually as	X25-X03
to promote rain for irrigation	X25-N01B		P14-B01
insecticide spraying	X25-N01	milk meter	S02-C
insecticide spraying, control	T06-D01		X25-N02B
	X25-N01	milk processing	T06-D01C
irrigating	X25-N01B		X25-P01C
irrigating, control	T06-D01B	milk monitoring	X25-N02B
	X25-N01B	milking	X25-N02B
livestock feeder control	T06-D01C		P14-A07
	X25-N02A	milking, control	T06-D01C
livestock milking control	T06-D01C		X25-N02B
	X25-N02B1	poultry farming	X25-N02
parasite extermination	X25-N01	poultry farming, egg incubator	X25-N02
plough	X22-X11	poultry farming, eggs grading	X25-F06
alaurah saraturah	X25-N01A		X25-N02
plough, control	T06-D01A	remote control/monitoring	W05-D07N
seed treatment	X25-N01A X25-N01	trawler fishing gear	X25-N02
soil working	X25-N01A	AGV	X25-F05A
son working	P11	position control	T06-B01A
soil working, control	T06-D01A	Al	
son working, control	X25-N01A	artificial insemination of livestock	X25-N02
sorting produce	X25-N01A X25-F06	artificial intelligence - see Artificia	ıl
sorting produce	X25-N01	intelligence	
sowing	X25-N01A	Aid device for handicapped people	S05-K
sowing, control	T06-D01A	mobility aid	S05-K01
tractors	Q19-G	vehicle mounted aid	X22-X19
	X22-P09	wheelchair	Q22-C02
	X25-N01A		S05-G02A
vermin extermination	X25-N01	Air circuit breaker	
vermin / insect extermination	X25-X02	with built-in arc control	X13-B02
		With Balle in are control	0 002

with separate arc control without arc control	X13-B03A X13-B01	Air-bridges, semiconductor device interconnections	U11-D03B2
Air cleaner/filter	Q74-A02F	acoustic transducer-sensor	S02-E09
disc drive	T03-F02G1	Airborne radio relay communicat	ions
	T03-N01		W02-C03B1F
computer room/laboratory	T04-L08	Aircraft	Q25
domestic	X27-E01B2	Aircraft	W06-B01
HEPA filter (for computer)	T04-L08	airship	Q25-P01
photocopier	S06-A10B	aop	W06-B15A
Air conditioning	X27-E01B	antenna	W02-B08F5
	Q74-A02B		W06-B01B7
aircraft	Q25-B03	antenna mounting	W02-B07D
airport	W06-B01C5 W06-B02T		W02-B08F5
clean room	U11-C15B1		W06-B01B7
cleaning	X27-E01B2	airspeed measurement	W06-B01B1
climate control	X27-E01C	alternator altitude control	W06-B01C3 Q25-C05
fan	X27-E01B1	attitude control	T06-B01B
freshening	X27-E01B2		W06-B01A5
humidifier	X27-E01B2	anti-hijack	W06-B01C8
ozoniser	X27-E01B2	antiphase sound cancelling	W04-V07
railway station	X23-S99		W06-B01C9
railway train	X23-A10	attitude control	T06-B01B
ship	Q24-B03 W06-C01C5		W06-B01A5
vehicle	Q14-M	autopilots	W06-B01A5
vernicie	X22-J02E	black box flight recorder	W06-B01B6
ventilator	X27-E01B1	braking control communications	W06-B01A W06-B01B7
Air curtains	Q74-A02G	control systems	W06-B01B7
		crew headsets	W06-B01A
Air de-humidifier	X27-E01B2 Q74-A02C	crew intercom	W01-C04A
A 1 (1).	Q74-A02C		W06-B01B7
Air filter clean room	1111 C1ED1	data bus systems	W06-B01B8
disc drive	U11-C15B1 T03-F02G1	de-icing equipment	W06-B01C4
disc drive	T03-N01	drone	Q25-P15
domestic	X27-E01B2		W06-B15U
medical	S05-A09	rotorcraft	Q25-P02 W06-B15B
photocopiers	S06-A10B	military	W07-X03E1A
vehicle IC engine	Q51-H05F	reconnaissance	W07-F03
Air freshener	X27-E01B2	toy	W04-X02
Air humidifier	X27-E01B2	dropping articles	Q25-B15
	Q74-A02C	electrical installations	W06-B01C1
Air humidity measurement	S03-D02C		X12-G04A
7	S03-F09A	electrical power generation	14/0 / D04/00
A ! !!		and distribution	W06-B01C3
Air quality measurement	S03-D06 S03-E14N	entertainment systems	X12-H01B4 W06-B01C7
clean room	S03-E14N3	escape hatch	Q25-B09E
in buildings	S03-E14N1	escape nateri	W06-B01C9
other air quality measurement	S03-E14N9	fire extinguishing	P35-C01C7A
Air reed musical instrument	P86-A01A5		Q25-B09A
			W06-B01C9
Air sports	P36-A03 W04-X01K3N	flight recorder	W06-B01B6
		gas turbine engine control	W06-B01A1C
Air temperature measurement	S03-D04	generator	W06-B01C3
(see alsoThermometers)		head-mounted display	W06-B01B4
Air tightness, semiconductor package testing	U11-F01E	head-up display	W04-A01K W06-B01B3

engine		instrumentation	Q25-B05
gas turbine engine	Q25-C02B		W06-B01B
	Q52	load handling	Q25-B02
IC engine	Q25-C02A	manufacture	Q25-X05
	Q51		W06-B08
turbofan engine	Q52-A01C	noise/vibration/harshness reduction	on Q25-N
turbojet engine	Q52-A01A	parachute	Q25-B09G
turboprop engine	Q52-A01E	ribs/spars/stringers	Q25-A02A
IC engine control	W06-B01A1A	safety/emergency equipment	Q25-B09
in-flight entertainment	W06-B01C7	salvaging/recycling of materials	W06-B10
instrumentation	Q25-B05	sanitation	Q25-B01C
	W06-B01B	shower	Q25-B01C2
jet engine control	W06-B01A1C	skins/linings	Q25-A01G
launching	Q25-R07	skis	Q25-A05B
	W06-B02L	toilet	Q25-B01C1
lighting, external	W06-B01C2	undercarriage	Q25-A05
	X26-U09	wheels	Q25-A05A
lighting, internal	W06-B01C5	window	Q25-A03A
	X26-U09	wings	Q25-A02
maintenance	Q25-R09	Aircraft instrumentation	Q25-B05
	W06-B08		W06-B01B
manufacture	Q25-X05	anticollision sec. radar	W06-A04B1
	W06-B08	unitedinater see. radar	W06-A04H1A
mooring (hot-air balloon)	W06-B02L		W06-A04H1K
oxygen generating cell	W06-B01C9		W06-B01B1
oxygen mask	Q25-B09C	black box recorder	W06-B01B6
	W06-B01C9	clear air turbulence (CAT) warning	
photography equipment	W06-B01C9	data bus systems	W06-B01B1
pilot protection alarm	W05-B07E	engine parameter measurement	W06-B01B5
power plant control systems	W06-B01A1	engine speed	W06-B01B5
public address (PA) systems	W04-S05	navigation	W06-B01B3
	W06-B01C7	vehicle parameter measurement	W06-B01B1
		vernere parameter measurement	VV00 D01D3
security	W06-B01C8	windshear warning	W06-B01B1
security simulators	W06-B01C8 Q25-X04	windshear warning	W06-B01B1
,		windshear warning  Aircraft propulsion	Q25-C
,	Q25-X04	Aircraft propulsion	Q25-C W06-B03A
simulators	Q25-X04 W06-B04	S S	Q25-C W06-B03A W06-B01A1
simulators	Q25-X04 W06-B04 W04-V07	Aircraft propulsion	Q25-C W06-B03A W06-B01A1 W06-B03A1
simulators sound cancelling	Q25-X04 W06-B04 W04-V07 W06-B01C9	Aircraft propulsion	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02
simulators sound cancelling testing	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05	Aircraft propulsion  control  engine cooling	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G
simulators sound cancelling testing	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03	Aircraft propulsion  control  engine cooling  flappable wings	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3
simulators sound cancelling testing training equipment trim adjustment	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5	Aircraft propulsion  control  engine cooling	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A	Aircraft propulsion  control  engine cooling  flappable wings fuel supply	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07G	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A Q25-C01G
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07G Q25-A07	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A Q25-C01G Q25-C01A1
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07G Q25-A07	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A Q25-C01G Q25-C01A1 Q25-C03E
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07G Q25-A07 Q25-B01 Q25-A01C	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A Q25-C01G Q25-C01A1 Q25-C03E Q52-B01A
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07G Q25-A07 Q25-B01 Q25-A01C Q25-A03A1	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A Q25-C01G Q25-C01A1 Q25-C03E Q52-B01A Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07G Q25-A07 Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01G Q25-C01A1 Q25-C03E Q25-C03E Q25-C02B Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07 Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A Q25-C01G Q25-C01A1 Q25-C03E Q25-C03E Q25-C02B Q25-C02B Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07 Q25-B01 Q25-A01C Q25-A03A1 Q25-A03C Q25-B09C	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01G Q25-C01G Q25-C01A1 Q25-C03E Q25-C02B Q25-C02B Q25-C02B Q25-C02B Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07 Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C02A Q25-C01G Q25-C01A1 Q25-C03E Q25-C02B Q25-C02B Q25-C02B Q25-C02B Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07 Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C Q25-B09C Q25-C02B	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission turbofan	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A Q25-C01A1 Q25-C01A Q25-C01A1 Q25-C03E Q25-C03E Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies engine manufacture	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A01A Q25-A07 Q25-B01 Q25-A01C Q25-A01C Q25-A01E Q25-A03C Q25-B09C Q25-C02B Q51-M	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A1 Q25-C01A1 Q25-C01A1 Q25-C01B Q25-C01A1 Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies engine manufacture	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07 Q25-B01 Q25-A01C Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C Q25-B09C Q25-C02B Q51-M Q52-M	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission turbofan  turbojet	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A Q25-C01A Q25-C01A Q25-C01A Q25-C01A Q25-C01A Q25-C03E Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies engine manufacture  escape slide floats	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07C Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C Q25-B09C Q25-C02B Q51-M Q52-M Q25-B09E Q25-A05C	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission turbofan	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A Q25-C01A1 Q25-C01A1 Q25-C03E Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction  air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies engine manufacture  escape slide floats fuselage	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07C Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C Q25-B09C Q25-C02B Q51-M Q52-M Q25-B09E Q25-A05C Q25-A05C	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission turbofan  turbojet  turboprop	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A1 Q25-C01A1 Q25-C01A1 Q25-C03E Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction  air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies engine manufacture  escape slide floats fuselage galley	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07C Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C Q25-B09C Q25-C02B Q51-M Q52-M Q25-B09E Q25-A05C Q25-A01 Q25-A01 Q25-B091	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission turbofan  turbojet	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A Q25-C01A1 Q25-C01A1 Q25-C03E Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction  air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies engine manufacture  escape slide floats fuselage galley hatch	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07C Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C Q25-B09C Q25-C02B Q51-M Q52-M Q25-B09E Q25-A05C Q25-A01 Q25-B01 Q25-A01 Q25-B01 Q25-A03E	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission turbofan  turbojet  turboprop	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A1 Q25-C01A1 Q25-C01A1 Q25-C03E Q25-C02B
simulators  sound cancelling  testing training equipment  trim adjustment  Aircraft construction  air cushion alighting gear air frame arrestor hooks brake systems cabin deck blind bulkhead door emergency oxygen supplies engine manufacture  escape slide floats fuselage galley	Q25-X04 W06-B04 W04-V07 W06-B01C9 W06-B05 Q25-X03 W06-B04 W06-B01A5 Q25-A Q25-A05F Q25-A07G Q25-A07C Q25-B01 Q25-A01C Q25-A03A1 Q25-A01E Q25-A03C Q25-B09C Q25-C02B Q51-M Q52-M Q25-B09E Q25-A05C Q25-A01 Q25-A01 Q25-B091	Aircraft propulsion  control  engine cooling  flappable wings fuel supply  gas turbine IC engine muscle power propeller propeller shaft Pulse detonation engine RAMJET SCRAMJET towed transmission turbofan  turbojet  turboprop	Q25-C W06-B03A W06-B01A1 W06-B03A1 Q25-C02 Q52-G Q25-C01A3 Q25-C02M W06-B01A1 Q25-C02B Q25-C01A1 Q25-C01A1 Q25-C01A1 Q25-C03E Q25-C02B

Aircraft steering/attitude/altitude c	ontrol	Airport/ground equipment	Q25-R
	Q25-C	aircraft cleaning	Q25-R10
	W06-B01A5	aircraft cleaning	Q25-R10
air brakes	Q25-A07A	aircraft launching/towing	Q25-R07
boundary layer control	Q25-C05H		W06-B02L
by adjusting propulsion direction		aircraft stand	Q25-R03
control surfaces	Q25-C05C	airfield	Q25-R02
flaps	Q25-C05C	cargo handling	Q25-R05
rudder	Q25-C05C	3 3	W06-B02T
stabilisation		construction	Q25-R02
	Q25-C05G	ground based servicing	Q25-R09
Aircraft type	Q25-P	hangar	Q25-R01
	W06-B15	helipad	Q25-R02
agricultural	W06-B15X	landing pad	Q25-R02
airship	Q25-P01A	passenger handling	Q25-R03
	W06-B15A	passenger nanding	W06-B02T
balloon	Q25-P01B		Q25-R02
	W06-B15A	runway	
blimp	Q25-P01A	towing/manoeuvring	Q25-R07
- · · · · · · ·	W06-B15A	Airport control systems and equipm	ent
civil	Q25-P25		Q25-R
CIVII	W06-B15D		W06-B02
commercial	Q25-P25	air traffic control	W06-B02E
Commercial	W06-B15D	baggage conveyor	W06-B02E W06-B02T
convertible aircraft	Q25-P10	baggage conveyor	X25-F01
		L	
crop-dusting	W06-B15X	loading aircraft	W06-B02D
dirigible	Q25-P01A	baggage inspection	W06-B02A5A
	W06-B15A	baggage monitoring	W06-B02A5E
emergency services	W06-B15H	baggage tracking	W06-B02A5E
flying hoverboard	W06-B15P	bird-scaring	W06-B02S
flying suit	W06-B15P	check-in	W06-B02R
	Q25-X01	via internet	T01-N01A2
glider	Q25-P05	evacuation	W06-B02S
	W06-B15C	fire-fighting	W06-B02S
hang-glider	Q25-P07		X25-X05
	W06-B15X	ground based communication	W06-B02E
helicopter	Q25-P02	ground based navigation	W06-B02E
	W06-B15B	ground equipment refuelling	W06-B02D
jet pack	W06-B15P	servicing/maintenance	W06-B02D
lighter-than-air	Q25-P01	passenger information equipment	W06-B02C
	W06-B15A	passenger security check systems	W06-B02A1
micro aerial vehicle (MAV)	W06-B15X	infectious disease detection	W06-B02A1
microlight	Q25-P06	passport control	W06-B02R
3	W06-B15F	safety	W06-B02S
military	Q25-P13	security	W06-B02A
- ,	W06-B15E	for personnel	W06-B02A1
model aircraft	W04-X03E1	for baggage	W06-B02A5
ornithopter	Q25-P03	servicing aircraft	Q25-R09
ommopter	W06-B15X	Servicing direction	W06-B02D
paraglider	Q25-P07		
paragilder	W06-B15X	Alamouti coding	W01-A01A
narranal flying aid	W06-B15A		W02-C03A5
personal flying aid		Alarm	W05-B
rotorcraft	Q25-P02		W05-B01D5
	W06-B15B	antimugging antitheft	W05-B01D3
sea plane	Q25-P04		
	W06-B15X	arming	W05-C03
space craft	Q25-S01C	carbon monoxide	W05-B07L1
	W06-B03	central station - see <b>Alarm</b> ,	
space shuttle	Q25-S01B	centralised signalling	W05-B05
	W06-B03	constructional details	W05-B10C
umanned aerial vehicle (UAV)	W07-F04		V04
VTOL	Q25-P08	disarming	W05-C03
	W06-B15G		
		•	

	false alarm prevention	W05-C02C5	Alignment checking	
	based on sensor features	W05-C02C5A	digitally marked record carriers	T04-B
	based on system features	W05-C02C5A	general measuring	S02-A10D
	fire	W05-B02	using electrical/measuring method	
	gas	W05-B02A	dsing electrical/measuring metrioc	S02-A02
	general details	W05-B02A	magnetic recording heads	T03-A05A
	interpretation	W05-C02C1	using mechanical methods	S02-A01
	intruder	W05-B01	using mechanical methods	S02-A01
	monitoring of	W05-C	using antical mathada	S02-A10D
	personal safety alarm	W05-B07	using optical methods	S02-A03 S02-A10D
	personal safety, antimugging	W05-B01D5	vehicle tracking/wheel alignment	
	power supplies	W05-B01D3	5	302-302A
	power supplies	U24	Alkaline	
	prediction of alarm condition	W05-C02C3	accumulator - see <b>Alkaline</b>	X16-B01A
	reminder	W05-A10A	secondary cell	
	responsive to two or more	W03-A10A	fuel cell	X16-C03
	different conditions	W05-B03	primary cell	X16-A01
	responsive to unspecified condition		secondary cell - see <b>Alkaline</b>	X16-B01A
	smoke	W05-B02A	secondary cell	
	switches	W05-B02A	Alkaline fuel cell (AFC)	X16-C03
	tamper detection	W05-C01J	Alkaline secondary cell	X16-B01A
	testing	W05-C01	metal-hydrogen	X16-B01A3
	theft	W05-B01	nickel-cadmium	X16-B01A1
	timer	S04-C02A	Aloha data network access	
	traffic signal fault	T07-C05		W01-A06F1G
	vehicle	X22-D03A	Alternator - see AC machine	
	with signalling to central station	W05-B05	Altitude	
			measurement of	S02-B02A
Ala	rm, centralised signalling	W05-B05	Ambulance equipment	S05-G02B2B
	cyclic interrogation	W05-B05A5		
	polling arrangement	W05-B05A5 W05-B05A1	American football	P36-A01
	remote sensor monitoring			W04-X01K1R
	remote sensor signalling	W05-B05A1 W05-B05A7	Ammeter clamp	S01-D01D1A
	reverse transmission transmission medium		Ammunition - see Weapons	Q79
	using 3G, 4G or 5G phone system	W05-B05B	Amorphous semiconductor	
	using cellular phone system	W05-B05G5C	film deposition	U11-C01J2
	using cordless phone system	W05-B05G5A	photodiode, phototransistor,	011-00132
	using optical link	W05-B05B4	photodrode, phototransistor,	U12-A02B5C
	using optical link using power transmission lines	W05-B05B4	solar cell	U12-A02A2F
	using radio transmission system	W05-B05B1		
	using data network	W05-B05B6	Amplidyne	X11-H09
	using telephone transmission lines		control	X13-H01C9
	vehicle tracking	X22-D03C	Amplifier	
	J	722-D03C	AGC for	U24-C01
	rm clock or watch	004.505	amplitude-locked loop	U24-C01G
	built into telephone	S04-B05	applications	U24-G01
		W01-C01P9	audio - see Audio amplifier	U24-G01C
	electrical	S04-B05		W03-C01
	mechanical	S04-A02X	bandwidth-extending arrangemen	
Ala	rm, pill bottle	X27-X	biasing network	U24-G03G1
Alc	oholic drinks		bidirectional	U24-G02F3
	bottling (electrical details)	X25-F03A1	bipolar transistor (discrete)	
	bottling (general details)	Q31-A	implementation	U24-G04B1
	3 (3	Q34-C07C	bipolar transistor (integrated)	
	manufacture, large/industrial scale		implementation	U24-G04A1
	manufacture, domestic scale	X27-X02	bridge	U24-G02F4
	wine cellar	X27-X02	calibration	U24-G05C
۔ای	ohol thermometer	S03-B01D	cascaded	U24-G02F5
AIC	onor mermometer	202-0010	cascode	U24-G02F7
			charge	U24-G02X
			chopper-modulation	U24-G02E
			CMOS implementation	U24-G04A2
			CMRR improvement	U24-G03P1

configuration	U24-G02	operational amplifier implementati	
constructional details	U24-G05A		U24-G04C
control signal derivation current mirror	U24-C01C U24-G02A3	operational amplifier per se opto-receiver	U24-G02A5 U24-G01A5
current mode operational amplific		other distortion	U24-G03D5X
G02A5C	81 024-	parametric	U24-G03D3X
DC coupled	U24-G02D	peak detector	U24-C03A
device characteristics - reducing	024-002D	phase-splitter	U24-G02C1
dependence on -	U24-G03Q	positive feedback	U24-G03B
dielectric	U24-G04X	power	U24-G01B
differential	U24-G02A1	power consumption reduction	U24-G03N1
differential input	U24-G02A1A	power supply variation immunity	
differential output	U24-G02A1B	arrangement	U24-G03G
differential input and output	U24-G02A1C	push-pull	U24-G02C5
digital	U24-G02E	PWM amplifier	U24-G02E
discrete device implementation	U24-G04B	reflex	U24-G02X
distortion introducing arrangeme		ringing reduction	U24-G03L
distortion reducing arrangement	U24-G03D5	RF, broadcast radio receiver	U24-G01D
distributed (microwave)	U24-G02F5		W03-B01A3
	U24-G04M	RF, communications receiver	U24-G01D
dynamic range improvement	U24-G03D3		W02-G03A3
efficiency improvement	U24-G03N1	RF power	U24-G01B5
feedback, negative	U24-G03A	RF power for transmitter	U24-G01B5
feedback, positive	U24-G03B	25.77	W02-G01B
feedforward	U24-G03B1	RF, TV tuner	U24-G01D
FET (discrete) implementation	U24-G04B2	and the state of t	W03-A01B3
FET (integrated) implementation	U24-G04A2	stability-improving arrangement	U24-G03L
gain control	U24-C	supply voltage reduction switching amplifier	U24-G03N5
gain improvement	U24-G03P5 U24-G02F1	switching amplifier switch-on ('shock') noise reduction	U24-G02E
gated general circuits	U24-G02F1	switched capacitor operational	024-G03D
harmonic distortion reduction	U24-G03D5A	amplifier implementation	U24-G04C1
headroom improvement	U24-G03D3A		U24-G04C1
high frequency	U24-G01D	telephone speech	W01-C01C1
high frequency power	U24-G01B5	temperature change immunity	
high power	U24-G01B	arrangement	U24-G03H
IF, broadcast radio receiver	W03-B02B5	testing	U24-G05C
IF, communications receiver	W02-G03C	thin film circuit implementation	U14-H01C
IF, TV receiver	W03-A03B5	·	U24-G04A
impedance modification	U24-G03R	transconductance	U24-G02A5A
implementation technology	U24-G04	transmission-line (microwave)	U24-G02F5
instrumentation	U24-G01A1		U24-G04M
integrated circuit - specific improv		two-way	U24-G02F3
	U24-G03E	vacuum tube implementation	U24-G04D
integrated semiconductor device		Amplitude compression	
implementation	U24-G04A	audio signal (general)	W04-G04
intermodulation distortion reduct	ion U24-	general	U24-C02B
G03D5C	1104 6045	,	W02-G04B1
logarithmic	U24-G01F	video signal (general)	W04-P01E8
low frequency low frequency power	U24-G01C U24-G01B1	video signal (recording)	W04-F01A5
low voltage operation	U24-G01B1 U24-G03N5	Amplitude demodulation	U23-K
magnetic	U24-E04	general signal rectifiers (AGC,	
microwave (involving	024-L04	level detection, etc.)	U24-C03
constructional aspects)	U24-G04M	Amplitude limiting	
multichannel	U24-G02F2	DC level clamping (general)	U24-C02A5
negative feedback	U24-G03A	general	U24-C02A
noise reduction	U24-G03D1	pulse	U22-D01A1
noise due to components	U24-G03D1A	soft (general)	U24-C02A1
noise due to external sources	U24-G03D1B		W03-A04C
nonlinearity introducing arrangen		video signal (general)	W04-P01E8
- 5 5	U24-G03K		W04-P01K
offset reduction	U24-G03F		

video signal (recording)	W04-F01A5	Analogue integrated circuits	U13-B
	W04-F01X	bipolar	U13-B01
Amplitude modulation	U23-G	combined FET and bipolar	U13-B03
Amplitude shift keying	U23-P01C1	custom analogue array FET	U13-B09 U13-B02
. , , ,	W01-A09A1	MESFET, JFET	U13-B02B
Amusements		MOSFET	U13-B02B
arcade games	W04-X02A8	with diodes and/or capacitors	013-D02A
cinema	S06-B05	and/or resistors	U13-B04
	W04-X03G5	Analogue input	T04-F02
coin or card actuated	T05-H05E	construction	T04-F02C
fairground	W04-X03G3	manufacture	T01-F02C
games	W04-X03G8	testing	T01-F02C
juke box	W04-X03A1	3	
karaoke	W04-X03A3	Analogue magnetic recording met	
museums, exhibitions	W04-X03G7		T03-A06A
music-based entertainment	W04-X03A		T03-A06B
novelties	W04-X03C	Analogue memories - see	
ornaments	W04-X03C	Memories, analogue	U14-B
pachinko	W04-X02A1	Analogue phase/frequency compa	rator
theatre	W04-X03G1 W04-X03G3		U23-C01
theme park		A	
Anaesthesia	S05-L	Analogue switching	U21-B05A
gas delivery systems	S05-L01	Analogue-digital converter	U21-A03
intravenous or intramuscular de	-	broader system details	U21-A03F5
	S05-L02	clock arrangements	U21-A03F5C
Anaglyph 3D glasses for stereosc	opic	dual-slope type	U21-A03A
display	W03-A08E7E	flash type	U21-A03C
Analogue		increased accuracy	U21-A03F7N
circuit modules testing	S01-G01C3	increased conversion speed	U21-A03F7C
circuits, testing	S01-G01C	increased precision increased range	U21-A03F7N U21-A03F7E
ICs testing	S01-G01C1	increased range	U21-A03F7A
Analogue automatic gain control	(AGC)	integrated circuit details	U13-B
, maiogue automant gam toma o	U24-C01A	interpolating type	U21-A03E
		input/output circuitry	U21-A03F5A
Analogue computers	T02-A	noise reduction and error correct	tion U21-
applications	T02-A04A	A03F7G	
arbitrary function generation convolution	T02-A04B4	performance improvements	U21-A03F7
economics, statistics	T02-A04B2A T02-A04A1	pipeline	U21-A03B3
electric	T02-A04A1	position encoders - see <b>Position</b>	
evaluation	T02-A04		U21-A03J
fuzzy logic	T02-A04B6	reducing power consumption	U21-A03F7J
hand-manipulated	T02-A01	reversible converters	U21-A03H
hybrid arrangements	T02-B	sampling	U21-A03F6
integration/differentiation	T02-A04B2	serial-parallel	U21-A03E
interpolation, extrapolation	T02-A04B5	size reduction	U21-A03F7L
magnetic .	T02-A04	successive approximation switch capacitor	U21-A03B1 U21-A03B5
mechanical/fluid pressure	T02-A02	testing and calibrating	U21-A03B3
multiplication/division	T02-A04B1	using superconducting devices	U14-F02C
neuronal	T02-A04A5	using superconducting devices	U21-A03G
optical implementations	T02-A03A	voltage reference circuits	U21-A03F5B
optical/electrooptical	T02-A03B	with conversion to duration/frequ	
processing	T02-A04B		U21-A03A
programming	T02-A04X	with feedback	U21-A03B
using optical or electro-optical e		Analogue/digital integration	U13-C09
	T02-A03	Analysing tube	V05-F01
Analogue filter - see Electric filter		AFM - see also Atomic force mic	
Analogue frequency multipliers/c	lividers	7 ti til 300 diso Atoline force ille	S03-E02F3
	U23-B01	antenna	V05-F04L
		apertures	V05-F04B1A
		•	

charge-up prevention element	V05-F04X	scientific processing	T01-J13
circuitry	V05-F01B5	Analysis, content, information retrie	eval
complete device	V05-F01B1		T01-J05B1
control circuitry	V05-F01B5A	Information analysis	T01-J05C
cooling	V05-F04K	<u> </u>	
detectors	V05-F04H	ANC (active noise control)	W04-V07
device details	V05-F01B3	Android®-based phone	W01-C01G
	V05-F04	Anemometer	S02-G02
device type	V05-F01A	Angle demodulation	U23-L
display systems	V05-F04J		
electrode arrangements electrodes, for beam modulation	V05-F04B V05-F04B1	Angle measurement	S02-A10D1
electrodes, for beam scanning	V05-F04B3		CO2 AO2
electron microscope	V05-F01A1	using electrical/magnetic method	S02-A02 S02-A10D1
enission source	V05-F04A	using mechanical method	S02-A10D1
equipment function	V05-F08	using mechanical method	S02-A01
field emission electrodes	V05-F04A3	using optical method	S02-A10D1
gas filling	V05-F04E	using optical method	S02-A03
heating arrangement	V05-F04X	surveying	S02-A10D1
imaging systems	V05-F04J	using sound or ultrasound	S02-B05
ion diffraction tube	V05-F01A2	using sound of unfasound	S02-A03D
ion microscope	V05-F01A2	A I I I	
ion source	V05-F04A5	Angle modulation	U23-H
microanalyser	V05-F01A4	Angling	P36-A07
monitoring	V05-F01B5A		W04-X01K7
novel details (general)	V05-F01B	Angular speed	
operation of device	V05-F01B5	electrical/magnetic measurement	S02-G01B1
photographic recording	V05-F04J	measuring	S02-G01
power supplies	V05-F01B5	optical measurement	S02-G01A
probe electrodes	V05-F04B6	Animal	
scanning electron microscope (SE	EM)	amphibians	P14-E01E
	V05-F01A1B	animal wear, e.g. horsetack	P14-A04
scanning transmission electron		birds	P14-E01B
microscope (STEM)	V05-F01A1C	breeding equipment	P14-A05
scanning tunnelling microscope (	STM)	fish	P14-E01C
	V05-F01A5	identification by audio analysis	W04-V04A7
seals	V05-F04D1	killing and stunning of animals, ab	attoir
secondary electron detectors	V05-F04H		X25-X03
secondary ion mass spectrometer			P14-B01
	V05-F01A9	feeding and drinking	P14-A02
	V05-J01A1	fishing	P14-B02
specimen holder	V05-F04G	housing and fencing	P14-A01A
specimen introduction arrangeme		hunting	P14-B01
spot analyser	V05-F01A4	incubator	P14-A01A
stimulable sheet recording	V05-F04J		P14-A05
the constraint and a section of	S06-K99G	invertebrates	P14-E01F
thermionic emitter	V05-F04A1	laboratory animals	P14-E02C
transmission electron microscope		livestock - see Agriculture, livesto	
to a selection of the fact	V05-F01A1A		X25-N02B
tunnel current device	V05-F01A5		P14-E02A
vacuum locks	V05-F04D3	maintenance/repair of equipment	
vessel	V05-F04D1	mammals	P14-E01A
video systems	V05-F04J	milking	P14-A07
waveguide	V05-F04L V05-F01A3	pets	X27-H
X-ray microscope	VU3-FUTA3		P14-E02B
llysis		reptiles	P14-E01D
biological fluids	S05-C02	shelter	P14-A01A
biological processing	T01-J13A	shoeing	P14-A06
	CUE CUO	training	P14-A01B
biological tissues	S05-C03		D44 : : :
biological tissues blood sample	S05-C01	washing and grooming	P14-A03
biological tissues blood sample drugs, medical medical			P14-A03 T01-J10C5

Anisotropic		gain measurement	W02-B08A1E
connector (general)	V04-A11	ground plane	W02-B01C1G
connector, for semiconductor dev		helical	W02-B01C3
	U11-D03A9	horn	W02-B02B
	V04-A11	housing	W02-B07C
Annealing for semiconductor manuf	facture	impedance matching	W02-B08E1
	U11-C03J2A	improvements in performance	W02-B08P
Anode	5 1 1 5 5 5 5 5 T	inductive coupling	W02-B08D3
cold cathode tube	V05-B03B5	inverted-F	W02-B01F
discharge tube (general)	V05-B03B3 V05-M03E	isolation from adjacent aerial	W02-B08P6
electrolytic capacitor	V01-B01A	lens	W02-B03A
fluorescent display	V01-B01A V05-D01C	living body used as aerial loading coil (whip aerial)	W02-B12C W02-B01C1C
nuorescent display	V05-D01C V05-D05F		W02-B01C1C
gas-filled tube	V05-A07A1	log periodic loop	W02-B01D1
plasma display tube	V05-A01C1	manufacture	W02-B01A W02-B08L
sacrificial	X25-R06	mass reduction	W02-B08L
sputtering apparatus	V05-F04B5A	mast	W02-B00761 W02-B07A1A
opationing apparatas	V05-F05C	mechanical strength increasing	W02-B08P8A
sputtering apparatus	V05-F05E3	metal structure used as aerial	W02-B12A
7 3 11	V05-F08D1A	metamaterials-based	W02-B08Q1
thermionic tube	V05-B01B5	microstrip	W02-B02A
transit time tube	V05-C02A1	microstrip slot	W02-B02A
X-ray tube	V05-E01A1	, , , ,	W02-B02C1
Anodising	X25-R05	modelling	W02-B08L1
•		monopole	W02-B01C
Answering machine - see Automatic		mounting hardware	W02-B07A1C
answering telephone equipment		multi-band	W02-B08R1A
Antenna (aerial)	W02-B	multi-directional	W02-B08R3
absorber	W02-B03D	multi-polarisation	W02-B08R5
absorber material	W02-B03D1	non-communications application	W02-B10
active	W02-B08C1	optical coupling	W02-B08D3
active element with e.g. reflector	W02-B04	overvoltage protection	W02-B08B1
appearance improvement	W02-B08P8G	parabolic	W02-B04E5
array - see <b>Antenna array</b> automatic directional control	W02-B05 W02-B06C	parasitic array	W02-B04
bandwidth increasing	W02-B08C W02-B08P3	performance improvement	W02-B08P
bird repellant	W02-B09	plasma chamber antenna	V05-F04L
box-kite	W02-B07 W02-B04D5		V05-F05C1A
capacitive coupling	W02-B04D3 W02-B08D3		V05-F05E3
collapsible	W02-B08K	plasma conductor antonno	W02-B10 W02-B09
compactness improving	W02-B08P8J	plasma conductor antenna polariser	W02-B03C
computer simulation	T01-J15	printed	V04-Q06
	W02-B08L1	printed	W02-B07A3A
concealment	W02-B08P8G	QFH (quadrifilar helix)	W02-B07A3A W02-B01C3A
coupling	W02-B08D	quad	W02-B04D5
cross-polarisation reduction	W02-B08P5C	radiating element details	W02-B01R
design	W02-B08L1	(dipole, monopole, etc.)	
diffractor	W02-B03A	radiation pattern measuring	S01-D07B1
dipole	W02-B01B	, , , , , , , , , , , , , , , , , , ,	S01-H05
dipole, folded (linear)	W02-B01B1A		W02-B08A1A
dipole, ring	W02-B01B2A	radiation protection	W02-B08B5
dipole, spiral	W02-B01B3	radome .	W02-B07C
directivity increasing	W02-B08P5A	reduced-size antennas	W02-B08P8J
discone	W02-B01C5	reduced-weight antennas	W02-B08P8L
durability increasing	W02-B08P8C		W02-B03B
edge effect reduction	W02-B08P5E	refractor	W02-B03A
electronic beam steering	W02-B06B	resonant slot	W02-B02C
feed	W02-B04C	rhombic	W02-B01D
ferrite rod	W02-B01A1	rod	W02-B01C1
folded dipole (linear)	W02-B01B1A	rotator	W02-B06A
folded dipole (ring)	W02-B01B2A W02-B08P1	scattering reduction	W02-B08P5E
gain increasing	VVUZ-DUOF I	set-up and alignment	W02-B08A5

	set-up based on optimum reception		Antenna arrays		W02-B05
	set-up based on geographical pos	W02-B08A5A	collinear arrangement different polarisation ra		W02-B05C W02-B05B8
	set-up based on geographical pos	W02-B08A5C			
			dipole		W02-B05B1
		S02-B	feed system helical		W02-B05A
	ates and antes	W06-A03			W02-B05B6
	size reduction	W02-B08P8J	horn		W02-B05B2
	slot type	W02-B02	log periodic		W02-B05B5
	special property material-based	W02-B08Q	microstrip		W02-B05B3
		14/00 00400	parasitic		W02-B04
	spiral dipole	W02-B01B3	patch		W02-B05B3
	standing wave ratio reduction	W02-B08P7	phased array		W02-B05D
	stub mast	W02-B07A1C	slot		W02-B05B2
	surface mounting	W02-B07A3C	slotted waveguide feed		W02-B05A
	superconductor-based	W02-B08Q5	Yagi (Yagi per se, W02-		W02-B05B4
	support	W02-B07A	Antenna housing and sup	port	W02-B07
	switching	W02-B08D5	collapsible support		W02-B07A5
	telescopic	W02-B01C1A	de-icing arrangement		W02-B07B
	testing	S01-G08A5	extensible support		W02-B07A5
		W02-B08A	housing		W02-B07C
	tower	W02-B07A1A	mast		W02-B07A1A
	travelling-wave	W02-B01D	mast mounting hardwa	re	W02-B07A1C
	tuning	W02-B08E5	protective cover		W02-B07C
	unipole	W02-B01C	radome		W02-B07C
	using existing metallic structure	11/00 5404	rotary support		W02-B06A
	or conductor system	W02-B12A	stabilising/vibration da	mping	W02-B07A7
	using living body, part of body	W02-B12C	Antenna reflector		W02-B03B
	using materials with special	14/00 0000	characterised by shape		W02-B03B1
	properties	W02-B08Q	parabolic		W02-B03B1A
	using metamaterials	W02-B08Q1	passive		W02-B03B2
	using superconductors	W02-B08Q5	planar		W02-B03B1B
	varying directional pattern	W02-B06	variable characteristic		W02-B03B3
	variable polarisation	W02-B06E	Antibacterial materials		
	vehicle application - see <b>Vehicle</b> a		for magnetic record car	rriore	T03-A01B5X
	historia and a war Waltinia	W02-B08F	packaging		Q34-J03
	vehicle mounted - see <b>Vehicle</b>	W02-B07D	sanitizing stations (in sh		
	aerial mounting	W/02 D00D7	Anticollision system	iops/ballks)	1 34-A01
	VSWR improvement	W02-B08P7 W02-B09	land vehicle on-board s	evetam	X22-J05
	warning light waveguide	W02-B07 W02-B02	lidar		W06-A06H1K
	waveguide waveguide horn	W02-B02B	radar		W06-A04H1K
	weather-resistance improvement		sonar		W06-A05H1K
	weight reduction	W02-B08P8L	warning of unsafe vehic		
	whip	W02-B001 6L W02-B01C1	(external)		T07-E05
	wideband	W02-B01C1 W02-B08R1C			107 200
	Yagi-Uda	W02-B04D1	Antieavesdropping system		\A/O1 A OF LE
_	9		data communications		W01-A05L5
An	tenna amplifier	W02-B08C5	general communication		W02-L07C
	mast-head amplifiers	W02-B08C5A	telephone network		W01-C08F1C
	general RF preamplifiers	W02-B08C5C	Antifungal materials for		T03-A01B5X
An	tenna applications	W02-B08F	magnetic record carrier	'S	
	aeroplane	W02-B08F5	Antifuse		
	land vehicle	W02-B08F1	manufacture, integrated	d circuit	U11-C05G2A
		X22-X02A	memory		U14-A06B1
	marine vehicle	W02-B08F2	structure, integrated cir	rcuit	U12-C04
		W06-C01B7	Antihacking arrangement		na)
	missile or other projectile	W02-B08F6	Antinacking arrangement	•	•
		W07-A03			T01-J12C
	non-communications	W02-B10	Antihunting electric/fluid	ic measure	s
	radar	W02-B	_		T06-A02
		W06-A04G7	Antilammi		<del></del>
	space vehicle	W02-B08F7	Antijamming		W02101C
		W06-B03C	communication system	5	W02-L01C

GPS navigation reception	W06-A03A5M	system aspects	W02-F10C
lidar systems	W06-A06C8	Aperture	
radar systems sonar systems	W06-A04E1C W06-A05C8	control in photography	S06-B02C
•		control in digital/video camera	W04-M01D5C
Antilock braking system, vehicle	X22-C02C3	correction for video signal value calculation in photography	W04-P01E5 S06-B02B
Antimagnetic shielding for clock or	watch	value calculation in digital/video	300-0020
	S04-A04A1	camera	W04-M01D2A
Antimugging alarms	W05-B01D	Application software ('apps') for	
Antireflective coating for optics	P81-T03	smartphones	T01-F
<b>Antireflective layer, microlithograp</b> C04A1H	<b>lhy</b> ∪11-	·	T01-N03A1 W01-C01G8S W01-C01Q3E
Antispam	T01-N02B1C	Annlication on aidic interveted	W01-C01Q3L
Antiskid braking system, vehicle	X22-C02C3	Application specific integrated circuits - see ASIC	U13-C04D
Antislip braking system, vehicle	X22-C02C1	Approximation, function	T01-J04D
Antistatic		• •	
aircraft arrangements	W06-B01C9	Aquarium (domestic) lighting (application)	X27-H01 X26-U99
arrangements (general)	X25-S		
coatings and materials for magne		Aqueous electrolyte primary cell	X16-A01 X16-A01A
record carrier coatings/materials for aerospace	T03-A01B5D	metal-air	X16-A01B
coatings/materials for aerospace	W06-B09	Arable	7,107,015
vehicle arrangements	X22-X	agricultural livestock	X25-N01
Antitheft		agricultural implement, vehicle-m	ounted
cable installations	X12-G11	·	X22-X11
cable markings	X12-D03C2	tractors	Q19-G
_, , , , , , , , , , , , , , , , , , ,	X12-D10		X22-P09
Electric vehicle anti-hacking syste			X25-N01A
Electric vehicle antitheft system vehicle engine immobiliser	X21-X03 X22-A08C	Arbitrary function generation in	TO2 A04D4
Vehicle anti-hacking system	X21-X03	analogue computer	T02-A04B4
vehicle antitheft system	Q14-H	Arc control circuit breakers	X13-B04
,	X22-X03	moulded case circuit breakers	X13-B04 X13-D07
Antitheft alarms	W05-B01	switches, low power	V03-B06B
arming/disarming	W05-C03	switches, medium & high power	X13-A03C
CCTV surveillance	W05-B01C5	Arc cutting - see Welding, arc	X24-B
ale dalla a conserva de la conserva	W02-F01A5	Arc detection (general)	S01-G03
child separation alarms detection system using tags	W05-B01A5A W05-B01A2	Arc discharge heating	X25-B03B
elect./magnetic field disturbance	VV03-D01A2	Arc fault current protection	X13-C01F
actuation	W05-B01A		
ferromagnetic tag	W05-B01A2A	Arc furnace	X25-C02
inductive tag	W05-B01A2B	Arc lamp	X26-A01A
mechanical actuation microwave tag	W05-B01B W05-B01A2C	construction - see Discharge lam	
motion detector	W05-B01A2C W05-B01C5A	Arc lamp manufacture - see Dischar	
object separation alarms	W05-B01A5C	Arc welding - see Welding, arc	X24-B
optical actuation	W05-B01C1B	architectures, computer memory	T01-H01
passive intrusion detection	W05-B01E	Archery	P36-A05
recording equipment (audio/vide			W04-X01K5A
ultrasonic actuation vehicle	W05-B01C1B	Arcing horn	X13-B04
vernue	W05-B01 X22-D03A	Area measurement	S02-A10C
Antitheft tag for alarm system	W05-B01A2	using electrical/magnetic method	
cancelling/deactivating	W05-B01A2 W05-B01A2	using mechanical method	S02-A10C S02-A01
zag, acaeavaanig	W05-C03	asing meenamear method	S02-A01
Anti-virus (computing) protection	T01-N02B3	using optical method	S02-A03
AOD (audio-on-demand)		-	S02-A10C
receiver aspects	W03-A16C5C	using sound or ultrasound	S02-A05B
			S02-A10C

		1	
ARI	W02 F01DE	Assembly-line robot	X25-A03E2
broadcast system decoder in broadcast receiver	W02-E01B5 W03-B02C5	control	T06-D07B X25-A03F
decoder in broadcast receiver	W03-B02C3	A	
APINC data bus systems	W06-B01B8	Asset tracking	X25-A03E2 X25-F11
ARINC data bus systems	VVUO-DU I DO	goods military equipment	W07-X05
Arithmetic multiplier/divider	T00 A04D4	stolen vehicle	X22-D03C
analogue	T02-A04B1 T01-E02B	vehicle	T07-A05
digital		Associative memories	
Armature (general)	V02-C	computer memory systems	T01-H03B
Arming		memory per se (see also <b>Memor</b> i	
alarms	W05-C03	, , , , , , , , , , , , , , , , , , , ,	U14-A05
weapons	W07-C05	Astable pulse generators	U22-A04A
Array		blocking oscillator	U22-A04A1
aerial - see Aerial arrays	W02-B05	crystal	U22-A04A2
digital IC - see <b>Digital</b>		relaxation	U22-A04A4
integrated circuits, with repetitive structure	U13-C04	voltage/current control (VCO)	U22-A04A9
magnetic head	T03-A03A7	Asynchronous induction machine	V06-M02B
matrix display (general)	W05-E01		X11-E
matrix display control (general)	W05-E01A	induction generator	X11-E05
matrix display control		Asynchronous transfer mode	
(general/computer)	T04-H03B	(ATM) data transmission	W01-A03B1
storage	T01-H01B7	ATC	X23-A02C
Arrester (see Surge arrester)			X23-B02
Arthroscope	S05-D04	ATE (see Automatic Test Equipmen	it)
Article feeding	X25-F02	Athletics	P36-A03
coil	X25-F02		W04-X01K3A
control	T06-D08B	ATM data network access	W01-A03B1
	X25-F02		WUI-AUSDI
strip	X25-F02	Atmospheric pressure	CU3 DU3
web	X25-F02	Barometer measurement (see also S02-F04 o	S03-D03
Artificial intelligence	T01-J16	measurement (see also 302-1 04 to	S03-D03
control system using Al	T01-J16	Atomic absorption spectrometry	S03-E04A5G
expert systems	T01-J16A T01-J16B	Atomic absorption spectrometry	
fuzzy logic systems genetic algorithms	T01-J16C4	Atomic emission spectrometry	S03-E04D3
heuristics	T01-J16C6	inductively coupled	S03-E04D3A
intelligent searching	T01-J16C6	Atomic Force Microscope - see	
knowledge processing	T01-J16C	also analysing tube cantilever	V05-F04B6A
learning	T01-J16C2	cantilever manufacture	V05-F04B6A V05-L01B2
natural language processing	T01-J16C3	circuitry	V05-F01B5
neural network (see also <b>Neural</b>	T04 14 / 04	manufacture	V05-L05F1A
network)	T01-J16C1	probe	V05-F04B6A
pictorial language processing	T01-J16C3	probe manufacture	V05-L01B2
Ashing, lithography,	U11-C04A1D	to measure atomic dimensions	S02-A02
semiconductor manufacture		Atomic oscillator	U23-A06
Ashtray	V07.V		
electrical details mechanical details	X27-X P15-T99	Atomizer	P42-A
		driving fluid	P42-A
ASIC	U13-C04D		P42-T05C
ASK	U23-P01C1	driving work to be sprayed	P42-A
	W01-A09A1	electrical aspects	P42-T05E X25-K09
ASR, vehicle	X22-A03D1	multiple nozzles or jet	P42-A03
	X22-C02C1	novel nozzle or spray head	P42-A03
	X22-G03B		P42-T01A
Assembler/disassembler for data p	ackets	reservoir or tank	P42-A
	W01-A03B		P42-T03
		variable characteristics	P42-A05

4.70	V02 404DE	11: 11 (DA) 1: ··	\A/O.4.COF.A
ATP	X23-A01B5 X23-B02	public address (PA) application	W04-S05A
		tone control TV receiver application	W03-C05A W03-A15A
ATS	X23-A01B5	volume control	W03-C03
	X23-B02		W00 C00
Attaching leads, semiconductor	U11-E01	Audio connector - see Connector	
flip chip bonding	U11-E01C	Audio player, general	W04-E30A3
gang bonding	U11-E01B	Audio recording equipment	
tape automated bonding (TAB)	U11-E01B	compact disc (CD)	W04-C10A1
wire bonding	U11-E01A	construction (general)	W04-L05
Attenuator	H05 D07	digital audio tape (DAT) player/re	corder W04-
lumped constant type	U25-D07	B12G	\A/O.4 LIOEE
waveguide type	W02-A04C	editing indexing	W04-H05E W04-H01
Attenuation measurement (electrical	al) S01-D05C	integrated with telephone	W01-C01P6A
Attitude		magnetic record carriers	T03-A01C8A
measurement of	S02-B05A	MP3 player	W04-G01B8
Audible advertising	W05-F	signal processing - see <b>Audio rec</b>	
Audible indication of measured value	ue	signal processing	W04-G01
	S02-K04A	testing	W04-J07
A		time code recording	W04-H01A
Audible signalling arrangements combined with visual signalling	W05-A02 W05-A04	Audio recording signal processing	W04-G01
	WU3-AU4	coding	W04-G01F
Audience research systems	W00 D04D	copy marking	W04-G01L3
radio broadcast	W02-D04B	copy prevention	W04-G01L1
radio broadcast receiver aspects	W02-D05 W03-B10R	digitising	W04-G01F
TV broadcast	W02-F04B	distortion reduction	W04-G01D
TV broadcast receiver aspects	W03-A18R	drop-out compensation	W04-G01D
•	WOS ATOK	dynamic recording (general) error correction	W04-G01A W04-G01F1
Audio coding	W04-V10	multiple channel recording	W04-G01F1 W04-G01M
coding	W04-V10 W04-V05G	multitrack recording	W04-G01M5
input/output (computer)	T04-F07	noise reduction	W04-G01D
magnetic recording head	T03-A03	recording of separate audio track	
g	W04-B	sampling	W04-G01F
mixing	W04-G05	static recording	W04-G01B
recording signal processing - see	Audio	static recording applications	W04-G01B7
recording signal processing	W04-G01	static recording memory addressi	
relaxation, used in medicine	S05-A09	stereo and surround sound record	
signal processing - see <b>Audio sig</b>			W04-G01M1
processing	W04-G	Audio signal coding	W04-V10
signal analysis	W04-V01 W04-V04A7	AC-2	W04-V10G1C
special effects production (musica		ATRAC	W04-V10G1G
switching	W04-G05E	hybrid coding	W04-V10G1G
transducers - see	V06-V	MPEG multichannel	W04-V10G1 W04-V10G1J
Acoustoelectric transducer		nonuniform	W04-V10C
Audio amplifier		perceptual coding	W04-V10G
balance control	W03-C03A	predicitive coding	W04-V10E
broadcast radio receiver applicati		reducing artefacts	W04-V10G7
circuitry details	U24-G	speech coding	W04-V05G
,	W03-C	standards conversion	W04-V10A
communication receiver application		subband coding	W04-V10G1A
constructional details	W03-C07	transform coding	W04-V10G1C
digital	W03-C01G	Audio signal processing	
graphic equaliser	W03-C05C	analysis	W04-V01
hearing aid application	W04-Y03A		W04-V04A7
loudness control	W03-C05	acoustic feedback reduction	W04-G03C
power amplifier	U24-G01B1 W03-C01C	coding, general	W04-V10
preamplifier	U24-G01C	coding, speech	W04-V05G
Premilphine	W03-C01A	compression and expansion	W04-G04A
		computer-based	T01-J18

	.•	1	1.	14/02 6406
frequency enhancement and addi	tion W04-G04E		recycling remote control - see <b>Audio/video</b>	W03-G10C
of harmonics improving S/N ratio	W04-G04E W04-G03A	'	equipment (general) remote co	ontrol
mixing - see <b>Sound mixing</b>	W04-G05A			W03-G05A
noise reduction	W04-G03	1 .		W03-G06
pitch changing	W04-V05J1		1 9 1	W06-C01C6
recording - see Audio recording				W03-G07A
processing	W04-G01			W03-G01C
reducing acoustic feedback	W04-G03C			W03-G01C
sample rate conversion	W04-V10A		• •	X22-J13
sound cancelling	W04-V07			
telephone set, speech DSP	W01-C01C7		lio/video equipment (general) re	
telephone set, non-speech DSP	W01-C01Q6C			W03-G05A
voice disguising system	W04-V09		5	W03-G05A1
Audio studio equipment	W04-G08	(	combined features (audio, video, e	W03-G05A5
				W03-G05A8
Audio tape recorder	W04-B12			W03-G05G
construction	W04-B12D			W03-G05A1A
control	W04-B12C		. =	W03-G05E1
dictation	W04-B12J			W03-G05A7
digital - see <b>Digital audio tape re</b>				W03-G05A1
dual assesta de di	W04-B12G		transponder-type location system	
dual cassette-deck	W04-B12K		with on-screen display	W03-G05A6
head	T03-A03			W03-G05A1A
hand and tana transport	W04-B12A W04-B12A			
head and tape transport interfacing	W04-B12C		lio/video recording equipment access control	W04-J01A
miniature	W04-B12H			W04-J01A
personal stereo unit	W04-B12H W04-B12H			W04-301
power supplies	W04-B12C		•	W04-B14C1
signal processing	W04-B12B			W04-B14C1
= : =			automatic music search system (AN	
Audio transformer	V02-F02	`		W04-H03
Audio-on-demand	14/02 44/050		casing and construction	W04-L05
receiver aspects	W03-A16C5C		DAT	W04-B12G
system aspects	W02-F10C		dubbing	W04-H05A
Audio-visual signalling arrangemen	ts W05-A04A	I	DVTR	W04-B10G
Audio/video equipment (general)	W03-G			W04-H05E
aircraft application	W06-B01C7		•	W04-M01B1
bus interconnection system	W03-G05C1	1	file server (interactive broadcasting	, .
cables	W03-G07A			W04-K05A
casings/housings	W03-G01A5		•	W04-E20C5
combination equipment	W03-G03			W04-B14C
combination, in one housing	W03-G03A		9 1 1	W04-E20A
combination, media centre PC	W03-G03A1		9	W04-H01
combination, mountable in rack	W03-G03C			W04-H01C
components	W03-G07C			W04-H01A
connectors	W03-G07A		5.	W04-H01C1 W04-K
constructional details of equipmen			5	W04-R W04-B
cordless headphones	W03-G05C5A		5	W04-D
D2B system	W03-G05C1		9 1	W04-H03
home network	W03-G05C1		•	W04-1103 W04-D20A
home theater equipment	W03-G03H			W04-G01B8
in-car entertainment system	W03-G08 W03-G05C			W04-K06
interconnection internal construction	W03-G05C W03-G01A1			W04-K10
leads	W03-G07A		multiple-recording units operation	
manufacture	W03-G07A W03-G10A			W04-R03A
mountings	W03-G10A W03-G01C		. •	W04-C
packaging	W03-G01C W03-G10G		•	W04-C10A
packaging plugs	W03-G10G W03-G07A			W04-E20E
portable	W03-G07A W03-G04		simultaneous play and record	- ·
power supplies	W03-G04 W03-G02			W04-E20M
Form. 626660		I	•	

slow speed operation mode	W04-E20C1	discontinuous, electric	T06-A06A1D
SMPTE time code recording	W04-E20C1 W04-H01A	electric	T06-A06A
synchronisation between recordin		hydraulic	T06-A06B
•	W04-K01	integral characteristics	T06-A06A9
testing	W04-J07	multi-step	T06-A06A1D
theft alarms	W04-J01C	multi-variable	T06-A06A2
time code recording	W04-H01A	multiple input/output-type	T06-A06A2
time-lapse recording	W04-E20C3	PD characteristics	T06-A06A9
VCR/VTR	W04-B10	PI-characteristics	T06-A06A9
video hard disc video optical disc	W04-B14C3 W04-C10A3	PID-characteristics	T06-A06A9
•	VVU4-C1UA3	pneumatic proportional characteristics	T06-A06B T06-A06A9
Audio/video recording heads	T00 004	pulse train output-type	T06-A06A2
capacitive	T03-C01	two-step	T06-A06A1D
magnetic magneto-optical	T03-A03 T03-D01C	using algorithms	T06-A05C
optical	T03-B02B	Automatic cord winders	X12-G10
positioning (general)- see <b>Head</b>	100 0020	Automatic directional control	X12 010
Audiometering, medical	S05-D01D2	antenna systems	W02-B06C
Auger spectroscopy	S03-E06D	Automatic focussing	
Augmented reality (AR)	T01-J40C	magneto-optical recording head	T03-D01D1A
Augmented reality (Ait)	W04-W07E1	optical recording head	T03-B02A1C
A valo analisasti am magulain a	VVO+ VVO/E1	photographic camera	S06-B01
Authentication marking coins/banknotes	T05-J	video camera	W04-M01D5D
record carriers	T03-H02A1C	Automatic frequency control - see A	FC
valuable papers	T05-J		U25-J05
Auto-reclosure	X13-C01X	Automatic gain control - see AGC	U24-C01
Autodiallers, subscriber telephone	W01-C01B1	7 g co co. /	U24-C01
external (e.g. portable) module	W01-C01B1D	Automatic goods retrieval	T06-D08C
hands free dialling	W01-C01B1B	Thatemane good Tourioral	X25-F01A
number storage details	W01-C01B1A	Automatic phase control	
OCR input	W01-C01B1C	digital	U22-H
re-dialler (re-router)	W01-C01B1F	general	U23-D
repertory	W01-C01B1A	PLL	U23-D01
reply dialling	W01-C01B1E	Automatic rhythm generators	W04-U04C
voice dialling	W01-C01B1B	Automatic shelving control	T06-D08C
Automatic analysis equipment	S03-E15	Automatic shelving control	X25-F01A
control	S03-E15A	Automatic test equipment	V04-R06G3
specimen preparation	S03-E13D1	Automatic test equipment	
Automatic answering telephone eq	-		S01-H03A
	W01-C01C5	Automatic train/tram control	X23-A02C
caller telephone number recordin		Autopilots for aircraft	W06-B01A5
and the Banad and Danas and San and asset	W01-C01C5G	Auxiliary power supply - see	
centralised call answering, at exch	ange W01-C02B4	Standby power supply	U24-J
date/time recording	W01-C02D4		X12-H02
dynamic recording	W01-C01C5A	AV network (home network)	W03-G05C1
integrated with telephone appara	tus	communication aspects	W03-G05C1C
	W01-C01P3	networked media storage	W03-G05C1A
outgoing message (OGM) transm		Avalanche breakdown diodes	U12-C01D
	W01-C01C5E	Avalanche photodiode	U12-A02B2A
privacy function	W01-C01C5F	Aviation	Q25
remote control playback	W01-C01C5D		W06-B
solid-state memory static recording	W01-C01C5B W01-C01C5B	Avionics connector - see Connector	V04-M30Δ
using tape	W01-C01C5A	7. Tomes connector see connector	W06-B01C1
Automatic band scanning	U25-J01	Azimuth	
Automatic control system	T06-A06	correction for magnetic heads	T03-A05A
continuous, electric	T06-A06A1A	measuring	S02-B05
differential characteristics	T06-A06A9		
		ı	

В		Ball mill	P41-A03E
_		Ball out-of-play detection (sports)	P36-A01
Baby		ball out-of-play detection (sports)	W04-X01C1
baby proofing	P26-E	Ball sports	P36-A01
bottle steriliser	X27-B09	Ball sports	W04-X01K1
ahambar nat	X27-X01 X27-X01	5. U P L L	
chamber pot cutlery	X27-X01 X27-X01	Ballast, discharge lamp	X26-C01B
cutiery	X27-X01 X27-B09	electronic electronic for fluorescent lamp	X26-C01B2 X26-C01B2
food warmer	X27-B09	electronic for hubrescent lamp	X26-C01B5A
rood warrier	X27-X01	inductive starting circuit	X26-C01B1A
furniture	P26-E	inductive components	V02-G
monitoring alarms	X27-X01	pro-	X26-C01B1C
prams	Q22-B	non-electronic	X26-C01B1
	X27-X01	Ballistic transistor - see Field effect	
wetting alarm	X27-X01	transistor resonant tunnelling	U12-D02J2
Back scattering		Balloons	Q25-P01B
ionospheric/tropospheric radio		Buildons	W06-B09
communication systems	W02-C03X	Balun	
nuclear radiation- materials inves		distributed constant type	W02-A02A5
	S03-E06C	lumped constant type	U25-D03
Back-lighting for displays	X26-U04A1	transformer	V02-F02
computer	T04-H03D	Bandages	P32-A60
LCD module aspects	U14-K01A4C	•	
Back up power supply (high)	X12-H02	Band gap reference circuit feedback type	U24-E02B9
Diesel generator-based	X12-H02A		1104 504 67
rotary	X12-H02C	Band gap reference circuit	U24-E01C7
static	X12-H02B	non-feedback type	
Back up power supply (low)	U24-J	Band scanning, automatic	U25-J01
battery back up	U24-J01	Bandstop filter	1100 C01D4
capacitor back up	U24-J02	digital distributed constant type	U22-G01B4 W02-A05K4
combination of battery and capac	U24-J04	lumped constant type	U25-E05D
for electric vehicle	X21-B04	•	
for motor vehicle	X22-F03	Bandwidth control (general)	U25-F05
power converter back up	U24-J03	Bandwidth reduction	14/04 1/40
Backing layer for magnetic record	carrier	audio signal coding (general)	W04-V10 W04-V05G
	T03-A01B3	audio signal coding (speech) audio signal coding for recording	
		facsimile signal	S06-K07A4D
Backplane, digital computer interfa		general radio communications	W02-G04A
	T01-C07C	radio receiver baseband for S/N	
Badge access entry or exit control	T05-D01A	ratio improvement	W02-G03B8
Badminton	P36-A01	radio receiver IF for S/N ratio	
	W04-X01K1P	improvement	W02-G03B2A
Baggage inspection at airport	S03-C	video signal coding	W02-F07
33 3 1 1	W06-B02A5A		W04-P01A
Bagpipes	P86-A01A1	video signal coding for recording	VVU4-FUTF
<del></del> .		Banknote	
Baking, lithography, semiconducto		actuated apparatus	T05-H02A
	U11-C04A1A	counting	T05-L07 T05-K02
Balance control, audio	W03-C03A	sorting or delivering validating, testing	T05-K02 T05-J
Balanced-to-unbalanced network		S. S	103-3
- see Balun		Barcode	TO4 A02D1
Balances		reading writing	T04-A03B1 T04-A02B
price indicating	S02-D02D	•	107-74020
spring	S02-F01A	Barcode applications	V2E E11
using elastic materials	S02-D01B	goods tracking inventory/stock control	X25-F11 X25-F09
weighing	S02-D01A	for military equipment	W07-X05
Balancing, static/dynamic	S02-J05	production line monitoring	T05-G02B1
	ı	p. caacaaio momening	

product code reading (POS) telephone dialling video recorder programming	T05-L01C W01-C01B1C W04-B10C	charging indicator, electric vehicle	X16-H01 X21-A06
	W04-E04C1	ale a contra a tradita at a a constituta	X21-B01A
Barograph	S02-F04A9	charging indicator, vehicle	S01-G06A
Barometer	S03-D03		X16-H01
Barrel (packaging container)	Q32-A05	ala a satis a contata i coma a a a la la accorda i a	X22-E03
		charging with jumper cables, vehic	X22-F01A1
Baseball	P36-A01	ala avaira a vaira a la attaux.	
	W04-X01K1A	charging, using battery charging, using generator	X16-G02B X16-G02C
Base layer for magnetic record carri	er	charging, using generator charging, using generator	X10-G02C
	T03-A01B1B	driven by IC engine	X16-G02C1
Base station for mobile radio		charging, using generator driven	X10-G02C1
cellular	W02-C03C1B	by wind turbine	X16-G02C2
non-cellular	W02-C03C1B W02-C03C3B	charging, using solar cell	X16-G02C2
transceiver details	W02-C03C3B W02-G02B	charging, using solar cell charging, vehicle	X16-G02A
		charging, verticle	X22-F01A
Basketball	P36-A01	clamp	V04-C01
	W04-X01K1C	ciamp	X16-F05
Bassoon	P86-A01A1	coin-shaped casing	X16-F01F1
Bath		compartment, for electrical/	X10-10111
electrical details	X27-A02A4	electronic equipment	V04-S03
for medical use	S05-A09	electionic equipment	X16-F06C
non-electrical details	P28-B02	connector	V04-C01
ultrasonic bath for cleaning	P43-B07C	connector	X16-F05
ditiasoffic batti for cleaning	X25-H09A	constructional details	X16-F 03
		container	X16-F01C
Bathroom equipment	P28-B	cooling	X16-K01
bathroom linen	P28-B03	cover	X16-R01 X16-F01C
shower screen	P28-B02	cylindrical-shaped casing	X16-F01F2
wash-stand	P28-B01	dustproof details	X16-F06A
Battery		electrolyte	X16-1 00A
AC-mains charger	X16-G01	electrolyte circulation	X16-5 X16-F04
active materials	X16-E01	electrolyte circulation	X16-H02
active nanomaterials	X16-E01H1	electrolyte nanomaterials	X16-1102 X16-J01E
air conditioning	X16-K03	electrolyte specific gravity measure	
applications - see Battery applica		creed by the openine gravity measure	X16-H02
battery classification	X16-H04	exchange, electric vehicle	X21-B01E
binder	X16-E01J	filler	X16-E01J
button-shaped casing	X16-F01F1	filler cap	X16-F03B
capacitor	X16-L02	gel electrolyte	X16-J01G
casing	X16-F01C	getter	X16-F09
casing seal	X16-F01A	heating	X16-K02
casing shape	X16-F01F	holder, associated with	X16-F06C
casing shape, button/coin	X16-F01F1	equipment casing	
casing shape, cylindrical	X16-F01F2	holder, charging	X16-F06E2
casing shape, micro	X16-F01F4	housing	X16-F01C
casing shape, printed	X16-F01F4	humidifier	X16-K03
casing shape, prismatic	X16-F01F3	internal connection	X16-F03A3
casing shape, tubular	X16-F01F2	inorganic solid electrolyte	X16-J01C
charger	X16-G	jumper cable	X16-F05
charger, electric vehicle	X16-G	leasing, electric vehicle	X21-B01E
	X21-B01A1	manufacture	X16-S
charger, inductive type	X16-G03	material recovery	X16-M
charger, non-contact type	X16-G03	measurements	S01-G06
charger, off-board electric vehicle			X16-H
	X21-B01A1C	measurements, battery classification	
charger, off-board vehicle	X16-G	measurements, electrolyte level	X16-H02
	X22-F01A2	measurements, remaining charge	
charger, on-board electric vehicle		measurements, specific gravity	X16-H02
	X21-B01A1A	measurements, temperature	X16-H05
		measurements, voltage/current	X16-H03

Battery (continued)		military equipment	W07-J03
membrane	X16-F02	portable computer	T01-L01
modelling	X16-F02 X16-S	portable computer	T01-L01
module (battery module)	X16-5 X16-F06A	portable telephone	W01-C01E5B
molten salt electrolyte	X16-100A X16-J03	ship	W06-C01C3
	X16-503 X16-F09	·	W06-B03B
nameplate label		spacecraft vehicle	
nanomaterials	X16-E01H1		X22-F01
2 2 1 1 2 2 1 2	X16-J01E	Battery charging	X16-G
organic solid electrolyte	X16-J01A	AC mains	X16-G01
pack (battery pack)	X16-F06A	by using battery	X16-G02B
packaging carton	X16-F09	by using generator	X16-G02C
photoelectrochemical cell electro		by using IC engine-	
pressure relief	X16-F03B	driven generator	X16-G01C1
prism-shaped case	X16-F01F3	by using non-contact means	X16-G03
primary	X16-A	by using solar cell	X16-G02A
primary, micro	X16-A05	by using wind-driven	
primary, printed	X16-A05	generator	X16-G01C2
protection	U24-F	camcorder	W04-B10C
recycling	X16-M		W04-M01K
redox battery	X16-C		W04-M01P5A
remaining charge measurement	S01-G06A	cordless telephone	W01-C01D1B
	X16-H01	cordiess terepriorie	W01-C01E5A
safety device	X16-F03B	electric vehicle	X21-B01A1
secondary	X16-B01	holder	X16-F06E2
secondary, lithium	X16-B01F1	personal stereo (tape)	W04-B12C
secondary, lithium with liquid	X16-B01F1A	personal stereo (tape)	W04-B12H
electrolyte		pod	X16-F06E1
secondary, lithium with solid	X16-B01F1C	portable telephone	W01-C01D3C
electrolyte		portable telephone	W01-C01E5A
secondary, maintenance	X16-B09	subscriber telephone	W01-C01E5A
secondary, micro	X16-B01G	subscriber telephone, contactless	
secondary, printed	X16-B01G	subscriber telephone, from	WOT-COTESE
separator	X16-F02	battery or solar source	W01-C01E5C
simulation	X16-S	subscriber telephone, from genera	
smart battery	X16-H09	subscriber telephone, from genera	W01-C01E5D
solid electrolyte	X16-J01	vehicle	X22-F01A
solid-state	X16-B01S	video camera	W04-M01P5A
steam separator	X16-K01	video camera video tape recorder	W04-N011 3A
storage heater	X16-L01	·	
surfactant	X16-E09	Battery electrode	X16-E
spacer	X16-F02	active complex oxide material	X16-E01C1
temperature	X16-H05	active material	X16-E01
terminal	X16-F03A1	active material manufacture	X16-E01G
terminal post	X16-F03A1	active material, binder	X16-E01J
testing	S01-G06	active material, filler	X16-E01J
9	X16-H	active material, nano-sized	X16-E01H1
theft prevention	X16-F09	active oxide material	X16-E01C1
thermoelectric battery	X15-D	alkaline accumulator	X16-E05
tubular-shaped casing	X16-F01F2	binder	X16-E01J
valve-regulated lead-acid (VRLA)t		carrier	X16-E02
valve regulated lead deld (VNE t/c	X16-B01B	collector	X16-E02
vent	X16-F03B	conductive material	X16-E01E
vibration damping	X16-F09	depolariser	X16-E07
voltage regulator, vehicle	X13-H02	filler	X16-E01J
voltage regulator, vernere	X16-G02	fuel cell	X16-E06A
	X22-F02	grid	X16-E02
waterproof details	X16-F09	hybrid cell	X16-E06C
zinc-carbon battery	X16-A01A	inorganic active material	X16-E01C
·	ATO-AVIA	lead-acid accumulator	X16-E04
Battery applications	14/07 50105	lithium-based non-aqueous	
aircraft	W06-B01C3	electrolyte secondary cell	X16-E08A
clock or watch	S04-B01A	material	X16-E
electric vehicle	X21-B01A	material structure	X16-E01H

material, active metal-air hybrid cell metal-halogen hybrid cell metal-hydrogen	X16-E01 X16-E06C1 X16-E06C2 X16-E05C	smart measurement voltage measurement	S01-G06 X16-H09 S01-D01 S01-G06
nickel-cadmium cell non-aqueous electrolyte cell non-aqueous, primary cell	X16-E05A X16-E08 X16-E03A	BCH error correction	X16-H03 U21-A06A9 W01-A01B1
organic compounds photoelectrochemical cell	X16-E01A X16-E11	BDMA (beam division multiple acce	ss)
plate	X16-E11	_	W02-K10
polymer active material primary cell sodium-sulphur cell	X16-E01A1 X16-E03 X16-E10	antenna beam steering aspects cellular base station aspects	W02-B06C W02-C03C1B W02-C03C1L
support	X16-E02	Beacon systems for navigation	W06-A01
Battery electrolyte	X16-J	fixed	W06-A01A
aqueous	X16-J07	buoy	Q24-P18 W06-C07C
circulating arrangement draining	X16-F04 X16-F03B	portable	W06-C07C
filling/topping up	X16-F03B	Beach volleyball	P36-A01
fused salt	X16-J03	beach voneyban	W04-X01K1W
gel	X16-J01G	Beam deflection coil	
gel, inorganic	X16-J01C	analysing/processing tube	V05-F04C1A
gel, organic holder	X16-J01A X16-J09	, , , ,	V05-F04C5
liquid	X16-J02	CRT	V02-F01A
matrix	X16-J09		V05-D01B
molten salt	X16-J03		V05-D06B1A W03-A08A1B
non-aqueous	X16-J08	manufacture	V02-H01
pressure relief	X16-F03B	Beam division multiple access -	
solid solid, inorganic	X16-J01 X16-J01C	see BDMA	W02-K10
solid, morganic solid, organic	X16-J01A	Beam failure recovery	W02-C03C1A
stirring	X16-F04	Beam indexing for CRT TV display	W03-A08A5E
Battery holder	X16-F06C	Beam rider missile guidance	W07-A01E1
-	X16-F06E2	_	
compartment	X16-F06C	Beam steering for aerial automatic directional control	W02-B06 W02-B06C
compartment, electronic equipme	ent V04-S03 X16-F06C	electronic	W02-B06B
electrical/electronic equipment	V04-S03	mechanical	W02-B06A
	X16-F06C	variable polarisation	W02-B06E
charging	X16-F06E2	Beam management (cellular radio)	W02-C03C1A
Battery materials recovery	X16-M	Beam sweeping	W02-C03C1A
Battery measurements - see Battery	testing	Beam treatment, semiconductor	
Battery protection	U24-F	alignment, lithography	U11-C04B3
Battery saving, power supply	U24-K	electron beam	U11-C03B U11-C07A2
portable telephone	W01-C01D3C	etching, localised ion beam	U11-C03B
	W01-C01E5B	laser treatment	U11-C03D
Battery testing	S01-G06	laser treatment apparatus	U11-C09G
	X16-H	lithography, beam control	U11-C04A6
classification	S01-G06	lithography, masking techniques	U11-C04D
current measurement	X16-H04 S01-D01	particle beam scribing	U11-C03E U11-C07A4
current measurement	S01-G06	ŭ .	011-C07A4
	X16-H03	Bearing applications clock or watch	S04-A05
electric vehicle battery	X21-A06	disc drive spindle	T03-F02C3C
and the second of the second o	X21-B01A	·	T03-N01
measuring remaining battery cap	acity S01-G06A	electric machines	V06-M10
	X16-H01	and the state of	X11-J05X
		machine, testing magnetic head support arm	S02-J03A T03-A05C5

vehicle wheel	Q11-A06	Bernoulli effect	
vernere wireer	Q62-G	fluid speed measurement	S02-G02B
X-ray tube rotary anode	V05-E01B1A	magnetic head positioning for dis	scs T03-
	V05-E01H1	A05C1A	TO2 AOFE1
Bearing details and types	Q62	-	T03-A05F1
ball ball thrust	Q62-G02A Q62-G02A1	Betatron	X14-G02
cleaning	Q62-G02A1	Bevelling, semiconductor wafer	U11-C06A1A
combination	Q62-H Q62-G05	Beverage vending machine	T05-H06 X25-F03B1
constructional details	Q62-G08	Bias circuit for amplifier	U24-G03G1
cooling	Q62-G09	Biasing integrated circuit substrate	U13-E02
elastic	Q62-G04	Biasing magnetic recording heads	T03-A06G
fluid (dynamic) bearings	Q62-G06 Q62-G02E	January State Control of the Control	T03-A03C9N
giant hydrodynamic bearings	Q62-G02E Q62-G06	BiCMOS integrated circuit structure	es
hydrostatic bearings	Q62-G06		U13-D03B
lubrication	Q62-G09	Bicycle	Q19-A
magnetic maintenance	Q62-G03 Q62-G		X22-P01
maintenance	Q62-G Q62-H	electric	X21-A01C
manufacture	Q62-G	exercise (static)	P36-A06 W04-X01A5A
	Q62-M	Bidirectional power converter - See	
play adjustment	Q62-G07	BiFET integrated circuit structures	U13-D03B
roller roller thrust	Q62-G02C Q62-G02C3	Billboard	P85-E01A
rolling contact type	Q62-G02		W05-E03A1
servicing	Q62-H	Billiards (game)	P36-A01
P. P	Q62-M		W04-X01K1E
sliding contact type tapered roller	Q62-G01 Q62-G02C1	Billing	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
Bed	P26-B02	data networks subscription TV/broadcasting	W01-A06E1E W02-F10N5
manufacture	P26-M	telephone	W01-C06E
engine bed	Q68-A02	Bimetal thermometer	S03-B01D
Bed clothes absence alarm	X27-X	Bimetal thermostat	V03-C06B1
Bed linen	P27-B02	BIMOS memories - see Memories,	
Bed wetting detector	X27-X	with FET and bipolar	U14-A03B5
Bed-of-nails connector, PCB	V04-B01		
	V04-M05	Binaural dummy head	V06-V02G
	V04-R06G1A		W04-R01C1
Bed-of-nails test probe	S01-H03A V04-R06G1A	Binder for output paper in copier	S06-A18A
Danifalaskaliakanana	VU4-RUOG 1A	Binder material electrophotographic photocondu	.atar CO4 AO1 A 2
Beer/alcoholic beverage brewing equipment, industrial s	cale X25-P01B	magnetic photocoride	V02-A09
brewing equipment, domestic s		magnetic recording medium	T03-A01A3
dispenser	X25-F03B1	Binding, ski safety release force	
dispenser, domestic	X27-X02	measurement	S02-F03A
mat wine cellar	X27-X02 X27-X02		P36-A03 P36-A08A
Bells	W04-U09		P36-AU6A
26.13	W05-A02		W04-X01E
Belt tension measurement	S02-F03A		W04-X01H
Belt, photoconductor	S06-A01A9		W04-X01K3P
Bench	P26-A	Binoculars	S02-B09 P81-A50A
manufacture	P26-M	optical elements for	
Bending, metal	X25-A02D	Biochips for instrumentation integrated circuit aspects	S03-H01A U13-D04B
control	T06-D05A1	Biocomputer data processing elem	
an araving avetere	X25-A02D	biocomputer data processing elem	GIIG TOT-LUJU
engraving systems	X25-X10	I	

	COE DO44	1	
Bioelectric current measuring	S05-D01A	Bipolar transistor - see Transistors, k	oipolar
EEG electrocardiograph	S05-D01A2 S05-D01A1	Bird	
electrocardiograph electrodes for electrocardiograph		general husbandry	P14-E01B
currents	S05-D01A1A	identification by audio analysis	W04-V04A7
electrodes for neurological currer		scarer	X25-N01 X25-N01
D01A2A		scarer at airports	
EMG	S05-D01A2	Bistable pulse generators	U22-A04C
SQUID	S05-D01A2	Black box recorder (aircraft)	W06-B01B6
Biofuel - power generation using	X15-E	Blanker, receiver noise	W02-G03B5
constructional details	X15-W	Blanket treatment, semiconductor	U11-C03J3
control, monitoring & testing	X15-V	Blanket, electric	X27-E02
Biological analysis processing	T01-J13A	ohmic resistance heating	X25-B01C3A
Biological materials analysis			X27-E02
biological fluids	S05-C02	Blanking	
_	S03-E14H2	noise in radio receiver	W02-G03B5
biological tissues	S05-C03	TV CRT display	W03-A08A7
blood	S05-C01	video signal generator	W04-M05
blood - see also <b>Blood</b>	S03-E14H1	Blasting	
bone	S03-E14H9	electrical	X25-D01
breath	S03-E14H9 S03-E14H5	non-electrical	Q79-A09
enzymes	S05-E14H5	Blasting machine	X25-A03C2
for medical diagnosis, general	S05-C07	control	T06-D07A
immunoassay	S03-E09F		X25-A03C2
iiiiiiaiiodosay	S05-C09		X25-A03F
nucleic acids	S03-E14H3	Blind	
PCR test	S03-E09F	electrical details	X27-T
proteins	S03-E14H5	manufacture	P27-M
	S05-C09	non-electrical details	P27-C
saliva	S03-E14H9	Bloch line memory	U14-A01A1
tissue samples	S03-E14H6	Blockchain (database)	T01-J05B4A
urine	S05-C03 S03-E14H9	Block codes, general error correction	
unne	S05-C02	block codes, general error correction	
Biological warfare agents	000 002	CRC	U21-A06A U21-A06A1
analysis	S03-E14L	Hamming codes	U21-A06A3
Bioluminescence measurements	S03-E04E	parity bit	U21-A06A2
		Reed Solomon coding	U21-A06A4
Biomass power generation constructional details	X15-E	Block code data transmission,	
	X15-W	error detection/correction	W01-A01B1
control, monitoring & testing	X15-V	Low Density Parity Check (LDPC)	W01-A01B1E
Biometrics	COE DO1CEA	parity	W01-A01B1A
body shape or feature, general fingerprint-based	S05-D01C5A T04-D07F2	polar codes	W01-A01B1G
image recognition-based	T04-D07F	Reed Solomon coding	W01-A01B1C
iris recognition-based	T04-D07F1A	Blocking oscillator, astable	
voice recognition-based	W04-V04A3A	pulse generation	U22-A04A1
Biosensors (see also Biological		Blocking reduction, radio	
materials analysis)	S03-E14H	receiver	W02-G03B4E
electrochemical	S03-E03C1	Blockwise coding for secret data	
using optical fluorescence	S03-E04D	communication	W01-A05A
using optical scattering	S03-E04C	wireless	W01-A05A1
using optical transmission	S03-E04B1A	Blood	
Biphase level coding	U21-A05C	analysis (general)	S03-E14H1
Bipolar ICs		dialysis	S05-H01
amplifiers	U24-G04A1	in vitro analysis, medical	S05-C01
pulse generators	U22-A02A1	in vivo composition measurement	
structures - see Integrated circuit		measuring blood flow and cardiac	
structures, bipolar	U13-D01	output	S05-D01B1B

oxygen content measurement, me	dical	Bonding pads for semiconductor de	evice
	S05-D01G	manufacture	U11-C05G2B
oxygen content measurement, op		pads per se	U11-D03B1
	S03-E04A4	Bonding, semiconductor layers	U11-C01
pressure measurements	S05-D01B1A S02-F04C2	for SOI, IC component isolation	U11-C01
pumping systems	S05-H02		U11-C01J8A
transfusion	S05-H02	insulating or semiconductor subst	U11-C08A6
treatment circuits	S05-H01	insulating of semiconductor subsi	U11-C01J8A
Blower	X25-L04	Banda samisandustan	011 001307
Bluesnarfing prevention		Bonds, semiconductor gang, attaching leads	U11-D03A2
in mobile phones	W01-C01D3C	gang, attaching leads	U11-E01B
pepe	W01-C01Q8E	inspection	U11-F01E
Discourage and ®	VV01-C01Q6L	metallurgical details	U11-D03B1
Bluetooth ® interface	W01-A07H2A	wire	U11-D03A2
network (LAN)	W01-A07H2A W01-A06B5A		U11-E01A
network (LAN)	W01-A06C4A	Bone analysis	S03-E14H9
Board/panel/sheet (general)	Q68-B	Books	
		application	P76-C09
Board games	P36-C01 W04-X02B	binding	P76-A
<b>-</b>			X25-T
Boat - see ship	Q24	binding apparatus	P76-A02
	W06-C	binding method	P76-A01
Bode plots	S01-D05C	covers	P76-B P76-C
Body, human		special printed matter newspapers	P76-C01
bone content measurement	S05-D01J	postcards	P76-C02
impedance measurement	S05-D01D1	'	P42-A03C
mineral content	S05-D01J	Boom for spraying apparatus	P42-A03C P42-T01A
movement, non medical measurer	S05-D01C5A	Poeting/initialization	T01-F05B
shape or movement, medical	303-D01C3A	Booting/initialisation sleeping	T01-F05B
measurement	S05-D01C5		
temperature measurement	S05-D01E	Borehole logging - see Well logging	=
Boilers		Boring	X25-A03B
applications		control	T06-D06 X25-A03B
cleaning	Q72-U41		X25-A03F
domestic (non-electrical)	Q72-U01	Pattina.	X25-F03A
domestic (electrical)	X27-G	Bottling	
industrial (electrical)	X25-W02	Bourdon tube	S02-F04A1
power generation vehicles	Q72-U16 Q72-U03	Boxing (sport)	P36-A04
constructional details	Q72-003 Q72-T		W04-X01K4A
maintenance	Q72-G	BPSK	U23-P01A3
manufacture	Q72-M		W01-A09B
repair	Q72-G	Brachytherapy	S05-A03X
types of boilers	Q72-B02	Braille	
biomass boiler	Q72-B03	clock	S04-B07
electric steam boiler	X25-W02	computer printer	S06-K99X
fire-tube boiler	Q72-B01	devices, general	S05-K
water-tube boiler flash boiler	Q72-B02 Q72-B02		T04-X
fluidized bed combustion boiler		teaching/writing	P85-A01C
heat recovery steam generator		Brake	Q63-D
pulverized fuel boiler	Q72-B06	disc drive	T03-F02C5
stoker fired boiler	Q72-B05	alaatii maaali oo kaasalaasi D	T03-N01
superheated steam boiler	Q72-B08	electric machine (mechanical)	V06-M10 X11-J05A
waste heat boiler	Q72-B07	electric machine, control	V06-N05
water-tube boiler	Q72-B02	electric macmille, control	X13-H01B
Bolometer	S03-A03	electric train/tram	X23-A01B
		electric vehicle	X21-A03
	'		

testing	electrically-driven	X25-L02	DAB	W02-D05C1
Vehicle, testing	testing	S02-F03B		W02-K07C
vehicle, testing         X22.C02         interactive - see Interactive broadcast and entertainment systems         WOZ-F10           vehicle, theft prevention         X22.V16         T01.N01010         WOZ-D05CS           Branching for TDM systems         W02.K0283         and entertainment systems         W0Z-D05CS           Branching for TDM systems         W02.H0283         ambile telephone network         W01.B05A1M           Branching program control         T01-F03A         satellite adio         W02-D05A           Brass - see Metallurgy         S5.B02         wobstems         W02-F06A           Brazing         X24-A09 yes         testing, sound broadcasting wind distribution (sound)         W02-D04           applications         P55-U17 electronics industry         P55-U17 electronics industrial post wind distribution (sound)         W02-D04           vehicle control system         P55-U17 electronics         P55-U17 editional information reception post wind distribution (sound)         W02-F05C           Breadmaker         X27-C08         AGC         W02-F05C           Breadmaker         X27-C08         AGC         W02-F07M1           Breadmaker         X27-C08         AGC, novel aspects         W03-B02A           Breaking strain - see Fatigue testing         AGC, firstage         W03-B02A           Breathing equi	vehicle (see <b>Vehicle</b> for brake det			
webicle, testing				
Wehicle, theft prevention	vehicle, testina			
Branching for TDM systems         W02-K02B3         mobile telephone network satelliter advo satellite radvo satelli	. e.mare, seeming		,	
Branching, program control  Branching, program control  Brasch Satellite TV W02-F06A  Brass - see Metallurgy  Braun tube  W05-D01B  Brazing X24-A09	vehicle, theft prevention	X22-X03		W02-D05C5
Branching, program control         T01-F03A         satellite TV         W02-F06A           Brass - see Metallurgy         brass - see Metallurgy         television - see Television systems           Brazing         X24-A09         testing, sound broadcasting         W02-F04           applications         P55-U0         testing, sound broadcasting         W02-F05C           applications         P55-U1         building, construction industry pelectronics         P55-U1         Broadcast markup language (BML)         T01-J11C1           industrial         P55-U2         Broadcast markup language (BML)         T01-J11C1         W02-F05C           control system         P55-U2         Broadcast markup language (BML)         T01-J11C1         W02-F05C           wired distribution (sound)         W02-F05C         W02-F05C         W02-F05C           wired distribution (sound)         W02-F05C           wired distribution (sound)         W02-F05C           w02-F05C         W02-F05C           w02-F05C         W03-B05C           w03-B05C         AFC         W03-B	Branching for TDM systems	W02-K02B3	· ·	
Brasn tube	Branching, program control	T01-F03A		
Brazing	Brass - see Metallurgy			
Brazing	Braun tube	V05-D01B		
P55-B02	Brazing			W02-D04
applications	Diazing			
electronics	applications			W02-D01
No.	building, construction industry	P55-U17	Broadcast markup language (BML)	
P55-U01				
control system         P55-T20         additional information reception         W03-B08           cooling system         P55-T20         AFC         W25-J05           lubricating system         P55-T20         W3-B01B           Breadmaker         X27-C08         AGC         U24-C01           Breakdown diodes         U12-C01D         AGC, novel aspects         W03-B02A           Breakdown voltage testing         S01-G03         AGC, provel aspects         W03-B02A           Breaking strain - see Fatigue testing         AGC, RF stage         W03-B02A           Breath analysis         S03-E14H9 S05-C09         AM demodulator         U23-K           Breathalyser         S03-E14H9 S05-C09         audience research aspects         W03-B01B           Breathing equipment         P35-A03E1         Car         W03-B01B           Breathing mask         P35-A03E1         Car         W03-B01B           Breathing mask         P35-D01C1         Casing         W03-B01B           Bridge rectifier, package for         U11-D01B3         W03-B01B         W03-B01B           Bridges         Q41-A05G         Channel storing, claation-based         W03-B01B1C           Bridges         Q41-A05G         Channel storing, receivable stations-based         W03-B01B1B				
Cooling system   P55-T20   W03-B01B				
Iubricating system				
BreadmakerX27-C08AGCU24-C01Breakdown diodesU12-C01DAGC, novel aspectsW03-B02A1Breakdown voltage testingS01-G03AGC, IF stageW03-B02A5Breaking strain - see Fatigue testingAGC, otherW03-B02A5Breath analysisS03-E14H9 S05-C09AGC, otherW03-B02A9BreathalyserS03-E14H9 S05-C09AM demodulatorU23-K W03-B02A9Breathing equipmentP35-A03E5audience research aspectsW03-B02C1Breathing maskP35-A03E5carW03-B03Breathing measurementS05-D01C1casing channel storingW03-B03Bridge rectifier, package forU11-D01B3Channel storing, channel listing-basedW03-B01B1CBridges constructional detailsC41-A05 constructional materialsC41-A05G channel storing, location-basedW03-B01B1Cfoundations structural components types of bridge e.g. suspensionC41-A05G C41-A01channel storing, user controlled channel storing, user controlledW03-B01B3BriefcaseX27-A02CcontrolW03-B01B3Broadband ISDNW01-C05B7EDAB receiver digital architecture receiver digital architecture receiver digital rights management (DRM) W03-B01A displaying text-based informationW03-B01A W03-B01A W03-B01A W03-B01A W03-B01A W03-B01ABML cable distribution (for cable TV see CATV)W03-B01F displaying text-based informationW03-B01A W03-B01CA			AIC	
Breakdown diodesU12-C01DAGC, novel aspectsW03-B02A1Breakdown voltage testingS01-G03AGC, IF stageW03-B02A5Breaking strain - see Fatigue testingS03-E14H9 S05-C09AGC, RF stageW03-B02A3Breath analysisS03-E14H9 S05-C09AGC, RF stageW03-B02A3BreathalyserS03-E14H9 S05-C09AM demodulatorU23-K W03-B02A9Breathing equipmentP35-A03E5audience research aspectsW03-B01B nc band scanningW03-B01B nc U25-J01Breathing maskP35-A03E1carW03-B01BBreathing measurementS05-D01C1casing channel storing, channel listing-basedW03-B01B nc channel storing, channel listing-basedBridge rectifier, package forU11-D01B3W03-B01B nc channel storing, phasedW03-B01B nc w03-B01B nc channel storing, phasedW03-B01B nc w03-B01B nc channel storing, phasedW03-B01B nc w03-B01B nc channel storing, user controlled channel storing, user controlled c	= -	X27-C08	AGC	
Breakdown voltage testing         S01-G03         AGC, novel aspects         W03-B02A5           Breaking strain - see Fatigue testing         AGC, RF stage         W03-B02A3           Breath analysis         503-E14H9         AGC, RF stage         W03-B02A3           Breathalyser         505-C09         AGC, other         W03-B02A9           Breathing equipment         P35-A03E5         W03-B01B         W03-B01B           Breathing mask         P35-A03E1         car         W03-B01B           Breathing measurement         505-D01C1         casing         W03-B01B           Bricks         Q44-A         channel storing, channel listing-based         W03-B01B1           Bridge rectifier, package for         U11-D01B3         W03-B01B1           Bridges         Q41-A05         channel storing, channel listing-based         W03-B01B1E           applications         Q41-A05         channel storing, RDS-based         W03-B01B1E           constructional details         Q41-A05         channel storing, receivable stations-based         W03-B01B1E           structural components         Q41-A05B         channel storing, user controlled         W03-B01B1A           structural components         Q41-A05B         channel storing, user controlled         W03-B01B1A           bridgham crysta				W03-B02A
Breaking strain - see Fatigue testing  Breath analysis  S03-E14H9 S05-C09  Breathalyser  S05-C09  Breathing equipment  Breathing mask  P35-A03E5  Breathing measurement  S05-D01C1  Breathing measurement  S05-D01C1  Bricks  Costructional details Constructional materials Suturdural components Structural components Strypes of bridge e.g. suspension Stricks  Bridgman crystal growth Briefcase  Ridgman crystal growth Briefcase  S25-A03C1 Control  Broadband ISDN  Broadcast distribution systems  BML  Broadcast distribution for cable TV see  S03-E14H9 S05-C09  AM demodulator U23-K W03-B02A3 AGC, RF stage W03-B02A3 AGC, other W03-B02A3 AGC, other W03-B01B Control U23-K W03-B01B1 Cassing Casing Cas				
Breath analysis\$03-E14H9 \$05-C09AGC, otherW03-B02A9 AM demodulatorBreathalyser\$03-E14H9 \$05-C09audience research aspects band scanningW03-B01R U25-J01Breathing equipment\$93-A03E5w03-B01BBreathing mask\$93-A03E1carW03-B01BBreathing measurement\$05-D01C1casingW03-B01BBricksQ44-Achannel storing, channel listing-basedW03-B01B1CBridge rectifier, package for applicationsU11-D01B3w03-B01B1CBridgeschannel storing, location-based constructional details constructional materials foundations structural components types of bridge e.g. suspensionQ41-A05G Q41-A05B AU1-B02Bchannel storing, location-based channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1CBridgman crystal growthU11-B02Bchannel storing, user controlled channel storing arrangements channel switching arrangements channel switching arrangements channel switching arrangements channel switching arrangements channel switching arrangements channel switching arrangements channel storing, user controlled channel storing, user controlled w03-B01B1Aw03-B01B1BBridgman crystal growthU11-B02Bconstructionw03-B01BBridgman crystal growthU11-B02Bconstructionw03-B05BBridgman crystal growthU11-B02Bcontrolw03-B01BBroaching controlX25-A03C1 X25-A03C1 X25-A03C1 X25-A03C1 X25-A03C1 X25-A0				
Sol-Colp				
Breathalyser  S03-E14H9 S05-C09  Breathing equipment  P35-A03E5  Breathing mask  P35-A03E1  Breathing measurement  S05-D01C1  Bricks  C44-A  Bridge rectifier, package for  Bridges  Applications  Constructional details  Constructional materials  foundations  Structural components  Attructural components  Structural components  Attructural components  Structural components  Attructural components  Structural components  Attructural components  Attructural components  Structural growth  Bridgman crystal growth  Briefcase  X27-A02C  Broaching  Control  T06-D07A  Az5-A03C1  Az5-A03	Breath analysis			
Breathing equipment P35-A03E5 Car W03-B01B Breathing mask P35-A03E1 Car W03-B01B Breathing measurement S05-D01C1 Casing W03-B05A Channel storing, channel listing-based Channel storing, location-based W03-B01B1C Channel storing, RDS-based W03-B01B1C Channel storing, RDS-based W03-B01B1C Channel storing, receivable stations-based Channel storing, receivable stations-based Channel storing, receivable stations-based W03-B01B1C Channel storing, receivable stations-based Channel storing, receivable stations-based W03-B01B1C W03-				
Breathing equipment P35-A03E5  Breathing mask P35-A03E1  Breathing measurement S05-D01C1  Bricks Q44-A  Bridge rectifier, package for U11-D01B3  Bridges  applications Q41-A05 constructional materials Q41-A056 structural components types of bridge e.g. suspension V11-B02B  Bridgman crystal growth U11-B02B  Briefcase X27-A02C  Broaching Control T06-D07A Control T06-D07A Broadcast distribution systems BML  Broadcast distribution (for cable TV see CATV)  Breathing mask P35-A03E1  Car W03-B01B Casing Casi	Breathalyser		audience research aspects	W03-B10R
Breathing mask P35-A03E1 car W03-B03 Breathing measurement S05-D01C1 casing W03-B05A channel storing W03-B01B1 channel storing, channel listing-based w03-B01B1C channel storing, location-based w03-B01B1C channel storing, location-based w03-B01B1C channel storing, RDS-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1C channel storing, receivable stations-based w03-B01B1C dhannel storing, receivable stations-based v03-B01B1C w03-B01B1C w03-B01B1			band scanning	
Breathing measurement  Bricks  Q44-A  Bridge rectifier, package for  W11-D01B3  Bridges  applications  constructional details  constructional materials  foundations  structural components  types of bridge e.g. suspension  Briefcase  Briefcase  Broaching  control  Broaching  Control  Broaching  Control  Broacking  Control  Broackage for  W11-D01B3  Channel storing, location-based  W03-B01B1C  Channel storing, receivable stations-based  Channel storing, user controlled channel switching arrangements component mounting  Construction  W03-B01B1C  W03-B01B1C  W03-B01B1C  W03-B01B1C  W03-B01B1C  W03-B01B1C  W03-B01B1C  W03-B01B1C  W03-B01B1C  Channel storing, location-based  W03-B01B1C  Channel storing, location-based  Channel storing, location-based  W03-B01B1C  W03-B0				
Bricks Q44-A Bridge rectifier, package for W11-D01B3 Bridges  applications constructional details constructural components types of bridge e.g. suspension Bridgman crystal growth Briefcase Broaching control Broaching Broachand ISDN Broadcast distribution systems BML Bricks Q44-A W03-B01B1 Channel storing, channel listing-based W03-B01B1C Channel storing, location-based W03-B01B1C Channel storing, RDS-based W03-B01B1C Channel storing, RDS-based W03-B01B1C W03-B01B1C Channel storing, receivable stations-based W03-B01B1A W03-B01B1A Channel storing, user controlled W03-B01B1A Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based Channel storing, receivable stations-based Channel storing, receivable stations-based W03-B01B1A Channel storing, receivable stations-based Channel storing, receivable stat	_			
Bridge rectifier, package for U11-D01B3  Bridges  applications Q41-A20 constructional details Q41-A05 foundations Structural components types of bridge e.g. suspension Q41-A01  Bridgman crystal growth U11-B02B  Broaching Control T06-D07A Eroadcast distribution systems  BML  Bridge rectifier, package for U11-D01B3  W03-B01B1C Channel storing, location-based W03-B01B1C Channel storing, RDS-based W03-B01B1C W03-B01B1C W03-B01B1C W03-B01B1C W03-B01B1A W03-B01B1G Channel storing, receivable stations-based w03-B01B1A Cohannel storing, receivable stations-based w03-B01B1A Cohannel storing, receivable stations-based w03-B01B1A Cohannel storing, RDS-based w03-B01B1C Channel storing, receivable stations-based w03-B01B1A Cohannel storing, receivable stations-based channel storing, receivable stations-based w03-B01B1A Cohannel storing, RDS-based w03-B01B1C Channel storing, RDS-based w03-B01B1C W03-B01B1A Channel storing, RDS-based w03-B01B1C Channel storing, RDS-based w03-B01B1C W03-B01B1C W03-B01B1C W03-B01B1C W03-B01B1C Channel storing, RDS-based w03-B01B1C Channel storing, RDS-based w03-B01B1C Channel storing, RDS-based w03-B01B1C W03-B01B1C W03-B01B1C W03-B01B1C Channel storing, RDS-based w03-B01B1C Channel storing, RDS-based w03-B01B1C W03-B01B1C W03-B01B1C W03-B01B1C Channel storing, RDS-based w03-B01B1C Channel storing, RDS-based wnos-Bost woda-Bot woda-	Breathing measurement	S05-D01C1		
Bridges applications constructional details constructional materials foundations structural components types of bridge e.g. suspension Briefcase Broaching control Broaching Control Broadband ISDN Broadcast distribution systems BML  Tol-J11C1 W03-B01B1C W03-B01B1A W03-B01B1A Channel storing, receivable stations-based Channel storing, user controlled Channel storing, user controlled Channel storing, user controlled W03-B01B1A W03-B01B1A W03-B01B1A W03-B01B1A W03-B01B1A Channel storing, receivable stations-based W03-B01B1A W03-B01B1A W03-B01B1A W03-B01B1A W03-B01B1A Channel storing, receivable stations-based W03-B01B1A W03-B01B1A W03-B01B1A W03-B01B1A Channel storing, RDS-based W03-B01B1A W3-B01B1A W3-B01B1 W3-B01B1A W3-B01B1 W3-B01B1A W3-B01B1 W3-B01B	Bricks	Q44-A	channel storing, channel listing-ba	sed
applications Q41-A20 constructional details Q41-A05 constructional materials Q41-A05G foundations Q41-A05B structural components types of bridge e.g. suspension Q41-A01  Briefcase X27-A02C  Broaching control T06-D07A X25-A03C1 X25-A03C1 X25-A03F  Broadband ISDN W01-C05B7E  Broadcast distribution systems BML T01-J11C1 W02-F05C W02-F07M1 cable distribution (for cable TV see CATV)  channel storing, RDS-based W03-B01B1C W03-B01B1C W03-B08 channel storing, receivable stations-based w03-B01B1A w03-B01B1G channel storing, receivable stations-based w03-B01B1G channel storing, user controlled channel switching arrangements component mounting w03-B05B construction W03-B01B1G channel storing, RDS-based W03-B04 w03-B06E channel storing, RDS-based W03-B04 w03-B06E channel storing, RDS-based W03-B08 channel storing, RDS-based W03-B08 channel storing, RDS-based w03-B04 w03-B08 channel storing, RDS-based w03-B08 channel storing, receivable stations-based channel storing, receivable stations-based w03-B08 channel storing, receivable stations-based channel storing, receivable stations-based channel storing, page w03-B08 channel storing, receivable stations-based w03-B08 channel storing, receivable stations-based channel storing, receivable stations-based w03-B08 channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B16 channel storing, receivable stations-based channel storing, receivable stations-based w03-B01B16 channel storing, receivable stations-based w03-B01B16 channel storing, receivable stations-based	Bridge rectifier, package for	U11-D01B3		
constructional details Q41-A05G constructional materials Q41-A05G foundations Q41-A05B structural components Q41-A05A types of bridge e.g. suspension Q41-A01  Bridgman crystal growth U11-B02B  Briefcase X27-A02C control W03-B01B  Broaching control T06-D07A control X25-A03C1 X25-A03F  Broadband ISDN W01-C05B7E  Broadcast distribution systems BML T01-J11C1 W02-F05C W02-F07M1 cable distribution (for cable TV see CATV)  W03-B08  channel storing, user controlled W03-B01B1G channel storing, user controlled W03-B01B3 component mounting w03-B01B3 component mounting W03-B05B construction W03-B05 Channel storing, user controlled W03-B01B3 component mounting W03-B01B3 component mounting W03-B05B Channel storing, user controlled W03-B01B3 component mounting W03-B01B3 construction W03-B05 Channel storing, user controlled W03-B01B3 component mounting W03-B01B3 construction W03-B05B Channel storing, user controlled W03-B01B3 component mounting W03-B01B3 component mounting W03-B05B Control W03-B05B Control W03-B05B Control W03-B05B Control W03-B05B Control W03-B05B Control W03-B06B decoder, stereophonic digital architecture receiver W03-B06B demodulator W03-B02C1 digital architecture receiver W03-B06B digital rights management (DRM) W03-B06B	Bridges			
constructional details constructional materials foundations Structural components types of bridge e.g. suspension  Bridgman crystal growth  Briefcase  X27-A02C  Broaching control  T06-D07A X25-A03C1 X25-A03F  Broadband ISDN  Broadcast distribution systems  BML  T01-J11C1 W02-F05C W02-F07M1 Cable distribution (for cable TV see CATV)  channel storing, receivable stations-based W03-B01B1 Channel storing, user controlled Channel switching arrangements Component mounting Construction W03-B01B3 Construction W03-B01B3 Construction W03-B05B Construction W03-B05 W03-B05 W03-B05 Control  W03-B06 W03-B06 W03-B06 W03-B06 Gecoder, stereophonic demodulator digital architecture receiver digital broadcast receiver W03-B06 W03-B01C display W03-B01C W03-B01B1 W03-B01B3 W03-	applications		channel storing, RDS-based	
foundations Q41-A05B structural components Q41-A05A types of bridge e.g. suspension Q41-A01 channel storing, user controlled channel switching arrangements component mounting W03-B01B3 w03-B05B construction W03-B05B construction W03-B05B construction W03-B05B construction W03-B05B control W03-B05B construction W03-B05B control W03-B05B construction W03-B05B control W03-B05B construction W03-B05B construction W03-B05B control W03-B05B control W03-B05B construction W03-B05B control decoder, RDS W03-B05B control W03-B05B control W03-B05B control decoder, stereophonic decoder, stereophonic demodulator digital architecture receiver W03-B07B control digital proadcast receiver W03-B07B control digital rights management (DRM) W03-B05B control W03-B05B			channel storing receivable station	
structural components types of bridge e.g. suspension  Bridgman crystal growth  Briefcase  X27-A02C  Broaching control  T06-D07A X25-A03C1 X25-A03C1 X25-A03F  Broadband ISDN  Broadcast distribution systems  BML  T01-J11C1 W02-F05C W02-F07M1 Cable distribution (for cable TV see CATV)  channel storing, user controlled channel switching arrangements component mounting W03-B01B3 W03-B05B Control  DAB receiver W03-B05 W03-B06 W03-B02C1 decoder, stereophonic decoder, stereophonic digital architecture receiver W03-B02C1 digital rights management (DRM) W03-B04B W03-B01B3 W03-B01B3 W03-B01B3 W03-B01B3 W03-B05B W03-B05B W03-B05B W03-B05B W03-B06B W03-B06B W03-B01B3 W03-B05B W03-B05B W03-B05B W03-B05B W03-B06B W03-B06B W03-B01B3 W03-B05B W03-B05B W03-B05B W			g, comments	
types of bridge e.g. suspension Bridgman crystal growth U11-B02B Construction W03-B05B Control W03-B05B Control W03-B05 W03-B05 W03-B05B Construction W03-B05 W03-B05 W03-B05 W03-B05 W03-B05 W03-B05 W03-B06			channel storing, user controlled	
Bridgman crystal growth         U11-B02B         component mounting construction         W03-B05B construction           Briefcase         X27-A02C         control         W03-B10C           Broaching control         X25-A03C1 T06-D07A X25-A03C1 X25-A03C1 X25-A03F         DAB receiver decoder, RDS         W03-B02C5 W03-B02C5 W03-B02C5 W03-B02C5 W03-B02C3 demodulator w03-B02C3 demodulator digital architecture receiver w03-B07 digital broadcast receiver w03-B07 digital broadcast receiver w03-B07 digital broadcast receiver w03-B06 digital rights management (DRM) w03-B06J w02-F05C direct conversion w03-B01A6 w02-F07M1 display         W03-B01C w03-B01C w03-B01C display w03-B01C displaying text-based information w03-B08C1A	•			
Briefcase         X27-A02C         control         W03-B10C           Broaching control         X25-A03C1 T06-D07A X25-A03C1 X25-A03C1 X25-A03F         DAB receiver decoder, RDS         W03-B06E W03-B02C5 W03-B08           Broadband ISDN         W01-C05B7E         decoder, stereophonic demodulator W03-B02C3 demodulator W03-B02C1 digital architecture receiver W03-B07 digital broadcast receiver W03-B07 digital broadcast receiver W03-B06 digital rights management (DRM) W03-B06 direct conversion W03-B06J direct conversion W03-B01A6 W02-F07M1 display w03-B01C display w03-B01C display w03-B01C displaying text-based information W03-B08C1A		U11-B02B		
Broaching         X25-A03C1         DAB receiver         W03-B06E           control         T06-D07A         decoder, RDS         W03-B02C5           X25-A03C1         W03-B08         W03-B08           X25-A03F         decoder, stereophonic         W03-B02C3           demodulator         W03-B02C1           digital architecture receiver         W03-B07           digital broadcast receiver         W03-B06           digital rights management (DRM)         W03-B06J           direct conversion         W03-B01A6           W02-F07M1         display         W03-B01C           displaying text-based information         W03-B08C1A				
Control   T06-D07A   X25-A03C1   X25-A03C1   X25-A03F   decoder, RDS   W03-B02C5   W03-B08   W03-B02C3				
X25-A03C1 X25-A03F  Broadband ISDN  W01-C05B7E  Broadcast distribution systems BML  T01-J11C1 W02-F05C W02-F07M1 Cable distribution (for cable TV see CATV)  W03-B08  W03-B08  decoder, stereophonic demodulator digital architecture receiver digital broadcast receiver W03-B06 digital rights management (DRM) W03-B06 digital rights management (DRM) W03-B06J W03-B01A6 W	3			
Roadband ISDN  W01-C05B7E  Broadcast distribution systems BML  T01-J11C1 W02-F05C W02-F07M1 Cable distribution (for cable TV see CATV)  M03-B02C1  demodulator W03-B02C1 digital architecture receiver digital broadcast receiver W03-B06 digital rights management (DRM) W03-B06J direct conversion W03-B06J W03-B01A6 W03-B01C display W03-B01C displaying text-based information W03-B08C1A	Control			W03-B08
Broadband ISDN  W01-C05B7E  digital architecture receiver W03-B07  digital broadcast receiver W03-B06 W02-F05C W02-F07M1 cable distribution (for cable TV see CATV)  digital architecture receiver W03-B07 digital architecture receiver W03-B06 W03-B06J digital architecture receiver W03-B06 W03-B06J digital architecture receiver W03-B06 W03-B06J digital architecture receiver W03-B06 digital architecture receiver W03-B07 digital architecture receiver W03-B07 digital architecture receiver W03-B06 digital architecture receiver W03-B06 digital architecture receiver W03-B06 digital broadcast receiver W03-B06 digital proadcast receiver W03-B06 digital rights management (DRM) W03-B06J digital rights management (DRM) W03-B01A6 digital rights management (DRM)				
Broadcast distribution systems  BML T01-J11C1 W02-F05C W02-F07M1 cable distribution (for cable TV see CATV)  digital broadcast receiver digital broadcast receiver W03-B07 digital rights management (DRM) W03-B06J direct conversion W03-B01A6 display W03-B01C displaying text-based information W03-B08C1A	Broadband ISDN	W01-C05B7E		
BML T01-J11C1 digital rights management (DRM) W03-B06J W02-F05C direct conversion W03-B01A6 W02-F07M1 display W03-B01C cable distribution (for cable TV see CATV) displaying text-based information W03-B08C1A	Broadcast distribution systems			
W02-F05C W02-F07M1 direct conversion W03-B01A6 W02-F07M1 display W03-B01C cable distribution (for cable TV see CATV) displaying text-based information W03-B08C1A		T01-J11C1		
W02-F07M1 display W03-B01C cable distribution (for cable TV see CATV) displaying text-based information W03-B08C1A				
cable distribution (for cable TV see CATV)  displaying text-based information W03-B08C1A				
W02-D01 displaying graphics and images W03-B08C1C	cable distribution (for cable TV see		displaying text-based information	W03-B08C1A
		W02-D01	displaying graphics and images	W03-B08C1C

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diversity circuits	W02-C03A W03-B01A9	motor, medium & high power	V04-L01B X11-J03
DSP applications	W03-B01A9 W03-B07A	repair, low power motor	V04-P02
dual tuner	W03-B07A W03-B01D	repair, low power motor	V04-1 02 V06-M11M
emergency broadcast reception	W03-B08C7	repair, medium & high power mo	
EPG	W03-B08C5	Topan, mearam a mgm perior mi	X11-J08M
FM demodulator	U23-L	Brushless AC/DC machine	
	W03-B02C1	speed regulation	X13-H01E
frequency control system	W03-B01B5	permanent magnet	V06-M03A
homodyne	W03-B01A6	permanent magnet	X11-H01A
housings	W03-B05A	permanent magnet, speed regul	
IF amplifier	W03-B02B5	sensorless	V06-M03C
IF filter	W03-B02B1		X11-H01C
input filter	W03-B01A1	sensorless, speed regulation	X13-H01E3
integrated with telephone	W01-C01P6E	switched reluctance	V06-M03B
interfacing	W03-B10E		X11-H01B
internal construction	W03-B05B	switched reluctance, speed regu	lation
internet broadcast receiver	W03-B06C		X13-H01E2
local oscillator low IF receiver	W03-B01A7 W03-B01A6C	BS - see DBS	
mixer	W03-B01A6C W03-B01A5	Bubble memory	
mixer, image rejection	W03-B01A5 W03-B01A5A	magnetic	U14-A01A1
mounting kit	W03-B01A3A W03-B05A	thin magnetic film	V02-B02
multiple tuner	W03-B01D	Buchholz relay	X13-C02
'now playing' display	W03-B08C5	transformer protection	X12-C02B
PCB	W03-B05B	transformer protection	X12-C02B X13-C04B
RDS	W03-B08	Bucket	Q32-A05
RDS decoder	W03-B02C5		
RF amplifier	W03-B01A3	Bucket brigade device	U13-A02A
satellite radio broadcast receiver	W03-B06A	Buffers for digital computer interfa	ice
self-testing	W03-B10A1		T01-C07C2
spoken bulletin reproduction	W03-B08C3	Building, construction (electrical a	spects)
stereophonic decoder	W03-B02C3		X25-U
storage, memory aspects storage, message or bulletin	W03-B08A7 W03-B08A1	door	X25-U01
storage, programme content	W03-B08A5	window	X25-U01
synchrodyne	W03-B01A6	Buildings, general mechanical con	struction and
synthesiser tuning	W03-B01B	structural elements	Q43-A
testing	W03-B10A	access	Q46-A03
transport information reception	W03-B08C4	bearings	Q43-A08
tuned circuits	W03-B01A1	blinds	Q48-L
tuner circuitry	W03-B01A	ceilings 	Q43-A03
tuner construction	W03-B01A8	connections	Q43-A08
weather information reception	W03-B08C4	construction aids demolition	Q46-A
zero IF receiver	W03-B01A6A	doors	Q46-A05A Q43-A05
Bronze - see Metallurgy		drainage	Q45-B
Browser	T01-N03A1	fittings e.g. for doors and window	
chat windows	T01-N03A1C	floors	Q43-A04
media player	T01-N03A1B		Q45-F
Brushes	P24-E	frames e.g. door, window	Q48-B
manufacture details	P24-M	girders	Q44-A01CA
Brush, current collection		insulation	Q43-A99
helical scan head signal coupling	T03-A05D3G	manufacture	Q43-M
manufacture, low power motor	V04-P02		Q44-M
, , , , , , , , , , , , , , , , , , ,	V06-M11A		Q45-M
manufacture, medium & high		material handling	Q46-A05 Q43-A01
power motor	V04-P02	partitions pillars	Q43-A01 Q44-A01B
	X11-J08A	pillars protection e.g. against fire, theft	Q48-P05
motor, low power	V04-L01B	protection e.g. against fire, their protection (other e.g. against da	
	V06-M12	protection (other e.g. against dai	Q43-F
		reinforcement components	Q44-A01G
	!	i i i i i i i i i i i i i i i i i i i	

relocation / moving	Q46-A05B	Bus bar	
repair	Q46-A05	conductor	X12-D02C1A
roof	Q43-A02		X12-G03
roof coverings	Q45-A	high power	X12-D02C1A
safety and protective arrangeme		installation	X12-G03
ee	Q46-A04	low power	V04-H01
scaffolds	Q46-A01	manufacture	X12-D07E1A
service and access	Q43-A07	protection	X13-C04X
shutters	Q48-L	switchgear	X13-E04A
stairs support structures, other	Q45-E Q44-A01X	Bus configuration, data networks	W01-A06B1
tools, used for building	Q45-D	Bus, computing	
trusses	Q44-A01C	common bus access request hand	•
ventilation	Q48-J		T01-H05B3
walls	Q43-A01	control	T01-H07A2
windows	Q43-A06	I/O bus access request handling	T01-H05B2
Buildings, uses ; special structures	Q46-B	memory bus access request hand	_
Built-in self test for integrated circ		structure (type)	T01-H07A T01-H07A1
Built-in self test for integrated circ		structure (type) transfer protocol	T01-H07B
	U11-F01D2		
	U13-C07	Business equipment - see Personal	
Built-up welding, arc	X24-B01		X27-A02C
Bumps, semiconductor device -		Business models	T01-J05A2A
see Contact bumps		advertising	T01-J05A2C
Bundled conductor	X12-D02X		T01-N01A2C
Bureau accessories	P77-D	agriculture	T01-J05A4
Buoy		auctions	T01-N01A2A
general	Q24-P18	copyright management	T01-J05A2G
lifebuoy	Q24-X01A	e-procurement	T01-N01A2G T01-N01A2B
electrical aspects	W06-C07C	financial brokerage	T01-N01A2F
Burglar alarms	W05-B01	fishing	T01-J05A4
CCTV surveillance	W05-B01C5	forestry	T01-J05A4
detection system using tags	W05-B01A2	government	T01-J05A3
electric/magnetic field disturban		_	T01-N01A3
G	W05-B01A	insurance	T01-J05A2E
false alarm prevention	W05-B01		T01-N01A2J
	W05-C02C5	Intellectual Property	T01-J05A2G
ferromagnetic tag	W05-B01A2A		T01-N01A2G
image scanning/comparing	W05-B01C5A	inventory monitoring / managem	T01-J05A2D
inductive tag	W05-B01A2B	marketing	T01-J05A2D
intrusion detection system mechanical actuation of	W05-B01A1 W05-B01B	marketing	T01-N01A2C
microwave tag	W05-B01B	mining	T01-J05A4
motion detection video actuation		online shop	T01-N01A2A
optical actuation	W05-B01C2	personnel management	T01-J05A2H
passive acoustic intrusion detecti			T01-N01A2H
•	W05-B01E	resources analysis	T01-J05A2C
ultrasonic actuation	W05-B01C1	stock and shares	T01-J05A2F
vehicle	X22-D03A	transportation industry	T01-J05A2N
Burn in		value chain service provider	T01-N01A2E
probes/contacts for IC testing	S01-H03	workflow	T01-J05A2B
	U11-F01C1	Buzzers	W05-A02
	U11-F01G	piezoelectric, communication	V06-V01B
test for integrated circuits	S01-G02B5	wise-selectric research	V06-V04C
	U11-F01C3	piezoelectric, general	V06-V01B
	U11-F01G	BWR	X14-A02
Burnishing	X25-A03C3		
control	T06-D07A		
	X25-A03C3		
Burying solid waste	P43-E03		
		1	

C			crimping ferrule	X12-G02A
<u> </u>	binet		crimping terminal	X12-G02A
Ca		M03 C01 A F	crimping, high power	X12-G01E
	audio/video equipment (general) broadcast radio receiver	W03-B05A	crimping, low power	V04-P01A
	communications receiver	W02-G03H	cutting	X12-G01E
	computer peripheral	T04-L01	defect indication	X12-D03B2
	non-electrical details	P25-C	drum	X12-D07X
	types of cabinets	P25-C01		X12-G09
	bedroom and dining room cabi		duct	X12-G04A1
	bearoom and dining room cabii	P25-A01B	duct, ground	X12-G04A1
	bookshelves and office cabinets		duct, rigid	X12-G04A1A
	kitchen and bathroom cabinets		duct, flexible	X12-G04A1C
	manufacture	P25-M	duct, fittings	X12-G04A1E
	mechanical details of cabinets	P25-C02	earthing	X12-G01F
	drawers and doors	P25-C02C	end connection	X12-G02B
	feet and casing	P25-C02A	extensible	X12-D03A2
	handles	P25-C02A	fault location	S01-G05
	shelves	P25-C02B	Constant	X12-G01C
	wheels	P25-C02A	fire-retardant	X12-D03C
	recording equipment (general)	T03-L05A	fitting	X12-G02X
	TV receiver	W03-A09A1	flat	X12-D03A1
	video tape recorder	W04-B10D	flat, connector	V04-B02
	video tape recorder	W04-L05A	flacciala	V04-M04
_		W04 200A	flexible	X12-D03A2
Ca	ble	V12 D02D1	floating-type	X12-D03K
	armour	X12-D03B1	for computer equipment gas pressure maintenance	T01-L03 X12-G02X
	armouring removal	X12-G01B	harness	X12-D03M
	audio-video	W03-G07A	harness manufacture	V04-V02
	leve alle le cesti e u	X12-D05B	namess manufacture	X12-D07D
	break location	X12-G01C X12-G10	heat conduction	X12-D07D X12-D03C
	cable dispensing reel	X12-G10 X12-G04A2	heat dissipation	X12-D03C
	clamp coaxial	X12-D05M	heat protection	X12-D03C1
	color coding	X12-D03W X12-D03C2	heat shielding	X12-D03C1
	communication	X12-D05C2 X12-D05A	heat-shrinkable cover for junction	
	composite, optical fibre and electr		hf	X12-002C1
	composite, optical libre and electi	V07-F01B4	high speed data	X12-D055
		X12-D08	installation, aircraft	W06-B01C1
	composite, power and signal	X12-D00 X12-D09	motanation, and are	X12-G04A
	conduit	X12-G04A1	installation, building	X12-G04A
	conduit, ground	X12-G04A1	installation, bushing	X12-E03A
	conduit, rigid	X12-G04A1A	motanation, basining	X12-G04A3
	conduit, flexible	X12-G04A1C	installation, ceiling	X12-G04A
	conduit, fittings	X12-G04A1E	installation, clamp	X12-G04A2
	conductor	X12-D02C	installation, floor	X12-G04A
	conductor, non-insulated	X12-D02C	installation, grommet	X12-E03C3
	conductor, non-insulated	X12-D02C1	, g	X12-G04A3
	high power		installation, ground	X12-G04
	low power	X12-D02C2	installation, relatively movable par	
	conductor manufacture	X12-D07E	, ,	X12-G08
	conductor manufacture, high power		installation, ship	W06-C01C1
		X12-D07E1	, ,	X12-G04A
	conductor manufacture, low powe		installation, vehicle	X22-X01B
		X12-D07E2	installation, wall	X12-G04A
	conductor, stranded	X12-D03R	installing, building	X12-G01A7
	connector, electrical	V04	installing, digging trenches	X12-G01A7A
	,	X12	installing, duct	X12-G01A7D
	connector, earthing/grounding	X12-G02D	installing, ground	X12-G01A7D
	construction	X12-D03	installing, submarine	X12-G01A7G
	contact-type	X12-D03J	installing, underwater	X12-G01A7G
	control	X12-D05C	installing, vehicle	X12-G01A7E
	cooling	X12-D03C1A	instrumentation	X12-D05C
	<del>-</del>	X12-G02X		S01-J05
		·		

		1	
insulating	X12-D07B	safety arrangement	X12-G01F
insulating by extrusion	X12-D07B1	salvaging	X12-D07X
insulating by liquid bath	X12-D07B1	screen	X12-D03E
insulating by spraying	X12-D07B1		X12-D03J
3 , 1 , 3		sensor-type	
insulating by winding on tape	X12-D07B9	sheath	X12-D03B1
insulation	X12-D03D	shield	X12-D03E
insulation removal, high power	X12-G01B	shielded twisted pair	X12-D05N
insulation removal, low power	V04-P03	splice	X12-G02C
insulation, disposition	X12-D03D	splice, protective cover	X12-G02C
insulation, material	X12-D03D		X12-D07X
insulation, material		spool	
	X12-E01	STP	X12-D05N
	X12-E02	submarine-type	X12-D03K
jacket	X12-D03B1	superconducting	X12-D06A
joining	X12-G01E	superconducting material	X12-D06B
joining, high power superconduct		superconducting metal alloy	X12-D06B1
joining, high power superconduct	•		
	X12-G01E1	superconducting, manufacture	X12-D06A1
joining, low power superconducting		superconducting, metal alloy	
	V04-P10	manufacture	X12-D06B1A
joint	X12-G02C	superconducting, oxide manufactu	ure
joint, protective cover	X12-G02C	3, 1 1 1 1 1 1	X12-D06B2A
•	X12-G02C	superconducting, oxide material	X12-D06B2
junction			
junction, protective cover	X12-G02C	superconductor cable connector/f	
ladder	X12-G04A1		X12-G02G
ladder, rigid	X12-G04A1A	telephone	X12-D05A
ladder, flexible	X12-G04A1C	telephone, fittings	W01-D02
ladder, fittings	X12-G04A1E	telephone, installations	W01-D03
LF	X12-D05K	telephone, installing	W01-D01
lightning protection arrangement		terminal	X12-G02B
location	S03-C02	terminating	X12-G01E
	X12-G01C	terminating, high power supercon	ducting
losses reduction in armour	X12-D03B3	3. 3 1	X12-G01E1
losses reduction in conductor	X12-D03B3	terminating, low power supercond	
		terminating, low power supercond	_
losses reduction in sheath	X12-D03B3		V04-P10
loudspeaker	X12-D05B	termination	X12-G02B
low power	X12-D05	testing (with fault location)	S01-G05
lubricating layers	X12-D03G	testing (without fault location)	S01-G12F
maintenance/repair	X12-G01D	,	X12-G01C
manufacture - see Cable manufac		testing, general (e.g. short circuit)	
manufacture - see Capie manufac		testing, general (e.g. short circuit)	
	X12-D07		X12-G01C
marking	X12-D03C2		X12-G07F
marking machine	X12-D07X	theft prevention	X12-D03C2
marking, circuit identification	X12-G01A7J	ties	X12-G04A2
oil pressure maintenance	X12-G02X	ties, electronic equipment	V04-T01A
optical - see <b>Optical cable</b>	V07-F01B4	trays	X12-G04A1
			X12-G04A1E
overhead, installing equipment/		trays, fittings	
	X12-G01A1	twisted pair	X12-D05N
power	X12-D04	uninstalling	X12-G01A
presence warning label	X12-G09	unshielded twisted pair (UTP)	X12-D05N
protection	X12-D03B1	vibration damper	X12-G02F
p. o.coca.o	X12-D03H	violation dampor	X12-G05
and a site of the sector between		and a disconfiguration of a management	
protection, chemical attack	X12-D03H	winding for transformer	X12-C01B2A
protection, corrosion	X12-D03H		X12-C01E
protection, force	X12-D03B1	Cable manufacture	X12-D07
protection, mechanical	X12-D03B1	armouring	X12-D07A
protection, pressure	X12-D03B1	<u> </u>	
protection, termite	X12-D03H	conductor	X12-D07E
		conductor stranding-up	X12-D07C
protection, water ingress	X12-D03H	harness	V04-V02
reel	X12-D07X		X12-D07D
	X12-G09	high power conductor	X12-D07E1
ribbon	X12-D03A1	impervious material coating	X12-D07A
ribbon, connector	V04-B02		
	V04-M04	insulating	X12-D07B
rigid tube tupe		insulating by extrusion	X12-D07B1
rigid tube-type	X12-D03L		

insulating by liquid bath	X12-D07B1	antenna systems	W02-B08A5
insulating by spraying	X12-D07B1	antenna set-up based on	
insulating by winding on tape	X12-D07B9	geographical position	W02-B08A5C
low power conductor	X12-D07E2		S02-B
low power conductor, fibres	X12-D07E2C		W06-A03
low power conductor, nanofibre	X12-D07E2A	antenna set-up based on	
low power conductor, nanowire	X12-D07E2A	optimum reception	W02-B08A5A
marking	X12-D07X	calorimeters	S03-B02
salvaging	X12-D07X	cameras, video/television	W04-M01D2J
screening	X12-D07A	dimension, angle, area, etc. measu	
sheathing	X12-D07A	amension, angle, area, etc. meast	S02-A07
superconducting	X12-D06A1	electrical instruments	S01-H01
		engineering instruments	S02-K07
Cable television systems - see CATV	/ W02-F03A	flowmeters	S02-R07
Cable tie		general	S01-J02
electric cable installations	X12-G01A	5	
electric cable ilistaliations		geophysics devices	S03-C10
	X12-G04A2	level indicating	S02-C07
electronic equipment wiring	V04-T01A	nuclear radiation measurement	S03-G05
packaging	Q32-T01B	optical instruments	S03-A05C
		optical test equipment, materials	
Cache memories	T01-H03A	investigation	S03-E04P
Caching, Network	T01-N01D4	pressure measurement	S02-F04F
<del>-</del>		radar systems	W06-A04E3A
CAD (Computer-aided design)	T01-J15	scientific instruments	S03-H03C
CPU design	T01-J15A1	special purpose measurement of f	orce S02-F03X
design verification	T01-J15B	speed/acceleration measurement	S02-G07A
digital data networks	W01-A06D	surveying/navigation equipment	S02-B10
digital filters and DSP	U22-G03A5	television cameras	W04-M01D2J
electrical circuit/hardware design		thermometers	S03-B01H3
electrical network design	T01-J15A4	transducers	S02-K07
integrated circuit design	T01-J15A2	video cameras	W04-M01D2J
	U11-G	volume and mass flow	
logic circuit design	T01-J15A1	measurement	S02-C07
	U21-C03D	weighing apparatus	S02-D07
non-electronic applications	T01-J15X	0 0	
of electrical systems using simulat	ion	Calipers, measuring	S02-A01B
, ,	T01-J15A3	Call screening in subscriber telepho	nes
PCB design	T01-J15A2		W01-C01F5
5 5 5 5	V04-R11		
simulation of non-electronic system	-	Call system, for nursing staff	S05-G02D
simulation of from electronic system	T01-J15H	Caller identification (telephone)	
simulation of radio networks	T01-J15A4	caller ID transmission	W01-C02B3C
Simulation of radio networks	W02-C03E5	caller ID withholding	W01-C02B3E
wiring layout	T01-J15A2	exchange/general	W01-B03C
• •		subscriber set display	W01-C01F3
Cadmium mercury telluride - see Al	I-BVI	' '	
compounds		Calorimeters	S03-B02
Cadmium selenide - see All-BVI con	npounds	Calorimetry	S03-B02
	•		S03-E01C
Cadmium sulphide - see All-BVI con	=	CAM (Computer-aided manufacturi	na) T01-I07B
Cadmium telluride - see All-BVI con	npounds	CAM (Compater alaca manaractam	T06-A07A
CAE	T06-A07A		100-A07A
	T06-A07A	Camcorder	
CAI	106-A07A	hard disk recording	W04-B14C3
CAN (controller area network)	W01-A06B5A		W04-M01K
	W05-D06F	optical disk recording	W04-C10A3
vehicle CAN bus	X22-K03		W04-M01K
electric vehicle CAN bus	X21-K	solid-state recording	W04-M01K
Calibration			W04-P01C8
		Camera	
A-D converters - see Analogue-di	gitai		W04-M01B1
converter, testing and calibra	_	digital	
_	U21-A03F1	digital, integrated with telephone	W01-C01P6C
amplifiers	_	9	

photographic - see <b>Camera</b> ,		Capacitive recording	T03-C01
photographic	S06-B	capaciare recording	W04-D
video - see <b>Video camera</b>	W04-M01	head	T03-C01
Camera, photographic	S06-B	head positioning	T03-C01
aperture and exposure calculation		1 3	T03-G
display	S06-B01C	record carrier	T03-C01
electronic flash	S06-B03A	record carrier positioning	T03-C01
electronic flash control	S06-B03A		T03-F
creed only hash control	X26-C01A	Capacitive voltage transformer (CV	T)
exposure control	S06-B02	eapadance romage manoremen (ex	S01-D01D3
eye gaze direction monitor to			X12-B
denote subject	S06-B01E		
film loading detection	S06-B08B	Capacitor	V01-B
film winding	S06-B08A	capacitive transducers - see	600 1600 446
flash	S06-B03	Variable capacitor	S02-K03A1C
	X26-C01A		V01-B02A5C V01-B02B3
lens positioning	S06-B01B1	casing	V01-B02B3 V01-B03D3
lighting (digital camera), applicat		casing ceramic dielectric	V01-B03D3
lighting (film-based camera), app		characterised by structure/type	V01-B03A
	X26-U11B	chip	V01-B03C5
motorised control for instant-pict		composite capacitor (RC, LC, etc.)	
1. 1	S06-B08	disk	V01-B03C3
pre-light emission	S06-B03A1	double-layer - see Electrolytic cap	
remote control timer actuation	S06-B02C1 S06-B02C5	,	V01-B01D
viewfinder display	S06-B01C		X16-L02
· ·		electret - see Variable capacitor,	
Camping equipment	P24-D	non-mechanical	V01-B02B5
Can (packaging container)	Q32-A05	electrochemical, double layer	V01-B01D5
Canals - see Hydraulic engineering		electrodes	V01-B03D1
Can crusher		electrodes, film	V01-B03D1A
Can crusher			
domestic	X27-X	electrolytic - see <b>Electrolytic capa</b>	
	X27-X T05-H02E	•	V01-B01
domestic		encapsulation	V01-B01 V01-B03D3
domestic reverse vending  Can opener	T05-H02E	•	V01-B01 V01-B03D3
domestic reverse vending  Can opener  Cancelling sound by destructive	T05-H02E X27-B04	encapsulation	V01-B01 V01-B03D3 r V01-B03C5
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic)	T05-H02E X27-B04 <b>W04-V07</b>	encapsulation external electrodes, chip capacito	V01-B01 V01-B03D3 r V01-B03C5 V01-B03D5
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic)  Capacitance element - see Capac	T05-H02E X27-B04 <b>W04-V07</b> itor	encapsulation external electrodes, chip capacito	V01-B01 V01-B03D3 r V01-B03C5 V01-B03D5 V01-B03C7 U12-C02F only)
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring	T05-H02E X27-B04 <b>W04-V07</b> itor S01-D05A3	encapsulation external electrodes, chip capacito feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type o	V01-B01 V01-B03D3 r V01-B03C5 V01-B03D5 V01-B03C7 U12-C02F only) V01-B03C5A
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation	T05-H02E X27-B04 <b>W04-V07</b> itor S01-D05A3 S03-E02C	encapsulation external electrodes, chip capacito feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 V11-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring	T05-H02E X27-B04 <b>W04-V07</b> itor S01-D05A3	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of film electrodes fixed	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 V11-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation	T05-H02E X27-B04 <b>W04-V07</b> itor S01-D05A3 S03-E02C S01-D05A3	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of film electrodes fixed flat plate	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of film electrodes fixed flat plate foil electrodes	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03D1C
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of film electrodes fixed flat plate foil electrodes folded	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03D1C V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of film electrodes fixed flat plate foil electrodes folded fuse protection	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03D1C V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of film electrodes fixed flat plate foil electrodes folded fuse protection housings	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03D1C V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier Capacitance spectroscopy Capacitive	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier Capacitance spectroscopy Capacitive conversion of sensor output	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03D1C V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier Capacitance spectroscopy Capacitive	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03C3 V01-B03D5 ufacture
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch transducers involving mechanical	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man  marking markings, component value	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03D3 V01-B03D1C V01-B03D1C V01-B03C3 V01-B03D3 V01-B03D3 V01-B03D3 V01-B03D3 V01-B03D3 V01-B03D3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1 S02-K03A1C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man	V01-B01 V01-B03D3 r V01-B03D5 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03D1C V01-B03D1C V01-B03D3 V01-B03D3 V01-B03D3 V01-B03D5 ufacture V01-B04 V01-B04C5 V01-B03D3
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch transducers involving mechanical	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man  marking markings, component value MIS - see Semiconductor capacito	V01-B01 V01-B03D3 r V01-B03D5 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03C3 V01-B03D1C V01-B03C3 V01-B03D5 u1-B03D5 u1-B03D5 u1-B03D5 u1-B03D5 u1-B04 V01-B04 V01-B04C5 V01-B03D3 r U12-C02A
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier Capacitance spectroscopy Capacitive conversion of sensor output touch screen  touch switch transducers involving mechanical variation	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1 S02-K03A1C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man  marking markings, component value	V01-B01 V01-B03D3 r V01-B03C5 V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03D1C V01-B03C3 V01-B03D3 V01-B03D3 V01-B03D5 ufacture V01-B04 V01-B04 V01-B04C5 V01-B03D3 r U12-C02A
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch transducers involving mechanical variation  transducers without mechanical	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1 S02-K03A1C V01-B02A5C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man  marking markings, component value MIS - see Semiconductor capacito	V01-B01 V01-B03D3 r V01-B03D5 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03D1C V01-B03C3 V01-B03D1C V01-B03D3 V01-B03D5 ufacture V01-B04 V01-B04 V01-B04C5 V01-B03D3 r U12-C02A
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch transducers involving mechanical variation  transducers without mechanical variation	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1 S02-K03A1C V01-B02A5C S02-K03A1C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man  marking markings, component value MIS - see Semiconductor capacito  MOS - see Semiconductor capacit	V01-B01 V01-B03D3 r V01-B03D5 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03D1C V01-B03C3 V01-B03D1C V01-B03D3 V01-B03D5 ufacture V01-B04 V01-B04 V01-B04C5 V01-B03D3 r U12-C02A v01-B03D7
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch transducers involving mechanical variation  transducers without mechanical variation  Capacitive coupling for control	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1 S02-K03A1C V01-B02A5C S02-K03A1C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man  marking markings, component value MIS - see Semiconductor capacito  MOS - see Semiconductor capacit mounting kit multilayer	V01-B01 V01-B03D3 r V01-B03D5 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03C3 V01-B03D1C V01-B03C3 V01-B03D5 v01-B03D5 v01-B03D3 v01-B03D5 ufacture V01-B04 V01-B04 V01-B04C5 V01-B03D3 r U12-C02A v01-B03D7 v01-B03D7 v01-B03D7
domestic reverse vending  Can opener  Cancelling sound by destructive interference (electronic) Capacitance element - see Capac  Capacitance measuring for materials investigation in capacitor manufacture  Capacitance multiplier  Capacitance spectroscopy  Capacitive conversion of sensor output touch screen  touch switch transducers involving mechanical variation  transducers without mechanical variation	T05-H02E X27-B04 W04-V07 itor S01-D05A3 S03-E02C S01-D05A3 S01-G12C V01-B01G7C V01-B04C1 U25-C S03-E02C5 S02-K03A1C T04-F02A2 U21-B02C1 U21-B02C1 S02-K03A1C V01-B02A5C S02-K03A1C V01-B02A5C	encapsulation external electrodes, chip capacito  feedthrough ferroelectric, integrated circuit film capacitor (discrete chip type of  film electrodes fixed flat plate foil electrodes folded fuse protection housings inorganic dielectric inorganic dielectric composition lead arrangements manufacture - see Capacitor man  marking markings, component value MIS - see Semiconductor capacito  MOS - see Semiconductor capacit	V01-B01 V01-B03D3 r V01-B03D5 r V01-B03C5 V01-B03C7 U12-C02F only) V01-B03C5A V01-B03D1A V01-B03 V01-B03D1C V01-B03C3 V01-B03D1C V01-B03D3 V01-B03D5 ufacture V01-B04 V01-B04 V01-B04C5 V01-B03D3 r U12-C02A v01-B03D7

p-n junction - see <b>Semiconductor</b>		shipping	V01-B04E
capacitors	U12-C02B	tape carriers	V01-B04E
power	X12-B	testing	S01-G12C
preset - see Variable capacitor,		3	V01-B04C1
mechanical	V01-B02A5B	treatment of dielectric	V01-B04B1
protection by disconnection	V01-B03E5	trimming value	V01-B04C3
pseudo-capacitor	V01-B01D	winding	V01-B04B5
seal	V01-B03D3	wound capacitor	V01-B04A1
self-healing dielectric type	V01-B03E1	multistep mfg processes	V01-B04B8A
semiconductor - see	70. 2002.	Capacitor, fixed - see Capacitor	
Semiconductor capacitor	U12-C02	•	V01-B03
stacked	V01-B03C3A	Capacitor, variable - see Variable ca	apacitor
super-capacitor	V01-B01D5		V01-B02
terminals	V01-B03D5	Capstan for tape recorder	T03-E07
testing - see Capacitor manufactor			
tooming ood <b>capacitos manacitos</b>	V01-B04C1	Capacitor, variable - see Variable ca	apacitor
transducer - see Variable capacite		Car - see Vehicle	
	S02-K03A1C	Car crusher	P41-A01
	V01-B02A5C		P41-U03
	V01-B02B3		P41-U20
trimmer - see Variable capacitor,		Car park	X25-U02
mechanical	V01-B02A5B	parking control	T07-F
ultracapacitor	V01-B01D5	Car radio (broadcast)	W03-B03
varactor/varicap diode - see <b>Varia</b>	ble	Car radio (broadcast)	X22-J13
capacitor, non-mechanical	U12-C02B	circuitry - see Broadcast radio rec	
•	V01-B02B1	circuity - see broaucast radio rec	W03-B
variable - see Variable capacitor	V01-B02	electronic antitheft arrangement	W03-B03A1
Capacitor bank	X12-B	RDS	W03-B08
distribution/transmission line			
reactance compensation	X12-H01A2A	Car wash	Q16-A01
, , , , , , , , , , , , , , , , , , ,	X12-H01A2C		X25-H09C
load side reactance compensation	1 X12-H01A2B	Carabiner (safety equipment)	P35-A03A
·	X12-H01A2C	Card	
power factor correction	X12-B	entry or exit control	T05-D01A
•	X12-H01A2	feeding	T04-A05
protection	X13-C04X	IC	T04-K
Capacitor manufacture	V01-B04		V04-Q02A3
application of electrodes	V01-B04 V01-B04B3	magnetic	T04-C01
bandolier	V01-B04B3 V01-B04E	mechanism actuated by	T05-H02C
chip capacitor	V01-B04E V01-B04A5	memory	T04-K03D
co-firing	V01-B04A3C	optical recorder/player	W04-C10C
co-ming	V01-B04A3C V01-B04B7	optical	T04-C02
dielectric treatment	V01-B04B7 V01-B04B1	playing card dealing equipment	W04-X02B
drying	V01-B04B7	punching or reading	T04-A01
electrodes	V01-B04B7 V01-B04B3	reader, point of sale	T05-L01B
electrodes electrolytic - see Electrolytic capa		semiconductor package	U11-D01A7
manufacture	icitoi	smart	T04-K01
manacarc	V01-B01G		V04-Q02A3
film capacitor	V01-B04A5A	Card games	P36-C05
firing	V01-B04/3/4 V01-B04B7	Gara games	W04-X02B5
heat treatment	V01-B04B7	6. 11	
impregnating	V01-B04B5	Cardboard manufacture	X25-T09B
laminating	V01-B04B5 V01-B04B5	control	T06-D03A
leadless capacitor	V01-B04B5 V01-B04A5	Cardiac	
multi-layer	V01-B04A3C	cardiac massage	S05-A05A
packing	V01-B04A3C V01-B04E	defibrillator	S05-A01B
packing pressing	V01-B04E V01-B04B5	pacemaker	S05-A01A
semiconductor devices	U11-C05G1B	rate measurement	S05-D01B5
semiconductor devices separating chip capacitors into	011-003010	Carding	
individual units	V01-B04A5	control, yarn	T06-D03B
individual utilits	V 0 1-D04A3		X25-T01
	V01-B04B9	yarn	X25-T01
	V 0 1-00-07	<b>7</b> -	

Corne menitering using DEID	W04 004BEC	an auritu auritam	TOE 1 02 CE
Cargo monitoring using RFID	W06-A04B5G	security system	T05-L03C5
Carpet	P27-B04	Cash register	T05-L01A
Carpet cleaner machine	X27-D08	Cashbox	T05-L05
Carpet shampooing machine	X27-D08	Casing	
Carpet, electrically-heated		electronic clock or watch	S04-B09
ohmic resistance heating	X25-B01C3B	EMI-shielded, electronic apparatus	
	X27-E01A3	for computer peripheral	V04-U03 T04-L01
Carriage switch	X13-A04E	magnetic heads	T03-A03J7
Carrier aggregation (CA)	W02-C03C1	· ·	P36-C09
	W02-C03G1C	Casino games	W04-X02E
Carrier concentration, measuremen		Casks	Q42-A05
semiconductor device	U11-F01A1		
Carrier data transmission systems	W01-A09	Cassette, tape	T03-H01B
ASK	W01-A09 W01-A09A1	constructional details drives	T03-H01B3 T03-E
demodulator	W01-A09E2	drives drives, manual control	T03-E05B
FSK	W01-A09A2	drives, mode control	T03-E05
layered modulation	W01-A09C5	drives, speed control	T03-E03A
modulator	W01-A09E1	integral tape cleaner	T03-H01B5
MSK,	W01-A09B		T03-H02B
minimum shift keying	W01-A09B	loading and changing	T03-E01B
multifrequency codes	W01-A09D	looping and threading	T03-E01C
PSK QAM	W01-A09B W01-A09C1	magnetic head cleaning	T03-A04B3B
repeaters	W01-A09C1 W01-A06G5G	manufacture protective arrangement	T03-H01B8 T03-H01B5
repeaters	W01-A09	•	103-1101153
Carrier material in photoconductor	S06-Δ01B	Casting continuous	X25-A01
		control	T06-D05B
Carrier mobility, measurement for s device	U11-F01A1	Control	X25-A01
	OTT-IOTAL	metal	X25-A01
Carrier tapes connections to chip terminals,		Catalysis	S03-E09B
semiconductor packages	U11-D03A2	Cathode	
electrolytic capacitor manufacture			V05-M03A
electrolytic capacitor manufacture fixed capacitor manufacture		cold (general)	V05-M03A
fixed capacitor manufacture semiconductor package transport	V01-B01G7E V01-B04E		V05-M03A V05-M03A3
fixed capacitor manufacture semiconductor package transport terminals for semiconductor	V01-B01G7E V01-B04E U11-F02A4	cold (general) cold (general), current limiting arrangements CRT	
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see	V05-M03A3 V05-D05C
fixed capacitor manufacture semiconductor package transport terminals for semiconductor	V01-B01G7E V01-B04E U11-F02A4	cold (general) cold (general), current limiting arrangements CRT	V05-M03A3 V05-D05C <b>device</b>
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode	V05-M03A3 V05-D05C <b>device</b> V05-B05
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape) Cartesian measurements	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode solid thermionic (general)	V05-M03A3 V05-D05C <b>device</b>
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape) Cartesian measurements Cartons	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode solid thermionic (general) sputtering apparatus	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape) Cartesian measurements Cartons Cartridge	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape) Cartesian measurements Cartons Cartridge fuse, electric	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape  transducer, gramophone pick-up	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode a solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV receive	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape  transducer, gramophone pick-up  Cascaded amplifier	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode a solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV receive	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape  transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode a solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape  transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7 X16-F01	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode of the solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received tube per se - see CRT Cathode ray tube drive circuitry TV receiver	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell	V01-B01G7E V01-B04E U11-F02A4 U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7 X16-F01 X16-F01	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode a solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received display control, computer peripheratube per se - see CRT Cathode ray tube drive circuitry TV receiver VDU	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape  transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell clock or watch	V01-B01G7E V01-B04E U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7 X16-F01	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode of the solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received tube per se - see CRT Cathode ray tube drive circuitry TV receiver	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell clock or watch electronic equipment	V01-B01G7E V01-B04E U11-F02A4 U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7 X16-F01 X16-F01 S04-A04 V04-S	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode of solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received tube per se - see CRT Cathode ray tube drive circuitry TV receiver VDU Cathodic sputtering CATV	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D W03-A08A T04-H01 X25-A04
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape  transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell clock or watch	V01-B01G7E V01-B04E U11-F02A4 U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7 X16-F01 X16-F01 S04-A04	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode of solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received display control, computer periphere tube per se - see CRT Cathode ray tube drive circuitry TV receiver VDU Cathodic sputtering CATV ancilliary receiver equipment	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D W03-A08A T04-H01 X25-A04 W03-A16C
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell clock or watch electronic equipment  Cash point	V01-B01G7E V01-B04E U11-F02A4 U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7 X16-F01 X16-F01 S04-A04 V04-S T05-L03	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode of the solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received display control, computer peripheratube per se - see CRT Cathode ray tube drive circuitry TV receiver VDU Cathodic sputtering CATV ancilliary receiver equipment cable TV receiver	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D W03-A08A T04-H01 X25-A04 W03-A16C W03-A16C
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell clock or watch electronic equipment  Cash point construction	V01-B01G7E V01-B04E U11-F02A4 U11-F02A4 U11-D03A1B S02-A10G Q32-A08 X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7 X16-F01 X16-F01 S04-A04 V04-S T05-L03 T05-L03E	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode of the solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received display control, computer peripheratube per se - see CRT Cathode ray tube drive circuitry TV receiver VDU Cathodic sputtering CATV ancilliary receiver equipment cable TV receiver cable fittings	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D W03-A08A T04-H01 X25-A04 W03-A16C W03-A16C1 W02-F03A9
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape  transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell clock or watch electronic equipment  Cash point construction control system depositing dispensing	V01-B01G7E V01-B04E U11-F02A4  U11-D03A1B S02-A10G Q32-A08  X13-D01 T03-H01B T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7  X16-F01 X16-F01 S04-A04 V04-S T05-L03 T05-L03E T05-L03A1 T05-L03A5	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode a solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received display control, computer peripheratube per se - see CRT Cathode ray tube drive circuitry TV receiver VDU Cathodic sputtering CATV ancilliary receiver equipment cable TV receiver cable fittings head-end details	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D W03-A08A T04-H01 X25-A04 W03-A16C W03-A16C1 W02-F03A9 W02-F03A5
fixed capacitor manufacture semiconductor package transport terminals for semiconductor packages (TAB tape)  Cartesian measurements  Cartons  Cartridge fuse, electric tape transducer, gramophone pick-up  Cascaded amplifier  Cascode amplifier  Case battery cell clock or watch electronic equipment  Cash point construction control system depositing	V01-B01G7E V01-B04E U11-F02A4  U11-F02A4  U11-D03A1B S02-A10G Q32-A08  X13-D01 T03-H01B T03-N03 V06-V04A3 W04-A02 U24-G02F5 U24-G02F7  X16-F01 X16-F01 S04-A04 V04-S T05-L03 T05-L03E T05-L03C1 T05-L03A1	cold (general) cold (general), current limiting arrangements CRT microfabricated cold type-see Microfabricated cold cathode of the solid thermionic (general) sputtering apparatus Cathode ray oscilloscopes Cathode ray tube display arrangements in TV received display control, computer peripheratube per se - see CRT Cathode ray tube drive circuitry TV receiver VDU Cathodic sputtering CATV ancilliary receiver equipment cable TV receiver cable fittings	V05-M03A3 V05-D05C <b>device</b> V05-B05 V05-M02 V05-F04B5C S01-C01 er W03-A08A ral type T04-H01 V05-D W03-A08A T04-H01 X25-A04 W03-A16C W03-A16C1 W02-F03A9

microwave distribution	W02-F03A7	internal connection	X16-F03A3
optical fibre network	W02-F03A7 W02-F03A3	membrane	X16-F02
receiver converter	W03-A16C1	organic solar	X15-A02F
receiver converter	W03-A10C1 W03-A01A5	micro primary	X16-A05
system	W02-F03A	micro secondary	X16-B01G
	110210071	packaging carton	X16-F09
CCD	U13-A02B	photoelectrochemical	U12-A02
circuits, drivers electrode formation		priotocioca conomica.	X15-A02D
electrode formation	U11-C05F6		X16-A04
imaga production	U11-C18B3 S06-D05	photovoltaic	U12-A02A
image production	S06-D03 S06-K99B	p	X15-A02A
copier facsimile	S06-K99D	primary, electrode	X16-E03
manufacture	U11-C18B3	printed primary	X16-A05
optical filter manufacture	U11-C18D	printed secondary	X16-B01G
optical litter manufacture	U13-A02X	prism-shaped case	X16-F01F3
optical filters	U13-A02X	safety device	X16-F03B
packaging aspects	U13-A02C	separator	X16-F02
scanner	T04-M	sodium-sulphur cell	X16-B01C
0000.	S06-D10	high temperature	X16-B01C1
shift stores	U14-A01B	low temperature	X16-B01C2
structure	U13-A02A	room temperature	X16-B01C2
testing	U11-F01C5	solar	U12-A02A
S	U13-A02		X15-A02A
video camera application	W04-M01B	spacer	X16-F02
ССТУ	W02-F01	terminal	X16-F03A1
burglar alarms	W02-F01A5	terminal post	X16-F03A1
Sargial alaims	W05-B01C5	testing	S01-G06
calibrated system for measuring		the area a best and but a	X16-H
dimensions	W02-F01D	thermophotovoltaic	U12-A02A9
component inspection in mfg. Pro	cess	tubular abanad againg	X15-A02E X16-F01F2
	W02-F01C	tubular-shaped casing	X10-FU1F2
	VVUZ-1 U I C	went	V14 E02D
entry-phone	W01-C04A1	vent	X16-F03B
entry-phone	W01-C04A1	Cellular radio systems	W02-C03C1
entry-phone free-space link	W01-C04A1	Cellular radio systems 3G	<b>W02-C03C1</b> W02-C03C1G
	W01-C04A1 W02-F01A1	Cellular radio systems 3G 4G	<b>W02-C03C1</b> W02-C03C1G W02-C03C1H
free-space link	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D	Cellular radio systems 3G 4G 5G	<b>W02-C03C1</b> W02-C03C1G W02-C03C1H W02-C03C1L
free-space link intruder alarms medical use	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M	Cellular radio systems 3G 4G 5G applications	<b>W02-C03C1</b> W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1J
free-space link intruder alarms medical use process control	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B	Cellular radio systems  3G  4G  5G  applications  base station equipment	W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B
free-space link intruder alarms medical use process control radio link	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F	Cellular radio systems 3G 4G 5G applications base station equipment beam management	W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A
free-space link intruder alarms medical use process control radio link surveillance use	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CIoT)	W02-C03C1 W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C
free-space link intruder alarms medical use process control radio link	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E	Cellular radio systems 3G 4G 5G applications base station equipment beam management	W02-C03C1 W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A
free-space link intruder alarms medical use process control radio link surveillance use	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CIoT)  cellular radio telephone system	W02-C03C1 W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A
free-space link intruder alarms medical use process control radio link surveillance use	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CloT)  cellular radio telephone system  distributed antenna system	W02-C03C1 W02-C03C1G W02-C03C1H W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CloT)  cellular radio telephone system  distributed antenna system  dual connectivity	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F W02-C03G1E
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player  CD video player	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3	2 Cellular radio systems 3 G 4 G 5 G applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system distributed antenna system dual connectivity femtocell	W02-C03C1 W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F W02-C03C1F
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CloT)  cellular radio telephone system  distributed antenna system  dual connectivity	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F W02-C03G1E W02-C03C1K W01-B05A1G
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access	W02-C03C1 W02-C03C1G W02-C03C1H W02-C03C1L W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F W02-C03C1F
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access GSM	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F W02-C03G1E W02-C03G1E W01-B05A1G W01-B05A1A
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access	W02-C03C1 W02-C03C1G W02-C03C1L W02-C03C1L W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F W02-C03G1E W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1A
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access GSM  hand-off system	W02-C03C1 W02-C03C1G W02-C03C1L W02-C03C1L W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03G1E W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1A
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access GSM  hand-off system hierarchical	W02-C03C1 W02-C03C1G W02-C03C1L W02-C03C1L W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1A W02-C03C1F W02-C03G1E W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1A W02-C03C1A
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A echanical S X27-E01B1	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CloT)  cellular radio telephone system  distributed antenna system  dual connectivity  femtocell  fixed location cellular radio access  GSM  hand-off system  hierarchical  location register details  LTE (long term evolution)  mobile apparatus	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03C1K W01-B05A1A W02-C03C1K W01-B05A1A W02-C03C1C W01-B05A1A W02-C03C1D W02-C03C1C W01-E01C1 W02-C03C1C
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A schanical s X27-E01B1 X16-F01F1 X16-F01C X16-F01A	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CIoT)  cellular radio telephone system  distributed antenna system  dual connectivity  femtocell  fixed location cellular radio access  GSM  hand-off system  hierarchical  location register details  LTE (long term evolution)  mobile apparatus  mobile location determination	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1B W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03G1E W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1A W02-C03C1D W02-C03C1D W02-C03C1H
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing casing casing seal casing shape	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A echanical s X27-E01B1  X16-F01F1 X16-F01C X16-F01A X16-F01F	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CIoT)  cellular radio telephone system  distributed antenna system  dual connectivity  femtocell  fixed location cellular radio access  GSM  hand-off system  hierarchical  location register details  LTE (long term evolution)  mobile apparatus  mobile location determination  mobile radio telephone	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03C1K W01-B05A1A W02-C03C1K W01-B05A1A W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1C
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing casing casing seal casing shape coin-shaped casing	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A cchanical s X27-E01B1  X16-F01F1 X16-F01C X16-F01A X16-F01F X16-F01F	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CIoT)  cellular radio telephone system  distributed antenna system  dual connectivity  femtocell  fixed location cellular radio access  GSM  hand-off system  hierarchical  location register details  LTE (long term evolution)  mobile apparatus  mobile location determination  mobile radio telephone  picocell	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03G1E W02-C03C1K W01-B05A1A W02-C03C1A W02-C03C1D W02-C03C1D W02-C03C1D W02-C03C1D W02-C03C1H W02-C03C1C W02-C03C1C
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing casing casing casing seal casing shape coin-shaped casing constructional details	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A cchanical s X27-E01B1  X16-F01F X16-F01C X16-F01F X16-F01F X16-F01F X16-F01F X16-F01F1 X16-F	Gellular radio systems  3G  4G  5G  applications  base station equipment  beam management  cellular internet of things (CIoT)  cellular radio telephone system  distributed antenna system  dual connectivity  femtocell  fixed location cellular radio access  GSM  hand-off system  hierarchical  location register details  LTE (long term evolution)  mobile apparatus  mobile location determination  mobile radio telephone  picocell  PDCCH	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03C1K W01-B05A1G W01-B05A1G W01-B05A1A W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1L W02-C03C1C
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing casing casing casing seal casing shape coin-shaped casing constructional details cylindrical-shaped casing	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01A W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A chanical s X27-E01B1  X16-F01F X16-F01C X16-F01F X16-F01F X16-F01F X16-F01F X16-F01F2	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CIoT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access GSM  hand-off system hierarchical location register details LTE (long term evolution) mobile apparatus mobile location determination mobile radio telephone picocell PDCCH PDSCH	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1C
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing casing casing seal casing shape coin-shaped casing constructional details cylindrical-shaped casing dye-sensitised solar	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A echanical s X27-E01B1  X16-F01F1 X16-F01C X16-F01F X16-F01F X16-F01F2 X15-A02D1	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access GSM  hand-off system hierarchical location register details LTE (long term evolution) mobile apparatus mobile location determination mobile radio telephone picocell PDCCH PDSCH PUCCH	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1A W02-C03C1C W02-C03C1A W02-C03C1A W02-C03C1A
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing casing casing seal casing shape coin-shaped casing constructional details cylindrical-shaped casing dye-sensitised solar electrolysis, non-metal prodn.	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01B W02-F01E X22-F01A W04-C10A1 W04-C10A3 W04-C10A Pchanical S X27-E01B1  X16-F01F X16-F01C X16-F01F X16-F01F X16-F01F X16-F01F X16-F01F2 X15-A02D1 X25-R01A	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access GSM  hand-off system hierarchical location register details LTE (long term evolution) mobile apparatus mobile location determination mobile radio telephone picocell PDCCH PDSCH PUCCH PUSCH	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03C1F W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1A W02-C03C1C W02-C03C1C W02-C03C1C W02-C03C1C W02-C03C1C W02-C03C1C W02-C03C1C W02-C03C1C W02-C03C1C W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1A
free-space link intruder alarms medical use  process control radio link surveillance use vehicle external viewing  CD audio player CD video player CD-I Ceilings - see Buildings, general me construction and structural element Ceiling fan Cell button-shaped casing casing casing seal casing shape coin-shaped casing constructional details cylindrical-shaped casing dye-sensitised solar	W01-C04A1 W02-F01A1 W02-F01F W05-B01C5C S05-D W02-F01M W02-F01B W02-F01F W02-F01E X22-E09A W04-C10A1 W04-C10A3 W04-C10A echanical s X27-E01B1  X16-F01F1 X16-F01C X16-F01F X16-F01F X16-F01F2 X15-A02D1	Gellular radio systems  3G  4G  5G  applications base station equipment beam management cellular internet of things (CloT) cellular radio telephone system  distributed antenna system dual connectivity femtocell fixed location cellular radio access GSM  hand-off system hierarchical location register details LTE (long term evolution) mobile apparatus mobile location determination mobile radio telephone picocell PDCCH PDSCH PUCCH	W02-C03C1 W02-C03C1H W02-C03C1L W02-C03C1J W02-C03C1B W02-C03C1A W05-D06E1C W01-B05A1A W02-C03C1F W02-C03C1F W02-C03C1K W01-B05A1G W01-B05A1A W02-C03C1A W02-C03C1C W02-C03C1A W02-C03C1A W02-C03C1A

system operation unlicensed radio network W02-C03H worlicensed radio network W02-C03H control (unspecified system) X27-E01A1 control (unspecified system) X27-E01A1 warm air circulation X27-E01A1 water circulation, control X27-E01A1 water circulation, control X27-E01A1 water circulation, control X27-E01A1 water circulation, control X27-E01A1 control office (telephone exchange) W01-C02G1 central station alarms W05-B05  Centralised control logic for telephone switching W01-B02A1 Centrex telephone exchange W01-C02G centrifuge P41-J X25-J  Centre packages, for semiconductor devices assembly U11-E02A2 hermetic seals U11	aubaaribar raamina	W01-E01A	solar cell	1112 402425
Central station alarms	subscriber roaming system operation			U12-A02A2E
control (unspecified system) X27-E01A1 warm air circulation X27-E01A1 warm air circulation X27-E01A1 warm air circulation x27-E01A1 warm air circulation x27-E01A1 water circulation x27-E01A1 hand written, ecognition x04-D07 recognition ystem T04-D07 recognition, color recognition, uses of T04-D07	unlicensed radio network	W02-C03H	Chamtering, semiconductor water	
warm air circulation	<b>5 5</b>	-	Chaos, generation	U23-F05
Warm air circulation, control   X27-E01A1   water circulation, control   X27-E01A1   variety circulation   X27-E01A1   variety circulation, control   X27-E01A1   variety circulation   X27-E01A1   variety circulation, control   X27-E01A1   variety control   X27-E01A1   variety circulation   X27-E01A1   variety circulation   X27-E01A1   variety circulation   X27-E01A1   variety control   X27-E01A2   variety circulation   X24-D02   variety circulation   X24-D02   Variety circulation   X25-X01   variety circulation   X23-D01A3C	control (unspecified system)		Character	
water circulation control X27-E01A1 water circulation, control X27-E01A1 recognition process T04-D04 recognition, color T04-D08 recognition, image acquisition recognition, using code marks single, display control T04-D03 recognition, using code marks single, display control T04-D03 recognition, using code marks single, display control T04-D03 recognition, uses of T04-D07 recognition, uses of T04-D01 and recognition, uses of T04-D01 recognition, uses of T04-D01 recognition, uses of T04-D01 and recognition and recognition, uses of T04-D01 and recognition and recog		-	generator, for CRT display	T04-H01A1
water circulation, control X27-E01A1  Central office (telephone exchange) W01-C02G1  Central station alarms W05-B05  Centralised control logic for telephone switching W01-B02A1  Centrigual switch V03-C06C  Centrifuge P41-J X25-J  Cermit packages, for semiconductor devices assembly U11-E02A2 assembly U11-E02A2 anountings U11-E02A2 mountings U14-H05 package per se U11-D01A1  Ceramics Ceramics S03-E01AD4 insulator, electrical X12-E01A  Cerenkov detectors S03-G02B2  CFAR (Constant false alarm rate)radar  Chain switch V03-C03  Chains switch V03-C03  Chains witch V03-C03  Charley elimination  electrophotography V04-CD2A1  Charge elimination  electrophotography V05-C05A6  Charge injection devices - see CCD  U13-A02  W05-D05A5  Charge transfer devices - see CCD  U13-A02  with array of semiconductor diodes  Charge transfer devices - see CCD  U13-A02  with array of semiconductor diodes  Charge transfer devices - see CCD  U13-A02  with array of semiconductor diodes  Charge injection evices - see CCD  U13-A02  with array of semiconductor diodes  Charge injection voice in th	•			
Central office (telephone exchange) W01-C02G1 Central station alarms  W05-B05  Central station alarms  W01-B02A1 Centrex telephone exchange W01-C02G Centrifugal switch V03-C06C Centrifuge P41-J X25-J Centrifuge P41-J X25-J  Cermic packages, for semiconductor devices assembly U11-E02A2 assembly U11-E02A2 hermetic seals mountings U14-H05 package per se U11-D01A1  Ceramics Ceramics Cramics Cramics Cramics Cramics Chaff, radar systems W06-A04E5 Chaff, radar systems W06-A04E5 Chainsaw timber industry Chair P26-A accessories P26-F constructional details electrical details x27-A03 manufacture types of chairs camping chair cinema/theatre chair dentist chair P26-B Editor Central station alarms W05-B05 V05-D05A5 V05-D05A5 V05-D05A5 V05-D05A5 Charge eimination electrophotography S06-K06B Charge eimination electrophotography S06-K06B Charge pump power supply phase lock loop application U23-D01A3C Charge storage screen for cathode ray tube Charge storage screen for cathode ray tube Charge storage screen for cathode ray tube Charge transfer devices - see CCD With array of semiconductor diodes Charging (electrical energy storage - see also codes for equipment being charged) batteries capacitors U24-U With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of semiconductor diodes Charge transfer devices - see CCD With array of		-		
Central station alarms W05-B05 Centralised control logic for telephone switching W01-B02A1 Centrex telephone exchange W01-C02G Centrifugal switch V03-C06C Centrifuge P41-J X25-J Ceramic packages, for semiconductor devices U11-E02A2 assembly U11-E02A2 mountings U14-H05 package per se U11-D01A1 Ceramics analysis S03-E14D4 insulator, electrical x12-E01A Cerank detectors S03-G02B2 CFAR (Constant false alarm rate)radar Chain switch V03-C03 Chairs witch V03-C03 Chairs P26-A accessories P26-F constructional details electrical details x27-A03 manufacture p26-B constructional details electrical dentist chair P26-B constructional details p26-A01B constructional details camping chair cinema/theatre chair P33-A110 Centrat V03-C03 Centrifuge W01-C02G recognition, image acquisition T04-D02 recognition, image acquisition T04-D03 T04-D07 recognition, uses of T04-D01 since proprocessing T04-D03 recognition, uses of T04-D01 since proprocessing T04-D03 recognition, uses of T04-D01 since proprocessing T04-D01 since proprocessing T04-D03 recognition, uses of T04-D01 recognition, uses of T04-D01 since proprocessing T04-D03 recognition, uses of T04-D01 since proprocessing T04-D03 recognition, uses of T04-D01 since proprocessing T04-D03 recognition, using code marks single, display control marks proprocessing T04-D03 recognition, using code marks single, display control marks proprocessing T04-D01 and T04-D03 recognition, using code marks single, display control marks proprocessing T04-D01 and T04-D03 recognition, using code marks single code lookes reco	Central office (telephone exchang	e) W01-C02G1	recognition process	
Cermic packages, for semiconductor devices assembly U11-E02A2 hermetic seals U11-E02A2 homountings package per se U11-D01A1  Cermic package per se U11-D01A1  Ceramics analysis insulator, electrical x12-E01A wo6-A04E5  Cerenkov detectors S03-G02B2  CFAR (Constant false alarm rate)radar				
switching W01-B02A1 Centrex telephone exchange W01-C02G Centrifugal switch V03-C06C Centrifuge P41-J X25-J Charge coupled devices - see CCD U13-A02 Ceramic packages, for semiconductor devices U11-E02A2 assembly U11-E02A2 hermetic seals U11-E02A2 mountings U14-H05 package per se U11-D01A1 Ceramics S03-E14D4 insulator, electrical X12-E01A Cerenkov detectors S03-G02B2 CFAR (Constant false alarm rate)radar Chaff, radar systems W06-A04E5 Chaff, radar systems X25-A03 Chainsaw X25-A03 Chainsaw X25-A03 Chainsaw X25-A03 manufacture p26-A10 electrical details X27-A03 manufacture p26-A01C chemical indicator S03-E03C Chentrex telephone exchange W01-C02G recognition, using code marks 704-D03 T04-H03A recognition, using code marks 704-D01 T04-H03A To4-D07 recognition, using code marks 704-D01 T04-H03A Charge climination electrophotography S06-K06B Charge elimination electrophotography S06-K06B Charge pump power supply D4-D02A1 Charge storage screen for cathode ray tube Charge storage screen for cathode ray tube Charge storage screen for cathode ray tube Charge transfer devices - see CCD U13-A02 With array of semiconductor diodes Charging (electrical energy storage - see also codes for equipment being charged) batteries capacitors U24-D02A1 Charge elimination electrophotography S06-K06B Charge simination Charge storage screen for cathode ray tube Char				
Cermic packages, for semiconductor devices assembly hermetic seals mountings package per se 1011-D01A1  Ceramicy analysis insulator, electrical Attacers CFAR (Constant false alarm rate)radar  Chain switch  Chain switch  Chain switch  Chainsw  Chainsw  Chainsw  Tod-D07 recognition, uses of rode marks single, display control Tod-H03A  Charge elimination electrophotography So6-K06B  Charge elimination electrophotography So6-K06B  Charge elimination electrophotography So6-K06B  Charge pump power supply phase lock loop application U23-D01A3C  Charge storage screen for cathode ray tube  Charge			recognition, image preprocessing	T04-D03
Ceramic packages, for semiconductor devices U11-E02A2 assembly U11-E02A2 hermetic seals U11-E02A2 mountings U14-H05 package per se U11-D01A1  Ceramics S03-E14D4 insulator, electrical insulator, electrical details W06-A04E5  Chaff, radar systems W02-B03B2A W06-A04E1A  Chain switch V03-C03  Charge elimination electrophotography S06-K06B  Charge injection devices - see CCD U13-A02 Charge pump power supply U24-D02A1 phase lock loop application U23-D01A3C  Charge storage screen for cathode ray tube Charge storage screen for cathode ray tube Charge transfer devices - see CCD U13-A02 with array of semiconductor diodes V05-D05A5  Charge transfer devices - see CCD U13-A02 with array of semiconductor diodes V05-D05A5  Charge transfer devices - see CCD U13-A02 with array of semiconductor diodes V05-D05A5  Charge transfer devices - see CCD U13-A02 with array of semiconductor diodes V05-D05A5  Charge transfer devices - see CCD U13-A02 with array of semiconductor diodes V05-D05A5  Charge elimination electrophotography phase lock loop application V03-D01A3C  Charge elimination electrophotography phase lock loop application V05-D05A5  Charge elimination electrophotography phase lock loop application V03-D01A3C  Charge injection devices - see CCD U13-A02 W13-A02  Charge injection devices - see CCD U13-A02 W13-D01A1  Charge injection devices - see CCD U13-A02 W13-D01A1  Charge injection devices - see CCD U13-A02 W15-D05A5  Charge injection devices - see CCD U13-A02 W16-D01A1  Charge injection devices - see CCD U13-A02 W16-D01A1  Charge injection devices - see CCD U13-A02 W15-D05A5  Charg	<del>-</del>			
Ceramic packages, for semiconductor devices	_			
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Ceramic packages, for semiconductor devices	Centinuge		= -	U13-AU2
devicesU11-E02A2 assemblyU11-E02A2 U11-E02A2 hermetic seals 	Caramic nackages for semicondus			CO/ KO/D
Assembly Notering Seeds U11-E02A2 bermetic seals U11-E02A2 mountings U14-H05 package per se U11-D01A1 Charge storage screen for cathode ray tube  Ceramics V05-D05A5 analysis S03-E14D4 insulator, electrical X12-E01A Charge transfer devices - see CCD V05-D05A5 with array of semiconductor diodes vital array of semiconductor diodes v05-D05A5 with array of semiconductor diodes vital array of semiconductor diod				
mountings U14-H05 package per se U11-D01A1  Ceramics analysis S03-E14D4 insulator, electrical X12-E01A  Cerenkov detectors S03-G02B2  CFAR (Constant false alarm rate)radar  W06-A04E5  Chaff, radar systems W02-B03B2A W06-A04E1A  Chain switch V03-C03  Chainsaw X25-A03 timber industry X25-X01  Chair P26-A accessories constructional details electrical details x27-A03 manufacture types of chairs camping chair children chair (P26-A01B P33-A10  Ceramics  V011-D01A1  Charge storage screen for cathode ray tube  Charge storage screen for cathodes  Charge screen for cathodes  Charges devices - see CCD  U13-A02  U13-A02  U24-L  Charden screen scree				
package per se U11-D01A1  Ceramics	hermetic seals	U11-E02A2		
Ceramics analysis insulator, electrical Cerenkov detectors  CFAR (Constant false alarm rate)radar  Chair, radar systems  Chain switch  Chain switch  Chain switch  Chainsaw timber industry  Chair accessories constructional details electrical details electrical details camping chair children chair children chair children chair children chair children chair children chair cinema/theatre chair children chair chi	5			
analysis insulator, electrical X12-E01A  Cerenkov detectors S03-G02B2  CFAR (Constant false alarm rate)radar  W06-A04E5  Chaff, radar systems W02-B03B2A W06-A04E1A  Chain switch V03-C03  Chainsaw X25-A03 timber industry X25-X01  Chair P26-A  accessories P26-F constructional details electrical details x27-A03 manufacture types of chairs camping chair children chair children chair cinema/theatre chair chemical factors insulator, electrical (P26-A01C dentist chair P33-A10  Chart switch Chart recorders S02-K07  Chart recording elements for S02-K06B  Checking - see Testing dimension measuring equipment S02-A07  Chemical indicator S03-E09E	package per se	U11-D01A1	Charge storage screen for cathode	ray tube
insulator, electrical X12-E01A  Cerenkov detectors \$03-G02B2  CFAR (Constant false alarm rate)radar  W06-A04E5  Chaff, radar systems W02-B03B2A W06-A04E1A  Chain switch V03-C03  Chainsaw X25-A03 timber industry X25-X01  Chair P26-A accessories P26-F constructional details P26-A10 electrical details manufacture p26-M types of chairs camping chair children chair P26-A01C dentist chair P36-A01C dentist chair P36-A01B P33-A10  Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G capacitors U24-L X16-L02 Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment profers Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Charging (electrical energy storage - see also co				V05-D05A5
Cerenkov detectors  CFAR (Constant false alarm rate)radar  W06-A04E5  Chaff, radar systems  W02-B03B2A W06-A04E1A  W06-A04E1A  Chain switch  V03-C03  Chainsaw X25-A03  timber industry  X25-X01  Chair  P26-A  accessories constructional details electrical details manufacture types of chairs camping chair children chair children chair children chair children chair dentist chair  P26-A01C  Chaff, radar systems  W06-A04E5  Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Capacitors U24-L X16-L02 Charity organisations Charity organisations T01-N01A4 Chart recorders S02-K05 Chart recording elements for S02-K05 Check validating and testing Check validating and testing Checkers (game)  Checking - see Testing dimension measuring equipment Checking - see Testing dimension measuring equipment S02-A07 CHEMFET S03-E03C U12-D03E P26-A01B P33-A10 Chemical indicator S03-E09E	,			
CFAR (Constant false alarm rate)radar  W06-A04E5  Chaff, radar systems  W02-B03B2A W06-A04E1A  W06-A04E1A  W06-A04E1A  Chain switch  Chain switch  Chainsaw  X25-A03  timber industry  X25-X01  Chair  P26-A  accessories constructional details electrical details manufacture types of chairs camping chair children chair children chair children chair children chair children chair dentist chair  P26-A01B P33-A10  Charging (electrical energy storage - see also codes for equipment being charged) batteries X16-G Capacitors U24-L X16-L02 Capacitors Capacitors Charity organisations T01-N01A4 Charity organisations T01-N01A4 Charity organisations T01-N01A4 Charity organisations T01-N01A4 Check validating and testing Check validating and testing T05-J Checkers (game) P36-C01 W04-X02B1 Checking - see Testing dimension measuring equipment S02-A07 CHEMFET S03-E02 U12-D03E U12-D03E Chemical indicator S03-E09E	,	-	with array of semiconductor diode	
Also codes for equipment being charged) batteries X16-G Chaff, radar systems W02-B03B2A W06-A04E1A W06-A04E1A Chain switch V03-C03 protection (low-power) U24-F08 Chainsaw X25-A03 Charity organisations T01-N01A4 timber industry X25-X01 Charrecorders S02-K05 Chair P26-A accessories P26-F recording elements for S02-K06B constructional details P26-A10 electrical details X27-A03 manufacture P26-M types of chairs camping chair children chair P26-E cinema/theatre chair P26-B dentist chair S05-E02 P26-A01B P33-A10 Checkers (game) P36-C01 W04-X02B1 CHEMFET S03-E03C U12-D02A U12-D03E Chemical indicator S03-E09E			Charries (alastrias) an army atarana	
Chair switch V03-C03 protection (low-power) U24-L X16-L02  Chain switch V03-C03 protection (low-power) U24-F08  Chairsaw X25-A03 Charity organisations T01-N01A4 timber industry X25-X01 Chair P26-A recording elements for S02-K05  Chair P26-A recording elements for S02-K06B constructional details P26-A10 electrical details X27-A03 manufacture p26-M types of chairs camping chair children chair cinema/theatre chair dentist chair P26-E cinema/theatre chair P26-A01C dentist chair S05-E02 P26-A01B P33-A10  Cheffic parallel statics S16-G capacitors S12-A04 Charity organisations T01-N01A4  Chair vorganisations T01-N01A4  Charity organisations T01-N01A4  Charity organisations T01-N01A4  Check validating and testing T05-J  Checkers (game) P36-C01  W04-X02B1  Checking - see Testing  dimension measuring equipment S02-A07  CHEMFET S03-E03C  U12-D02A  U12-D03E	CFAR (Constant false alarm rate)ra			
Chain switch V03-C03 protection (low-power) U24-F08  Chainsaw X25-A03 Charity organisations T01-N01A4 timber industry X25-X01 Chair recorders S02-K05 Chair P26-A S06-K99E accessories P26-F recording elements for S02-K06B constructional details P26-A10 electrical details X27-A03 manufacture P26-M types of chairs camping chair children chair P26-E cinema/theatre chair P26-A01C dentist chair S05-E02 P26-A01B P33-A10  Checkers (game) S02-A07  Checking - see Testing dimension measuring equipment S02-A07  CHEMFET S03-E03C U12-D02A U12-D03E  Chemical indicator S03-E09E		W06-A04E5	· · · · · · · · · · · · · · · · · · ·	
Chain switchV03-C03protection (low-power)U24-F08ChainsawX25-A03Charity organisationsT01-N01A4timber industryX25-X01Charity organisationsT01-N01A4ChairP26-AS02-K05ChairP26-Frecording elements forS02-K06Bconstructional detailsP26-A10Check validating and testingT05-Jelectrical detailsX27-A03Checkers (game)P36-C01manufactureP26-MW04-X02B1types of chairsChecking - see Testingdimension measuring equipmentS02-A07camping chairP26-Edimension measuring equipmentS02-A07cinema/theatre chairP26-A01CCHEMFETS03-E03Cdentist chairS05-E02U12-D02AP26-A01BP33-A10Chemical indicatorS03-E09E	Chaff, radar systems		capacitors	U24-L
Chainsaw X25-A03 Charity organisations T01-N01A4 timber industry X25-X01 Chair P26-A S06-K99E accessories P26-F recording elements for S02-K06B constructional details P26-A10 electrical details X27-A03 manufacture P26-M types of chairs camping chair children chair P26-E cinema/theatre chair dentist chair S05-E02 P26-A01B P33-A10 Chemical indicator S03-E09E		W06-A04E1A		
timber industry X25-X01 Chart recorders S02-K05  Chair P26-A S06-K99E  accessories P26-F recording elements for S02-K06B  constructional details P26-A10 electrical details X27-A03 manufacture P26-M types of chairs camping chair children chair P26-E cinema/theatre chair S05-E02 dentist chair S05-E02 P26-A01B P33-A10 Cherk recorders S02-K05 S06-K99E Check validating and testing T05-J Checkers (game) P36-C01 W04-X02B1 Checking - see Testing dimension measuring equipment S02-A07 CHEMFET S03-E03C U12-D02A U12-D03E	Chain switch	V03-C03	·	
Chair     accessories	Chainsaw	X25-A03	Charity organisations	T01-N01A4
accessories P26-F constructional details P26-A10 electrical details X27-A03 manufacture P26-M types of chairs camping chair children chair P26-E cinema/theatre chair dentist chair S05-E02 P26-A01B P33-A10  recording elements for S02-K06B Check validating and testing T05-J Checkers (game) P36-C01 W04-X02B1  Checking - see Testing dimension measuring equipment S02-A07 CHEMFET S03-E03C U12-D02A U12-D03E S03-E09E	timber industry	X25-X01	Chart recorders	
constructional details P26-A10 electrical details X27-A03 manufacture P26-M types of chairs camping chair children chair cinema/theatre chair dentist chair S05-E02 P26-A01B P33-A10  Check validating and testing T05-J Checkers (game) P36-C01 W04-X02B1  Checking - see Testing dimension measuring equipment S02-A07  CHEMFET S03-E03C U12-D02A U12-D03E S03-E09E	<del></del>	-	19 1	
electrical details X27-A03 manufacture P26-M types of chairs camping chair children chair P26-E cinema/theatre chair S05-E02 P26-A01B P36-C01 W04-X02B1  Checkers (game) P36-C01 W04-X02B1  Checking - see Testing dimension measuring equipment S02-A07  CHEMFET S03-E03C U12-D02A U12-D03E P33-A10 Chemical indicator S03-E09E		. = * .	_	
manufacture P26-M types of chairs camping chair children chair cinema/theatre chair dentist chair P26-A01C P26-A01B P33-A10 Checking - see Testing dimension measuring equipment S02-A07 CHEMFET S03-E03C U12-D02A U12-D03E S03-E09E				T05-J
types of chairs camping chair children chair cinema/theatre chair dentist chair P26-A01C P26-A01B P33-A10  Checking - see Testing dimension measuring equipment S02-A07  CHEMFET S03-E03C U12-D02A U12-D03E S03-E09E			Checkers (game)	
children chair children chair cinema/theatre chair dentist chair P26-E P26-A01C CHEMFET S03-E03C U12-D02A P26-A01B P33-A10 Chemical indicator S02-A07 CHEMFET S03-E03C U12-D02A U12-D03E		. 20		W04-X02B1
Cinema/theatre chair	camping chair	P24-D		600 407
dentist chair         \$05-E02         U12-D02A           P26-A01B         U12-D03E           P33-A10         Chemical indicator         \$03-E09E		-	9	
P26-A01B U12-D03E P33-A10 <b>Chemical indicator</b> S03-E09E			CHEMFET	
P33-A10 Chemical indicator S03-E09E	dentist chair			
folding chair P26-A01D observing color change of S03-E04E	folding chair			
gaming chair P26-A01A temperature history of foods S03-B01X				
home/office chair P26-A01A Chamical lacor V/08 A04B		P26-A01A	-	
hairdressers/barbers chair P26-A01B				
vehicle seat P26-A01F Chemical mechanical polishing - see Polishing an polishers				e Polisning and
Chaicogenide/chaicopyrite semiconductor			•	miconductors
electronic switching circuits U21-B01P Chemical mechanical polishing, semiconductors layer deposition U11-C01J4			Chemical mechanical polishing, ser	inconductors
logic circuits U21-C01P apparatus U11-C06A1A			apparatus	U11-C06A1A
memory circuits U14-A03H endpoint detection U11-C06A1C				
photoreceiver U12-A02B5X process U11-C06A1A			· ·	
semiconductor structure U12-E01A4 CVD apparatus, gas delivery headsU11-C09B1			CVD apparatus, gas delivery head	sU11-C09B1

Chamilant and a samiland data and	U12 D02E	Challes as !!	
Chemical sensors, semiconductors	U12-B03E	Choke coil	V02-F01
Chemical strips	S03-E09E	1	V02-F01 V02-G01C
Chemical testing	S03-E09	smoothing	U25-E02
catalysis	S03-E09B	Smoothing	V02-F01J
chemical indicator, general (see		variable, hf	V02-F01D
also S03-E04E)	S03-E09E		V02-G01C1
chemisorption	S03-E09A		U24-G02E
chromatography	S03-E09C		
combustion analysis gas chromatography	S03-E09B S03-E09C1	CHP, combined heat and power - sec	e cogeneration
ion exchange	S03-E09C1	power plant fossil fuels	X11-C04
ion exchange chromatography	S03-E09C5	non-fossil fuels	X11-C04 X15-K
liquid chromatography	S03-E09C5		7(15 IC
precipitation	S03-E09A	Christmas decorations	D27 D0/
thin layer chromatography	S03-E09C3	non-electrical details	P27-B06
titration	S03-E09D	Christmas lighting	X26-X
Chemical vapour deposition,			X26-M
semiconductor manufacture plass	ma CVD		W04-X03C
apparatus		Chroma keying	W04-N05C5A
••	U11-C09B	Chromatography	S03-E09C
	U11-C09C	affinity	S03-E09C5
Chemical vapour deposition,		gas	S03-E09C1
CVD apparatus gas delivery head	s U11-C09B1	gel permeation	S03-E09C5
Chemical vapour deposition, condu		HPLC	S03-E09C5
Chemical vapour deposition, condu		ion exchange	S03-E09C5
The Proof of the Section 1	U11-C05C3	liquid	S03-E09C5
localised deposition	U11-C05C5	size exclusion	S03-E09C5
Chemical vapour deposition, insula	ting layer	thin layer	S03-E09C3
	U11-C05B2	Chromatography detectors	S03-E09C7
Chemical vapour deposition, semic	onductor layer	electrochemical	S03-E09C7F
	U11-C01B	electron capture	S03-E09C7E
laser assisted CVD	U11-C01B1	flame ionisation	S03-E09C7D
low pressure CVD	U11-C01B	ionisation	S03-E09C7D
metal-organic CVD	U11-C01B	katharometer	S03-E09C7C S03-E09C7B
photochemical CVD	U11-C01B	mass spectrometric optical	S03-E09C7A
plasma enhanced CVD	U11-C01B	photoionisation	S03-E09C7D
reactive CVD	U11-C01B	thermal conductivity	S03-E09C7C
CVD apparatus	U11-C09B	Cigarette lighter	200 207 07 0
Chemical warfare agents			X27-G01
analysis	S03-E14L	mechanical details	P15-T99
Chemiluminescence	S03-E04E		Q73-T11
Cheque validating and testing	T05-J	vehicle	X22-J06
Chess (game)	P36-C01	Cigarette manufacture	X25-P03
Giless (gaine)	W04-X02B1		P15-M
Child-proofing arrangements	P26-E	control	T06-D02
Chimney	Q46-B10		X25-P03
•		CIM	T06-A04B7
Chip capacitor - see Capacitor	V01-B03C5	Cinematography	S06-B05
Chip carriers		cinema equipment	S06-B05
digital computer interface	T01-C07C		W04-X03G5
packages for IC	U11-D01A3	video processing	W04-N05G3
substrates for IC packages	U11-D01A U11-F01E	Circuit	
testing/inspection		electrical testing	S01-G01
Chip inductor	V02-F01L	general manufacture - see <b>Genera</b>	
Chip resistor - see Resistor	V01-A02D	manufacture	V04-V
Chip terminals	U11-D03	Circuit assembly	_
		general - see General circuit man	
		المتاسط المتاسط	V04-V
		hybrid	U14-H04B

PCB - see <b>PCB manufacture</b>	V04-R	cutoffs, thermal	X13-D12
	VOTIC	earth leakage current type	X13-D12
Circuit breakers	L V12 D02	ELCB	X13-D05
air-break, with built-in arc contro		electrodynamic release	X13-D09
air-break, with separate arc cont air-break, without arc control	X13-B01	electromagnetic release	X13-D04
·		electrothermal release	X13-D03
arc extinguishing/prevention/de	X13-B04	fuses, thermal	X13-D12
arcing horns	X12-F01A	harmful gases detection	X13-D08
arcing norms	X12-101A X13-B04	indicators, operation	X13-D06
casings	X13-B09	induced-current release	X13-D09
contacts - see <b>Contacts</b>	X13-B07 X13-A	induction-motor release	X13-D09
CTs	V02-G01B	interlocking	X13-D09
C13	X12-C01G	latching mechanism	X13-D20C
	X12-C01G X13-B09	locking	X13-D09
DC applications	X13-B07 X13-B09	logic - see <b>Logic circuits</b>	U21-C
disconnectors	X13-B07 X13-B01	magnets, arc blow out	X13-D07
driving mechanisms	X13-B05	manufacture	X13-D08
fuses, electrical - see <b>Fuses, elec</b>		markings, distinguishing	X13-D06
rases, electrical see l'ases, elec	X13-D01	miniature circuit breaker	X13-D11
fuses, thermal - see Fuses, therr		monitoring	X13-D08
rases, thermal see I ases, then	X13-D12	mountings	X13-D06
fuse-switches	X13-B01	name plates	X13-D09
gas-break, with built-in arc contr		operating mechanism	X13-D20D
gas-break, with separate arc con		overload type, with hand-reset	
gao aroun, marooparato aro con	X13-B03A1	overload type, with power-reset	
interlocks	X13-B09	overload type, with separate	
isolators	X13-B01	overvoltage type	X13-D05
liquid-break, with built-in arc cor		protectors (not covered elsewhe	re)
	X13-B02		X13-D09
liquid-break, with separate arc c		protectors, thermal	X13-D12
.,,	X13-B03	rating plates	X13-D09
maintenance	X13-B08	RCCB	X13-D05
manufacture	X13-B08	release mechanism	X13-D20C
measurements	X13-B08	reset mechanisms	X13-D04A
microprocessors	X13-B08B	residual current type	X13-D05
monitoring	X13-B08	sensing mechanism	X13-D20A
moulded case type - see Circuit		solid state circuit breaker	X13-D10
breaker, moulded case	X13-D	terminals	X13-D06
oil-break, with built-in arc contro	I X13-B02	testing	X13-D08
oil-break, with separate arc cont	rol X13-B03	thermal cutoffs	X13-D12
optical fibre sensors	X13-B08A	thermal fuses	X13-D12
protectors (not covered elsewhe	ere)	thermal protectors	X13-D12
	X13-D09	thin film	U14-H01
PTs	V02-G01B	trigger mechanism	X13-D20B
	X12-C01G	underload type	X13-D05
	X13-B09	under-voltage type	X13-D05
repair	X13-B08	resetting action	X13-D02C
sectionalisers	X13-B01	electrothermal release mechanism	X13-D03A X13-D02A
SF6 circuit breakers	X13-B03A1A	mechanism	X13-D02A X13-D02B
testing	S01-G10		
	X13-B08	Circuit breaker/protector, applicat	
thermal cutoff	X13-D12	aerospace	X13-U03
thermal fuse	X13-D12	aviation	X13-U03
thermal protector	X13-D12	boats	X13-U04
vacuum circuit breaker	X13-B02A	industrial machines	X13-U06
vents for arc products	X13-B09	military	X13-U05
Circuit breaker, moulded case		railway	X13-U02
arc control	X13-D07	road vehicles	X13-U01
casings	X13-D06	ships	X13-U04
color coding, terminals	X13-D06	Citizens band radio	W02-G02
combined EM and connections	X13-D06	Clamp ammeter	S01-D01D1
contacts - see Contacts	X13-A	Clamp, electric cable installations	X12-G04A2
		•	

Clamping circuits		materials for semiconductor manu	facture
general application (DC limiter)	U24-C02A	materials for sermeofiadeter mana	U11-A10
general video signal application	W04-P01K		U11-C06A1B
pulse circuits application	U22-D01A1A	optical record carrier during manu	
TV receiver application	W03-A04C	J	T03-B01E3L
Clarinet	P86-A01A1	plasma processing apparatus	V05-F05C
			V05-F05E9
Clay pigeon shooting (sport)	P36-A05	railway train	Q21-M01
	W04-X01K5E	recording disks/cards/tapes etc.	T03-H02B
Clean room		road	X25-U05
air cleaner	X27-E01B2	scraper, in electrophotography	S06-A10A1
	T04-L08	semiconductor wafers	U11-C06A1B
air conditioning, semiconductor		sewage treatment	Q42-E
manufacture	U11-C15B1		X25-H03
air filter semiconductor manufactu		ship	Q24-R10
	U11-C15B1	sputtering, dry etching, deposition	
air quality	S03-E14N3	plasma apparatus, semiconduct	
facilities, semiconductor manufact			U11-C09F
	U11-C15B1	stamper, optical record carrier ma	
gas supply apparatus (see also sp			T03-B01E3L
CVD, plasma apparatus)	U11-C15B1	sterilisation	X27-D10
magnetic record carrier manufact		water treatment	X25-H03
andido antido	T03-A02B9	ultrasonic	P43-B07C
particle counting	S03-F06C		X25-H09A
	U11-C15B1		V06-V04C
protective clothing, semiconducto	U11-C15B1	Cleaning appliance	X27-D
static electricity prevention	X25-S01	carpet cleaner	X27-D08
• •	7/25-30 T	carpet shampooing machine	X27-D08
Cleaning	D42 D05	cleaning equipment (non-electrica	
air blast	P43-B05	clothes peg	P28-C05
aircraft	Q25-R10	dish drier	X27-D09
blade, in electrophotography	S06-A10A1	dish washer	X27-D01B
car wash	Q16-A01 X25-H09C	drier, clothes (electrical)	X27-D02
cassatta for magnetic heads	T03-A04B3B	drier (non-electrical)	P28-C05
cassette for magnetic heads cassette tape within cassette	T03-A04B3B T03-H01B5	clothes line (electrical)	X27-D06
cassette tape within cassette	T03-H02B	clothes line (non-electrical) domestic, mixed mode	P28-C05 X27-D07
	T03-N03	bubble systems	X27-D07 X27-D07G
cleaning equipment	P28-C	fabric enhancement	X27-D07G X27-D07M
computers and peripherals	T04-L08	using chemicals	X27-D07W
disinfection	X27-D10	using radiation	X27-D07K X27-D07C
domestic - see Cleaning appliance	ce	using steam/vapour	X27-D07E
5	X27-D	using vibration	X27-D07A
electrolytic	X25-R06	floor polisher, domestic	X27-D05
electronic component (general)	V04-X01D	floor polisher, industrial	X25-H09
electrophotographic charge remo	oval S06-A10B	floor washer	X27-D05
electrophotographic ozone remo		mangle, clothes drier (electrical)	X27-D09
electrophotographic toner remov		robotic vacuum cleaner	X27-D04R
electrophotography	S06-A10	shoes	X27-D09
floor cleaning	X27-D05	sweeper	X27-D05
gas blast	P43-B05	trouser press	X27-D09
general	P43-B	ultrasonic	X27-D07A
ground/soil decontamination	X25-H04	using radiation	X27-D07C
industrial	X25-H	vacuum cleaner	X27-D04
industrial workspace	X25-H05	vacuum cleaner, dual cyclone	X27-D04C
leads, semiconductor device/	U44 F00D2	washing machine	V07 50:
integrated circuit	U11-E02B3	electrical washing machine	X27-D01
lenses	P81-A01 P81-G	non-electrical washing machine	
lithography comiconductor many		wringer, clothes	X27-D09
lithography, semiconductor manu	U11-C04A1A	Climbing (sport/leisure)	P36-A06
magnetic heads	T03-A04B3		W04-X01K9
magnetic neads	100-70400		

Climate control for aircraft	X27-E01C W06-B01C5	tim		S04-B06 S04-C02
for electric vehicle	X21-C02		ing chain, for electrical type	S04-B03
for motor vehicle	X22-J02E1		ing fork, oscillator	S04-B02A
for railway train	X23-A10		ying clock frequency in comput	
for ship	W06-C01C5		ter-proofing	S04-A04A2
Clip, electric cable installations	X12-G04A2		ights	S04-A01
Clipper, garden	X27-A01A		nding	S04-A03
Clock			W-synchronised	S04-B06
acoustical time indication	S04-B05	Clock		
alarm, in electronic type	S04-B05		mputer system synchronisation	
alarm, in mechanical type	S04-A02X		ta transmission synchronisation	
antimagnetic shielding	S04-A04A1		egrated circuit	U13-E04
balance, oscillator	S04-B02A		mory synchronisation circuit	U14-A07C
battery	S04-B01A	rec	cording	T03-J03C
BPM-synchronised	S04-B06	Clock-i	in time registering	T05-G03
Braille	S04-B07	Clos ne	etwork	W01-A06G1
	S05-K			
buzzer	S04-B05		l circuit television systems	W02-F01
case	S04-A04		rglar,antitheft,intruder alarms	W05-B01C5
casing, for electrical type	S04-B09		ibrated system for measuring	W02 F01D
chain	S04-A01	_	dimensions mbined with alarm	W02-F01D W02-F01A5
clock/watch housing	S04-A04A			W02-F01A5 W02-F01C
combined radio-alarm	S04-B05		mponent inspection in mfg. try-phone	W01-C04A1
cuckoo	S04-B08	ent	ту-рпопе	W02-F01A1
date, local time, or tide indication	S04-A02B	ma	edical use	W02-F01M
DCF-77-synchronised	S04-B06	IIIe	dicai use	S05-D
electrical aspects	S04-B	pro	ocess control	W02-F01B
electrical winding	S04-B01A		veillance use	W02-F01A
electro-optic display	S04-B04A		nicle external view	W02-F01E
electronic display	S04-B04	vei	iicle exterrial view	X22-E09A
framework, bearings, calipers	S04-A05	veh	nicle internal view	X22-E09C
glass	S04-A04			
hands, dial, or drum	S04-A02A	Ciosed	l-caption TV receiver	S05-K
HBG-synchronised	S04-B06		_	W03-A10G
illumination, in mechanical type	S04-A02X		manufacture	X25-T04B
JJY-synchronised	S04-B06	cor	ntrol	T06-D03C
laser, maser oscillator	S04-B02X			X25-T04B
locking bar manufacture and materials	S04-A03 S04-A04B	Clothe	s	P21
master-slave system	S04-B06	apr	ron	P28-A99
•	S04-B00 S04-A	bak	by/children clothes and linen	P21-K
mechanical aspects mechanical construction aspects	S04-A04A	bel	lts, suspenders	P21-L
mechanical drive mechanism	S04-A01		ckle	P23-A06
motion, e.g. movable drum	S04-A01 S04-B08		ats, jackets	P21-C
motor driven	S04-B01B		lars, cuffs	P21-T01
MSF-synchronised	S04-B06		ctrical details	X27-A02B1
musical animation	S04-B05A	_	oves, scarves, ties, bow-ties	P21-H
oscillator	S04-B02		adwear	P21-F
parts	S04-A		ng, sleeves and pockets	P21-T01
pendulum, oscillator	S04-B02A		nufacture	P21-M
power supply	S04-B01A		vel constructional materials	P21-T50
quartz oscillator	S04-B02B		en gloves	P28-A99
radio transmission for setting	S04-B03		otective clothing	P21-N
9	S04-B06		rts , dresses	P21-B02
ringing, in mechanical type	S04-A02X		ortswear nirts, shirts, vests	P21-D
setting, for electrical type	S04-B03		nirts, shirts, vests users, shorts	P21-A P21-B01
spring	S04-A03		users, snorts dergarments, hosiery, nightwea	
striking, in mechanical type	S04-A02X	unc	aergarments, nosiery, nightwear	r P21-E
synchronous-motor	S04-B06			
TDF-synchronised	S04-B06	Clothe	s drier	X27-D02
test gear	S04-D			

Clothes line		convolution code error detection/	correction
clothes pegs	P28-C05		U21-A06C
electrical clothes line	X27-D02L		W01-A01B2
non-electrical clothes line	P28-C05	data transmission, error detection	
Clothes washer	X27-D01A	correction by block code	W01-A01B1
Clothing - see Personal article, clot	hina	data transmission, error detection	
<b>3</b>	X27-A02B1	correction by interleaving	W01-A01B5
military specific	W07-F01B	dot-and-dash, data transmission equal-length, data transmission	W01-A07A W01-A07B
non-electrical details	P21	error correction (general)	U21-A06
sports clothing	P36-A08A	error correction (general)	
vehicle/motorcycle specific	Q14-C16		W01-A01B
	X22-J11C	error correction for recording	T03-P01A
Cloud computing	T01-N01D3A	HARQ	W01-A01B4A
		hybrid coding scheme	W01-A01B4
Clutch electric machine	Q63-B	interleaving error detection/	
electric machine	V06-M10 X11-J05A	correction (general)	U21-A06E
electrically-driven	X11-303A X25-L02	pseudonoise (PN) code details	W02-K05B5
for electric vehicle	X21-A02A	Code conversion	U21-A05
for motor vehicle	Q13-A03	biphase level	U21-A05C
	X22-G01	compression	U21-A05A2
CMOS - see Integrated circuit		data transmission	W01-A02
structures, CMOS	U13-D01A	expansion language script	U21-A05A2 U21-A05D1
CNC	T01-J07B	Manchester	U21-A05C
CITC	T06-A04A2	parallel	U21-A05A1
machine tool	T06-D06	parallel/series	U21-A05B
	X25-A03F	run length codes (to or from)	U21-A05A2B
Coagulation properties	S03-F03	stochastic codes (to or from)	U21-A05A1
• • •		variable length codes (to or from)	U21-A05A2A
Coal-fired power plant	X11-A	Code converters, static	U21-A05A
Coal crusher	P41-A01	Code division multiplexing	W02-K08
	P41-V28	direct sequence spread spectrum	
Coating equipment (general)	P42-A	Code excited linear predictive (CEL	
	P42-B	encoding	W04-V05G3A
metallic coating	X25-K05 X25-A09	Codes	
plasma spray coating	X25-A09	data transmission, error	
Coating processes (general)	P42-E	correction/detection	W01-A01B
flocking	P42-E05A	error correction, digital computers	s T01-G01A
novel process	P42-E01	error correction/detection (genera	
pre- or post-treatment	P42-E03		U21-A06
special texture or finish	P42-E05	pseudonoise (PN)	W02-K05B5
control	T06-D18	secret data communication, block	wise W01-A05A
Coating thickness measurement -:	see Thickness	Coding	
Coating, luminescent for discharge	tube (general)	audio signals (general)	W04-V10
	V05-M01	audio signals (recording)	W04-G01F
Coaxial cable	X12-D05M	audio signals (speech)	W04-V05G
connector	V04-F	compression, general digital computer data	U21-A05A2 T01-D02
Connector	V04-M01	error correction, general	U21-A06
	V04-M03	error correction, telecoms	W01-A01B
	V04-M30G	general	U21-A05
Coaxial connector - see Connector,	electrical	image compression	T01-J10D
Code		secret communication	W01-A05
block code error detection/corre	ction	video(general)	W04-P01A
block code elloi detection/come	U21-A06A	video(recording)	W04-F01F
conversion - see Code conversion		Coefficient of thermal expansion, m	easuring
	W01-A02		S03-E01A
		Coffee grinder	X27-B03
		Coffee maker	X27-B03 X27-B01

Coffee pods/capsules         032-006           Coffine pods/capsules         032-006           Coffine and accessories         P33-A50           Cogeneration power plant carbon footprint reduction catalytic converter         M11-C08           carbon footprint reduction control         X11-C08           carbon footprint reduction control         X11-C10           environmental protection monitoring in poperation         X11-C10           operation operation         X11-C10           operation operation         X11-C10           operation operation operation         X11-C10           operation oper	Coffee percolator	X27-B01	insulating	V02-H01
Coffina and accessories   P33.A50   insulator, hf inductor   V02.F0381   insulator, hf reactor   V02.F0381   insulator, prower supply inductor   V02.G0281   insulator, power supply inductor   V02.G0281   insulator, power supply reactor   V02.G0			insulating	
Cogeneration power plant   fossil fuels			insulator, hf inductor	
Tossil fuels		P33-A50		
carbon footprint reduction		V44 C04	•	
Catalytic converter				
control environmental protection X11-C10 environmental protection X11-C10 operation X11-C10 operation X11-C10 operation X11-C10 operation X11-C10 testing X11-C10 manufacture, electromagnet (nloy power) V02-H01C manufacture, electromagnet (nloy power) V02-H01C manufacture, electromagnet for printer cob-F- v02-H01C manufacture, electromagnet for printer manufacture, electromagnet for printer cob-F- v02-H01C manufacture, electromagnet for printer manufacture, legtromagnet for printer manufacture, legtromagnet for printer manufacture, legtromagnet for printer manufacture, electromagnet for printer manufacture, leetromagnet for printer manufacture, leetromagn	•			
environmental protection ministrogram (211-C10 moniform) (211-C10 moni				
monitoring partition year transformer year testing printed, hf year handling control magnetic head year handling printed, hf year handling printed, hf year handling printed, hf year handling printed, hf year handling printed, manufacture year year handling year handling printed, manufacture year year handling			magnetic recording head	
operation x11-C10 repair x11-C10 testing x11-C10 testing x11-C10 testing x11-C10 testing x11-C10 non-fossil fuels constructional details control, monitoring & testing x15-V Conflowinding x15-V Corrections with a control, monitoring & testing x15-V Corrections with a control, monitoring & testing x15-V Corrections with a control, monitoring & testing x15-V Corrections with a control with a control, monitoring & testing x15-V Corrections with a control w	•			
repair testing X11-C10 testing non-fosail fuels X15-K			manufacture electromagnet (high	
testing X11-C10 non-fossil fuels X15-K constructional details X15-W Control, monitoring & testing X15-V Cognitive radio systems W02-C03G5 Cherent detection U23-P01J3A  CRT convergence V02-D CRT convergence V02-D CRT degaussing coil V02-D (N05-D01B3 V05-D08A5 V02-B0183 V05-D08A5 V02-B0183 V05-D08A5 V02-B0183 V05-D08A5 V02-B0183 V05-D08A5 V02-B0183 V05-D08A5 V02-B0183 V05-D08A5 V05-D0183 V05-D08A5 V05-D0183 V05-D08A5 V05-D0183 V05-D08A5 V05-D0183 V05-D0184 V05-D01	•		manufacture, electromagnet (mgn	•
Non-fossil fuels			manufacture electromagnet (low)	
Constructional details   Control monitoring & testing   X15-W   W02-C03G5   W02-C03G2   W02-C03G5   W02-C03G2		X15-K	manadatare, electromagnet (lett.)	
Control, monitoring & testing Copinitive radio systems (V02-C03GS5 Coherent detection  Coil  CRT convergence  V02-D  CRT convergence  V02-D  CRT convergence  V02-D  CRT degaussing coil  CRT degaussing coil  CRT degaussing coil  V02-D01B3  V05-D08B1  V05-D08B3  V05-D08B5  flat, hf  V02-F01N  handling  X25-F02  handling control  M20-F01N  magnetic head  T03-A03J5  poloidal, fusion reactor  X12-C01F  X14-A03  printed, hf  V02-F01N1  printed, manufacture  V02-H01A  V02-F01  printed, manufacture  V02-H01A  printed, manufacture  V02-H01A  V02-H01B  manufacture, power supply transformer  manufacture, power supply transformer  M12-C01B  manufacture, other low power devices  V02-H01S  manufacture, power supply transformer  manufacture, power supply transformer  manufacture, power supply transformer  v02-H01B  manufacture, other low power devices  V02-H01B  manufacture, power supply transformer  manufacture, power supply transformer  v02-H01B  manufacture, ligh power reactor  V12-C01D2  manufacture, high power reactor  V12-C01D2  manufacture, bigh power reactor  V12-C01D2  manufacture, bigh power reactor  V12-H01C  manufacture, bigh power reactor  V12-C01D2  manufacture, bigh power reactor  V12-C01D2  manufacture, power varisformer  manufacture, power supply transformer  v02-H01B  manufacture, low power reactor  V12-C01D2  manufacture, bigh power  manufacture, bigh power  v12-C01D2  manufacture, bigh power  v12-C01D2  man	constructional details	X15-W	manufacture, electromagnet for pr	
Coil         V02-D         W05-D0183         W02-H01C1         V02-H01C1         V02-H01C1         V02-H01C1         V02-H01C1         V02-H01C2         V02-H01C         V02-H01C         V02-H01C         V02-H01A         V02-H01A         V02-H01S         V02-H01S <th< th=""><th>control, monitoring &amp; testing</th><th>X15-V</th><th>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</th><th></th></th<>	control, monitoring & testing	X15-V	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Coil         V02-D         V02-D           CRT convergence         V05-D0681         V03-D0681           V05-D0681         V05-D0681         V02-D0           W03-A08A5A         W03-D08A5         W02-D0           CRT degaussing coil         V02-D         manufacture, high power reactor         X12-C01D2           flat, hf         V02-F01N         manufacture, high power transformer         X12-C01D2           handling         X25-F02         manufacture, low power transformer         V02-H01A           hf         V02-F01         manufacture, low power transformer         V02-H01B           manufacture, low power transformer         V02-H01B         manufacture, low power transformer           hf         V02-F01         manufacture, low power transformer         V02-H01B           manufacture, low power transformer         V02-H01B         manufacture, low power transformer         V02-H01B           manufacture, low power transformer         V02-H01B         manufacture, low power transformer         V02-H01B           manufacture, power supply transformer         V02-H01B         manufacture, other low power devices           manufacture, power supply transformer         V02-H01B         manufacture, other low power devices           manufacture, log power transformer         V02-H01B         manufacture,	Cognitive radio systems	W02-C03G5		V02-H01C3
CRT convergence	Coherent detection	U23-P01J3A	manufacture, electromagnetic rela	ıy
NOS-DOB183	Coil			
V05-D0681	CRT convergence	V02-D		
CRT degaussing coil			manufacture, electromagnetic valv	
CRT degaussing coil V02-D V05-D0183 manufacture, high power reactor X12-C01D2 manufacture, high power transformer X12-C01D2 manufacture, high power transformer X12-C01D2 manufacture, high power transformer V02-H01A manufacture, low power transformer V02-H01B Manufacture, low power transformer with low power devices Manufacture, low power transformer with low power devices Manufacture, low power transformer V02-H01B manufacture, low power transformer with low power devices manufacture, low power transformer with low power low low low power with low power with low power with low low power with low power with low power wi				
V05_D01B3	ODT   1		manufacture high newer reseter	
State	CRT degaussing coil			
flat, hf handling handling			manufacture, high power transform	
handling X25-F02 handling control T06-D08A X25-F02 hf V02-F01 magnetic head T03-A03J5 poloidal, fusion reactor X12-C01B1 printed, hf V02-F01N1 printed, manufacture V02-H01A printed, manufacture V02-H01A printed, manufacture V02-H01A printed, manufacture V02-H01A printed, manufacture V02-F01 printed, manufacture V02-B01 printed, manufacture V02-H01A printed, manufacture, power transformer N02-C01D2 manufacture, power transformer N11-C01D2 manufacture, power transformer N12-C01D2 manufacture, power transformer N12-C01D2 manufacture, power transformer N12-C01D2 manufacture, other low power devices w02-H01K manufacture, other low power devices w02-H01B manufacture, other low power devices w02-H01X manufacture, other low power devices w02-H01B manufacture, other low power devices w02-H01X manufacture, other low power supply transformer N02-H01B manufacture, other low power devices w02-H01X manufacture, other low power supply transformer N02-H01B manufacture, other low power supply v02-H01B manufacture, other low power supply v02-H	flot hf		manufacture low power reactor	
handling control   T06-D08A   X25-F02   hf   V02-F01   T03-A04A1C   T03-A04A1C   V02-F05   T03-A04A1C   V02-H05   V02-F05   Poloidal, fusion reactor   X12-C01B1   X12-C01B1   X12-C01B1   X12-C01B1   Y02-F01N1   X12-C01B1   Y02-F01N1   Y02-F03N1				
hf v02-F01 magnetic head T03-A04A1C v02-H015 v02-H05 v02-F05 manufacture, other low power devices v02-H01 magnetic head v02-F05 manufacture, other low power devices v02-H01X manufacture, power supply transformer v02-H01B manufacture, power transformer v02-H01B manufacture, solenoid v02-H01C manufacture, solenoid v02-H01C motor, high power v02-H01C motor, high power v02-H01C motor, low power v04-H01C motor, high power v11-J02 motor, high power v11-J02 motor, high power v04-H01C motor, high power v11-J02 motor, high power v11-J02 woll-H01C motor, high power v11-J02 motor, high power v11-J02 superconducting, high power v12-C01B1 superconducting, high power v12-C01B1 testing, high power v12-C01B1 testing, high power v12-C01B2 transformer, high power v12-H01B transformer, high power v12-C01B2 transformer, high power v12-H01B transformer, high power v12-C01B2 transformer, high power v12-H01B transforme	5			
hf magnetic head         V02-F01 magnetic head         T03-A03J5 V02-F05 manufacture, other low power devices         T03-A04A1C V02-H05 V02-H05 v02-H05 v02-H01 manufacture, other low power devices           poloidal, fusion reactor         X12-C01B1 X12-C01B1 X14-A03 v02-F01N1 v04-Q04 manufacture, power supply transformer v02-H01A v04-Q04 manufacture, solenoid v02-H01C motor, high power v11-J02 manufacture, solenoid v02-H01C motor, high power v11-J02 motor, high power v11-J02 motor, high power v11-J02 motor, high power v12-C01B1 superconducting, high power v12-C01B1 superconducting, high power v12-C01B1 testing, low power v12-C01B1 testing, low power v12-C01B1 testing, low power v12-C01B2 transformer, high power v12-C01B2 transformer, high power v12-C01B2 transformer, power supply v12-C01B2 sorting or delivering, in coin freed apparatus v13-C01B1 inductor, power supply v12-C01B1 sorting or delivering, in coin freed apparatus v13-C01B1 inductor, power supply v12-C01B1 coin mechanism v105-H01	nanaling control		manufacture, magnetic recording	head
Moderate	hf			T03-A04A1C
poloidal, fusion reactor  X12-C01B1 X12-C01F X14-A03  printed, hf  V02-F01N1  printed, manufacture  V02-H01A  V04-Q04  printed, manufacture  V02-H01A  V04-R  telecommunication-type telephone line loading  V02-F01  testing  toroidal, fusion reactor  X12-C01B1  X12-C01B2  V02-F02  V02-F03B  Vehicle ignition  V02-G01  V02-B03  V03-B03	magnetic head	T03-A03J5		
x12-C01F x14-A03 y02-F01N1 manufacture, power supply transformer y02-H01B y04-Q04 manufacture, solenoid y02-H01C manufacture, solenoid y02-H01C motor, high power x11-J02 motor, high power y04-M08 telecommunication-type telephone line loading y02-F01 y04-C01B y04-C01B y04-C01B y04-C01B y04-C01B y04-C01B y04-C01B testing y04-C01B y04-C01B toroidal, fusion reactor x12-C01B1 x12-C01B1 x12-C01F x14-A03 y04-F02 y14-A03 yehicle ignition y02-F01 x22-A01A winding, high power y02-F02 winding, low power y02-H01			manufacture, other low power dev	
printed, hf V02-F01N1 manufacture, power transformer X12-C01D2 manufacture, solenoid V02-H01C motor, high power X11-J02 motor, high power V06-M08 reactor, hf V02-F03B telephone line loading V02-F01 reactor, power X12-C01B1 superconducting, high power X12-C01B1 testing S01-G12E5 testing toroidal, fusion reactor X12-C01B1 x12-C01F x14-A03 vehicle ignition V02-G01 x22-A01A winding, high power V02-H01 V02-F01 vinding connection (general) V02-F01 country, power supply V02-F03B inductor, power supply V02-G01C inductor, power supply V02-G01C inductor, power supply V02-G01C vol-Mo8 vol-Mo8 reactor, hf V02-F03B reactor, power vol-Mo8 reactor, hf V02-F01 superconducting, high power X12-C01B1 testing, high power X12-C01D3 testing, low power V02-H08 transformer, hf V02-F02 vol2-F03B reactor, hf V02-F03B reac	poloidal, fusion reactor			
printed, hf V02-F01N1 V04-Q04 manufacture, power transformer V02-H01C manufacture, solenoid V02-H01C motor, high power V02-H01C motor, high power V02-H01C motor, high power V02-H01C motor, high power V04-M08 reactor, hf V02-F03B reactor, hf V02-F03B reactor, power V04-M08 v02-F01 superconducting, high power V02-E02X testing S01-G12E5 testing, high power V02-E02X testing toroidal, fusion reactor X12-C01B1 testing, low power V02-E02X vehicle ignition V02-G01 transformer, hf V02-F02 winding, low power V02-H01			manufacture, power supply transfo	
v04-Q04 printed, manufacture v02-H01A v04-R telecommunication-type telephone line loading v02-F01 testing toroidal, fusion reactor v12-C01B1 vehicle ignition v12-C01D2 winding, low power v02-H01 v02-F01 toroidol, fusion reactor v12-C01D2 winding, low power v02-H01 v02-F01 transformer, power v02-H08 testing, ligh power v02-F02 testing, ligh power v02-F03B testing, low power v02-F03B testing, low power v02-F03B testing, low power v02-F03B transformer, power v02-F03B transformer, power supply v02-G01A transformer, power supply v02-G01B sorting or delivering v02-F03 validating, testing validating, testing T05-J  Coin freed apparatus coin mechanism T05-H01	and a second of the		manufacture nower transformer	
printed, manufacture V02-H01A V04-R motor, high power V06-M08 telecommunication-type telephone line loading V02-F01 reactor, power V02-F03B telephone line loading V02-F01 superconducting, high power V02-F03B testing S01-G12E5 testing, high power V02-F02X testing S01-G12E5 testing, high power V02-F02X testing toroidal, fusion reactor X12-C01B1 testing, low power V02-F02X testing, high power V02-F02X testing, low power V02-F02X transformer, power v02-F03B transformer, power supply V02-G01A transformer, power supply V02-G01A v02-G02B vinding Connection (general) V02-D sorting or delivering T05-L07 non-electrical details P23-C30 sorting or delivering, in coin freed apparatus volumed apparatus validating, testing T05-H03 validating, testing T05-J Coin freed apparatus coin mechanism T05-H01	printed, ni			
telecommunication-type telephone line loading V02-F01 reactor, hf V02-F03B reactor, power X12-C01B1 superconducting, high power X12-C01D3 superconducting, low power V02-F02X testing S01-G12E5 testing, high power X12-C01D3 toroidal, fusion reactor X12-C01B1 testing, low power V02-H08 testing, low power V02-H08 transformer, hf V02-F02 X14-A03 V02-F03B vehicle ignition V02-G01 transformer, power X12-C01B2 transformer, power supply V02-F03B vinding, low power V02-H01 Coin  Coil/winding Connection (general) V02-D sorting or delivering T05-L07 non-electrical details P23-C30 sorting or delivering, in coin freed apparatus inductor, power supply V02-G01C V02-G02B Coin mechanism T05-H01  Coin freed apparatus coin mechanism T05-H01	printed manufacture		· ·	
telecommunication-type telephone line loading  V02-F01  W01-C08E  W02-C01B  V02-C01B  testing toroidal, fusion reactor  V12-C01B1  V22-R01B  V22-R01B  V22-R01B1  V22-R01B2  V22-R01B1  Coin  T05-L07  T05-K01  T05-H03  T05-H03  V22-R03  V22-R03B  V23-R03B  V2	printed, mandiaetare			V06-M08
telephone line loading	telecommunication-type		reactor, hf	V02-F03B
testing S01-G12E5 testing, high power X12-C01D3 toroidal, fusion reactor X12-C01B1 testing, low power X12-C01D3 testing, low power V02-H08 testing, low power V02-H08 transformer, hf V02-F02 V02-F03B transformer, power Supply V02-G01A transformer, power Supply V02-G01A transformer, power Supply V02-G01A transformer, power Supply V02-G01A vo2-G02B vinding, low power V02-H01  Coil/winding Connection (general) Superior Supply V02-D sorting or delivering sorting or delivering inductor, hf V02-F01 sorting or delivering, in coin freed apparatus validating, testing T05-H03 inductor, power supply V02-G01C Coin freed apparatus coin mechanism T05-H01		V02-F01		X12-C01B1
testing toroidal, fusion reactor X12-C01B1 testing, high power X12-C01D3 testing, low power V02-H08 V12-C01F X14-A03 V2-F02 X14-A03 V2-F03B V22-A01A Winding, high power W12-C01D2 Winding, low power V02-H01 Coil/winding Connection (general) general inductor, hf V02-F01 inductor, power inductor, power w12-C01B1 inductor, power w12-C01B1 inductor, power w12-C01B1 inductor, power supply V02-G01C V02-G02B V02-G02B V02-G02B V02-G01C V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G01C V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G01C V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G02B V02-G01C V02-G02B V02-G01C V02-G02B V02-G01C V02-G02B V02-G01B V02-		W01-C08E		
toroidal, fusion reactor  X12-C01B1 X12-C01F X14-A03  vehicle ignition  V02-G01 X22-A01A  winding, high power winding, low power V02-H01  Coil/winding connection (general) general inductor, hf V02-F01 inductor, power inductor, power supply V02-G01C V02-G02B  transformer, power transformer, power transformer, power supply V02-G01A transformer, power supply V02-G01A transformer, power v02-H08 transformer, hf V02-F03B transformer, power supply V02-G01A V02-G02B  Coin  counting counting r05-L07 non-electrical details p23-C30 sorting or delivering sorting or delivering, in coin freed apparatus v02-F03B validating, testing T05-H03 T05-H01  Coin freed apparatus coin mechanism T05-H01		W02-C01B		
x12-C01F x14-A03 vehicle ignition V02-G01 x22-A01A winding, high power winding, low power V02-H01  Coil/winding connection (general) inductor, hf v02-F03 inductor, power inductor, power supply V02-G02B  transformer, hf v02-F02 v02-F03B transformer, power x12-C01B2	5			
vehicle ignition  V02-G01  X22-A01A  winding, high power winding, low power  V02-H01  Coil/winding  connection (general) inductor, hf  v02-F03B  v02-F03B  v02-F03B  v02-F03B  v02-F03B  v02-F03B  inductor, power winding, low power  V02-F03B  inductor, power winding, low power  V02-F03B  v02-F03B  v02-F03B  v02-F03B  v02-F03B  v02-F03B  v02-F03B  v02-F03B  validating, testing  Coin freed apparatus  v02-F03B  validating, testing  Coin freed apparatus  vo2-F03B  validating, testing  Coin freed apparatus  vo2-F03B  validating, testing  Coin freed apparatus  coin mechanism	toroidal, fusion reactor			
vehicle ignition  V02-G01  X22-A01A  winding, high power winding, low power V02-H01  Coil/winding connection (general) inductor, hf v02-F03B inductor, power inductor, power supply V02-G02B  transformer, power transformer, power supply V02-G01A  v02-G02B  Coin  counting counting non-electrical details p23-C30 sorting or delivering sorting or delivering, in coin freed apparatus v02-F03B validating, testing T05-H03 validating, testing T05-H01  Coin freed apparatus coin mechanism T05-H01			transformer, nf	
x22-A01A winding, high power winding, low power V02-H01  Coil/winding connection (general) inductor, hf v02-F03B inductor, power inductor, power supply  x22-A01A transformer, power supply V02-G02B  Coin  counting counting r05-L07 non-electrical details P23-C30 sorting or delivering r05-K01 sorting or delivering, in coin freed apparatus v02-F03B validating, testing r05-H03 validating, testing r05-H03 Coin freed apparatus coin mechanism r05-H01	contribute in the state of		transformer nower	
winding, high power winding, low power V02-H01  Coil/winding connection (general) v02-D connection (general) v02-F01 inductor, hf v02-F03B inductor, power inductor, power supply v02-G02B  winding, low power v02-H01  Coin  counting T05-L07  non-electrical details P23-C30  sorting or delivering T05-K01  sorting or delivering, in coin freed apparatus  v02-F03B validating, testing T05-H03  Coin freed apparatus  coin mechanism T05-H01	venicle ignition			
winding, low power V02-H01  Coil/winding connection (general) V02-D connection (general) V02-D sorting or delivering T05-K01 inductor, hf V02-F01 sorting or delivering, in coin freed apparatus V02-F03B validating, testing T05-H03 inductor, power supply V02-G01C V02-G02B  Coin  Coin	winding high power		a and on the company	
Coil/windingcountingT05-L07connection (general)V02-Dnon-electrical detailsP23-C30generalV02-Dsorting or deliveringT05-K01inductor, hfV02-F01sorting or delivering, in coin freed apparatusV02-F03BT05-H03inductor, powerX12-C01B1validating, testingT05-Jinductor, power supplyV02-G01CCoin freed apparatusV02-G02Bcoin mechanismT05-H01			Coin	
connection (general) V02-D non-electrical details P23-C30 sorting or delivering T05-K01 sorting or delivering, in coin freed apparatus V02-F03B validating, testing T05-J Coin freed apparatus V02-G02B Coin mechanism T05-H01	= · ·			T05-L07
general V02-D sorting or delivering T05-K01 sorting or delivering, in coin freed apparatus T05-H03 validating, testing T05-J  Coin freed apparatus T05-H03  Coin freed apparatus T05-H03  Coin freed apparatus T05-H01	_	V02-D		
inductor, hf V02-F01 sorting or delivering, in coin freed apparatus T05-H03 inductor, power supply V02-G01E validating, testing T05-J  Coin freed apparatus validating, testing T05-J  Coin freed apparatus coin mechanism T05-H01				
inductor, power X12-C01B1 validating, testing T05-J inductor, power supply V02-G01C V02-G02B Coin freed apparatus coin mechanism T05-H01	5		sorting or delivering, in coin freed	apparatus
inductor, power supply  V02-G01C  V02-G02B  Coin freed apparatus  coin mechanism  T05-H01	•			
V02-G02B coin mechanism T05-H01			validating, testing	T05-J
	inductor, power supply		Coin freed apparatus	
coin sorting, testing T05-H03		V02-G02B		
			coin sorting, testing	T05-H03

copier	S06-K99B	general record carriers	T04-J02
dispensing electricity	T05-H06	Collector	
dispensing fluid, granular materia facsimile		batch, in non-computer printing	S06-C09
Tacsimile	T05-H05C S05-K99D	electric train/tram	X12-G02E
games, amusements	T05-H05E		X23-A04
games, amasements	W04-X02A	electric trolley bus	X12-G02E
hiring articles	T05-H05A	electric vehicle	X21-B03 X21-B03
individual item dispensing	T05-H04		
supermarket trolley lock	T05-H05A1	Colonoscope	S05-D04
telephone	T05-H05C	Colorimetry	S03-A02C
	W01-C07A5	Color	
Coin holder, personal	T05-L05B	change, for time indication	S04-C07
Coin operated apparatus - see Coin	freed apparatus	facsimile measurement	S06-K01 S03-A02C
Cold cathode		pattern recognition	T04-D08
analysing tube	V05-F04A3	photocopying	S06-K01
analysing tube, current limiting ar		printer, for computer	S06-K01
10. 1	V05-F04A3C	separation, for plate production	S06-C02B
display	V05-D05C5	Color coder	W04-Q05
display display, current limiting arrangem	V05-D05C3	Color coding of cable insulation	X12-D03C2
display, current inflang arrangen	V05-D05C5C	Color coding of resistor value	V01-A01D
display manufacture	V05-L05D1A	Color organ	W04-U08
fluorescent lamp	X26-A01E1	_	S06-C02B
for display	V05-D05C5,	Color separation, for printing	300-C02B
general	V05-D01C3 V05-M03A	Color signal processing demodulation circuit in TV receive	~/V/U3 V UED
general, currrent limiting arrange		in computer printer	S06-K01
general, carrient innang arrange	V05-M03A3	in computer printer	S06-K07A
manufacture, for discharge tubes		in copier	S06-K01
micro cold cathode devices (e.g.		'	S06-K07A
	V05-B05	in facsimile	S06-K01
micro cold cathode devices (e.g.	**		S06-K07A
current limiting arrangements	V05-B03B1A	recognition of standard in TV rece	
micro-fabricated	V05-M03A1	i d a a wa a a wali a a	W03-A05D1 W04-F01D
Cold cathode device	\/OF DOF 4 2\/	video recording	
heat pumps microfabricated - see <b>Microfabri</b> c	V05-B05A3X	Color television systems (analogue	) VVUZ-FUZ
cathode device	U12-B03D	Comb filter	
microminiature (e.g. triode) - see	012 0000	analogue	U25-A03
Microfabricated cold cathode	device	digital RF waveguide	U22-G01B5 W02-A05A3
	V05-B05	1	
Cold cathode tube	V05-B03	Combat-based sports	P36-A04 W04-X01K4
anodes	V05-B03B5	Combination comparts	
cathode	V05-B03B1	Combination connector	V04-M12
complete novel tube	V05-B03B8	Combination cooker	X27-C07
current limiting arrangements grid	V05-B03B1A V05-B03B3	Combination oven	X27-C07
lead-in conductors	V05-B03B7	Combined cycle power plant	
manufacture	V05-L05B3	fossil fuels	X11-C03
microminiature - see		carbon footprint reduction	X11-C08
Microfabricated cold cathode	device	catalytic converter	X11-C08
	V05-B05	control environmental protection	X11-C10 X11-C08
tube details	V05-B03B	monitoring	X11-C00
vessel	V05-B03B7	operation	X11-C10
Cold conductor	V01-A02A7B	repair	X11-C10
Cold nuclear fusion	X14-A03A	testing	X11-C10
Collator		non-fossil fuels	X15-J
batch, in non-computer printing	S06-C09	constructional details	X15-W
copier	S06-A12C	control, monitoring & testing	X15-V

Combing	X25-T04A	Combustion analysis	S03-E01C
control, yarn	T06-D03B		S03-E09B
	X25-T04A	Comfort noise generation	
Combustion	X27-G	general speech signal processing	
1	Q73-A	silence detection aspects	W04-V04A1
analysis by boiler heat recovery	S03-E09B X27-G	telephone speech signal processi	ng W01-C01C7A
burner construction	Q73-T01		
calorimetry	S03-E01C	Commercial air conditioning system	
combustion chamber	Q73-T03	Air conditioning	X27-E01B
control	X27-G02	Commercial heating system - see H	eating
Control	Q73-B		X27-E01
control, air/fuel supply	X27-G02	Commercial message	
control, draft	X27-G02	detection in TV receiver	W03-A18A5G
control, flame monitor	X27-G02	local storage	W03-A16G
control, flue gas	X27-G02	recording prevention	W04-E04C5C
detection of,	S03-E14R	selective insertion	W02-F10Q5
damper	X27-G	transmission monitoring	W02-F04C5
extinguishing devices	Q73-T12	TV broadcasting, general	W05-E03C
filters	Q73-T06	Commercial refrigeration - see Refr	igeration
fluid circulation/flow	Q73-T02	Commercial remigeration - see Ken	_
fluidized bed construction	Q73-T10		X27-F
fuel, pre-treatment	Q73-T05A	Common mode rejection ratio	
fuel feed system	Q73-T05B	improvement in amplifier	U24-G03P1
fuel nozzle	Q73-T05C	Communication cable	X12-D05
fuel used biomass fuel	Q73-A15	Communication connector - see Co	nnector.
	Q73-A15D Q73-A15C	electrical	•
gaseous fuel liguid fuel	Q73-A15B	Communication transducer - see Ac	oustoelectric
solid fuel	Q73-A15B Q73-A15A	transducer	Justociccuic
gas/liquid/solid fuel	X27-G		
grates	Q73-T04	Communications aircraft	WO/ DO1D7
igniter	X27-G01	anti-eavesdropping	W06-B01B7 W02-L07C
5	Q73-T11	anti-jamming	W02-L01C
maintenance	Q73-G	data system	W01-A
recycling of components	Q73-R	eavesdropping	W02-L07A
reducing flame noise	X27-G	jamming	W02-L01A
repair	Q73-G	line system	W02-C01
safety/protection	Q73-T20	near field system	W02-C02
start-up details	Q73-A03	optical system	W02-C04
types of combustion	Q73-A	protocol (general data transmissio	on)
using catalytic material	Q73-A01	· -	W01-A07G
burners	Q73-A02	protocol for bus communication	T01-H07B
cremation furnaces	Q73-A05	protocol for data network	W01-A06F
fluidized bed combustion	Q73-A04	radio system	W02-C03
incinerators	Q73-A05	receiver	W02-G03
Combustion (applications)		scrambling	W02-L05
boiler	Q73-U27	secret data	W01-A05
burner	X27-G	secret, general	W02-L
central heating	X27-E01A1	ship	W06-C01B7
dana anta	X27-G	sonic telephone system	W02-C07A W01-C
domestic	X27-G Q73-U01	telephone system television system	W01-C W02-F
food industry	Q73-U07	ultrasonic	W02-C07A
food industry industrial	X25-X13	vehicle	X22-K
maustriai	Q73-U40		
metallurgy	Q73-U26	Commutator	V04-L01A
underwater use	Q73-U45	manufacture	V04-P02
waste disposal/treatment	Q73-U20	manufacture, motors	V06-M11A
waste disposal/treatment water heating	X27-E03	motors	X11-J08A
	X27-G	motors	V06-M12 X11-J03
	-		X11-303

Compact disk player	W04-C10A	Composite resistor (e.g. RC, RL etc.	.) - see <b>Resistor</b>
audio	W04-C10A1		V01-A02G
interactive (CD-I)	W04-C10A	•	V017102G
video	W04-C10A3	Compression	14/04/004
Companders	U24-C02B	audio compression	W04-G04
audio applications	W04-G04	audio data compression	W04-V10
general/radio applications	W02-G04A	gain control	U24-C02B
= ::	W02 00 I/ (	speech compression	W04-V05G
Comparator	1100.0	time compression, radio	W02-G04A1
frequency	U23-C	video signal amplitude	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
general circuits	U22-A04D5	compression (general)	W04-P01E8
phase	U22-D02	video data compression	W04-P01A
i e e	U23-C	video signal amplitude	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
pulse generation using	U22-A02E	compression (recording)	W04-F01A5
Compasses	S02-B06	volume compression, radio	W02-G04B1
	W06-A09	Compression of data	
Compensation		computer, (general)	T01-D02
ambient variations	S02-K02B	digital data (general coding)	U21-A05A2
CCD imager characteristics	W04-M01B7	digital data transmission	W01-A02A
g	W04-M01D6	digital recording (general)	T03-P01B
	W04-P01H	facsimile	S06-K07A4D
dimension, angle, area, etc. Mea		image	T01-J10D
	S02-A07	Compressor	X25-L03B
electronic imaging device charac		industrial, electric	X25-L03B
and the same and t	W04-P01H	refrigeration	X25-L03B
flowmeters	S02-C07		X27-F02C1
general, of sensor/transducer ou		vehicle, mechanical	Q55
9	S02-K02		Q56
geophysics devices	S03-C10	vehicle supercharger	Q51-H05A
level indicating	S02-C07	The state of the s	X22-A14
noise effects in electrical instrum		vehicle turbocharger	Q51-H05A
	S01-H01A		X22-A14
nuclear radiation measurement	S03-G05	Compton offset	S03-E06C
optical instruments	S03-A05E	Compton effect	303-E00C
.,	S03-A05E	Computer	
optical test equipment- materials		analogue	T02-A
investigation	S03-E04P	analogue input	T01-C08
pressure variations	S02-K02B3	analogue output	T01-C08
scientific instruments	S03-H03B	architecture - see Computer arch	
special purpose measurement of			T01-M
	S02-F03X	characterised by type	T01-M06
speed/acceleration measuremen	t S02-G07C	client-server systems	T01-M02A1B
temperature pressure measurem		clock signal generation and distri	
	S02-F04E	coding for, keyboards or printers	
temperature variations	S02-K02B1	Computer aided design - see CAI	
thermometers	S03-B01H5	computer games	
transducer characteristics	S02-K02A	computer programming techniqu	
volume and mass flow measurem	nent	constructional details	T01-L02
	S02-C07	cooling and ventilating	T01-L02A
weighing apparatus	S02-D07	cooperative	T01-M02B
Complementary bipolar IC - see Int	tegrated	CPUs	T01-J15A1
circuit structures, complementar		data input	T01-C
circuit structures, complementar	U13-D01A	data output	T01-C
	013-D01A	data logging	T01-J08F
Complementary MOSFET IC - see	SC1142 D004	data/demand driven	T01-M03
Integrated circuit structure, CMC	<b>JS</b> U13-DU2A	desk calculator	T01-J01
Composing, photoelectronic, print	ing	desktop	T01-M06A3
•	S06-C01	distributed	T01-M02A
Commonito comonitare/a es DC 10		docking stations	T01-M06A1B
Composite capacitor (e.g. RC, LC, e		electrical circuits and hardware	T01-J15A
	V01-B03C8	electrical equipment monitoring	T01-J08F
Composite displays	W05-E05C	electrical equipment testing	T01-J08F
		EM shielding	T01-L02D

Emulator					
toys and novelties T01-30B mand-held T01-M06A1A housing T01-102B T01-M06A1A housing T01-102B T01-M06A1A housing T01-102B T01-M06A1A housing T01-102B T01-M06A1A housing T01-M06A1A housing T01-M06A1A housing T01-M06A1A housing T01-M06A1A toys and novelties T01-M06A1A housing T01-M06A1A toys and novelties T01-M06A1A to the separatus with telephone apparatus with telephone system (CTI) W01-C05B4A (with telephone system T01-M06A1A (with telephone system T01-M		T01-F05G			
hand-held   T01-M06A1A   Would arrangements   T02-B   hybrid arrangements   T02-B   warying clock rate   T01-K01   hybrid arrangements   T02-B   warying clock rate   T01-K01   wibration testing   T01-G04   wibration testing   T01-G04   wibration testing   T01-G04   wibration testing   T01-G05   T01-M06A1A   wibration testing   T01-M06A1A   wearship   T01-M06A1A   wearship   T01-M06A1A   wearship   T01-M06A1A   wibration testing   T01-M06A1A   warehines   T01-M06A1A   wibration testing   T01-M06A1A   warehines   T01-M06A1A   wibration testing   T01-M06A1A   warehines   T01-M06A1A   warehines   T01-M06A1A   wibration testing   T01-M06A1A   warehines   T01-M06A1A   warehines   T01-M06A1A   warehines   T01-M06A1A   warehines   T01-M06A   witrust allowed   T01-M06A   warehines   T01-M06				n (CTI)	W01-C05B4A
housing   T01-L02B   hybrid arrangements   T02-B   this grated circuit   T01-I15A2   tintegrated with telephone apparatus   W01-C01P2   tintegration with telephone system   T01-M02A1C   keyboard input in-co-operation with display   T01-C02A1   this processor display   T01-C02A1   the processing telephoral processor on total processing technology   T01-M02A1C   the processing technology   T01-M02A1C   the processing technology   T01-M02A1C   the processor on total processor on total powers   T01-M02A1C   the processor on total powers   T01-M02A1C   the processor on total proc	•	-	toys and novelties		
hybrid arrangements   TO2-B   tintegrated circuit   TO1-J15A2   integrated with telephone apparatus   W01-CO1P2   integrated with telephone system (CTI)   W01-CO584A   W01-CO584A   W01-CO584A   woranable   TO1-M06A1A   webboard input in-co-operation with display   W01-CO584A   webboard input in-co-operation   W01-CO584A   webboard input in-co-operation   W01-CO584A   webboard input in-co-operation   W01-A06A1A   webboard input in-co-operation   W01-A06A1   webboard input in-c	hand-held	T01-M06A1A			W04-X
integrated circuit triegrated with telephone apparatus	9	T01-L02B			T01-K01
Integrated with telephone apparatus   W01-C01P2	hybrid arrangements	T02-B	vibration testing		T01-G04
wearable   T01-M06A1A		T01-J15A2	virtual machines		T01-M09
wearable   T01-M06A1A		tus	virtual systems		T01-F05G3
W01-C0584A   W01-C0584A   Reyboard input in-co-operation with display   T01-C02A1   Reyboard interface   T01-M02A1C   W01-A068   T01-M02A1A   Mainframe   T01-M02B   Mo2A1C   W01-A068   T01-M02A1A   Mainframe   T01-M02B   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   M			wearable		T01-M06A1A
W01-C0584A   W01-C0584A   Reyboard input in-co-operation with display   T01-C02A1   Reyboard interface   T01-M02A1C   W01-A068   T01-M02A1A   Mainframe   T01-M02B   Mo2A1C   W01-A068   T01-M02A1A   Mainframe   T01-M02B   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A068   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   W01-A06A   Mo2A1C   M	integration with telephone system	(CTI)	Computer animation		T01- I10C5
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quantum processor record carriers, magnetic tape RISC server single chip T01-M05 U13-C05 software development software equipment supercomputer superconductive superscalar T01-M06Q T01-M06Q T01-C01 T01-M04 Superconductive T01-M04 Superconductive T01-M06Q T01-C01 T01-M04 Superconductive T01-M04 Superconductive T01-M06Q Superconductive Superconductive T01-M06Q Superconductive T01-M06Q Superconductive Superconductive T01-M06Q Superconductive T01-M06Q Superconductive Superconductive T01-M06Q Superconductive Superconductive T01-M06Q Superconductive Superconductive Superconductive T01-M06Q Superconductive Superconductive T01-M06Q Superconductive Superconductive Superconductive Superconductive T01-M06Q Superconductive Superc			varying clock rate		
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RISC server T01-M06S single chip T01-M05 U13-C05 Single processor unit software development sport equipment supercomputer superconductive superscalar  T01-M04  3-D image generation T01-J10C4 3-D printing T01-J07B3 Additive manufacturing T01-J07B3 Additive manufacturing T01-J07B3 Application Programming Interface T01-J20B1 applications, image processing T01-J10G approximation, function evaluation T01-J04D artificial intelligence (AI) T01-J16 audio processing T01-J18 CAD for non-electrical application T01-J15X	•		built into clothing		X27-A02B1E
server T01-M06S single chip T01-M05 U13-C05 Single processor unit T01-M01 Software development T01-J20 Sport equipment T01-P02B Supercomputer T01-M06C Superconductive T01-M06E Superscalar T01-M06S Single processor unit T01-M06S SID printing T01-J07B3 Additive manufacturing T01-J07B3 Additive manufacturing T01-J07B3 Application Programming Interface T01-J20B1 Sport equipment T01-P02B Superscalar T01-M06C Superscalar T01-M06E Superscalar T01-M06S SID image generation T01-J07B3 Additive manufacturing T01-J07B3 Additive manufacturing T01-J07B3 Application Programming Interface T01-J20B1 Supplication Programming Interface T01-J20B1 Superscalar T01-M06C Superscalar T01-M06E Superscalar T01-M06S Supe			Computer data process	ina systems	T01-J
single chip  T01-M05 U13-C05 Additive manufacturing T01-J07B3 Additive manufacturing T01-J07B3 Additive manufacturing T01-J07B3 Additive manufacturing T01-J07B3 Application Programming Interface T01-J20B1 Application Programming Interface T01-J10G Application Programming Interface T01-J20B1 Application Programming Interface T01-J10G Application Programming Interface T01-J20B1 Application Programming Interface T01-J10G Application Programming Interface					
U13-C05  single processor unit  software development  sport equipment  supercomputer  superconductive  superscalar  U13-C05  Additive manufacturing  Application Programming Interface  T01-J20B1  applications, image processing  T01-J10G  applications, image processing  T01-J10G  applications, image processing  T01-J10G  approximation, function evaluation T01-J04D  artificial intelligence (AI)  T01-J16  audio processing  T01-J18  CAD for non-electrical application  T01-J15X			5 5		
single processor unit T01-M01 Application Programming Interface T01-J20B1 software development T01-J20 applications, image processing T01-J10G sport equipment T01-P02B approximation, function evaluation T01-J04D superconductive T01-M06C artificial intelligence (Al) T01-J16 superscalar T01-M02C3 CAD for non-electrical application T01-J15X	sg.c cp			ina	
software developmentT01-J20applications, image processingT01-J10Gsport equipmentT01-P02Bapproximation, function evaluation T01-J04DsupercomputerT01-M06Cartificial intelligence (Al)T01-J16superconductiveT01-M06Eaudio processingT01-J18superscalarT01-M02C3CAD for non-electrical applicationT01-J15X	single processor unit				
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superscalar T01-M02C3 CAD for non-electrical application T01-J15X	•			(, ()	
				al application	
switching, applications 021-000A   Color processing 101-310000				ат аррисацоп	
	switching, applications	07 1-D03V	color processing		

T01-J15H T01-J20 T01-J18 T01-J11G T01-J10C3 T01-J12B1 T01-J04C T01-J07D1 T01-J07D3 T01-J10C4A T01-J04B1 T01-J12 T01-J12B T01-J11A

T01-J10C4 T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3 T01-J10C4A

nputer data processing system		line generation, image	T01-J10C2
color system conversion	T01-J10B3B	mark-up languages	T01-J11C1
communication controller	T01-J08C	matrix computation	T01-J04C
composite image formation	T01-J10C7	medical information system	T01-J06A1
computer control of industrial m		missile guidance	T01-J07D3
	T01-J07B	multiple sensor data acquisition	T01-J07A3
computer control of manufactur		neural network	T01-J16C1
machines	T01-J07B	office automation	T01-J11D
computer graphics	T01-J10C	portable data acquisition device	T01-J07A1
computer tomography	T01-J10C4B	process control	T01-J07B1
correlation function	T01-J04B2	process control, industrial	T01-J07
correlation or transformation	T01-J04B	program management	T01-J12
curve generation, image	T01-J10C2	quality control	T01-J07B1
data collection/acquisition	T01-J07A	security	T01-J12C
lesk-top publishing	T01-J11B	shape generation, image	T01-J10C2
lictionary, word processing	T01-J11A1	simulation of non-electrical system	
ligital function generator	T01-J17		T01-J15H
locument delivery systems	T01-J11D	software development	T01-J20
OTP	T01-J11B	speech processing	T01-J18
electronic documentation	T01-J11C	spreadsheets	T01-J11G
quipment support	T01-J08A	text generation, image	T01-J10C3
equipment support using	T01-J08A1	user interface management	
equipment support using DSP	T01-J08A2	system, windows	T01-J12B1
expert systems	T01-J16A	vector computation	T01-J04C
ont generation, image	T01-J10C3	vehicle control	T01-J07D1
or administration	T01-J05A2	vehicle guidance	T01-J07D3
or commerce	T01-J05A	virtual reality image generation	T01-J10C4A
or computer aided design	T01-J15	Walsh transformations	T01-J04B1
or electrical equipment	T01-J08	WIMPS	T01-J12
or equation solving	T01-J04A	windows computer interface	T01-J12B
or finance	T01-J05A1	word processing (WP)	T01-J11A
or function synthesis/analysis	T01-J04	Computer data processing technology	av
or information handling	T01-J05B	J	
or medical systems	T01-J06A	hita a sana atau	T01-E05
or statistics evaluation	T01-J03	biocomputer	T01-E05D
ourier transform	T01-J04B1	electro-optical	T01-E05A
uzzy logic system	T01-J16B	neuronal	T01-E05B
genetic algorithm	T01-J16C4	optical	T01-E05A
geographical information systen	n T01-J06B1	superconducting	T01-E05D
	ssina	Computer graphics	
rammar-checking, word proces	,g		
rammar-checking, word proces	T01-J11A1	3-D image generation	T01-J10C4
-			T01-J10C4 T01-J10C7
raphic packages	T01-J11A1	3-D image generation	
raphic packages graphical image generation	T01-J11A1 T01-J10C5	3-D image generation composite image formation	T01-J10C7
raphic packages raphical image generation GUI	T01-J11A1 T01-J10C5 T01-J10C1	3-D image generation composite image formation computer animation	T01-J10C7 T01-J10C5
graphic packages graphical image generation GUI ICI	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12	3-D image generation composite image formation computer animation curve generation graph generation	T01-J10C7 T01-J10C5 T01-J10C2
graphic packages graphical image generation GUI HCI aelp documentation	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2	3-D image generation composite image formation computer animation curve generation	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A	3-D image generation composite image formation computer animation curve generation graph generation image generation line generation	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A T01-J10B2	3-D image generation composite image formation computer animation curve generation graph generation image generation line generation shape generation	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2
grammar-checking, word procest graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis mage coding	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D	3-D image generation composite image formation computer animation curve generation graph generation image generation line generation shape generation text generation	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis mage coding mage data compression	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D	3-D image generation composite image formation computer animation curve generation graph generation image generation line generation shape generation text generation virtual reality	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3 T01-J10C4A
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis mage coding mage data compression mage digitisation	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D	3-D image generation composite image formation computer animation curve generation graph generation image generation line generation shape generation text generation	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3 T01-J10C3 T01-J10C4A
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis mage coding mage data compression mage digitisation mage enhancement	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3 T01-J10C4A
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis mage coding mage data compression mage digitisation mage enhancement mage generation	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis mage coding mage data compression mage digitisation mage enhancement mage generation mage memory management	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10B1 T01-J10C	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02
graphic packages graphical image generation GUI HCI help documentation mage acquisition mage analysis mage coding mage data compression mage digitisation mage enhancement mage generation mage memory management mage object enlargement	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10D T01-J10C T01-J10C T01-J10A2 T01-J10A2 T01-J10B3A	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard input from magnetic tape	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C3 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02 T01-C01
graphic packages graphical image generation GUI HCI Hcl documentation Hage acquisition Hage acquisition Hage acquisition Hage data compression Hage digitisation Hage enhancement Hage generation Hage memory management Hage object enlargement Hage object processing	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10D T01-J10C T01-J10C T01-J10A2 T01-J10B3A T01-J10B3	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C2 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis mage coding mage data compression mage digitisation mage enhancement mage generation mage memory management mage object enlargement mage object reduction	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10C T01-J10C T01-J10C T01-J10A2 T01-J10B3A T01-J10B3A	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard input from magnetic tape	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C3 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02 T01-C01
graphic packages graphical image generation GUI HCI Help documentation Hage acquisition Hage analysis Hage coding Hage data compression Hage digitisation Hage enhancement Hage generation Hage memory management Hage object enlargement Hage object reduction Hage object reduction Hage object reduction Hage object rotation	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10C T01-J10C T01-J10C T01-J10A2 T01-J10B3A T01-J10B3A T01-J10B3A	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard input from magnetic tape manual input devices interface	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C3 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02 T01-C01 T01-C02
graphic packages graphical image generation GUI HCI Help documentation mage acquisition mage analysis mage coding mage data compression mage digitisation mage enhancement mage generation mage memory management mage object enlargement mage object reduction mage object reduction mage object rotation mage processing	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10C T01-J10C T01-J10C T01-J10A2 T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard input from magnetic tape manual input devices interface output to magnetic tape	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02 T01-C01 T01-C02 T01-C01 T01-C02 T01-C01
graphic packages graphical image generation GUI HCI HCI Help documentation Hage acquisition Hage analysis Hage coding Hage data compression Hage digitisation Hage enhancement Hage generation Hage memory management Hage object enlargement Hage object reduction Hage object reduction Hage object rotation Hage processing Hage processing Hage processing Hage storage	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10C T01-J10C T01-J10A2 T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard input from magnetic tape manual input devices interface output to magnetic tape	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02 T01-C01 T01-C02 T01-C01 T01-C02 T01-C01
graphic packages graphical image generation GUI GUI elp documentation mage acquisition mage analysis mage coding mage data compression mage digitisation mage enhancement mage generation mage memory management mage object enlargement mage object reduction mage object reduction mage processing mage processing mage storage nowledge processing	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J12 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10B1 T01-J10C T01-J10A2 T01-J10B3A	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard input from magnetic tape manual input devices interface output to magnetic tape	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02 T01-C01 T01-C02 T01-C01 T01-C02 T01-C01
graphic packages graphical image generation GUI HCI nelp documentation mage acquisition mage analysis	T01-J11A1 T01-J10C5 T01-J10C1 T01-J12 T01-J11C2 T01-J10A T01-J10B2 T01-J10D T01-J10D T01-J10D T01-J10D T01-J10C T01-J10C T01-J10A2 T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A T01-J10B3A	3-D image generation composite image formation composite image formation curve generation graph generation image generation line generation shape generation text generation virtual reality  Computer input/output arrangement broadcast TV signal input input from keyboard input from magnetic tape manual input devices interface output to magnetic tape	T01-J10C7 T01-J10C5 T01-J10C2 T01-J10C1 T01-J10C T01-J10C2 T01-J10C3 T01-J10C4A  nts T01-C T01-C03C1 T01-C02 T01-C01 T01-C02 T01-C01 T01-C02 T01-C01

T01-J16C2

learning, Al

Computer input/output arrangeme	ents for	output to printing device	T01-C05
data communication		Computer input/output arrangem	ents for record
arrangements for interfacing with	h	carrier	
networks	T01-C03A	DASD	T01-C01A
broadcast radio signal input	T01-C03C1	direct access storage device	T01-C01A
data communication via modem	T01-C03B	semiconductor memory interfac	e T01-C01C
data exchange with distant static	ons T01-C03	Computer input/output arrangement	
radio link	T01-C03C	scanner	T01-C06
measurement signal input	T01-C08B		
sampling of analog signals	T01-C08	Computer integrated manufacturi	ng 106-A04B7
speech recognition	T01-C08A	Computer memory	
speech synthesis	T01-C08A	DASD	T01-C01A
Computer input/output arrangement	ents for displays	nurseinterleaved	T01-H03C
display processing	T01-C04D	network communication	T01-N02A2
other display input/output proce	essing	network control	T01-N02B1
	T01-C04X	network management	T01-N02B2 T01-N02B2
output to CRT (Cathode Ray Tub		network monitoring private networks	T01-N02B2
output to display	T01-C04	'	
output to display panel	T01-C04B	Computer organ	W04-U01
output to LED display	T01-C04C	Computer peripheral equipment	
Computer input/output arrangement	ents for	2D scanner	T04-M01
interconnections		3D scanner	T04-M05
asynchronous/synchronous oper		accessories	T04-L09
	T01-C07A	casing or cabinet	T04-L01
buffer interface function	T01-C07C2	construction of	T04-L
expansion card	T01-C07C5	CRT display control	T04-H01
fibre optic interconnections	T01-C07B	digitiser, for input	T04-M
interfaces for interconnections	T01-C07C		T04-M01
non-wired connection with perip			T04-M02
DC anda	T01-C07C3	disc drive	T04-M05 T04-P
PC cards PCMIA	T01-C07C5 T01-C07C5	disc drive display control, general	T04-F T04-H
remote control of computer	T01-C07C3	display control, general display unit control	T04-H
serial-parallel conversion	T01-C07C3	electroluminescent display conti	
smart card reader interface	T01-C07C1	field emission display	T04-H03C5
standard interfaces	T01-C07C5	flat bed scanner	T04-M01
sub-systems	T01-C07	fluorescent display control	T04-H03C9
topology	T01-C07D	hand scanner, for input	T04-M02
Computer input/output arrangement	ents for	hand written character input	T04-F04
manual input devices		input devices	T04-F
inductive or capacitive pen	T01-C02B1H	joystick	T04-F02B3
keyboard input in co-operation v		keyboard	T04-F01
keyboara input in eo operation i	T01-C02A1	LCD display control	T04-H03C2
keyboard interface	T01-C02A	LED display control	T04-H03C1
other keyboard interfaces, e.g		light pen	T04-F02A1
opto-electronic	T01-C02A9	manual input	T04-F
position digital converters	T01-C02B	mounting of PCBs mouse	T04-L05 T04-F02B1
Computer input/output arrangement	ents for	non CRT display control	T04-F02B1
non-manual input		plasma display panel control	T04-H03C4
eye input	T01-C10	plotter	S06-K99E
foot input	T01-C10	printer	S06-K99B
neurological input	T01-C10	program control for	T01-H05A
non-manual human input	T01-C10	touchscreen	T04-F02A2
pedal input	T01-C10	trackball	T04-F02B5
PCMCIA input/output details	T01-C11	Computer printer - see Printer, co	
Computer input/output arrangeme		Computer printer - see Filliter, Col	=
			S06-K99B
<pre>printing devices   output to networked printer</pre>	T01-C05A1	Computer security	T01-J12C
output to networked printer	T01-C05A1	lock	T01-J12C
output to printer	T01-C05B	password	T01-N02B1B
Sarpar to printer	.01 000/1	I	

Computer simulation		cable	X12-D02C
emulation	T01-J15A3	carbon material	X12-D02C X12-D01C
of non-electronic systems	T01-J15H	dispersion in non-conductive material	
simulation of electrical circuits	T01-J15A3	and personal minor demandance ma	X12-D01F
		dispersion in non-conductive	X12-D01F2
Computer telephony integration (C		material, inorganic vehicle	
	W01-C05B4A	dispersion in non-conductive	X12-D01F1
Computer tomography	T01-J10C4B	material, organic vehicle	
for medical use	T01-J06A	fibres	X12-D02C2E
	T01-N01E	film	X12-D02A
Computer-controlled system	T06-A07A	film, anisotropic	X12-D02A2
	. 00 / 10 / / 1	insulated - see Cable	X12-D03
Computerised tomography optical	S03-E04C3	insulating	X12-D07B
X-ray	S03-E04C3 S03-E06B3	insulating by extrusion	X12-D07B1
		insulating by liquid bath	X12-D07B1
Computerised tomography (CT), X-		insulating by spraying	X12-D07B1
medical	S05-D02A1	insulating by winding on tape	X12-D07B9
Conception detection	S05-D09	ionic	X12-D01E
Concrete		manufacture	X12-D07E
analysis	S03-E14D1	manufacture, bus bars	X12-D07E1A
crusher	P41-A01	manufacture, fibres	X12-D07E2C
	P41-V22	manufacture, high power	X12-D07E1
mixer	X25-U	manufacture, low power	X12-D07E2
Conductive adhesive connection	V04-A06	manufacture, nano-wire	X12-D07E2A
		materials, for semiconductor mar	
Conductive layer formation	U11-C05C		U11-A08B
chemical vapour deposition,		materials (inorganic), for semicon manufacture	U11-A08B2
semiconductor manufacture	U11-C05C3	materials (organic), for semicond	
electroplating, semiconductor ma		materials (organic), for semicond	U11-A08B1
ciectropidting, sermeonadetor me	U11-C05C6	metal material	X12-D01A
localised deposition, semiconduc		nano-material	X12-D01D
icoanicoa aspeciment, cermeentaa	U11-C05C5	non-insulated	X12-D01D X12-D02C
selective deposition, semiconduc		non-metallic material	X12-D02G
,	U11-C05C5	oxide material	X12-D01B
sputter deposition, semiconducto	or manufacture	polymer material	X12-D01C1
	U11-C05C2	silicon material	X12-D01C
Conductive layer on insulating sup	port	stranded	X12-D02X
g	=	stranding-up	X12-D07C
alastro da LCD	X12-D02A	sulphide material	X12-D01B
electrode, LCD	U14-K01A1B X12-D02A1	Cone, acoustoelectric transducer	
transparent	X12-D02A1 X12-D02A1	general transducers	V06-V02A
transparent, LCD	U14-H01E	loudspeakers	V06-V04A1
transparent, ECD	U14-K01A1B	manufacture	V06-V03A
	X12-D02A1	Cone crusher	P41-A01C
Conductive material - see Conducto	-	Conference equipment	W04-W05C
Conducting nanostructures	X12-D01 X12-D02C2D	Conference communications system	
•		data	wo1-A06E1A
Conductive wire	X12-D02C	telephone	W01-A00E1A W01-C02B1
audio/video	X12-D02C2B	television	W02-F08A
control	X12-D02C2C		VV02 1 00/4
communication	X12-D02C2A	Confidential document handling	607.1607.40
fibres	X12-D02C2E	Facsimile/copier/printer	S06-K07A3
high power	X12-D02C1	general sorting	T05-K02
instrumentation low power	X12-D02C2C X12-D02C2	Confocal microscopy	S03-E04R1
•	S03-E01A	Conformal masks, semiconductor	U11-C04D1
Conductivity, thermal		Conical-skirt monopole antenna	W02-B01C5
Conductor	X12-D01	Conjuring tricks	P36-E15
alloy material	X12-D01A	· · · · · · · · · · · · · · · · · · ·	W04-X03X
anisotropic, film bundled	X12-D02A2		vvU4-∧U3∧
bunalea	X12-D02X		

<b>nnections</b> chip to lead frame, semiconducto	yr nackagos	coupling part connecting to two/n dissimilar counterparts	nore V04-H
cilip to lead frame, semiconducto	U11-D03A2	coupling part connecting to two/n	nore
nnector, electrical		identical counterparts	V04-H
adverse environment	V04-M06	coupling-supported	V04-J
antenna	V04-M01	cover	V04-D0
	W02-B08D	crimped	V04-M1
assembly, terminal connection to	housing		V04-P01
<b>3</b> .	V04-P05	crimping apparatus/method	X12-G0
assembly, wire stripping	V04-P03	crocodile clip-terminal end piece	
avionic/military use	V04-M30A	for cable/wire	V04-C0
,	W06-B01C1	data communication	V04-M0
	W07-J01		W01-A
base	V04-D03		W01-D0
battery	X16-F05	data processing	V04-M3
battery post end piece for cable/v		details, two-part	V04-D
р	X16-F05	direct - see Direct connection	V04-A
body	V04-D03	distributor	V04-L09
brush - see <b>Brush</b>	V04-L01B	distributor block	V04-B0
bus bar allowing connection of		domestic appliance (unspecified)	V04-M3
counterpart at discrete location	ns V04-H01		X27-X
bus bar facilitating connection of		dust cap	V04-D0
at any point	V04-H01	dusty environment	V04-M0
cable TV	V04-M01	earthing	V04-D0
	W02-F	elastomer block	V04-A0
case	V04-D03	electric train/tram	X23-A0
case, dust cap	V04-D03	end piece for cable/wire	V04-C0
case, hood	V04-D03	end pieces, multiconductor cable	V04-B0
case, material	V04-D03A	eye-terminal end piece for cable/v	
case, moulding	V04-D03		V04-C0
case, potting boot	V04-D03	fastening	V04-D0
case, seal	V04-D03	fastening, bayonet	V04-D0
clamp end piece for cable/wire	V04-C01	fastening, bolt	V04-D0
clamps	V04-C01	fastening, coupling nut	V04-D0
coaxial	V04-F	fastening, coupling ring	V04-D0
coaxial cable	V04-M03	fastening, lever	V04-D0
combination connector	V04-M12	fastening, screw	V04-D0
commutator - see Commutator	V04-L01A	fastening, snap-action	V04-D0
computer equipment	T01-L03	fastening, threaded ferrule	V04-D0
conductive members interconnec	cted at	ferrule end piece for cable/wire	V04-C0
two or more connecting location	ons V04-C05	filter	V04-M0
consumer electronics	V04-M30L	filter capacitor	V04-D0
contact	V04-D01	flat cable	V04-M0
contact blade	V04-D01A	flat cable arrangement, vehicle	X22-C0
contact material	V04-D01		V04-M3
	X12-D01		V04-N
contact pin	V04-D01A	fork-terminal end piece	V04-C0
contact prong	V04-D01A	grounding	V04-D0
contact securement to base	V04-D02	guide	V04-D0
contact, crimped-type	V04-D01	hermaphroditic contact	V04-D0
contact, dual leaf	V04-D01	high frequency	V04-B0
contact, female	V04-D01B	high frequency application	V04-M0
contact, male	V04-D01A	high speed	V04-M0
contact, receptacle	V04-D01B	holder - see <b>Holder</b>	V04-K
contact, single beam	V04-D01	hook-terminal end piece	V04-C0
contact, socket	V04-D01B	hot environment	V04-M0
contact, soldered-type	V04-D01	hot-plug	V04-M1
contact, tongue	V04-D01B	housing - see Connector case	V04-D0
contact, twin cantilever	V04-D01B	hybrid signal	V04-M0
contact, wire wrap-type	V04-D01	IDC	V04-M0
coupling part connecting to coun	terparts	incorrect coupling prevention	V04-D0
of different voltages	V04-H	inductive	V02-F0

C	· 1	(	V04 D07 A
Connector, electrical (continued		safety, dummy plate	V04-D06A
industrial machines instrumentation	V04-M30S	safety, live part access-prevention	
	V04-M30Q	safety, shutter	V04-D06A
insulation displacing	V04-M07	screening	V04-D06B
intermediate part distributing ene		screw end piece for cable/wire	V04-C01
two/more paralled circuits	V04-J	seal	V04-D03
intermediate part linking two		shielding	V04-D06B
coupling parts	V04-J	shunt	V04-J
intermediate part linking		sleeve end piece for cable/wire	V04-C01
two female coupling parts	V04-J	slip-ring - see <b>Slip-ring</b>	V04-L01A
intermediate part linking two		smart	V04-M11
male coupling parts	V04-J	spade-terminal end piece	V04-C01
land vehicles	V04-M30C	specific application	V04-M
latch (see also Connector fasteni		specific industry-type	V04-M30
P. L. L. H.	V04-D04	spring clip end piece for cable/wir	
light bulb	V04-D05		V04-C01
line, flexible	V04-N	strain-relief clamp for cable	V04-D06D
line, turnable	V04-N	strain-relief for cable	V04-D06D
lock (see also Connector fastenin		structural association with	
lockable dummy plug	V04-D06A	electrical component	V04-D05
lockable housing for plug not in u		structural association with electrica	
machine tools	V04-M30R	component, filter capacitor	V04-D05
mains	V04-M02		V04-M08
manufacture	V04-P	structural association with electrica	
manufacture, case/cover/housing		component, fuse	V04-D05
manufacture, contact	V04-P06	structural association with electrical	
manufacture, plating	V04-P04	component, lamp	V04-D05
manufacture, superconducting wi		structural association with electrica	
	V04-P10	component, switch	V04-D05
manufacture, terminating cable	V04-P11	switch	V04-D05
medical appliance	V04-M30M	telecommunications	V04-M30G
metal recovery	V04-P09	testing	V04-P
microconnector	V04-M20	three-part coupling	V04-J
mixed signal	V04-M09	two-part	V04-E
multi-way adaptor	V04-H		V04-F
multi-way mains adaptor	V04-H		V04-G
	V04-M02	two-part and multi-pole, circular	V04-G09
needle point end piece for cable/		two-part and multi-pole, jack	V04-G09
non-contact type	V02-F01P	two-part, multi-pole, printed circui	
	V02-G01D	two-part and multi-pole, printed c	
nut end piece for cable/wire	V04-C01	edge	V04-G02A
oil/petrochemical industry	V04-M30J		V04-M05
panel mounting arrangement of		two-part and multi-pole, printed c	
coupling parts	V04-D09	surface	V04-G02B
personal article use	V04-M30P		V04-M05
plug standards converter	V04-H	two-part, multi-pole, telephone jac	
polarisation	V04-D06C		V04-G09
printed, for PCBs	V04-M05		W01-D02
	V04-Q01	two-part, multi-pole	V04-G
probe end piece for cable/wire	V04-C01	two-part, multi-pole D-type	V04-G01
protective arrangement (see also		two-part, multi-pole rectangular	V04-G01
Connector, safety)	V04-D06A	two-part, multi-pole trapezoidal	V04-G01
rail allowing connection of counte		two-part, multi-pole with parallel s	
at discrete locations	V04-H01	contacts	V04-G01
rail facilitating connection of coun	•	two-part, printed circuit	V04-M05
at any point	V04-H01	two-part, single-pole	V04-E
repair	V04-P	two-part, two-pole	V04-F
RF	V04-M01	USB	V04-G15
ribbon cable	V04-B02	vehicles, land	V04-M30C
	V04-M04		X22-X01A
robotics	V04-M30R	wet environment	V04-M06
safety, contact insulation	V04-D06A	ZIF connector	V04-M16
safety, cover plate	V04-D06A	engagement/diengagement	V04-D04

Constant false alarm rate (CFAR) ra	dar W06-A04E5	spin coating	P42-B03
Construction		Contact bumps, manufacture, semi	conductor
alarms	W05-B10C	devices	U11-C05G2B
audio/video equipment in genera	al W03-G01	Contact holes, semiconductor man	ufacture
audio/video recording apparatus	W04-L05	Contact noice, semiconductor man	
broadcast radio receiver	W03-B05		U11-C05D3 U11-C05D4
computer housing	T01-L02B		
computers	T01-L02	Contactor	X13-A04G
computer peripheral equipment	T04-L	air gap type	X13-A04G5A
cooling and ventilating for compu		electromagnetic	X13-A04G1
19 1	T01-L02A	gas-insulated	X13-A04G5B X13-A04G5C
displays	W05-E05G	vacuum type	
EM shielding in computers PCB mounting in computer	T01-L02D T01-L02C	Containers, see Packaging	Q32-A
radio communications receiver	W02-G03H	ampoules	Q32-A02
radio communications receiver		bags barrels	Q32-A15
in general	W02-G06	barreis baskets	Q32-A05C Q32-A10
radio transceiver	W02-G02H	blister packaging	Q32-A10 Q32-A17
radio transmitter	W02-G01H	bottles	Q32-A17 Q32-A01
telemetry/telecontrol	W05-D08N	boxes	Q32-A01
television receiver	W03-A09A	buckets	Q32-A99
Construction toys and kits	P36-E03	cable ties	Q32-T01B
construction toys and kits	W04-X03E9	cans	Q32-A05
Consumer electronics connector - s		cargo containers	Q32-A30
Connector, electrical	ee	cartons	Q32-A08
•		casks	Q32-A05C
Contact	1/02 100	collapsible tubes	Q32-A16
bounce prevention	V03-A09	crates	Q32-A08
-1	X13-A02	cups	Q32-A20
chatter prevention	V03-A09 X13-A02	drawer-and-shell	Q32-A09
cleaning	V03-A09	drums	Q32-A05B
Cleaning	X13-A02	envelopes	Q32-A15
contact-pressure increasing	V03-A09	films, wrapping -	Q32-A18
	X13-A02	jars juice boxes	Q32-A04 Q32-A03
engagement techniques	V03-A02	large containers (tanks)	Q32-A03 Q32-A30
3 3	X13-A02	milk cartons	Q32-A30 Q32-A03
for test equipment (see also <b>Prob</b>	e)	pods (beverage -)	Q32-A05
	S01-H03	pouches	Q32-A15
lubrication	V03-A09	racks	Q32-A09
	X13-A02	resealable packaging	Q32-A15A
manufacture	V03-A08	sacks	Q32-A15
	X13-A01C	shipping containers	Q32-A30
materials	V03-A01A	shrink packaging	Q32-A18A
and a series of a series of	X13-A01A	silo	Q32-A30
monitoring	V03-A08	skin packaging	Q32-A17
protective englesures	X13-A01C V03-A03	tanks	Q32-A05B
protective enclosures	X13-A02	tanktainers	Q32-A30
shape/structure	V03-A01B	trays	Q32-A09
shape/shactare	X13-A01B	constructional details	Q32-B
terminals	V03-A09	collapsible	Q32-B05 Q32-B04
	X13-A02	foldable handles	Q32-B04 Q32-B06
testing	V03-A08	inspection windows	Q32-B06 Q32-B99
<u> </u>	X13-A01C	label holder	Q32-B99
Contact-based liquid application	P42-B	lining	Q32-B77
brush transfer of fluid	P42-B05	partitions/dividers	Q32-B02
immersion or passage through		reinforcements	Q32-B03
liquid bath	P42-B01	walls	Q32-B01
pouring or flowing of liquid over		Container (electronics)	-
surface	P42-B03	electrolytic capacitors	V01-B01B
roller transfer of fluid	P42-B05	electronic component (general)	V04-X01A
		i i i i (2 :	-

and a self a selfal a	T02 H04 A	d'a de como la com	V0/ C01
recording disks	T03-H01A	discharge lamp	X26-C01
semiconductor devices	U11-D01	discharge lamp, intensity	X26-C01C T04-H03
Contaminant trapping in disk drives	T03-F02G1	display, non CRT drive-by-wire, vehicle	X22-A03B2
Contaminated ground treatment for	r	electric machine - see <b>Electric ma</b>	
soil reclamation	P43-J	regulation/control	V06-N
Contamination detection		regulation/control	X13-H
capacitive	S03-E02C3	electroluminescent display	T04-H03C3
general	S03-F09C	electroluminescent display	T04-H03F
magnetic variables	S03-E11C1	electronic throttle, IC engine	X22-A03B2
optical	S03-E04F1	electronic throttle, vehicle	X22-A03B2
with preset threshold	S01-G04C5A	electrophotographic apparatus	S06-K07A
with resistance measurement	S01-G04C5	electroplating	X25-R04B
without resistance measurement	S01-G04C1	embroidery machine	T06-D03D
Content recommendation, broadcas	sting	engine	
broadcaster / server	W02-F10Q3	for aircraft	W06-B01A1
receiver / subscriber	W03-A18A5C	for motor vehicle	X22-A03
		for railway train	X23-A01A2B
Continuous casting	X25-A01	for ship facsimile apparatus	W06-C01A1 S06-K07A
Contour correction for video signal	W04-P01E3	frequency	U23-D
Contour measurement	S02-A10C	fuel cell	X16-C09
using electrical/magnetic method	S02-A02	fuel pump, IC engine	X22-A03A3
	S02-A10C	fuel purging, IC engine	X22-A03A4
using mechanical method	S02-A01	fuzzy, vehicle non-engine related	
	S02-A10C	, ·	X22-Q
using optical method	S02-A03	gain	U24-C
	S02-A10C	general control systems	T06
using sound or ultrasound	S02-A05B S02-A10C	generators - see <b>Electric machine</b>	
		regulation/control	X13-H02
Contrast media	S03-E09X	IC engine air-fuel ratio	X22-A03A2A
for medical MRI	S05-D02B3	IC engine exhaust braking	X22-A03B5
for medical ultrasound	S05-D03C	IC engine exhaust gas recirculatio	
for medical x-rays for general x-rays	S05-D02A7 S03-E06X	IC analysis for History to a	X22-A03A2C
for sonic/ultrasonic measurements		IC engine fuel injection IC engine fuel injection quantity	X22-A03A1 X22-A03A1C
	3 303-2007	IC engine fuel injection quantity	X22-A03A1C
Control	MO/ DO1 A 1	IC engine fuel supply	X22-A03A
aircraft power plant	W06-B01A1 W06-B02	IC engine idling speed	X22-A03B3
airport anti-lock brake system, vehicle	X22-C02C3	IC engine inlet/outlet valves	X22-A03G
anti-skid brake system, vehicle	X22-C02C3 X22-C02C3	IC engine management	X22-A03F
anti-skid brake system, vehicle	X22-C02C1	IC engine noise	X22-A12
ASR braking, vehicle	X22-C02C1	IC engine pollution	X22-A03J
audio tape recorder	W04-B12C	IC engine power/torque	X22-A03D
braking force, vehicle	X22-C02C	for traction regulation	X22-A03D1
centralised, decentralised control	T01-H07A2	IC engine rpm/speed for cruising	
centralised, data network	W01-A06E2A	IC engine rpm/speed for cruising	•
communication control using com		throttle	X22-A03B1A
	T01-J08C	IC engine rpm/speed using electr	
copier	S06-A14	throttle	X22-A03B2 X22-A03L
CRT display, TV receiver	W03-A08A	IC engine secondary air IC engine speed	X22-A03L X22-A03B
CRT display, VDU	T04-H01	IC engine speed using exhaust br	
data transfer patruark	W01-A06E	to engine speed using exhaust bit	X22-A03B5
data transfer, network data transmission (general)	T01-N01D W01-A07F	IC engine supercharging	X22-A03C
data transmission (general) data transmission path access	W01-A07F W01-A06F1	IC engine swirl	X22-A03I
decentralised, data network	W01-A06E2B	IC engine temperature	X22-A03H
data transmission	W01-A00E2B	IC engine turbocharging	X22-A03C
decentralised, network	W01-A06E2B	IC engine vibration	X22-A03X
diesel-electric locomotive generat		IC engine	T01-J07D1
gonorde	X13-H02		X22-A03
	X23-A01A2	IC engine, stop-start	X22-A03E
	1	incandescent lamp	X26-C02

Control (continued)		vehicle supercharging	X22-A03C
integrated engine/transmission	X22-A03F	vehicle turbocharging	X22-A03C X22-A03C
integrated engine/transmission	X22-A031 X22-G01	vehicle window winder	X22-A03C X22-H01
ISDN control	W01-C05B7D	video tape recorder	W04-B10C
lamp intensity, general	X26-C03A5	X-ray equipment	V05-E02
lamp, general	X26-C03	Control programs (computers	
LCD display	T04-H03C2		) T01-F05E
	T04-H03F	data handling	T01-F05E T01-F05D
LED display	T04-H03C1	job entry operating system	T01-F05D
	T04-H03F	storage management	T01-F05G T01-F05E
lighting, general	X26-C03	_	
machines, electric - see <b>Electric n</b>	nachines,	Control rod, nuclear reactor	X14-C01
regulation/control	X13-H	Control system	
	V06-N	abrading	T06-D07A
matrix display, non CRT	T04-H03B		X25-A03C2
motors - see Electric machines,			X25-A03F
regulation/control	X13-H	acceleration	T06-B09
	V06-N	acceleration, electric	T06-B09B
networks (data)	W01-A06E	acceleration, with auxiliary r	
non CRT display	T04-H03	power	T06-B09A
nuclear power plant	X14-C05B	acceleration, without auxilia	
phase	U23-D	3D / 4D / FD	T06-B09A
plasma display	T04-H03C4	3D / 4D / 5D printing	T06-D17
	T04-H03F	adaptive	T06-A05
power reactor	X12-C02B	Al-based	T06-A05A
power transformer	X12-C02B	algorithm based	T06-A05C T06-A05A1
and the second s	X13-H04	fuzzy control additive manufacturing	T06-A05A1 T06-D17
power transformer, tap changing	X12-C02B1 S06-C03A	agriculture	T06-D17
printing press printing, computer	S06-K07A	agriculture	X25-N01
radio transceiver	W02-G02C		T01-J07
signal transmission methods	W05-D	Al-based	T01-J16
single character display	T04-H03A	, ii basea	T06-A05A
storage or color tubes, CRT	T04-H01B	aircraft	W06-B01A
switching point/instant	U21-B02A	analogue comparator	T06-A01
tape operating mode	T03-E05	antihunting	T06-A02
telephone exchange	W01-C02A7	application	T06-D
telephone set (general)	W01-C01Q	article feeding	T06-D08B
traction braking, vehicle	X22-C02C1		X25-F02
traction by engine power/torque		artificial intelligence-based	T06-A05A
regulation	X22-A03D1	automatic	T06-A06
traction using vehicle transmission	า	automatic goods retrieval	T06-D08C
regulation	X22-G03B		X25-F01A
traffic light	T07-B05A	automatic open-loop	T06-A20
	T07-C	automatic shelving	T06-D08C
traffic signal	T07-C	and the second s	X25-F01A
transmission procedure	14/04 4 0704	automatic, continuous elect	
(general data transmission)	W01-A07G1	automatic, differential chara	T06-A06A9
vehicle air-fuel ratio	X22-A03A2A	automatic discontinuous al	
vehicle cruising speed	X22-A03B1	automatic, discontinuous ele automatic, disengagement	T06-A03
vehicle cruising speed using throt		automatic, disengagement	T06-A06A
vehicle ervising appeal using trans	X22-A03B1A	automatic, electric	T06-A03
vehicle cruising speed using trans	X22-G03A	automatic, engagement	T06-A06B
vehicle differential	X22-G05A X22-G05	automatic, nydradic	
vehicle differential vehicle engine fuel supply	X22-A03A	automatic, multi-variable	T06-A06A2
vehicle exhaust braking	X22-A03B5	automatic, multiple input/or	
vehicle exhaust gas recirculation	X22-A03A2C	automatic, PD characteristic	
vehicle four-wheel drive system	X22-G05	automatic, PI-characteristics	
vehicle fuel injection	X22-A03A1	automatic, PID-characteristic	
vehicle fuel injection quantity	X22-A03A1C	automatic, pneumatic	T06-A06B
vehicle fuel injection timing	X22-A03A1A	automatic, proportional cha	
vehicle IC engine	X22-A03		T06-A06A9

trol system (continued)		drilling	T06-D07C
automatic, pulse train output-ty			X25-A03B
bending, metal	T06-D05A1		X25-A03F
	X25-A02D	drying	T06-D20
blasting machine	T06-D07A	1 1 111	X25-G
	X25-A03C2	earth drilling	T06-D12
	X25-A03F		X25-E01
boring	T06-D07C	electric and non-electric varial	•
	X25-A03B	simultaneously	T06-B20
	X25-A03F	electric forklift truck	X21-A01B
bottling broaching	T06-D15 T06-D07A	elevator	X25-F05A T06-D08D
broaching	X25-A03C1	elevator	X25-F04A
	X25-A03F	error detector	T06-A01
burnishing	T06-D07A	escalator	T06-D08D
burnishing	X25-A03C3	escalatol	X25-F04A
	X25-A03F	excavator	T06-D08E
CAE	T06-A07A	excavator	X25-D01
CAL	T06-A07A	expert system	T01-J16A
CAM	T01-J07B	expert system	T06-A05A
CAIVI	T06-A07A	FA	T06-A04A2
cardboard making	T06-D03A	fabric manufacture	T06-D03C
carding, yarn	T06-D03A	idone mandideture	X25-T04B
arding, yarri	X25-T04A	fertilising, agriculture	T06-D01B
chemical processing	T06-D10	rerunsing, agriculture	X25-N01B
chemical variable	T06-B06	flexible manufacturing	T06-A04B7
CIM	T06-A04B7	flow	T06-B04
cloth manufacture	T06-D03C	flow, electrical	T06-B04B
	X25-T04B	flow, with auxiliary non-electric	
CNC	T06-A04A2	,,	T06-B04X
coating	T06-D18	flow, without auxiliary power	T06-B04A
coil handling	T06-D08A	fluid pressure, electric	T06-B11
3	X25-F02	fluid pressure, without auxiliar	y power
combing, yarn	T06-D03B	,	T06-B11A
3. 3	X25-T04A	fluidic, non-numerical	T06-A04B3
communication aspects	T06-A11	fluids' flow ratio, electrical	T06-B08A1
comparing element	T06-A01	FMS	T06-A04B7
computer integrated manufact	uring T06-A04B7	food processing	T06-D02C
constructional details	T06-A20	· -	X25-P01
contouring, NC	T06-A04A3	forging	T06-D05A
conveying	T06-D08C		X25-A02C
	X25-F01A	fork lift truck	T06-D08F
crane	T06-D08E		X22-P05F
	X25-F05		X25-F05A
crushing	T06-D04	fuzzy logic	T01-J16B
	X25-J		T06-A05A1
culture, agriculture	T06-D01B	general	T06-A
	X25-N01B	goods conveying vehicle	T06-D08F
cutting, metal	T06-D07C		X25-F05A
	X25-A03	graph set processing-type	T06-A04B1
		grinding	T06-D07A
	X25-A03F		
	T06-A01		
direct/distributed numerical	T06-A01 T06-A04A2A		X25-A03F
direct/distributed numerical direction	T06-A01 T06-A04A2A T06-B02	hammering	X25-A03F T06-D05A1
direct/distributed numerical direction direction, with feedback	T06-A01 T06-A04A2A T06-B02 T06-B02B	C	X25-A03F T06-D05A1 X25-A02D
direct/distributed numerical direction direction, with feedback direction, without feedback	T06-A01 T06-A04A2A T06-B02 T06-B02B T06-B02A	hammering harvesting, agriculture	X25-A03F T06-D05A1 X25-A02D T06-D01A
digital comparator direct/distributed numerical direction direction, with feedback direction, without feedback dispensing	T06-A01 T06-A04A2A T06-B02 T06-B02B T06-B02A T06-D15	harvesting, agriculture	X25-A03F T06-D05A1 X25-A02D T06-D01A X25-N01A
direct/distributed numerical direction direction, with feedback direction, without feedback dispensing	T06-A01 T06-A04A2A T06-B02 T06-B02B T06-B02A T06-D15 X25-F03	harvesting, agriculture heuristic rules	X25-A03F T06-D05A1 X25-A02D T06-D01A X25-N01A T06-A05A
direct/distributed numerical direction direction, with feedback direction, without feedback dispensing distributed computers	T06-A01 T06-A04A2A T06-B02 T06-B02B T06-B02A T06-D15 X25-F03 T01-M02A	harvesting, agriculture	X25-A03F T06-D05A1 X25-A02D T06-D01A X25-N01A T06-A05A T06-D08E
direct/distributed numerical direction direction, with feedback direction, without feedback dispensing	T06-A01 T06-A04A2A T06-B02 T06-B02B T06-B02A T06-D15 X25-F03	harvesting, agriculture heuristic rules	T06-D05A1 X25-A02D T06-D01A X25-N01A T06-A05A

ntrol system (continued)		mining tool	T06-D11
honing	T06-D07A		X25-D02B
	X25-A03C2	mining, materials conveying	T06-D08C
	X25-A03F		X25-D02A
humidity	T06-B07		X25-F01A
inference engine	T06-A05A	mixing	T06-D04
internal feedback, electric	T06-A02		X25-J
internal feedback, fluidic	T06-A02	models	T06-A07B
irrigating, agriculture	T06-D01B	monitoring	T06-A08
irrigating, agriculture			
KDE	X25-N01B	monitoring, NC	T06-A04A
KBE	T06-A05A	multi-machine	T06-A04B7
knitting machine	T06-D03C	multiplex	W05-D02
	X25-T04B2	for vehicle	X22-K01
knowledge base	T06-A05A	multi-step, automatic	T06-A06A1
labelling	T06-D15	NC, using measuring device	T06-A04A
lapping	T06-D07A	neural net-type	T06-A05A
парринд	X25-A03C2	non-electric variable	T06-B
1 .1	X25-A03F	non-numerical	T06-A04B
lathe	T06-D05A	non-numerical, programme cor	
	T06-D07C		T06-A04B1
	X25-A03A	numerical	T06-A04A
	X25-A03F	numerical, using measuring dev	riceT06-A04A
level	T06-B05	open loop, numerical	T06-A04A9
lift	T06-D08D	optimum	T06-A05
	X25-F04A	packing	T06-D15
light intensity	T06-B07	packing	X25-F03A
light intensity		and the state of t	
	X26-C03A5	paper handling	T06-D08A
livestock feeder	T06-D01C		X25-F02A
	X25-N02A	paper making	T06-D03A
livestock milking	T06-D01C		X25-T09
	X25-N02B	paper working	T06-D03A
load engaging equipment	T06-D08E		X25-T09
.oaa ogagg oqa.po	X25-D01	parking	T07-F
logic controller	T06-A04B1	parking	X22-J05
		DD.	
loom, textile	T06-D03C	PD	T06-A02
	X25-T04B	pharmaceuticals	T06-D02A
machine tool (general)	T06-D06		X25-P02
	X25-A03	physico-chemical variable	T06-B06
	X25-A03F	PI	T06-A02
manipulator	T06-D07B	PID	T06-A02
	X25-A03E	planing	T06-D07A
	X25-A03F	planing	X25-A03C
manual data input, NC	T06-A04A4		X25-A03F
manufacturing automation pro		plastics extruding	T06-D13
MAP	T06-A11		X25-A06
material dimension	T06-B03	plastics injecting	T06-D13
MDI, NC	T06-A04A4		X25-A06
mechanical - see Mechanical	Control system	plastics moulding	T06-D13
	T06-C		X25-A06
mechanical force	T06-B10	PLC	T01-F06
mechanical oscillation			T06-A04B1
	T06-B12	alasah as to te	
mechanical power	T06-B12	plough, agriculture	T06-D01A
metal casting	T06-D05B		X25-N01A
	X25-A01	polishing	T06-D07A
metal working	T06-D05A		X25-A03C
-	X25-A02		X25-A03F
metallurgy	T06-D09	position	T06-B02
c.anurgy	X25-Q	position position, with feedback	T06-B02B
:II:			
milling	T06-D07A	position, without feedback	T06-B02A
	X25-A03C1	positioning, NC	T06-A04A3
	X25-A03F	power plant, aircraft	W06-B01A
mining	T06-D11		
	X25-D02	1	

ntrol system (continued)		target seeking, missile	T06-B01B
press	T06-D20		W07-A01C
	X25-A02A	teaching, non-numerical	T06-A04B5
pressure	T06-B11	temperature	T06-B13
programmable logic controller	T01-F06	temperature, using electric senso	
	T06-A04B1	temperature, using magnetic ser	sor
programmed	T06-A04		T06-B13B1
punching	T06-D05A	temperature, using radiation sen	sor
	X25-A02D		T06-B13B9
ratio	T06-B08	temperature, with auxiliary heate	
ratio, non-electric auxiliary power	-type	temperature, with electric means	T06-B13B
	T06-B08A9	temperature, without auxiliary po	ower
ratio, non-electric without auxiliar	y		T06-B13A
power	T06-B08A9	tension regulating	T06-D08B
recording and playback, non-num	nerical	testing	T06-A08
	T06-A04B5	textile fabric manufacture	T06-D03C
relay ladder-type	T06-A04B1		X25-T04B
robot	T06-D07B	tobacco processing	T06-D02B
	X25-A03E		X25-P03
robotic vehicle	T06-D08F	tool path interpolation, NC	T06-A04A5
	X25-F05A	torque	T06-B12
rolling	T06-D05A1	total factory, numerical	T06-A04A2A
	X25-A02B	tractor, agriculture	T06-D01A
rule base	T06-A05A		X22-P09
safety arrangement	T06-A03		X25-N01A
safety, NC	T06-A04A6	turning	T06-D07C
sampled-variable	T06-A10		X25-A03A
sawing	T06-D06		X25-A03F
	X25-A03	twisting, yarn	T06-D03B
	X25-A03F		X25-T04A
separating	T06-D04	two-step, automatic	T06-A06A1D
	X25-J	using algorithms	T06-A05C
sequence controller-type	T06-A04B1	vehicle course/position in 3-dime	ensions -
several fluids flow ratio	T06-B08A	see also Aircraft, ship and Ve	hicle for
sewing machine	T06-D03D	particular cases	T06-B01X
_	X25-T04C	vehicle course/position in two-di	mensions
	W06-C01A	<ul> <li>see also Aircraft, Ship and</li> </ul>	
ship	1100 00171	see also All clart, Sinp and	
ship simulator	T06-A07B	Vehicle for particular cases	T06-B01A
			T06-B01A T06-B12
simulator	T06-A07B	Vehicle for particular cases	
simulator simultaneous, multivariable-type	T06-A07B T06-B14	Vehicle for particular cases vibration	
simulator simultaneous, multivariable-type	T06-A07B T06-B14 T06-D08E	Vehicle for particular cases vibration vibration reduction	T06-B12
simulator simultaneous, multivariable-type soil shifter	T06-A07B T06-B14 T06-D08E X25-D01	Vehicle for particular cases vibration vibration reduction for aircraft	T06-B12 Q25-N
simulator simultaneous, multivariable-type soil shifter	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A	Vehicle for particular cases vibration vibration reduction for aircraft for ship	T06-B12 Q25-N Q24-N
simulator simultaneous, multivariable-type soil shifter soil working, agriculture	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A	Vehicle for particular cases vibration vibration reduction for aircraft for ship	T06-B12 Q25-N Q24-N Q17-N
simulator simultaneous, multivariable-type soil shifter soil working, agriculture	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K	Vehicle for particular cases vibration vibration reduction for aircraft for ship	T06-B12 Q25-N Q24-N Q17-N X22-A12
simulator simultaneous, multivariable-type soil shifter soil working, agriculture	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle	T06-B12  Q25-N  Q24-N  Q17-N  X22-A12  X22-X08
simulator simultaneous, multivariable-type soil shifter soil working, agriculture	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle viscosity	T06-B12  Q25-N  Q24-N  Q17-N  X22-A12  X22-X08  T06-B07
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping	T06-B12  Q25-N  Q24-N  Q17-N  X22-A12  X22-X08  T06-B07  T06-D03C
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle viscosity	T06-B12  Q25-N  Q24-N  Q17-N  X22-A12  X22-X08  T06-B07  T06-D03C  X25-T02
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping web-advancing	T06-B12  Q25-N  Q24-N  Q17-N  X22-A12  X22-X08  T06-B07  T06-D03C  X25-T02  T06-D08A
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed speed, electric	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping	T06-B12  Q25-N  Q24-N  Q17-N  X22-A12  X22-X08  T06-B07  T06-D03C  X25-T02  T06-D08A  X25-F02
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping web-advancing	T06-B12  Q25-N  Q24-N  Q17-N  X22-A12  X22-X08  T06-B07  T06-D03C  X25-T02  T06-D08A  X25-F02  T06-D03C
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed speed, electric	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping web-advancing wefting	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-T02
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed speed, electric speed, with auxiliary non-electric	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping web-advancing wefting	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-T02 T06-D03C
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-B09A	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping web-advancing wefting winch	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-T02 T06-D03C X25-T02 T06-D08E X25-F05
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-B09A T06-B09A T06-D03B	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping web-advancing wefting winch	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-T02 T06-D03C X25-T02 T06-D03C X25-T02 T06-D03B
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power spinning, yarn spraying	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-B09A T06-D03B X25-T04A	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping  web-advancing  wefting  winch  winding, yarn	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-F02 T06-D03C X25-F02 T06-D03B X25-F05 T06-D03B X25-T04A
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power spinning, yarn	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-B09A T06-D03B X25-T04A T06-D18	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping  web-advancing  wefting  winch  winding, yarn  wire drawing	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-F02 T06-D03C X25-F02 T06-D03B X25-F05 T06-D03B X25-T04A T06-D05A
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting  sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power spinning, yarn spraying	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-B09A T06-D03B X25-T04A T06-D18 T06-D01B X25-N01B	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping  web-advancing  wefting  winch  winding, yarn	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-T02 T06-D03B X25-F05 T06-D03B X25-T04A T06-D05A X25-A02E T06-D06
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting  sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power spinning, yarn spraying sprinkler, agriculture stress	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-B09A T06-D03B X25-T04A T06-D18 T06-D01B X25-N01B T06-B10	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping  web-advancing  wefting  winch  winding, yarn  wire drawing	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-T02 T06-D03B X25-F05 T06-D03B X25-F05 T06-D03B X25-T04A T06-D05A X25-A02E T06-D06 T06-D16
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting  sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power spinning, yarn spraying sprinkler, agriculture	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-B09A T06-D03B X25-T04A T06-D18 T06-D01B X25-N01B	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping  web-advancing  wefting  winch  winding, yarn  wire drawing	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-T02 T06-D03B X25-F05 T06-D03B X25-T04A T06-D05A X25-A02E T06-D06
simulator simultaneous, multivariable-type soil shifter soil working, agriculture sorting  sowing, agriculture speed speed, electric speed, with auxiliary non-electric speed, without auxiliary power spinning, yarn spraying sprinkler, agriculture stress	T06-A07B T06-B14 T06-D08E X25-D01 T06-D01A X25-N01A T05-K T06-D04A T06-D15 X25-F06 T06-D01A X25-N01A T06-B09 T06-B09B power T06-B09A T06-D03B X25-T04A T06-D18 T06-D01B X25-N01B T06-B10 T06-D08A	Vehicle for particular cases vibration vibration reduction for aircraft for ship for vehicle  viscosity warping  web-advancing  wefting  winch  winding, yarn  wire drawing	T06-B12  Q25-N Q24-N Q17-N X22-A12 X22-X08 T06-B07 T06-D03C X25-T02 T06-D08A X25-F02 T06-D03C X25-F02 T06-D03B X25-F05 T06-D03B X25-F05 T06-D03B X25-T04A T06-D05A X25-A02E T06-D06 T06-D16 X25-A03

Control system (continued)		DC-AC, full-bridge	U24-D05A
working plastics	T06-D13		X12-J05A
	X25-A06	DC-AC, half-bridge	U24-D05A
working rubber	T06-D14	5050	X12-J05A
<b>6</b> .	X25-A07	DC-DC	U24-D02
yarn manufacture	T06-D03B		X12-J02
	X25-T04A	DC-DC with intermediate AC	U24-D02B
Controlled collapse bonding	U11-E01C	DC-DC without intermediate AC	X12-J02B U24-D02A
Convergence, television CRT displa	<b>y</b> W03-A08A5	DC-DC without intermediate AC	X12-J02A
coil	V02-D	DC-DC, flyback	U24-D02B1
	V05-D01B3	DC-DC, forward	U24-D02B1
	V05-D06B1	DC-DC, full-bridge	U24-D02B5
	W03-A08A5C	DC-DC, half-bridge	U24-D02B3
control circuitry	W03-A08A5A	DC-DC, push-pull	U24-D02B3
Conversion		DC-DC, resonant	U24-D02B7
format	T01-J14	DC-DC, SEPP	U24-D02B3
	T01-N03B4	DC-DC, single-ended push-pull	U24-D02B3
Converter		details, other	U24-D01X
AC to surge	U24-D09		X12-J01X
3	X12-J09	digital protector	U24-F05
AC-AC	U24-D03	dynamo-electric	X11-H09
	X12-J03	dynamo-electric, braking	X13-H01B
AC-DC	U24-D04	dynamo-electric, starting	X13-H01A
	X12-J04	electromagnetic interference (EM	
AC-DC bridge	U24-D04C1	reduction	U24-D01E5
	X12-J04C1		W02-H01 X12-J01E5
AC-DC bridge, characterised by d		avagas aurrent/voltage limiting	U24-D01B
	U24-D04C1A	excess current/voltage limiting	U24-DU16 U24-F02
	X12-J04C1A		X12-J01B
AC-DC bridge, characterised by	V40 104C4D		X12-301B X13-C03
thyristors	X12-J04C1B		X13-C03
AC-DC, full-wave	U24-D04C X12-J04C	filtering output	U24-D01E
AC-DC, half-wave	U24-D04A	g carpar	U25-E
AC-DC, Hall-wave	X12-J04A		X12-J01E
AC-DC, multiplier	U24-D04E	frequency	U24-D03
AC-DC, synchronous	U24-D04G	. ,	X12-J03
	X12-J04E	frequency, matrix	X12-J03A
bidirectional converter	U24-D10	general details	U24-D01
	X12-J10		X12-J01
charge pump	U24-D02A1	harmonics reduction	U24-D01E1
chopper	U24-D02A2		U25-E
constuctional details	U24-D01K		X12-J01E
	X12-D01K	interference (EM/RF) reduction	U24-D01E5
cooling	U24-D01G		W02-H01
	V04-T03		X12-J01E5
	X12-J01G	measuring/testing	U24-D01J
current source inverter	U24-D05B2	multi-phase control	U24-D01A8
D.C.:	X12-J05B2	multiple input/outputs position, interface	U24-D11 T01-C02B
DC to surge	U24-D09	power, electric train/tram	X23-A01A3
DC-AC	X12-J09 U24-D05	protection	U24-D01B
DC-AC	X12-J05	protection	U24-F
DC-AC, characterised by bipolar	A12-303		X12-J01B
transistors	U24-D05A1		X13-C04D
11 0113131013	X12-J05A1	pulse	U24-D06
DC-AC, characterised by FET	U24-D05A3	•	X12-J06
2 3 . 15, Grandeterioda by I E1	X12-J05A3	PWM control	U24-D01A9
DC-AC, characterised by IGBT	U24-D05A1A		X12-J01A9
	X12-J05A1A		
DC-AC, characterised by thyristor			
, ,			

Converted (soutinged)	1	Cooking	
Converter (continued) radio frequency interference (RFI)		Cooking	P28-A02
reduction	U24-D01E5	barbecue	P24-D
reduction	W02-H01	camping equipment	P28-A02
		cookware (non-electrical)	
ain a la caradicación a	X12-J01E5	electric cooking appliances - see	
ripples reduction	U24-D01E2	and a land be and	X27-C
	U25-E	cooker hood	X27-B05
	X12-J01E	ovenware (non-electrical)	P28-A02
smart protector	U24-F05	rice cooker	X27-B05
smoothing output	U24-D01E	Cooling	
	U25-E	battery	X16-K01
1.1	X12-J01E	computer equipment	T01-L02A
snubber circuits	U24-D01B1	discharge tube	V05-M07
snubber circuits, active	U24-D01B1C	electric machine	V06-M13
snubber circuits, dissipative	U24-D01B1F		X11-J06
snubber circuits, non-dissipative	U24-D01B1H	electronic apparatus	V04-T03
snubber circuits, passive	U24-D01B1A	fuel cell	X16-K01
solid-state (analogue) protector	U24-F04	instruments	S01-J02C
synchronous rectifier	U24-D04G	IR detector	S03-A04
utility inter-tie inverter	U24-D05B3	lasers	V08-A05
	X12-J05B3	light fixture	X26-D02
voltage source inverter	U24-D05B1	magnetic	X27-F02A1
	X12-J05B1	optical instruments	S03-A04
Conveyor	X25-F01	radio transmitters	W02-G01H
conveying trucks	X25-F05A	semiconductor packages	U11-D02
control	T06-D08C	semiconductor packages, cryroge	nic
	X25-F01A	arrangements	U11-D02C
conveying	X25-F05A	semiconductor packages, externa	l heatsinks
counting objects on	T05-A01	(detachable)	U11-D02B2
for semiconductor wafers	U11-F02A	semiconductor packages, heat tra	nsfer
handling of different materials	Q36	by fluid means	U11-D02D1
filamentary materials	Q36-D	semiconductor packages, high po	wer
piles	Q36-A	thyristor, transistor, rectifier	U11-D02A
thin materials	Q36-C	semiconductor packages, high po	wer,
webs	Q36-B	stacks, installation	U11-D02A1
mining	X25-D02A	semiconductor packages, materia	ls for
Convolution, analogue	T02-A04B2A	heat transfer	U11-D02B
<del>-</del>		semiconductor packages, module	es,
Convolutional code data transmissi	· •	surface mounted chip assembli	
error detection/correction	W01-A01B2		U11-D02D
algorithm aspects	T01-S	semiconductor packages, on chip	/within
	W01-A01B2S	package heat sinks	U11-D02B1
combined convolutional coding s		semiconductor packages, using P	eltier
	W01-A01B4	element	U11-D02D2
coding	T01-D02 W01-A01B2S	semiconductor packages, ventilat	ing
Turbo andina			Ū11-D02
Turbo coding	W01-A01B2E	steam turbines	X11-A01C
Viterbi coding	W01-A01B2A	switches	V03-B06
Convolutional error detection/corre	ection	switchgear	X13-E09
	U21-A06C	Cooling, discharge tube	
turbo coding	U21-A06C2	forced circulation	V05-M07B
using Trellis coding	U21-A06C3	heat sink	V05-M07A
Viterbi coding	U21-A06C1		X12-C02A3
Cooker	X27-C	Cooling, superconducting	X12-C02A3
combination	X27-C07	device/equipment cryostat	X12-C02A3A
electric	X27-C02	,	
gas	X27-C02 X27-C05	Cooling therapy	S05-A05B
in vending machine	T05-H04A	Coordinate measurement	S02-A10G1
induction	X27-C06	calibration	S02-A07
pressure, electric	X27-C00 X27-C04	compensation	S02-A07
rice, electric	X27-C04	using electrical/magnetic method	S02-A02
		Ç	S02-A10G1
Cooker hood	X27-B05		

usin	ng mechanical method	S02-A01	transformer, power supply	V02-H03A
usiii	ig mechanical method	S02-A01		
usin	ng optical method	S02-A03	Core stores (magnetic) - see Digital s stores, magnetic core type	U14-A04X
	5 1	S02-A10G1	=	
mor	nitoring/testing	S02-A07	Coriolis flowmeters	S02-C01F
		S02-A10G1	corona charger, in electrophotogr	apny S06-E02
Coordi	nates, transforming (radar sys	stems)		
		W06-A04E3E	Cornet (instrument)	P86-A01A3
C:	Flactus ub stannaub	VV00-A04E3E	Corona charger for transfer	S06-E05
-	- see Electrophotography		for toner transfer, electrophotogra	
	revention		_	S06-E05A
	lio recording signal	W04-G01L1	for paper separation,	00/ 5055
	ctrophotography	S06-K07A3	electrophotography	S06-E05B
	eo projectors	W04-Q01J5	Corona discharge	X12-F04
	eo recording signal	W04-F01L1	photocopier	S06-A02A
Copyrig	ght protection	T01-J05A2G	rings	X12-F04
		T01-N01A2G	Corona motor	V06-M06J
Cord sv	vitch	V03-C03	Correction for measurements - see	
Cordles	ss headphone	W03-G05C5A	Compensation	S02-K02
	ss loudspeaker	W03-G05C5C	Correlation	
		W04-S05C1	computer data processing systems	5
	•	VV04-303C1	5 p. 1 1 1 p. 1 1 1 1 5 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1	T01-J04B2
	ss telephone	W04 C04D4D	radar signal processing	W06-A04E9
	e unit (subscriber location)	W01-C01D1B	speech signal processing	W04-V05C
call	point (e.g. CT2) base station	W01-B05A1B	statistical analysis by computer	T01-J03
والمم	naint tuna aubaaribar aat	W02-C03C3B W01-C01D1E	using DSP	U22-G03E3D
	point type subscriber set ecurity	W01-C01D1E W01-C01D1D	<b>Corrosion resistance measurement</b>	S03-F07
	table unit (subscriber location)		Cosmetics testing	S03-E14A3
SIM	•	W01-C01D1D	Cosmic ray muon radiography	S03-C02M
_			Cosmic ray muon radiography	303-C02IVI
Core				CO2 FO2 A
<b>Core</b> gen	eral	V02-C	Coulometric titration	S03-E03A
gen	eral nductor	V02-C V02-F03A2	Counters	
gen hf ir	eral nductor eactor	V02-C V02-F03A2 V02-F03A2	<b>Counters</b> asynchronous	U21-D04
gen hf ir hf re	nductor	V02-F03A2	Counters asynchronous bipolar transistors	U21-D04 U21-D06A2
gen hf ir hf re hf tr	nductor eactor	V02-F03A2 V02-F03A2 V02-F03A2	Counters asynchronous bipolar transistors decade	U21-D04 U21-D06A2 U21-D05B2A
gen hf ir hf re hf tr	nductor eactor ransformer	V02-F03A2 V02-F03A2 V02-F03A2	Counters asynchronous bipolar transistors decade divide-by-N	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2
gen hf ir hf re hf tr	nductor eactor ransformer	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05	Counters asynchronous bipolar transistors decade divide-by-N electromechanical	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B
gen hf ir hf re hf tr mag	nductor eactor ransformer gnetic recording head (general) ver reactor	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B
gen hf ir hf re hf tr mag pow pow	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2	Counters asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1
gen hf ir hf re hf tr mag pow pow	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D
gen hf ir hf re hf tr mag pow pow pow pow	nductor eactor ransformer gnetic recording head (general) ever reactor ever supply reactor ever supply transformer ever transformer	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2	Counters asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1
gen hf ir hf re hf tr mag	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer anufacture	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01
gen hf ir hf re hf tr mag	nductor eactor ransformer gnetic recording head (general) ever reactor ever supply reactor ever supply transformer ever transformer eanufacture etromagnet	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B
gen hf ir hf re hf tr mag	nductor eactor ransformer gnetic recording head (general) ever reactor ever supply reactor ever supply transformer ever transformer eanufacture etromagnet	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D02B
gen hf ir hf re hf tr mag  pow pow pow pow pow elec elec	nductor eactor ransformer gnetic recording head (general) ever reactor ever supply reactor ever supply transformer ever transformer eanufacture etromagnet etromagnetic relay	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D02B U21-D05B3 U21-D05B3 U21-D05B2B U21-D06A3
gen hf ir hf re hf tr mag  pow pow pow pow pow elec elec	nductor eactor ransformer gnetic recording head (general) ever reactor ever supply reactor ever supply transformer ever transformer eanufacture etromagnet etromagnetic relay	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D02B U21-D05B3 U21-D05B3 U21-D05B2B U21-D06A3 U21-D06A3 U21-D05C6
gen hf ir hf re hf tr mag  pow pow pow pow pow elec elec	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer eanufacture ctromagnet ctromagnetic relay	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D02B U21-D05B3 U21-D05B3 U21-D05B2B U21-D06A3 U21-D05C6 U21-D05A
gen hf ir hf re hf tr mag  pow pow pow pow pow elec elec indu	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer canufacture extromagnet extromagnetic relay extromagnetic valve uctor, general	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D02B U21-D05B3 U21-D05B3 U21-D05B2B U21-D06A3 U21-D05C6 U21-D05A U21-D05A
gen hf ir hf re hf tr mag  pow pow pow pow elec elec indu indu	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer ctromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, hf	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D06B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D06A3 U21-D05C6 U21-D05A U21-D05A U21-D03A U21-D06A
gen hf ir hf re hf tr mag  pow pow pow pow elec elec indu indu indu	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer tromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, power supply	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D06A3 U21-D05A U21-D05A U21-D03A U21-D03A U21-D06A U21-D06A
gen hf ir hf re hf tr mag  pow pow pow pow elec elec indu indu indu	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer ctromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, hf	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D02B U21-D05B3 U21-D05B3 U21-D05B2B U21-D05A3 U21-D05A U21-D05A U21-D03A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A
gen hf ir hf re hf tr mag  pow pow pow pow elec elec indu indu indu mag	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer tromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, power supply	V02-F03A2 V02-F03A2 V02-F03A2 )T03-A03J1 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D05A6A3 U21-D05A U21-D05A U21-D03A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A
gen hf ir hf re hf tr mag  pow pow pow pow elec elec indu indu indu mag mot	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer eanufacture ctromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, hf uctor, power supply gnetic recording head (general)	V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors using biquinary code	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D05A6A3 U21-D05A U21-D05A U21-D05A U21-D06A U21-D03A U21-D06A U21-D02A U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D03 U21-D05C3
gen hf ir hf re hf tr mag  pow pow pow pow core m elec elec indu indu indu mag mot mot	nductor eactor ransformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer eanufacture ctromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, hf uctor, power supply gnetic recording head (general) tor, large	V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C V02-H03C2 X25-L01A V02-H03E	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors using biquinary code using excess three code	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D05C6 U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D06A U21-D05A U21-D06A U21-D05A U21-D06A U21-D05A U21-D05A U21-D05A
gen hf ir hf re hf tr mag  pow pow pow pow core m elecc elecc indu indu indu mag mot mot	reductor reactor reansformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer anufacture ctromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, hf uctor, power supply gnetic recording head (general) ctor, large ctor, small cer low power devices uter electromagnet	V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H05 X11-J08A V06-M11D V02-H03X S06-F	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors using biquinary code using excess three code using Gray code	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D03A U21-D06A U21-D03A U21-D03A U21-D03A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A
gen hf ir hf re hf tr mag  pow pow pow pow elec elec indu indu indu mag  mot mot othe prin	reductor reactor reansformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer ver transformer anufacture ctromagnet ctromagnetic relay ctromagnetic valve uctor, general uctor, hf uctor, power supply gnetic recording head (general) tor, large tor, small ter low power devices ter electromagnet	V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H05 X11-J08A V06-M11D V02-H03X S06-F V02-H03C3	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors using biquinary code using excess three code using Gray code with non-binary base	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D03A U21-D03A U21-D03A U21-D03A U21-D03A U21-D03A U21-D03A U21-D03A U21-D03A U21-D05C6 U21-D03 U21-D05C3 U21-D05C3 U21-D05C2 U21-D05C1 U21-D05C1
gen hf ir hf re hf tr mag  pow pow pow pow pow elec elec indu indu indu mag  mot mot othe prin	reductor reactor reansformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer anufacture ctromagnet ctromagnetic relay ctromagnetic valve  uctor, general uctor, power supply gnetic recording head (general) tor, large tor, small ter low power devices of the sector of the	V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H05 X11-J08A V06-M11D V02-H03X S06-F V02-H03C3 X12-C01D1	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors using biquinary code using excess three code using Gray code with non-binary base with variable counting base	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2B U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D03A U21-D06A U21-D03A U21-D03A U21-D03A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A U21-D05A
gen hf ir hf re hf tr mag  pow pow pow pow pow elec elec indu indu indu mag  mot mot othe prin	reductor reactor reansformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer anufacture ctromagnet ctromagnetic relay ctromagnetic valve  uctor, general uctor, power supply gnetic recording head (general) tor, large tor, small ter low power devices of the power ustor, power	V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H05 X11-J08A V06-M11D V02-H03X S06-F V02-H03C3 X12-C01D1 V02-H03A	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors using biquinary code using excess three code using Gray code with non-binary base with variable counting base  Counting	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05B2 U21-D05A U21-D05A U21-D05A U21-D03A U21-D06A U21-D03 U21-D03 U21-D06A U21-D03 U21-D05C3 U21-D05C3 U21-D05C2 U21-D05C1 U21-D05B1
gen hf ir hf re hf tr mag  pow pow pow pow pow elec elec indu indu indu mag  mot mot othe prin	reductor reactor reansformer gnetic recording head (general) ver reactor ver supply reactor ver supply transformer ver transformer anufacture ctromagnet ctromagnetic relay ctromagnetic valve  uctor, general uctor, power supply gnetic recording head (general) tor, large tor, small ter low power devices of the relation of the power ter of the pow	V02-F03A2 V02-F03A2 V02-F03A2 V02-F03A2 V02-F05 X12-C01A V02-G02A2 V02-G02A2 X12-C01A V02-H03C V02-H03C1 V03-D06B V02-H03C2 X25-L01A V02-H03E V02-H03E V02-H03E V02-H03E V02-H03E V02-H05 X11-J08A V06-M11D V02-H03X S06-F V02-H03C3 X12-C01D1	Counters  asynchronous bipolar transistors decade divide-by-N electromechanical error correction FET for pulse generation input/output circuits mechanisms for counting items monitoring non-integer base odd number base opto-electronic random reversible ring type semiconductor starting/stopping synchronous thyristors using biquinary code using excess three code using Gray code with non-binary base with variable counting base	U21-D04 U21-D06A2 U21-D05B2A U21-D05B2 U21-D06B U21-D02B U21-D06A1 U22-A02D U21-D01 T05-B U21-D05B3 U21-D05B3 U21-D05A2 U21-D05A U21-D05A U21-D05A U21-D05A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D06A U21-D05C6 U21-D05C6 U21-D05C1 U21-D05C2 U21-D05C1 U21-D05C1

Counting tube (radiation)         \$03-60282A         W02-C01C2           Coupler         Q63-A         V02-G01D           optical libre - see Optical couplers optical fibre - see Optical couplers optical fibre - see Optical couplers of Coupling (electronic) - see Connector, electrical         V07-G         V05-D           Coupling (electronic) - see Connector, electrical         Coupling device (electronic) - see Connector, electrical         See Connector (electrical)         V05-D08-D08-S           Coupling mechanical vibrations         P43-A05         See Connector (outping mechanical vibrations of Cover layer, photoconductor of Cradle switch, telephone         V01-D15-A1         Common V05-D08-D08-D08-D08-D08-D08-D08-D08-D08-D08	randomly distributed objects stacked objects	T05-A02 T05-A02	Crossover network (loudspeaker)	V06-V02S W04-T05
Coupler	vehicles for traffic monitoring	T07-A01C	Crosstalk reduction, line transmission	on
inductive optical see Optical couplers V07-G optical fibre - see Optical couplers V07-D optical fibre - see Optical couplers v07-D optical fibre - see Optical fibre - see Optical couplers v07-D optical fibre - see Optical fibre - see Optical couplers v07-D optical fibre - see Connector, electrical antistatic tube coatings v07-D optical associated devices v07-D optical sasociated devices v07-D optical convergence coil v07-D optical deflection y08-D optical v07-D optical deflection y08-D optical deflection powers with y08-D optical deflection powers y08-D optical deflection powers y08-D optical deflection y08-D optical defle	=			W02-C01C2
optical fibre - see Optical couplers	•		Crosstie random access memory	U14-A04A
opitical fibre - see Optical couplers w07-G waveguide w02-A02  Coupling (electronic) - see Connector, electrical Coupling device (electronic) - see Connector, electrical coupling device (electronic) - see Connector, electrical coupling device (electronic) - see Connector, electrical coupling mechanical vibrations P43-A05  Cover layer, photoconductor S06-A018  Corel ayer, photoconductor S06-A018  Cradle switch, telephone W01-C01A  Cradle switch, telephone W01-C01A  Crane O19-E  control T06-D08E  control T06-D08E  control Q41-A10  Q41-B10  Q41-B10  Q41-B10  Q41-B10  Q41-B10  Q41-B10  Crash testing  crash dummy, vehicle S02-J02F1  Crash testing  crash dummy, vehicle S02-J02F1  Cremation X25-C  Cricket (sport) P36-A01  W04-X01K1G  Crimped connector V04-A02  V04-M02  V04-M02  V04-M02  Crop analysis S03-E14J  Crop spraying boom P13-A  Crop spra			CRT	V05-D
Coupling (electronic) - see Connector, electrical Coupling device (electronic) - see Connector, electrical Coupling mechanical vibrations Coupling mechanical vibrations COUPLING mechanical vibrations CPU, computer aided design for T01-J15A1 Cradle switch, telephone Crane Q19-E Control T06-D08E X25-F05 Control T06-D08E Q41-B10 Q41-B10 Q41-B10 Q41-B10 Q41-B10 CRC Crash testing crash dummy, vehicle Creep measurements Creep measurements Cremation X25-C Cricket (sport) P36-A01 W04-A02 V04-M10 X12-G02 Crop analysis Crop spraying boom P13-A P42-U05 Crops-country running P36-A03 Cross-color suppression in color TV receiver Cross-connect switch, data network worl - M05-D06A5 Cross-country skiing ('langlauf') Cross-cut shredder P41-A04 T04-X01 Cross-cut shredder Cross-section control for CRT electron beam V05-D06A5 Cross-section measurement S01-D08A  And Sociated devices V05-D06 camera tube v05-D08 comments sesociated devices v05-D08 comments sesociated devices v05-D08 comment sesociated event ube v05-D018 associated devices v05-D08 comment sube v05-D08 comment sesociated event ube v05-D08 comment sesociated event ube v05-D08 comment sesociated event ube v05-D08 comment sesociated even			antireflective filter	V05-D07C3
Coupling (electronic) - see Connector, electrical coupling device (electronic) - see Connector, electrical clectrical clectrical clectrical clectrical electronic) - see Connector, electrical associated devices v05-D08 associated devices				
Coupling mechanical vibrations Coupling mechanical vibrations Cover layer, photoconductor CPU, computer aided design for Cradle switch, telephone Crane  Class Control  T06-D08E X25-F05 Control  T06-D08E X25-F05 Control  Q41-810 Q41-810 Q41-810 Q41-810 C41-810 C41-810 C41-810 C41-810 C52-CCRC Crash darmy, vehicle Creep measurements - see mechanical stength measurements Cremation Cricket (sport)  Cricket (sport)  Cricket (sport)  Crop analysis Crop spraying boom P13-A P42-T014 P42-T014 P42-T014 P42-T014 P42-V105 Cross-country running P36-A03 W04-X01K3P Cross-country running P36-A03 W04-X01K3P Cross-country running P36-A03 W04-X01K3P Cross-country skiing ('langlauf') P36-A03 W04-X01K3P Cross-cut shredder P41-A04 T04-X X25-J X27-A02C Cross-section control for CRT electron beam Sol1-D08A Sol2-D08A Sol2-date devices V05-D07Cs beam controlling/generating arrangements V05-D06A compenents associated with electron gun Conductive coatings Conductive coatings Complete novel tube V05-D01A complete novel tube V05-D08A deflection yoke assembly fixing system V05-D08B deflection	•	tor electrical		
Coupling mechanical vibrations   P43.A05   Sok-A01B   V05-D06   V05-D06   V05-D06   CPU, computer aided design for   T01-J15A1   Conductive coatings   V05-D06B1   Cooling			,	
Cover layer, photoconductor         S06-A01B         camera tube         V05-D02           CPU, computer aided design for         T01-J15A1         complete novel tube         V05-D01A           Crade switch, telephone         W01-C01A         complete novel tube         V05-D06A7           Crane         Q19-E         Components associated with electron gun           Control         T06-D08E         V05-D06B1           Control         Q41-B10         Conductive coatings         V05-D06B1           Control         Q41-B10         Cooling         V05-D06B1           Crash barrier         Q41-B10         Cooling         V05-D06B1A           Crash testing         V05-D06B1A         deflection yoke assembly         V02-D06B1A           CRC         U21-A06A1         degaussing circuitry         V05-D06B1A           Crep measurements - see mechanical stength measurements         V05-D06B1         degaussing circuitry         V05-D06B1A           Crep measurements - see mechanical stength measurements         V04-M01         degaussing circuitry         V05-D06B1A           Crep measurements - see mechanical stength measurements         V04-M10         degaussing system         delagun tube         V05-D06B1A           Cricket (sport)         V04-M10         V04-M10         V05-D06B1         d	electrical			
CPU, computer aided design for T01-J15A1 complete novel tube V05-D01A conductor vos-D01A conductor vos-			beam controlling/generating arra	
Cradle switch, telephone Crane  Crane  Class  control  To6-D08E X25-F05 Control  To6-D08E X25-F05 Control  Crash barrier  Q41-A10 Q41-B10 Q41-B10 Q41-E10  Crash testing crash dummy, vehicle CRC  U21-A06A1 Creep measurements - see mechanical stength measurements  Cremation  Cricket (sport)  Cricket (sport)  Crop analysis  Crop spraying boom P13-A P42-D05 P42-A03C P42-T01A P42-U05 Crops-color suppression in color TV receiver  Cross-country running P36-A03 W04-X01K3A Cross-country skiing ('langlauf') Cross-cut shredder Cross-cut shredder Cross-section Components associated with electron gun V05-D08A Convergence coil V02-D Conductive coatings V05-D06B1 Cooling V05-D06B1 Adeflection yoke assembly fixing system V05-D06B1A deflection yoke assembly fixing system V05-D08B1A deflection yoke assembly fixing system V05-D08B1 delettion yoke assembly fixin		S06-A01B	camera tube	
Crane Q19-E X25-F05 Control T06-D08E X25-F05 Crash barrier Q41-A10 Q41-E10 Q41-E10 C41-B10 Q41-E10 C45-B08E Crash dummy, vehicle Crash testing Crash dummy, vehicle S02-J02F1 CRC U21-A06A1 CRC U21-A06A1 Creep measurements - see mechanical stength measurements Cremation X25-C Cricket (sport) P36-A01 W04-X01K1G Crop spraying boom P13-A P42-U05 Crop spraying boom P13-A P42-U05 Crop spraying boom P13-A P42-U05 Crops-color suppression in color TV receiver Cross-connect switch, data network Cross-connect switch, data network Cross-connect switch, data network Cross-country running P36-A03 W04-X01K3P Cross-country skiing ('langlauf') P36-A03 W04-X01K3P Cross-cotor suppression in Color TV receiver Cross-country skiing ('langlauf') P36-A03 W04-X01K3P Cross-country skiing ('langlauf') P36-A03 W04-X01K3P Cross-cotor suppression in Color TV receiver Cross-country skiing ('langlauf') P36-A03 W04-X01K3P R1 will ediction yoke assembly W05-D08A deflection yoke assembly W05-D08A1 deflection yoke assembly W05-D0BA1 deflection yoke assembly W05-D08A1	CPU, computer aided design for	T01-J15A1	complete novel tube	V05-D01A
control 706-D08E 705-D07B3 convergence coil 705-D07B3 control 706-D08E 705-D06B1 706-D08E 705-D06B1 706-D08E 705-D06B1 706-D08E 705-D06B1 706-D08E 705-D06B1	Cradle switch, telephone	W01-C01A	components associated with elect	
control T06-D08E X25-F05 Carsh barrier Q41-A10 Q41-B10 Q41-B10 Q41-E10  Crash testing crash dummy, vehicle Creep measurements - see mechanical stength measurement Cremation Cricket (sport) P36-A01 W04-X01K1G Crop spraying boom P13-A P42-T01A P42-T01B P42-A03C Crop spraying boom P13-A P42-T01A P42-T01B P43-A03C P43-R03C P43-R0	Crane	Q19-E		
Crash barrier  Cash barrier  Q41-A10 Q41-B10 Q		X25-F05		
Crash barrier  Q41-A10 Q41-B10 Q41-E10  deflection yoke assembly V02-F01A V05-D06B1A deflection yoke assembly fixing system V05-D08B1A degaussing circuitry V05-D08B1A degaussing system V05-D08B1 degaussing system	control		convergence con	
Crash testing crash dummy, vehicle Creep measurements - see mechanical stength measurements Cricket (sport) Cricket (sport) P36-A01 W04-X01K1G Crop analysis Crop spraying boom P13-A P42-V05 Crops-country running Cross-country running P36-A03 W04-X01K3A Cross-country skiing ('langlauf') Cross-country skiing ('langlauf') Cross-country skiing ('langlauf') Cross-section Cross-secti			cooling	
Crash testing crash dummy, vehicle  CRC U21-A06A1 Creep measurements - see mechanical stength measurements Cricket (sport) Cricket (sport) P36-A01 W04-X01K1G Crimped connector V04-A02 V04-M10 Cripped connector V04-M10 Crop spraying boom P13-A P42-U05 P42-T01A P42-U05 Cropsing, image processing W04-N05C3G Cross-color suppression in color TV receiver Cross-country running P36-A03 W04-X01K3A Cross-country skiing ('langlauf') Cross-cut shredder P41-A04 T04-X X25-J X27-A02C Cross-section control for CRT electron beam V05-D06A5 Cross-section control for CRT electron beam V05-D06A5 Cross-manufacture - see CRT manufacture V05-D07B3 M05-D07B3 M05-D08A5  degaussing circuitry V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing circuitry V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing circuitry V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing circuitry V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing circuitry V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing system V05-D08A1 degaussing cruitry V05-D08A1 degaussing system V05-D08A1 degaussing cruitry V05-D08A1 degaussing system V05-D08A1 delectron sperts of the proposed delection components V05-D06A5  P42-M01 displaytube per se V05-D06A5  electron beam focusing components electron gun characterised by type V05-D06A5 electron gun with structurally-associated components V05-D06A5 electron gun with structurally-associated components V05-D06A5 electron-multiplier arrangements V05-D06A5  EM radiation prevention screen filter V05-D01B3A liat V05-D01B3A	Crash barrier		deflection yoke assembly	V02-F01A
Crash testing crash dummy, vehicle  CRC  U21-A06A1  Creep measurements - see mechanical stength measurements  Cremation  X25-C  Cricket (sport)  P36-A01  W04-X01K1G  Crimped connector  V04-M10  X12-G02  Crop analysis  Crop spraying boom  P13-A  P42-T01A  P42-U05  Crops-color suppression in color TV receiver  Cross-color suppression in color TV receiver  Cross-country running  P36-A03  W04-X01K3A  Cross-country skiing ('langlauf')  P36-A03  W04-X01K3P  Cross-country skiing ('langlauf')  P36-A03  W04-X01K3P  Cross-ceut shredder  P41-A04  T04-X  X25-J  Luminescent screen V05-D06A5  Cross-section control for CRT electron beam V05-D06A5  V05-D06A5  V05-D06A5  V05-D06B1  degaussing circuitry V05-D0BA delta gun tube V05-D01B3A delta gun tube V05-D01B3A delta gun tube V05-D01B3A delta gun tube V05-D01B3A delta gun tube V05-D0BA delta gun tube				
Crash dummy, vehicle CRC U21-A06A1  Creep measurements - see mechanical stength measurements Cremation Cricket (sport) P36-A01 W04-X01K1G Crimped connector V04-M10 X12-G02 Crop analysis Crop spraying boom P42-T01A P42-U05 Cross-color suppression in color TV receiver Cross-country running Cross-country skiing ('langlauf') P36-A03 W04-X01K3A Cross-country skiing ('langlauf') Cross-cut shredder P41-A04 T04-X		Q41-E10	deflection yoke assembly fixing sy	
Creep measurements - see mechanical stength measurements  Cremation X25-C display control aspects T04-H01  Cricket (sport) P36-A01 W04-X01K1G  Crimped connector V04-M2 V04-M10 X12-G02 Crop analysis S03-E14J Crop spraying boom P13-A P42-H01A P42-H01S  Cropping, image processing W04-N05C3G  Cross-color suppression in color TV receiver W03-A05B5  Cross-country running P36-A03 W04-X01K3A  Cross-country skiing ('langlauf') P36-A03 W04-X01K3A  Cross-country skiing ('langlauf') P36-A03 X27-A02C Cross-section control W05-D06A5  Cross-section control W04-X01K3A Cross-section control W05-D06A5 Cross-country skiing ('langlauf') w05-D06A5 Cross-section control w05-D06A5 Cross-section control w05-D06A5 Cross-country skiing ('langlauf') w05-D		CO2 102E1		
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stength measurements  Cremation  Cricket (sport)  Crimped connector  Crop analysis  Crop spraying boom  P13-A  P42-A03C  P42-T01A P42-U05  Cross-color suppression in color TV receiver  Cross-country running  Cross-country skiing ('langlauf')  Cross-country skiing ('langlauf')  Cross-country skiing ('langlauf')  Cross-country skiing ('langlauf')  Cross-cotor suppression  Cross-cotor suppression  Cross-country skiing ('langlauf')  Cross-cotor suppressed  Cross-country skiing ('langlauf')  Cross-cotor suppression  Cross-cotor suppression  Cross-cotor suppression  Cross-country skiing ('langlauf')  Cross-cotor suppression  Cross-cotor suppression  Cross-cotor suppression  Cross-cotor suppression  Cross-country skiing ('langlauf')  Cross-cotor suppression  Cross-cotor suppression  Cross-cotor suppression  Cross-country skiing ('langlauf')  Cross-cotor suppression  Cross-cotor suppression  Cross-cotor suppression  Cross-cotor suppression in color TV  receiver  Cross-country skiing ('langlauf')  P36-A03  W04-X01K3A  W04-X01K3A  EM shielding tube coatings  EM shielding tube coatings  EM shielding tube coatings  EM shielding tube coatings  V05-D0183  EM shielding tube coatings  V05-D0185  EM shielding tube coatings  V05-D0185  Flood gun tube  V05-D01816  In-line gun tube  V05-D01818  In-line gun tube  V05-D01818  In-line gun tube  V05-D05B  magnetic tube coatings  V05-D05B  maunfacture - see CRT manufacture  V05-D07B3M  manufacture - see CRT manufacture  V05-D07B3M  manufacture - see CRT manufacture				
Cricket (sport) P36-A01 W04-X01K1G  Crimped connector V04-M10 X12-G02 Crop analysis Crop spraying boom P42-T01A P42-V05 P42-T01A P42-U05 P42-T01A Cross-color suppression in color TV receiver Cross-country running Cross-country skiing ('langlauf') P36-A03 W04-X01K3A Cross-country skiing ('langlauf') P36-A03 W04-X01K3A Cross-country skiing ('langlauf') P36-A03 W04-X01K3A Cross-section Cross-section Cross-section Cross-section Cross-section Cross-section Cross-section Cross-country for CRT electron beam Cross-countable Cross-countable Cross-countable Cross-countable Cross-countable Cross-section Cross-section Cross-section Cross-section Cross-section Cross-countable Cross-countable Cross-countable Cross-section Cross-section Cross-countable Cross-countable Cross-countable Cross-section Cross-section Cross-section Cross-countable Cross-countable Cross-countable Cross-countable Cross-section Cross-countable Cross-countable Cross-countable Cross-countable Cross-section Cross-countable Cross-section Cross-countable Cross-countabl	-	nical		V05-D01B3B
Cricket (sport)  P36-A01 W04-X01K1G  Crimped connector V04-M10 X12-G02 V05-D06A5  Crop analysis Crop spraying boom P13-A P42-T01A P42-U05 P42-T01A P42-U05 Cross-color suppression in color TV receiver W03-A05B5 Cross-country running P36-A03 W04-X01K3A Cross-country skiing ('langlauf') Cross-cut shredder P41-A04 T04-X X25-J X27-A02C Cross-cection Cross-cection Cross-coult (Sport) X04-A01 V05-D06A5 P24-T01A P42-U05 P42-T01A P42-U0	stength measurements			
Crimped connector  V04-X01K1G  Crimped connector  V04-M10 X12-G02  Crop analysis  Crop spraying boom  P13-A P42-A03C P42-T01A P42-U05 Cross-color suppression in color TV receiver  Cross-country running  Cross-country running  P36-A03 W04-X01K3A  Cross-country skiing ('langlauf')  Cross-cut shredder  P41-A04 T04-X X25-J W27-A02C  Cross-countrol for CRT electron beam  V05-D06A5  electron beam cross-section control V05-D06A5 electron beam focusing components V05-D06A5 electron gun characterised by type V05-D06A1 electron gun with structurally-associated components V05-D06A7 electron-multiplier arrangements V05-D06A7 electron-multiplier arrangements V05-D06A7 electron-multiplier arrangements V05-D06A5  EM shielding tube coatings V05-D01B5 flood gun tube V05-D01B3A laser diode screen laser diode screen laser diode screen laminescent screen wagnetic tube coatings V05-D07B3M manufacture - see CRT manufacture wots-D01B3C	Cremation	X25-C		
Crimped connector  V04-A02 V04-M10 X12-G02 Crop analysis Crop spraying boom P13-A P42-W03C P42-T01A P42-U05 Cross-color suppression in color TV receiver Cross-country running P36-A03 W04-X01K3A Cross-country skiing ('langlauf') P36-A03 W04-X01K3P Cross-cout shredder P41-A04 T04-X X25-J X27-A02C Cross-cotion control for CRT electron beam Cross-color suppression Cross-cotion Cross-country for CRT electron beam V04-X01K3A  P41-A04 V05-D06A5 electron beam cross-section control V05-D06A5 electron beam focusing components V05-D06A5 electron gun characterised by type V05-D06A1 electron gun with structurally-associated components V05-D06A7 electron-multiplier arrangements V05-D06A7 electron-multiplier arrangements V05-D06A7 electron beam focusing components V05-D06A5 electron beam focusing components V05-D06A5 electron beam focusing components V05-D06A5  electron beam cross-section control V05-D06A5  electron beam focusing components V05-D06A5  electron beam cross-section control V05-D06A5  electron beam focusing components V05-D06A5  electron beam focusing components V05-D06A5  electron beam focusing components V05-D06A5  electron beam cross-section control V05-D06A5  electron beam cross-section control V05-D06A5  electron beam cross-section control V05-D06A5  electron beam focusing components V05-D06A5  electron beam cross-section control V05-D06A5  EM radiation prevention screen filter V05-D07B5  EM shielding tube coatings V05-D01B3C  flood gun tube V05-D01B3C	Cricket (sport)	P36-A01	electromagnetic deflection compo	
Crop analysis S03-E14J Crop spraying boom P13-A P42-H015 P42-U05 P42-U05 Crops-country running P36-A03 W04-X01K3P Cross-cut shredder P41-A04 Cross-country skiing ('langlauf') P36-A03 Cross-country skiing ('langlauf') P36-A03 Cross-countrol V04-M16 P41-A04 Cross-countrol P41-A04 Cross-countrol P41-A04 Cross-countrol P41-A04 Cross-countrol P41-A04 Cross-countrol for CRT electron beam Cross-countrol for CRT electron beam Cross-countrol V04-M16A Cross-countrol for CRT electron beam Cross-countrol for CRT electron beam Cross-countrol P30-A03 Cross-countrol for CRT electron beam Cross-countrol P30-A03 Cross-countrol for CRT electron beam Cross-countrol for CRT electron		W04-X01K1G	electron beam aberration correcti	
Crop analysis S03-E14J P13-A P42-MO3C P42-T01A P42-U05 Cropping, image processing W04-N05C3G Cross-color suppression in color TV receiver W03-A05B5 Cross-country running P36-A03 Cross-country running P36-A03 Cross-country skiing ('langlauf') P36-A03 Cross-cut shredder P41-A04 T04-X X25-J Cross-section Cross-country function Measurement S01-D08A  X12-G02 V05-D06A5 electron beam focusing components V05-D06A5 electron gun characterised by type V05-D06A1 electron gun characterised by type V05-D06A1 electron gun with structurally-associated Components V05-D06A7 electron gun characterised by type V05-D06A1 electron gun with structurally-associated Components V05-D06A1 electron gun characterised by type V05-D06A1 electron gun with structurally-associated Components V05-D06A1 electron gun characterised by type V05-D06A1 electron gun with structurally-associated Components V05-D06A5  EM radiation prevention screen filter V05-D07B3 EM shielding tube coatings V05-D07B3E external shield enclosure V05-D01B3E flood gun tube V05-D01B3E in-line gun tube V05-D01B3A laser diode screen V05-D05A3 lead-in V05-D07B3 magnetic tube coatings V05-D07B3M manufacture - see CRT manufacture V05-D01B3C	Crimped connector			
Crop analysis Crop spraying boom P13-A P42-A03C P42-T01A P42-U05 W04-N05C3G Cross-country running Cross-country skiing ('langlauf') P36-A03 W04-X01K3P Cross-cut shredder P41-A04 T04-X X25-J Cross-section control for CRT electron beam P13-A P42-A03C P42-T01A P42-U05 W04-X01K3A P42-W05 P42-U05 electron gun characterised by type V05-D06A1 electron gun with structurally-associated components V05-D06A5 electron gun with structurally-associated components V05-D06A7 electron-multiplier arrangements V05-D06B5 EM radiation prevention screen filter V05-D07B5 EM shielding tube coatings V05-D07B3 external shield enclosure V05-D01B5 flood gun tube V05-D01B5 flood gun tube V05-D01B3A In-line gun tube V05-D01B3A In-line gun tube V05-D05A3 V05-D05B3 W05-D07B3M magnetic tube coatings V05-D07B3M manufacture - see CRT manufacture V05-D01B3C			electron beam cross-section contr	rol
Crop spraying boom P13-A P42-A03C P42-T01A P42-U05 W04-N05C3G Cross-color suppression in color TV receiver W03-A05B5 Cross-country running P36-A03 W04-X01K3A Cross-country skiing ('langlauf') Cross-cut shredder P41-A04 T04-X X25-J Lord Cross-section control for CRT electron beam P13-A P42-A03C P42-T01A P42-U05 P42-U05 electron gun characterised by type V05-D06A1 electron gun with structurally-associated components V05-D06A7 electron-multiplier arrangements V05-D06A5 EM radiation prevention screen filter V05-D07B5 EM shielding tube coatings V05-D07B3 External shield enclosure V05-D01B15 flood gun tube V05-D01B15 In-line gun tube V05-D01B3A In-line gun tube V05-D01B3A In-line gun tube V05-D05B V05-D05B W05-D07B3 In-line gun tube V05-D05B W05-D07B3 In-line gun tube V05-D05B W05-D07B3 In-line gun tube W05-D07B3 In-line gun	Cron analysis			
P42-A03C P42-T01A P42-U05  Cropping, image processing  W04-N05C3G  Cross-color suppression in color TV receiver  W03-A05B5  Cross-connect switch, data network  Cross-country running  P36-A03 W04-X01K3A  Cross-country skiing ('langlauf')  P36-A03 W04-X01K3P  Cross-cut shredder  P41-A04 T04-X T04-X AV25-J X27-A02C  Cross-section control for CRT electron beam Crossmodulation measurement  P42-A03C P42-T01A P42-U05 electron gun characterised by type V05-D06A1 electron gun with structurally-associated components V05-D06A7 electron-multiplier arrangements V05-D06E EM radiation prevention screen filter V05-D07B5 EM shielding tube coatings V05-D07B3 EM shielding tube coatings V05-D01B5 flat V05-D01B3 flood gun tube V05-D01B1 in-line gun tube V05-D01B1 V05-D05A3 lead-in V05-D07B1 W05-D07B1 matrix configuration multiple gun tube w05-D01B3C			electron beam tocusing compone	
Cropping, image processing  W04-N05C3G  W04-N05C3G  W04-N05C3G  W03-A05B5  Cross-connect switch, data network  Cross-country running  P36-A03 W04-X01K3A  Cross-country skiing ('langlauf')  W04-X01K3P  Cross-cut shredder  P41-A04 T04-X T04-X T04-X X25-J X27-A02C  Cross-section control for CRT electron beam Crossmodulation measurement  P42-T01A P42-U05 W04-N05C3G  EM radiation prevention screen filter  V05-D07B3  EM shielding tube coatings V05-D07B3  Flood gun tube W05-D01B3 Flood gun tube W05-D01B3 Flood gun tube W05-D01B3  W05-D01B3  W05-D07B3	erop opraying accin		electron gun	
Cropping, image processing  W04-N05C3G  W04-N05C3G  Cross-color suppression in color TV receiver  W03-A05B5  Cross-connect switch, data network  Cross-country running  P36-A03 W04-X01K3A  Cross-country skiing ('langlauf')  P36-A03 W04-X01K3P  Cross-cut shredder  P41-A04 T04-X T05-D01B3 T04-X T04-X T04-X T04-X T04-X T04-X T04-X T04-X T04-X T05-D01B3 T04-X T04-X T04-X T04-X T04-X T04-X T04-X T04-X T04-X T05-D01B3 T04-X T04-X T04-X T04-X T04-X T04-X T04-X T04-X T04-X T05-D01B3 T05-D01B3 T06-D01B3 T07-D01B3 T		P42-T01A		
Cross-color suppression in color TV receiver W03-A05B5  Cross-connect switch, data network W01-A06G5A  Cross-country running P36-A03 W04-X01K3A  Cross-country skiing ('langlauf') P36-A03 Flat V05-D01B5  Cross-cut shredder P41-A04 Fro4-X R25-J R25				
receiver W03-A05B5  Cross-connect switch, data network W01-A06G5A  Cross-country running P36-A03 W04-X01K3A  Cross-country skiing ('langlauf') P36-A03 Flat V05-D01B5  Cross-cut shredder P41-A04 Float X25-J Float X27-A02C  Cross-section Control for CRT electron beam Control for CRT electron beam Measurement S01-D08A  Poss-country would at a network W01-A06G5A  EM radiation prevention screen filter  V05-D07B5  EM shielding tube coatings V05-D07B3E  external shield enclosure V05-D01B5  fload gun tube V05-D01B5  in-line gun tube V05-D01B3A  laser diode screen V05-D05A3  k25-J lead-in V05-D05B  magnetic tube coatings V05-D07B3M  manufacture - see CRT manufacture  V05-D01B3C				
Cross-country running P36-A03 W04-X01K3A  Cross-country skiing ('langlauf') P36-A03 W04-X01K3P  Cross-cut shredder P41-A04 T04-X X25-J X27-A02C  Cross-section control for CRT electron beam P36-A03 W05-D01R3C P36-A03 FInat P36-A03 Flat P36-				
Cross-country running P36-A03 W04-X01K3A EM shielding tube coatings external shield enclosure V05-D07B3E  Cross-country skiing ('langlauf') P36-A03 W04-X01K3P F1 bit of the coatings W05-D01B5 F1 bit of the coatings F2 bit of the coatings F3 bit of the coatings F4 bit of the coatings F5 bit of the				
Cross-country running P36-A03 W04-X01K3A EM shielding tube coatings v05-D07B3E external shield enclosure V05-D01B5 P36-A03 Flat V05-D01B5 Flood gun tube V05-D01B1E Flood gun tube V05-D01B1E Flood gun tube V05-D01B3A V05-D01B3A V05-D01B3A V05-D05A3 V05-D05A3 V05-D05B	Cross-connect switch, data networ	k W01-A06G5A	Livi radiation prevention screen in	
Cross-country skiing ('langlauf')         P36-A03 W04-X01K3P         flat flood gun tube         V05-D01B5           Cross-cut shredder         P41-A04 in-line gun tube         V05-D01B3A           T04-X X25-J lead-in         V05-D07B1           X27-A02C         luminescent screen         V05-D05B           Cross-section control for CRT electron beam control for CRT electron beam measurement         V05-D06A5         matrix configuration multiple gun tube           Mosphalacture in the control for CRT electron beam measurement         V05-D01B3C         V05-D01B3C	Cross-country running		EM shielding tube coatings	
Cross-cut shredder  P41-A04 T04-X X25-J Lord Section Control for CRT electron beam Measurement  W04-X01K3P P41-A04 F04-X R05-D01B3A F04-X R05-D01B3A F04-X R05-D01B3A F04-X R05-D01B3A F04-X R05-D01B3A F04-X R05-D01B3A R05-D01B3A R05-D01B3A F100d gun tube V05-D01B1E R05-D01B3A F100d gun tube F05-D01B1E F100d gun tube F10d gun tube F100d gun tube F100d gun tube F100d gun tube F100d gun				V05-D08E
Cross-cut shredder  P41-A04 T04-X X25-J Iead-in V05-D01B3A R27-A02C  Iuminescent screen V05-D07B1 V05-D07B3  Control for CRT electron beam V05-D06A5  Crossmodulation measurement  P41-A04 in-line gun tube V05-D01B3A laser diode screen V05-D07B1 V05-D07B3M manufacture - see CRT manufacture V05-L05D matrix configuration multiple gun tube	Cross-country skiing ('langlauf')			
T04-X X25-J Iead-in V05-D05A3 X27-A02C Iluminescent screen V05-D05B W05-D07B3M Control for CRT electron beam V05-D06A5  Crossmodulation measurement  V05-D08A  Illuminescent screen W05-D07B3M manufacture - see CRT manufacture V05-L05D matrix configuration multiple gun tube	Cuasa aut abuaddau			
X25-J Radician Superscript Non-Dot Non	Cross-cut shredder		S .	
Cross-section control for CRT electron beam V05-D06A5  Crossmodulation measurement S01-D08A  Crossmodulation Measurement S01-D08A  Luminescent screen V05-D05B magnetic tube coatings V05-D07B3M manufacture - see CRT manufacture V05-L05D matrix configuration multiple gun tube				
Cross-section control for CRT electron beam V05-D06A5  Crossmodulation measurement S01-D08A  magnetic tube coatings V05-D07B3M manufacture - see CRT manufacture V05-L05D matrix configuration multiple gun tube				
Crossmodulation measurement  S01-D08A  V05-L05D matrix configuration multiple gun tube	Cross-section		magnetic tube coatings	V05-D07B3M
Crossmodulation measurement S01-D08A matrix configuration multiple gun tube	control for CRT electron beam	V05-D06A5	manufacture - see CRT manufact	
measurement S01-D08A matrix configuration multiple gun tube	Crossmodulation		and the sample of the first	
reduction in radio receiver W02-G03B4F			matrix configuration multiple gun	
Todada in in Tuda in Toda in in Tuda in Toda in in Tuda in	reduction in radio receiver	W02-G03B4E		400-D01D3C

matrix-drive	e-with-deflection type (I	MDWD) V05-D01B3C	h	nead-up	W04-Q01A W04-Q01K
monochron	ne tube, single gun	V05-D01B1A	s	ingle beam tube control, comput	
	ectron gun tubes	V05-D01B3		peripheral	T04-H01A
	n with separate tube ne		S	torage tube control, computer	
a.a.p.o ga		V05-D01B3D		peripheral	T04-H01B
ontical coat	ting on tube surface	V05-D07C3	+	ube per se - see <b>Cathode ray tub</b>	
	nents associated with tu			abe per se see cumoue ray tak	V05-D01
optical elen	ments associated with the	V05-D07C5	1 -	V receiver circuits	W03-A08
phosphor c	compositions	V05-D07C5 V05-D05B1			
	tion arrangement	V05-D05B1 V05-D06C		manufacture	V05-L05D
	vider integral with elec			igeing .	V05-L07E3
potential di	vider integral with elec	V05-D06A7		ssembly	V05-L03C
radiation no	reventing coil	V05-D08B	-	athode manufacture	V05-L01A
	egral with electron gun			electrode system insertion	V05-L03C1
	grai with electron gun	V05-D08C5		electron gun manufacture	V05-L01B4
rose seals		V05-D08C3		exhausting	V05-L03C5C
	ctor diode array screen			getter flashing	V05-L03C7A
	reening device	V05-D03A3 V05-D07B5		getter manufacture	V05-L06
separate sc shadow ma		V05-D07B3		nserting gun	V05-L03C1A
shield, exte		V05-D03D V05-D08E		creen	V05-L02
shield, exte		V05-D06E V05-D05E		creen coating processes	V05-L02C
•				creen exposure and developmer	tV05-L02E
	netic, internal	V05-D05E1		creen exposure apparatus	V05-L02E5
	ron gun tubes	V05-D01B1		creen protection layer application	
	multibeam tube	V05-D01B1D		creen testing	V05-L02H
socket, con tension ban		V05-D08C V05-D07A1	-	hadow mask	V05-L01B5
	iu	S01-G02A		ension band fitting	V05-L03C7C
testing		V05-L05D		ension band manufacture	V05-L03D
		V05-L03D V05-L07E		ube ageing	V05-L07E3
vessel detai	ile			ube assembly	V05-L03C
		V05-D07A5		ube rectification	V05-L07E5
CRT beam defl				ube salvage	V05-L07E6
TV receiver		V02-F01A		ube shipping/packing	V05-L07E7
		V05-D01B		ube testing	V05-L07E1
		V05-D06B1A		ressel coating and marking	V05-L03B
		W03-A08A1B		ressel part joining	V05-L03C5
VDU		T04-H01		ressel per se	V05-L03A
		V02-F01A	V	ressel sealing	V05-L03C5A
		V05-D01B	CRT	screen	
		V05-D06B1A	n	nanufacture	V05-L02
CRT deflection	n circuits				V05-L05D1B
TV receiver		W03-A08A1	n	on-phosphor aspects	V05-D05B7
VDU		T04-H01	p	phosphor composition	V05-D05B1
CRT degaussin	na		S	ingle phosphor screen	V05-D05B3
coil (genera		V05-D01B3	Crus	hina	X25-J
(3	•	V05-D08A5		control	T06-D04
coil in TV re	eceiver	W03-A08A4A			X25-J
	uitry (general)	V05-D01B3	Cunt	chos (modical)	P33-A99
	, (9,	V05-D08A1		ches (medical)	
control circ	uitry in TV receiver	W03-A08A4C	Cryo	genic cooling, semiconductor o	devices
CRT display	,				U11-D02C
antireflectiv	o filtor	V05-D01B	Cryo	genics	X25-V
antinenectiv	re milei	V05-D07C3	_	=	
associated (	ontics	V05-D07C3	Cryo		X12-C02A3A
associated	optics	V05-D016 V05-D07C5		uperconducting coil	X12-C05
color tubo d	control computer perin		S	uperconducting magnet	X12-C05A
color tube (	control, computer perip	nerai T04-H01B1	Cryo	surgery	S05-B06
control cor	mputer peripheral type		Crvp	to-currency	T01-N01A1
	rrangement, TV receive		"	-	T05-L02
iocassing a	gomoni, i v roceive	W03-A08A3			100-202
				tography	VA/O.1 A.O.E.A
			I c	data transmission	W01-A05A

general	P85-C	Current collector	
quantum (data)	W01-A05E	brush	V04-L01B
Crystal filter	U25-B	brush, motor	V06-M12
	V06-V01B		X11-J03
	V06-V04D1	commutator	V04-L01A V06-M12
Crystal growth apparatus for semice	onductor	commutator, motor	X11-J03
manufacture		electric vehicle	X21-B03
crucibles, crystal holders	U11-B05A	manufacture, brush	V04-P02
crystal pulling mechanisms	U11-B03B	manufacture, brush, motor	V06-M11A
heating arrangements for growth	U11-B05A		X11-J08A
Crystal growth, semiconductor	U11-B	manufacture, commutator	V04-P02
AII-BVI compounds	U11-B03B	manufacture, commutator, motor	V06-M11A
AIII-BV compounds	U11-B03A		X11-J08A
AIV elements, compounds	U11-B03C	manufacture, slip-ring	V04-P02
apparatus- see Crystal growth ap		manufacture, slip-ring, motor	V06-M11A
for semiconductor manufactu	-		X11-J08A
Pridaman method	U11-B05 U11-B02B	non-rotary	V04-N
Bridgman method casting	U11-B02B	rotary	V04-L
Czochralski method	U11-B01	slip-ring	V04-L01A V06-M12
edge-defined film fed growth	U11-B04	slip-ring, motor	X11-J03
gradient freeze method	U11-B02X	sliding, high power	X11-303 X12-G02E
materials	U11-B03	train, electric	X12-G02E
pulling from melt (boules)	U11-B01	aa, creeare	X23-A04
ribbon techniques	U11-B04	Current flow controlling, semicondu	
spherical, e.g. drop method	U11-B03A	<del>-</del>	
zone refining	U11-B02A	Current measurement	S01-D01
sinusoidal output	U23-A01A	by AC/DC conversion by beam deflection	S01-D01C5 S01-D01D7
Crystal oscillator		by DC/AC conversion	S01-D01D7
analogue circuit	U23-A01A	capacitive voltage transformer	S01-D01D3
astable pulse generator	U22-A04A2	CVT	S01-D01D3
Crystal resonator thermometer	S03-B01C	digitally	S01-D01C1B
Crystallographic orientation, semic	onductor	effective values	S01-D01A1
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	U11-B03	functions of currents	S01-D01A
Constalla avanhu		indicating AC waveform zero-cros	
Crystallography	S03-E06C	point	S01-D01B5
CSMA data network access	W01-A06F1A	indicating presence	S01-D01B1
CT (current transformer)	V02-G01B	indirect, inductive/magnetic	S01-D01D1
	X12-C01G	indirect, non-contact other indirect current/voltage	S01-D01D
measurement	S01-D01D1A	measurements	S01-D01D9
	V02-G01B	peak	S01-D01D7
and a diam	X12-C01G	RMS	S01-D01A1
protection	V02-G01B	thresholding	S01-D01B5
	X12-C01G X13-C01X	using chopper circuit	S01-D01C1A
A 1 1 1 1 1 1 1 A 111 A	X13-C01X	using current transformer	S01-D01D1A
Cubic boron nitride- see AIII-BV		using electrochromic effect	S01-D01D5
compounds		using electron beam probing circu	uit
Cuckoo clock	S04-B08		S01-D01D7
Curling tongs	X27-A02A1	using electrostatic fields	S01-D01D3
Cultivation bags	P13-A02A	using Faraday cup	S01-D01D3
<u> </u>		using Faraday rotation	S01-D01D5
Cultivation rooms	P13-A01	using optical transformation	S01-D01D5
Cupboard	P25-C	using particle beam	S01-D01D7 S01-D01D5
Current		using Pockel's effect	
mirror, amplifier	U24-G02A3	Current mirror circuit	U24-G02A3
mirror, supply	U24-E01C5	supply	U24-E01C5
transformer	S01-D01D1A	Curtain	
transionner			
u ansionnei	V02-G01B X12-C01G	electrical details for vehicle	X27-T Q14-D

manufacture	P27-M	D	
non-electrical details	P27-C	3D spectacles, stereoscopic display	,
Curve follower for input to comput		anaglyph type	W03-A08E7E
	T04-E	alantus antinal akuttantus	W03-A12A
Cushion manufacture	P26-C P26-M	electro-optical shutter type	W03-A08E7C W03-A12A
Custom analogue arrays	U13-B09	LC shutter type	W03-A08E7C
Cutlery	P27-B03	2.	W03-A12A
•	W04-A01	D-A conversion - see Digital-analog	ue
Cutter, gramophone		conversion	U21-A02
Cutting electron/ion beam (using) optical fibres	P62-B V05-F08E3 V07-G01	DAB (digital audio broadcasting)	W02-D05C1 W02-K07C
Optical libres	V07-G01 V07-H01	Daisy wheel computer printer	S06-F01
paper in copier	S06-K05A	Dairy products	P13-D
semiconductor wafers	U11-C06A2	cleaning, maintenance/repair of e	
Cutting ability	S03-F02B	milking and primary treatment	P13-G P13-D01
Cutting machine/tools	X25-A03	secondary milk treatment	P13-D01
axe, hatchet	P62-B10	type of dairy product	P13-D50
clippers, shavers constructional details	P62-B08 P62-T	Damping sound (general)	P86-E05E
control	T06-D07	novel materials	P86-E05E
	X25-A03		P86-T50
1	X25-A03F	Dark current compensation for solid	d-state W04-M01B7
knife punch	P62-B05 P62-B01	imager	W04-M01D6A
razor	P62-B09		W04-P01H1
scissors, shears	P62-B07	Darts (sports/leisure)	P36-A05
Cuvettes, optical (see also Material	s		W04-X01K5C
investigation)	S03-E04X	DAT - see Digital audio tape record	er
CVT	S01-D01D3		W04-B12G
	X12-B	Data card or carrier	T04-C
Cyclic redundancy code	U21-A06A1	Data communication equipment (ge	
Cycling (sport/leisure)	P36-A03	construction	W01-A07J
	W04-X01K3C	fault detection interface	W01-A07L W01-A07H
Cycloconverter	X12-J03	optical	W01-A07E
control	X12-J01A X12-J03	power supply	W01-A07K
	X12-303 X13-H03X	protocol	W01-A07G
Cyclotron	X14-G02	receiver	W01-A07D
Cytometry- see flow cytometry	711 002	transmitter	W01-A07C
Czochralski crystal growth, liquid		Data comparing	T01-E01C
encapsulated	U11-B01	Data compression - see Compression	
•		Data concealment	W01-A05L5
		Data conversion	T01-D
		Data decoding, facsimile	S06-K07A4D
		Data encryption	
		digital communication digital computers	W01-A05A T01-D01
		encrytion algorithm	T01-D01
		facsimile transmission	S06-K07C8
		interactive broadcasting	W02-F10N1
		remote control/measurement syst	
		TV signal	W05-D05B1 W02-F05A1
		quantum cryptography	W01-A05E
		Data interception	W01-A05L1

Data interception prevention	W01-A05L5	connections between multiproces	sors
remote control/measurement syst			T01-H07C7C
remote control/measurement syst		data exchange with distant station	s T01-C03
	W05-D05B5A	electronic mail	T01-N01C
Data network - see Network (data)	W01-A06	image file transfer	T01-N01D1B
Data processing		inter-processor data transfer	T01-H07C7
adding, subtracting	T01-E02A	internet	T01-N02A2B
ALU	T01-E02D	multiprocessor data transfer	T01-H07C7
biocomputer	T01-E05D	Network communication	T01-N02
logic processing	T01-E02C	other types of data transfer	T01-H07A9
multiplying, dividing	T01-E02B	routing server	T01-N02A3B T01-N02A3C
neuronal	T01-J16C1	sound	T01-N02A3C
neuronal configurations	T01-E05B	video file transfer	T01-N01D1A
optical/electro-optical	T01-E05A T01-E05C		
superconducting elements		Data transmission	W01-A
Data processing connector - see Co	nnector	AM carrier systems baseband	W01-A09A1 W01-A08
Data processing, digital	T01-E	BluetoothTM Interface	W01-A07H2A
denominational number represen		BluetoothTM network	W01-A06C4A
	T01-E02	carrier-based	W01-A09
digital value comparison	T01-E04	control, communication	W01-A07F
nondenominational number repre		control, transmission procedure	W01-A07G1
and a second	T01-E03 T01-J	DC offset adjustment	W01-A08E
systems	101-J	DC systems	W01-A08
Data processor	00/1/07/1/1	differential (DC/baseband)	W01-A08D
facsimile	S06-K07A4A	dot-and-dash code	W01-A07A
Data recording, editing	T03-K01	dot-and-dash code	W01-A07A
Data refreshing for memories	U14-A03B4A	equal-length code facsimile	W01-A07B S06-K07C
Data shifting, digital computers	T01-D03	FM carrier systems	W01-A09A2
Data sorting, digital computers	T01-E01A	free space optical data interface	W01-A07H3
	T01-E01B	IEEE 802.11 network link	W01-A06C4E
image storage	T01-J10E	IEEE 802.15 radio link	W01-A06C4A
Data streaming over PSTN		IEEE 802.16 network link	W01-A06C4G
GPRS	W01-B05A1A	interface, characterised by	W01-A07H
	W01-C05B3J	long range link	W01-A06C4P
	W02-C03C1A	LVDS	W01-A08D
telephone network aspects	W01-C05B3J	millimeter wave (mmWave)	W01-A06C4L
telephone set aspects	W01-C01G6G	multiple use of transmission path optical communications	W01-A03 W01-A07E
Data terminal	W01-A07H	optical communications optical fibre interface	W01-A07L
fault detection	W01-A07L	packet	W01-A07H4
general construction details	W01-A07J	packet switching	W01-A06G2
power supply	W01-A07K	power line data network	W01-A06C6
Data transfer network, point-of-sale	T05-L01D	processing	W01-A07F
Data transfer	T01-N01D	protocol, general	W01-A07G
audio	T01-N01D1A	protocol, network	W01-A06F
between applications	T01-F02C4	radio data interface	W01-A07H2
document	T01-N01D2	repeaters	W01-A06G5G
medical applications	S05-G02G3	stored and forward switching	W01-A06G2
	T01-N01E	terahertz link	W01-A06C4N
mulitmedia	T01-N01D1	UWB and impulse radio interface	
remote site	T01-NO1D3		W01-A07H2K
video	T01-N01D1B	UWB and impulse radio network li	
Data transfer, computing	T01-N	wired data interface	W01-A06C4K W01-A07H1
and Bankana	T01-H07	Data transmission, multiple use of	**************************************
applications	T01-N01D		
audio	T01-N01D1A T01-H07B	transmission path	\A/O1 AO/E4
bus protocol bus structure		access control protocol	W01-A06F1
bus structure bus structure (type)	T01-H07A T01-H07A1	asynchronous transfer mode (ATM	
communication control	T01-N02	CSMA/CD and CA	W01-A03B1
communication control	I U I -I NUZ	CSIVIA/CD and CA	W01-A06F1A

full duplex	W01-A03D5	DC systems, data transmission	W01-A08
half duplex	W01-A03D1	characterised by code	W01-A08A1A
packet transmission TDM	W01-A03B	differential	W01-A08D
TDMA	W01-A03C W01-A03C1	non-synchronous systems offset prevention	W01-A08C W01-A08E
TDMA network access	W01-A05C1	receiving circuits	W01-A08L
token pass	W01-A06F1E	repeaters	W01-A06G5G
Data/demand driven computer	T01-M03	repeaters	W01-A08
Database Applications	T01-M03	start-stop	W01-A08A
Database Management	T01-J05B4M	synchronous	W01-A08A
Deductive database	T01-J05B4D	transmitting circuits	W01-A08A1
Distributed database	T01-J05B4A	with storage	W01-A08A1B
health care records	S05-G02G2	DC-AC converter - see Converter	
image and video databases	T01-J05B4F	DC-DC converter - see Converter	
medical, hospital	S05-G02G	DCF-77 receiver	S04-B06
Object-Oriented database	T01-J05B4C		
patient's medical records	S05-G02G1	De-husking grain	P41-A07A
Relational database	T01-J05B4B	De-icing equipment for aircraft	W06-B01C4
Databases	T01-J05B	De-soldering iron	X24-A02A
	T01-J05B4		P55-T01
data and directory structure	T01-J05B2B	Deaf aid -see Hearing aid	W04-Y
image archiving image filing	T01-J05B2A T01-J05B2A	Decimation	****
searching	T01-J05B2A	filter (digital)	U22-G01B6
storage	T01-J05B2	general downsampling	U22-G03B1C
Date indicator, clock or watch	S04-A02B	Decision support systems	T01-J05A2
•	304-A02D	Decoder	
DBS	W02 D0/ A	ARI	W03-B02C5
broadcast radio receiver	W03-B06A W02-D05A	AIVI	W03-B02C3
radio broadcast systems TV broadcast systems	W02-D03A W02-F06A	facsimile data	S06-K07A4D
TV receiver ancillary equipment	W03-A16A	remote position transmission syste	ems
TV receiver tuner	W03-A01A1	·	W05-D09
DC amplifier	U24-G02D	stereophonic radio broadcast rece	eivers
offset reduction	U24-G02D		W03-B02C3
onserreduction	U24-G03F	stereophonic TV receiver	W03-A03C1
DC bridges (see also S01-D05 codes		1	W03-A12B1
transducer	S01-F01A	subscription TV	W03-A16C3
DC brushless machine (see DC macl		Decoding (general)	U21-A
•	•	Decorative art	P78
DC circuit breaker	X13-B09	branding	P78-A04
DC machine (see also Electric machi		carving .	P78-A03
brushless (general)	V06-M03	embossing	P78-A06
h	X11-H01	guilloching inlaying	P78-A02 P78-A05
brushless, permanent magnet	V06-M03A X11-H01A	materials	P78-P
brushless, sensorless	V06-M03C	painting or drawing	P78-A07
Drustness, sensotiess	X11-H01C	paper hanging	P78-C01
brushless, switched reluctance	V06-M03B	sculturing or modelling	P78-A01
	X11-H01B	special designs	P78-S
interrupter type	V06-M06	Dedicated record carrier	
	X11-H09	mechanism actuated by	T05-H02C1
mechanical commutator	V06-M02A	Deep Level Transient Spectroscopy	(see
	X11-F	also U11-F01A codes)	S03-E02C5
DC network	U24-H	· ·	
	X12-H01D	Defect detection and inspection (see	e also
DC offset adjustment or prevention		Flaw detection) optical disk, during manufacture	T03-B01E7B
amplifiers	U24-G03F	semiconductor film	U11-F01B
data transmission	W01-A08E	semiconductor film, using pattern	0.11010
direct-conversion radio receivers	W02-G03B4G	recognition	U11-F01B3
		semiconductor material	U11-F01A2
		•	

**Delta modulation** 

semiconductor package	U11-F01E	Delta-sigma converters	U21-A04A
using pattern recognition	T04-D07A	sampling aspects	U21-A03F6
Defibrillator, heart		Demagnetising	
charge storage	S05-A01C	coil	V02-D
defibrillator	S05-A01B	magnetic heads	T03-A04B1
electrode	S05-A02A	ships	W06-C09
power supplies	S05-A01C	TV CRT	W03-A08A4
Deflection circuits, TV CRT	W03-A08A1	Demand-type pacemaker	S05-A01A1
combined with power supply	W03-A08A1C	Demister	
Deflection coil for CRT	V02-F01A	ohmic resistance heating	X25-B01C1C
	V05-D01B	ohmic resistance heating, vehicle	
	V05-D06B1A		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
manufacture	V05-D06B1A	Demodulation	LIOO DOE
Deflection, light	V07-K05	AM/FM combined amplitude	U23-P05 U23-K
=		amplitude	U24-C01G
Deformation measuring - see Meas	uring	angle	U23-L
Defruiter for secondary radar	W06-A04B3	data transmission	W01-A09E2
	W06-A04E5	digital modulation/demodulation	
Degaussing		frequency	U23-L
general	V02-D	general	U23-P
ships	W06-C09	phase	U23-L
TV CRT	W03-A08A4	phase-locked loop	U23-D01C
Dehusking grain	P41-A07A	pulse	U22-E05A
Delay devices		recorded television/video signal	W04-F01A1A
for transit-time tubes	V05-C02C3	Demodulator	
Delay equalisation network		broadcast radio receiver	W03-B02C
lumped constant	U25-E05Q	communications receiver	W02-G03E
distributed constant	W02-A03B	data transmission	U23-P01
Delay line		distriction described	W01-A09E2
electromechanical	V06-V04D2	digital implementation optical communication	U23-P03 W02-C04A3A
wavequide	W02-A03B	systems aspects	U23-P04
lumped constant	U25-A05	TV receiver sound	W03-A03C1
Delay lock loop	U23-D01D	TV receiver video	W03-A03C5
acquisition time reduction	U23-D01F1	Densimeter	S03-F01
active loop control	U23-D01F4		303-101
broadening capture range	U23-D01F7	Densitometer	600 504545
charge pump	U23-D01A3C	optical reflection type	S03-E04B1B
Costas loop	U23-D01C1	optical scattering type	S03-E04C1 S03-E04B1A
data synchronisation using	W01-A04B1	optical transmission type	303-E04DTA
delay array	U23-D01A6	Density measurement	
demodulation using	U23-D01C	by immersion of objects in fluids	S03-F01A
details	U23-D01A	by measuring pressure differences	s S03-F01A
digital	U23-D01A8B	from flow proportion	S03-F01X
false lock prevention	U23-D01F3	from flow properties from transmission of radiation	S03-F01A
frequency synthesiser - see <b>Frequ</b>	l <b>ency</b> U23-D01B	vibrating tube densimeter	S03-F01X
synthesis	U23-D01F		
improving loop characteristics lock detector	U23-D011 U23-D01A5	Dentistry	S05-E
loop filter	U23-D01A7	dental treatment diagnostic equipment - electrical	S05-E01 S05-E03
loop filter, variable characteristic	U23-D01A7A	equipment - mechanical	P32-A01
modulation using	U23-D01C	peripherals, lamp, chair	S05-E02
noise reduction in	U23-D01F5	surgery apparatus	S05-E01
phase detector	U23-D01A3A	1	-00 -01
phase error reduction	U23-D01F4	Depilation electical	SOE AO4
voltage controlled oscillator	U23-D01A1	electical laser	S05-A04 S05-A03A2
Delivering			
coin	T05-K01	Depolariser, battery electrode	X16-E07
manufactured objects	T05-K05	Deposit, reverse vending	T05-H02E
valuable paper, banknotes, mail	T05-K02		
		ĺ	

U21-A04A

Deformation measurement	S02-A10F	Developer material	
using electical/ magnetic method	S02-A02	for semiconductor manufacture	U11-A11
	S02-A10F	printing	S06-K07B
using mechanical method	S02-A01	Developing process	
	S02-A10F	electrophotographic, using liquid	developer
using optical method	S02-A03	g	S06-E04B
	S02-A10F	electrophotographic, using magne	
using sound or ultrasound	S02-A05B	brush	S06-E04C
	S02-A10F	electrophotographic, using solid d	leveloper
using simulation	T01-J15A3		S06-E04A
Depth measurement	S02-A10B	lithography, semiconductor manuf	facture
using electical/ magnetic method			U11-C04A1C
	S02-A10B	Diac - see Thyristors, bidirectional	U12-D01B2
using mechanical method	S02-A01	Diagnosis, medical	S05-D
	S02-A10B	diagnostic display	S05-D07
using optical method	S02-A03	endoscope	S05-D04
using sound or ultrasound	S02-A10B S02-A05B	endoscope, imaging aspects	S05-D04B
using sound or ultrasound	S02-A03B S02-A10B	eye testing	S05-D05
	302-A10B	in dentistry	S05-E03
Desensitizing reduction, radio	14/02 C02D4E	information systems	S05-D06
receiver	W02-G03B4E	medical endoscope, positioning a	
Design, computer aided (CAD)	T01-J15		S05-D04A
data networks	W01-A06D	NMR	S05-D02B
digital filters and DSP electrical networks	U22-G03A5	nuclear radiation simulation and education systems	S05-D02C
hardware	T01-J15A4 T01-J15A	sonic or ultrasonic	S05-P S05-D03
ICs	U11-G	ultrasonic transducer arrangement	
PCB	V04-R11	anasome nansaucer arrangement	S05-D03A2
Desk accessories	P77-D	using expert systems	S05-D06
folders/magazine binders	P76-F	using UV, IR, Laser	S05-D02X
Desk calculator	T01-J01	using visible light	S05-D02X
		X-ray	S05-D02A
Desk top publishing (DTP)	T01-J11B	Dial	
Desk, for computer	T04-L07	clock or watch	S04-A02A
Destroying/recycling/ recording me		for indicating/ recording measured	
magnetic	T03-A01R		S02-K06A
optical	T03-B01R	Dialling, telephone	
magneto-optical	T03-D01R T03-H02R	automatic dialling	W01-C01B1
general		bar code input	T04-A03B1
Detachable lens, digital/video came	era	dial format detection	W01-C01B1C W01-C01B7
	W04-M01C1D	dial pulses	W01-C01B2A
Detection		dial signal generator	W01-C01B2A
conception	S05-D09	DTMF	W01-C01B2C
digital mark	T04-A03	external module	W01-C01B1D
movement, using pattern recogni	tion	hands free dialling	W01-C01B1B
	T04-D07D1	mechanical lock	W01-C01B5D
ovulation	S05-D09	number storage at exchange	W01-C02B5
Detectors		OCR input	W01-C01B1C
AM	U23-K	preventing dialling of	
broadcast radio receiver	W03-B02C	predetermined numbers	W01-C01B5C
communications radio receiver	W02-G03E	repertory	W01-C01B1A
FM	U23-L	reply dialling	W01-C01B1E
optical detector	S03-A	security/restricted dialling	W01-C01B5 W01-C01B1B
particles radiation	V05-H V05-H	voice dialling voice recognition-based secure dia	
		voice recognition-based secure dis	W01-C01B5B
Determination of sex	S05-D09	Dialysis	S05-H
Detonator			
blasting	VOE DO1	blood treatment circuits	202-HO i
5	X25-D01	blood treatment circuits dialysis systems	S05-H01 S05-H01
blasting, mining weapon	X25-D01 X25-D02 W07-C01	dialysis systems	

Diameter measurement	S02-A10A	Diesel-electric locomotive	X23-A01A2
using electrical/magnetic method	S02-A02		X11-D
	S02-A10A		X11-U03
using mechanical method	S02-A01	generator	X23-A01A2
	S02-A10A	Diesel-generator rotary UPS	X12-H02A
using optical method	S02-A03		
3 1	S02-A10A	Differential	Q64
Diamond - see AIV elements and the	nie.	vehicle	Q13-A09
	21I	Differential amplifier	U24-G02A1
compounds		Differential modulation	U21-A04B
Diaper	P32-A60		
Embedded in underwear	P21-E	Differential of machine, testing	S02-J03A
Diaphragm, acoustic transducer		Differential phase shift keying	W01-A09B
general transducers	V06-V02A	Differential protection	X13-C01D
9	V06-V02A V06-V02A	generator	X13-C01B
loudspeakers	V06-V02A V06-V04A1	transformer	X13-C04B
manufacture	V06-V04A1	transmission line	X13-C04B X13-C04A
Dice games	P36-C07	Differential thermal analysis	S03-E01E
	W04-X02B7	Diffraction	
Dichroism, optical, materials investi	gation	grating, generating spectrum	S03-A02A
, , , , , , , , , , , , , , , , , , , ,	S03-E04B5	grating, testing	S02-J04A9
		optical, materials investigation	S03-E04B5
Dicing, semiconductor wafer	U11-C06A2	X-ray	S03-E06C
Die bonding		X-ray, flaw detection	S03-E06C1
for semiconductor device package	e U11-E02A3	_	
metallurgical aspects	U11-D03B3	Diffused isolation structure, transis	tor
= ;		Diffusion, semiconductor doping	U11-C02A
Die, semiconductor, handling	U11-F02A3	apparatus	U11-C02A1
Dielectric		dopants	U11-A01M
heating	X25-B02D	method	U11-C02A2
material	X12-E01	Digging equipment	X25-D01
	X12-E02		7,25 D01
material manufacture	V01-B03B3	Digital	
strength testing	S01-G03	amplifier	U24-G02E
waveguide conductor	W02-A01B3	audio tape recorder (DAT) - see <b>D</b>	-
waveguide resonator	W02-A03A5	audio tape recorder	W04-B12G
Dielectric barrier discharge lamp	X26-A01C	broadcast receiver architecture	W03-B07
construction - see <b>Discharge lam</b>		camera - see Electronic still picto	
construction - see Discharge land	X26-A02	camera	W04-M01B1
	720-A02	communications receiver architec	
Dielectric constant		Digital communications recei	
measuring .	S01-D05A3	architecture	W02-G03K
measuring- materials investigation	S03-E02C	filter - see <b>Digital filter</b>	U22-G01
Dielectric for capacitors	V01-B03	information transmission	W01-A
inorganic material	V01-B03A1	mark sensing	T04-A03
organic material	V01-B03B1	marked record carrier	T04-C
Dielectric isolation, for IC compone		marking or erasure	T04-A02
Dielectric isolation, for ic compone		radio transceiver architecture	W02-G02K
	U11-C08A4	radio transmitter architecture	W02-G01K
Dielectric material (see also Insulati	on	signal processor (DSP) - see <b>Digit</b>	al signal
material)		processor	U22-G03
manufacture	V01-B03A3	speech processing (general)	W04-V05
Dielectric test, for semiconductor	U11-F01A9	speech processing for telephone	W01-C01C7
·		transducers, electromechanical	V06-V01L
Diesel engine	Q51-D03	TV receiver architecture	W03-A11K
compression ignition, vehicle	X22-A01A3	versatile disk player/recorder	W04-C10A2
	X22-A20C	videoe disk player/recorder	W04-C10A2
electric power plant	X11-C02	video tape recorder (DVTR) - see	Digital
electric train propulsion	X23-A01A2	video tape recorder	W04-B10G
electric train propulsion, control	X23-A01A2	Digital amplifier	U24-G02E
ignition, using glow plug heating	X22-A01A3		024-002L
	X22-A20C		
testing	S02-J01A		

	gital-analogue conversion binary weighted	U21-A02 U21-A02A1	detachable lens	W04-M01B1 W04-M01C1D
	broader system details	U21-A02B1	digital/static recording type	W04-M01B1C
	clock arrangements	U21-A02B1C	display drive circuitry	W04-M01B1
	digital-analogue converter	U21-A02A		W04-M01D3C
	improvements to DAC performan		display (novel)	W04-M01B1
		U21-A02B7		W04-M01D3A
	increased accuracy	U21-A02B7N	dynamic (e.g. disk) recording type	
	increased conversion speed	U21-A02B7C	(electro)mechanical iris diaphragn	
	increased precision	U21-A02B7N	(* * * * * * * * * * * * * * * * * * *	W04-M01C8C
	increased range	U21-A02B7E	(electro)mechanical iris diaphragn	
	increased resolution	U21-A02B7A	drive	W04-M01B1
	increased voltage swing	U21-A02B7E		W04-M01C8E
	integrated circuit details	U13-B	(electro)mechanical shutter	W04-M01B1
	input/output circuitry	U21-A02B1A	,	W04-M01C7C
	ladder-type	U21-A02A2	(electro)mechanical shutter drive	W04-M01B1
	noise reduction and error correct	ion	(electro)mechanical shutter drive	W04-M01C7E
		U21-A02B7G	electro-optical iris diaphragm	W04-M01B1
	reducing power consumption	U21-A02B7J	electro-optical instalapinagin	W04-M01C8A
	resistor string	U21-A02A4	electro-optical shutter	W04-M01B1
	size reduction	U21-A02B7L	electro-optical strutter	W04-M01C7A
	switch capacitor	U21-A02A5	electronic flash	W04-M01B1
	testing and calibrating	U21-A02B2	electionic hash	W04-M01H5
	using superconducting devices	U14-F02C	electronic image stabilizer	W04-M01B1
		U21-A02A	ciectionie image stabilizer	W04-M01D7
	voltage reference circuits	U21-A02B1B		W04-N05C3A
	with intermediate conversion to ti	me or	electronic shutter	W04-M01B1
	frequency of pulses	U21-A02A3	creationic stratter	W04-M01B5A
D	igital audio tape recorder	W04-B12G		W04-M01D5C
_	construction	W04-B12D	exposure conditions evaluation	W04-M01B1
	control/interfacing	W04-B12C	expectate containent evaluation.	W04-M01D5A
	head	T03-A03	exposure control	W04-M01B1
		W04-B12A		W04-M01D5
	head positioning (see Helical sca	n	eye gaze direction determination	W04-M01B1
	head positioning (see <b>Helical sca</b> recording also)	<b>n</b> T03-A05D	eye gaze direction determination	W04-M01B1 W04-M01D2G
	recording also)		eye gaze direction determination face detection	
		T03-A05D	, ,	W04-M01D2G
	recording also) power supply	T03-A05D W04-B12C	, ,	W04-M01D2G W04-M01B1
	recording also) power supply	T03-A05D W04-B12C W04-B12C	face detection	W04-M01D2G W04-M01B1 W04-M01D2F
	recording also) power supply remote control	T03-A05D W04-B12C W04-B12C W04-E04A	face detection	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1
	recording also) power supply remote control	T03-A05D W04-B12C W04-B12C W04-E04A T03-E	face detection flash (electronic)	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01H5
D	recording also) power supply remote control tape transport	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A	face detection flash (electronic)	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01H5 W04-M01B1
D	recording also) power supply remote control  tape transport	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1	face detection  flash (electronic)  focus control (automatic)  focus detection	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01H5 W04-M01B1 W04-M01D5D
D	recording also) power supply remote control tape transport	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-M01B1 W04-M01B1	face detection  flash (electronic)  focus control (automatic)	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01H5 W04-M01B1 W04-M01D5D W04-M01B1
D	recording also) power supply remote control  tape transport  gital camera aperture control	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D2E
D	recording also) power supply remote control  tape transport	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C W04-M01B1	face detection  flash (electronic)  focus control (automatic)  focus detection	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D2E W04-M01B1
D	recording also) power supply remote control  tape transport  gital camera aperture control  battery	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01B1 W04-M01D5D W04-M01D5D W04-M01D2E W04-M01D1C W04-M01D1C W04-M01D1C
D	recording also) power supply remote control  tape transport  gital camera aperture control	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01B1 W04-M01D5D W04-M01D5D W04-M01D2E W04-M01D1C W04-M01D1C W04-M01D1 W04-M01D7 W04-M01B1
D	recording also) power supply remote control  tape transport  gital camera aperture control  battery	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C W04-M01B1 W04-M01B1 W04-M01P5 W04-M01B1	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01H5 W04-M01B1 W04-M01D5D W04-M01D2E W04-M01D1C W04-M01D1C W04-M01D1C W04-M01D7 W04-M01D1 W04-M01D7
D	recording also) power supply remote control  tape transport  gital camera aperture control  battery	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5	face detection flash (electronic) focus control (automatic) focus detection GUI control aspects hand tremor compensation image cropping (in camera)	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01H5 W04-M01B1 W04-M01D5D W04-M01D2E W04-M01D1C W04-M01D1C W04-M01D7 W04-M01D7 W04-M01D6 W04-N05C3G
D	recording also) power supply remote control  tape transport  igital camera aperture control  battery  battery charger	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5 W04-M01P5A X16-G	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D2E W04-M01D1C W04-M01B1 W04-M01D7 W04-M01B1 W04-M01B1 W04-M01D6 W04-N05C3G W04-M01B1
D	recording also) power supply remote control  tape transport  igital camera aperture control  battery  battery charger  calibration	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5 W04-M01P5A X16-G W04-M01B1	face detection flash (electronic) focus control (automatic) focus detection GUI control aspects hand tremor compensation image cropping (in camera) image processing	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01D5D W04-M01D5D W04-M01D2E W04-M01D1C W04-M01D1C W04-M01D7 W04-M01D7 W04-M01D7 W04-M01D6 W04-N05C3G W04-M01B1 W04-M01D6
D	recording also) power supply remote control  tape transport  igital camera aperture control  battery  battery charger	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5A X16-G W04-M01B1 W04-M01D2J	face detection flash (electronic) focus control (automatic) focus detection GUI control aspects hand tremor compensation image cropping (in camera)	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D2E W04-M01B1 W04-M01D1C W04-M01D1 W04-M01D1 W04-M01D1 W04-M01D6 W04-N05C3G W04-M01B1 W04-M01D6 U13-A01
D	recording also) power supply remote control  tape transport  igital camera aperture control  battery  battery charger  calibration	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5 W04-M01B1 W04-M01B1 W04-M01D5C W04-M01B1 W04-M01D5C W04-M01B1 W04-M01D5A X16-G W04-M01B1 W04-M01D2J W01-C01D3C	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation  image cropping (in camera)  image processing  image sensor	W04-M01D2G W04-M01B1 W04-M01D2F W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D1C W04-M01D1C W04-M01D1 W04-M01D5 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01B1 W04-M01D6 W04-M01B1 W04-M01D6 W04-M01B1 W04-M01D6 U13-A01 W04-M01B5
D	recording also) power supply remote control  tape transport  igital camera aperture control  battery  battery charger  calibration	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5A X16-G W04-M01B1 W04-M01D2J W01-C01D3C W01-C01P6C	face detection flash (electronic) focus control (automatic) focus detection GUI control aspects hand tremor compensation image cropping (in camera) image processing	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D2E W04-M01B1 W04-M01D1C W04-M01D1 W04-M01D5 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01D6 U13-A01 W04-M01B5 W04-M01B5
D	recording also) power supply remote control  tape transport  figital camera aperture control battery battery charger  calibration camera phone	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5A X16-G W04-M01B1 W04-M01D2J W01-C01D3C W01-C01P6C W04-M01B1	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation  image cropping (in camera)  image processing  image sensor  inhibiting use in restricted area	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D5D W04-M01D2E W04-M01B1 W04-M01D1C W04-M01D1 W04-M01D7 W04-M01B1 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01D6 U13-A01 W04-M01B5 W04-M01B1 W04-M01B1 W04-M01B5 W04-M01B1
D	recording also) power supply remote control  tape transport  figital camera aperture control battery battery charger  calibration camera phone	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5A X16-G W04-M01B1 W04-M01D2J W01-C01D3C W01-C01P6C W04-M01B1 W04-M01B1	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation  image cropping (in camera)  image processing  image sensor	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D5D W04-M01D5D W04-M01D1C W04-M01D1C W04-M01D1 W04-M01D7 W04-M01D6
D	recording also) power supply remote control  tape transport  figital camera aperture control battery battery charger  calibration camera phone  camera shake compensation	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D2J W01-C01D3C W01-C01D3C W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D2J W01-C01D3C	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation  image cropping (in camera)  image processing  image sensor  inhibiting use in restricted area	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D5D W04-M01D5D W04-M01B1 W04-M01D1C W04-M01B1 W04-M01D7 W04-M01B1 W04-M01D6 W04-M05C3G W04-M01B1 W04-M01D6 U13-A01 W04-M01B5 W04-M01D2R W04-M01D2R W04-M01D2R
D	recording also) power supply remote control  tape transport  figital camera aperture control battery battery charger  calibration camera phone  camera shake compensation	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01D5C W04-M01B1 W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5A X16-G W04-M01B1 W04-M01D2J W01-C01D3C W01-C01D3C W04-M01B1	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation  image cropping (in camera)  image processing  image sensor  inhibiting use in restricted area  integral hard copy unit	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D5D W04-M01D5D W04-M01D1C W04-M01D1C W04-M01D1 W04-M01D7 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01D6 U13-A01 W04-M01D6 U13-A01 W04-M01B1 W04-M01D6 U13-A01 W04-M01B1 W04-M01D2R W04-M01D2R W04-M01D1 W04-M01D2R W04-M01D1 W04-M01D1 W04-M01D1 W04-M01D1 W04-M01D1
D	recording also) power supply remote control  tape transport  regital camera aperture control battery battery charger  calibration camera phone  camera shake compensation carrying case	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-B12A W04-M01B1 W04-M01B1 W04-M01D5C W04-M01B1 W04-M01P5 W04-M01P5A X16-G W04-M01B1 W04-M01D2J W01-C01D3C W01-C01P6C W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D3C W01-C01P6C W04-M01B1	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation  image cropping (in camera)  image processing  image sensor  inhibiting use in restricted area	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D5D W04-M01B1 W04-M01D2E W04-M01B1 W04-M01D1C W04-M01B1 W04-M01D7 W04-M01B1 W04-M01D6 W04-M01B1 W04-M01D2R W04-M01D1 W04-M01D2R W04-M01B1 W04-M01B1 W04-M01B1
D	recording also) power supply remote control  tape transport  regital camera aperture control battery battery charger  calibration camera phone  camera shake compensation carrying case	T03-A05D W04-B12C W04-B12C W04-E04A T03-E W04-B12A W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01P5 W04-M01B1 W04-M01P5A X16-G W04-M01B1 W04-M01D2J W01-C01D3C W01-C01D3C W04-M01B1 W04-M01B5 W01-C01D3C	face detection  flash (electronic)  focus control (automatic)  focus detection  GUI control aspects  hand tremor compensation  image cropping (in camera)  image processing  image sensor  inhibiting use in restricted area  integral hard copy unit	W04-M01D2G W04-M01B1 W04-M01B1 W04-M01B1 W04-M01B1 W04-M01D5D W04-M01D5D W04-M01D1C W04-M01D1C W04-M01D1 W04-M01D7 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01D6 W04-M01D6 U13-A01 W04-M01D6 U13-A01 W04-M01B1 W04-M01D6 U13-A01 W04-M01B1 W04-M01D2R W04-M01D2R W04-M01D1 W04-M01D2R W04-M01D1 W04-M01D1 W04-M01D1 W04-M01D1 W04-M01D1

Digital camera (continued)	İ	tripod	W04-M01B1
interfacing with detachable lens	W04-M01B1	проа	W04-M01G7
interracing with detachable lens	W04-M01C1D	user controls	W04-M01B1
	W04-M01D8A	user controls	W04-M01D1
interfacing with PC	W04-M01B1	video recording aspects	W04-M01B1E
interracing with the	W04-M01D8C	viewfinder	W04-M01B1
	W04-W01D8C W04-K08	viewiiiidei	W04-M01D3
infrared(IR) cut filter	W04-N00 W04-M01B1	version control for software	T01-F05F
minared(iix) cut iiiter	W04-M01C3C	version control for software	W04-M01B1
lens barrel internal construction	W04-M01B1		W04-M01D2S
iens barrer internal construction	W04-M01C1	zoom control	W04-M01B1
	W04-M01G1B	200m control	W04-M01D5E
lens cap/cover	W04-M01B1		VV04-IVI0 I D3L
iens cap/cover	W04-M01C9	Digital circuits	
lens, detachable	W04-M01B1	logic analyser (see also <b>Testing</b> )	S01-G01A5
iens, detachable		testing	S01-G01A
lana duiva fan faavain a	W04-M01C1D	testing integrated circuits (see also	
lens drive for focusing	W04-M01B1 W04-M01C1B		S01-G01A1
lens drive for zooming	W04-M01B1	testing modules or cards (see also	
iens drive for zoonning	W04-M01C1C		S01-G01A3
lens, novel	W04-M01B1	Digital communications receiver	
iens, novei	W04-M01C1A	architecture	W02-G03K
liquid crystal iris diaphragm	V07-K01A2	AD conversion	W02-G03K3
ilquid crystai ilis diapiliagili	W04-M01B1	characterised by use of DSP	W02-G03K1
	W04-M01C8A	DA conversion	W02-G03K8
liquid crystal shutter	W04-M01B1	digital mixing / DDC	W02-G03K5
ilquia crystai siluttei	W04-M01C7A	filtering	W02-G03K6
magnification control	W04-M01B1	transform functions	W02-G03K7
magnification control	W04-M01D5E		
memory card	W04-M01B1C	Digital computer	T01 C00
memory card	W04-P01C1	analog input	T01-C08
multiple cameras in same housing		analog output	T01-C08
maniple cameras in same neasing	W04-M01V1	audio input audio output	T01-C08 T01-C08
neutral density (ND) filter	W04-M01B1	buffer/interface	T01-C08
mountain demons (1127 miles	W04-M01C3D	coding	T01-C07C2
optical image stabilizer	W04-M01B1	CRT display interface	T01-D02
- h	W04-M01C9	data comparing	T01-E01C
	W04-M01D7	data conversion	T01-D
optical filter	W04-M01B1	data encryption	T01-D01
•	W04-M01C3	data exchange	T01-H07
preventing use in restricted area	W04-M01B1	data exchange, LAN/WAN interfac	
	W04-M01D2R	g-,	T01-C03A
range finder	W04-M01B1	data exchange, modem interface	
9	W04-M01D2C	data exchange, network interface	
red-eye editing in camera	W04-M01B1	data exchange, telephone interfac	
-	W04-M01D6	3.,p	T01-C03B
	W04-N05C5E	data selecting	T01-E01B
red-eye prevention camera flash	W04-M01B1	data shifting	T01-D03
	W04-M01H5A	data sorting	T01-E01A
remote control	W04-M01B1	diagnostics	T01-G08
	W04-M01D1A	3	T01-G08A
self-checking	W04-M01B1	display output interface	T01-C04
	W04-M01D2J	display panel interface	T01-C04B
shutter timing control	W04-M01B1	error correction	T01-G
	W04-M01D5C	error detection	T01-G
single lens reflex (SLR/DSLR)	W04-M01B1S	error detection, checking codes	T01-G01A
software update/version control	T01-F05F	error detection, parity	T01-G01A1
	W04-M01B1	fault simulation	T01-G07
	W04-M01D2S	fibre-optic interface	T01-C07B
testing	W04-M01B1	fluid pressure	T01-B
	W04-M01D2J	input	T01-C
touchscreen	W04-M01B1	interconnections	T01-C07
	W04-M01D3E		

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interface, asynchronous/synchron		error detection/correction using co	
operation	T01-C07A	1	W01-A01B
logic simulation	T01-G	error detection/prevention	W01-A01
manual device input interface	T01-C02	error detection/prevention by dive	
mechanical 	T01-A	repeating or returning	W01-A01A
monitoring	T01-G	error detection/prevention by inte	
output	T01-C		W01-A01B5
peripheral control	T01-H05	error detection/prevention using f	
plotter output interface	T01-C05B		W01-A01B3
printer output interface	T01-C05A	general systems or equipment	W01-A07
punched cards interface	T01-C01	hybrid coding scheme	W01-A01B4
scanning, interface	T01-C06	link quality checking	W01-A01C
smart card reader interface	T01-C07C1	multiple use of transmission path	W01-A03
sound input	T01-C08	networks	W01-A06
sound output	T01-C08	protocol, general	W01-A07G
speech input	T01-C08A	protocol, network	W01-A06F
speech output	T01-C08A	secret communication	W01-A05
storage systems	T01-J10C2	standard code systems	W01-A07
test	T01-G02	synchronisation	W01-A04
test sequence generation	T01-G07A	Digital integrated circuits	U13-C
Digital electricity meter	S01-B03	bipolar	U13-C01
Digital electrostatic		bipolar, with diodes and/or capaci	tors
record carrier reading	T04-A03A	and/or resistors	U13-C01A
record carrier reading	T04-A02A	combined bipolar and FET	U13-C03
ğ		FET	U13-C02
Digital EQ (equalisation)	W03-C05E	FET, with diodes and/or capacitors	5
Digital filter	U22-G01	and/or resistors	U13-C02C
adaptive	U22-G01A5	MESFET, JFET	U13-C02B
bandpass filter	U22-G01B2	MOSFET	U13-C02A
bandstop filter	U22-G01B4	on-chip testing	U13-C07
characterised by function	U22-G01B	trimming	U13-C08
coefficient derivation details	U22-G01A5A	wafer scale	U13-C06
comb filter	U22-G01B5	with repetitive structure, arrays	U13-C04
decimation filter	U22-G01B6	Digital magnetic	
design	T01-J08B	record carrier reading	T04-A03A
	T01-J15A	record carrier reading	T04-A02A
	U22-G03A5	record carriers	T04-A02A
finite impulse response (FIR)	U22-G01A3		
highpass filter	U22-G01B3	Digital modulation/demodulation	U23-P01
infinite impulse response (IIR)	U22-G01A1	amplitude modulation	U23-P01C
Kalman filter	U22-G01A1B		W01-A09A1
lowpass filter	U22-G01B1	angle modulation	U23-P01A
matched filter	U22-G01A5B	ASK	U23-P01C1
non-recursive	U22-G01A3		W01-A09A1
notch filter	U22-G01B4	coherent detection	U23-P01C3A
processing details (computing)	T01-J04B2	demodulator circuits	U23-P01J3
	T01-J08B		W01-A09E2
recursive	U22-G01A1	FSK	U23-P01A1
transversal	U22-G01A3		W01-A09A2
variable characteristic	U22-G01A5	hybrid modulation	U23-P01E
wave type	U22-G01A1A		W01-A09C
Digital frequency multiplier/divider	•	modulator circuits	U23-P01J1
counter circuit implementations	U21-D		W01-A09E1
for converted sinusoidal signals	U23-B02	MSK	U23-P01A5
general, for pulses	U22-D05A		W01-A09B
= :		multi-frequency code techniques	U23-P01G
Digital function generator	T01-J17	DCK	W01-A09D
Digital information transmission	W01-A	PSK	U23-P01A3
baseband systems	W01-A08	0.444	W01-A09B
broadband systems	W01-A09	QAM	U23-P01E1
code conversion	W01-A02	ODCK	W01-A09C1
collision detection or avoidance	W01-A06F1A	QPSK	U23-P01A3
DC systems	W01-A08		W01-A09B

Digital multimedia broadcast		design	T01-J08A2
(DMB) receiver  Digital network (DSP)	W01-C01D3C W01-C01P6G W03-A11G5 U22-G03	equalisation functions	T01-J15A U22-G03A5 U22-G03E3C U22-G03C1
addition and multiplication applications array handling construction correlation delay digital sampling down sampling equalisation functions increasing processing speed integration noise reducing/cancelling operation performance phase shifting and delay reduction in power consumption re-sampling size reduction software and algorithms testing	U22-G03C1A U22-G03E3 U22-G03C1E U22-G03A U22-G03E3D U22-G03C1C U22-G03B U22-G03B1C U22-G03E3C U22-G03C1 U22-G03C1 U22-G03C1 U22-G03C1 U22-G03C2E U22-G03C1G U22-G03E3A U22-G03E3F U22-G03C2 U22-G03E3F U22-G03C2C U22-G03B1 U22-G03C2A U22-G03C2A U22-G03E1A U22-G03A1	increasing processing speed noise cancelling operation performance phase shifting and delay reduction in power consumption size reduction software and algorithms testing  Digital SLR camera  Digital static stores addressing circuitry associative magnetic core type permanent reading/writing semi-permanent using (electro-) optical elements using bipolar transistors using FETs using magnetic elements	U22-G03C2E U22-G03E3A U22-G03E1 U22-G03C2 U22-G03C2C U22-G03C2A U22-G03E1A U22-G03A1 W04-M01B1S U14-A U14-A08 U14-A05 U14-A04X U14-A06 U14-A07 U14-A06 U14-A07 U14-A06 U14-A02 U14-A03A1 U14-A03B U14-A04
up-sampling  Digital phase-locked loop	U22-G03B1A U23-D01A8B	Digital data transmission	W01-A
Digital phase/frequency comparato		Digital versatile disk player/recorde	
Digital photo frame	W04-E30A5A	Digital TV gassiyor	W04-C10A3
Digital position encoder absolute type inductive/magnetic photoelectric	U21-A03J5 U21-A03J2 U21-A03J1	Digital TV receiver combined with analogue receiver set top box	W03-A11G W03-A11G1 W03-A11G W03-A16E
Digital protection	X13-C15	Digital video broadcasting (DVB) broadcast system	W02-F07M1
A/D signal conversion artificial intelligence digital relays	X13-C15N2 X13-C15B X13-C15	broadcast system, reduced data ra	
expert systems fuzzy logic low power protectors microprocessors neural networks numeric relays protection algorithms signal conditioning	X13-C15B1 X13-C15C U24-F05 X13-C15A X13-C15B2 X13-C15 X13-C15N3 X13-C15N1	Digital video tape recorder (DVTR) construction control/interfacing head head positioning  power supply remote control	W04-B10G W04-B10D W04-B10C T03-A03 T03-A05D W04-B10A W04-B10C W04-B10C
Digital Radio Mondiale (DRM)	W01-A09C W02-D05C1 W02-K07C	tape transport	W04-E04A T03-E W04-B10A
Digital recording general magnetic	T03-P01 T03-A06C	<b>Digital Video Transmission</b> for broadcasting non-broadcasting	W02-F07M W02-F07M1 W02-F07M5
Digital signal processor addition and multiplication applications array handling construction correlation delay	U22-G03 U22-G03C1A U22-G03E3 U22-G03C1E U22-G03A U22-G03E3D U22-G03C1C	Digitiser computer input digitiser including flat bed scanner hand held scanner tablet, for computer input  Dimension measurement - see Meas  DIMM	T04-M02 T04-F02A5
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Dimmer control	ı	inculation displacement member	V04 A03
discharge lamp	X26-C01C	insulation displacement member	V04-A03 V04-M07
fluorescent lamp	X26-C01B5A	insulation penetrating member	V04-N07
naorescent lamp	X26-C01C	moditation penetrating member	V04-M07
incandescent lamp	X26-C02C	manufacture	V04-P
lamp, general	X26-C03A5	manufacture, riveting	V04-P08
	U23-J01A1	manadan o, m oanig	X25-A03R
Diode ring mixer	U23-J01C5E	manufacture, soldering	V04-P08
	023-301C3E	g	X24-A
Diodes, semiconductor		manufacture, welding	V04-P08
breakdown	U12-C01D	needle point for insulation penetra	ation
for non-reprogrammable memory			V04-A03
elements	U14-A06B1		V04-M07
light emitting manufacture	U12-A01A	nut clamping member	V04-A04B
MIM	U11-C18B1 U12-C01E	prong for insulation penetration	V04-A03
packages for	U11-D01B1		V04-M07
rectifier	U12-C01C	repair	V04-P
testing	U11-F01C5	resilient member	V04-A04C
testing	U12-C01	riveted	V04-A01
tunnel	U12-C01G	screw clamping member	V04-A04B
varicap diodes	V01-B02B1	shape memory contact	V04-A09
Zener	U12-C01D	slotted-plate for insulation penetra	
Dip-stick, for level indicating	S02-C06X	dans dalara Cartas latas assaul	V04-M07
	302-C06X	slotted-plate, for insulation penetr	
Dipole antenna	14/00 00504	soldered	V04-A03 V04-A01
array of dipoles	W02-B05B1	spring	V04-A01 V04-A04C
folded, linear	W02-B01B1A	superconducting cable/wire	V04-A04C V04-A10
folded, ring	W02-B01B2A	superconducting cable, wire	X12-D06
linear	W02-B01B1	testing	V04-P
spiral	W02-B01B3	twisted	V04-A02
Direct and low IF conversion receiv		wedge maintaining contact	V04-A04X
broadcast radio receiver	W03-B01A6	welded	V04-A01
communications receiver	W02-G03A8	wire wrapping apparatus /method	
TV receiver	W03-A01B6	11 3 11	V04-P01C
Direct connection	V04-A	wrapped	V04-A02
zebra	V04-A07	Direct coupled amplifier	U24-G02D
anisotropic	V04-A11	Direct digital conversion (digital rac	
ball maintaining contact	V04-A04X	receivers)	W02-G03K5
bent	V04-A02	•	
cam maintaining contact clamping member acted on by nu	V04-A04X	Direct fluid coating equipment	P42-B
clamping member acted on by nu	V04-A04A	brush transfer of fluid	P42-B05
clamping member acted on by sc		immersion or passage through liquid bath	P42-B01
clamping member acted on by sc	V04-A04A	pouring or flowing of liquid over	1 42-001
clip	V04-A04C	surface	P42-B03
conductive adhesive	V04-A06	Surface	1 42-005
cone maintaining contact	V04-A04X	roller transfer of fluid	P42-B05
crimped, ferrule	V04-A02		P42-B03
'	X12-G02A	spin coating	
crimped, sleeve	V04-A02	Direct frequency synthesis	U23-F03
	X12-G02A	analogue circuitry	U23-F03A7
crimping apparatus/method	V04-P01A	D/A and A/D aspects	U23-F03A5
	X12-G01E	improve spectral purity	U23-F03B5
earth	V04-A05	improving frequency resolution	U23-F03B1
elastomer block with alternate		increasing frequency transition memory aspect and look-up table:	U23-F03B3
conductive/insulating areas	V04-A07	phase accumulators	U23-F03A1
grounding electrode	V04-A05	synthesiser performance	U23-F03A3
IDC	V04-A03		
to a father set.	V04-M07	Direct numerical control	T06-A04A2A
insulating using end cap	V04-A08	Direct retinal projection display	
insulating using sleeve	V04-A08	general	W04-Q01L
			W05-E07

		_	
TV receiver	W03-A08E7A	control/operation, starter switch	X26-C01B1
	W04-Q01L	cooling	X26-A02X
virtual reality	W04-Q01L	deuterium arc lamp	X26-A01E
	W04-W07E1A	dielectric barrier	X26-A01C
Direction finders	W06-A02	dimming	X26-C01C
Direction finding		electrode	X26-A02B
automatic RDF systems	W06-A02A1	electrode manufacture	X26-A03C
RDF	W06-A02A	electron stream-type	X26-A01A
tracking object with electronic im		electronic ballast	X26-C01B2
a doming object that close clied in	W06-A02C1	electronic ballast, inverter	X26-C01B2A
using light	W06-A02C	end cap welding	X26-A03A
using radio waves	W06-A02A	envelope	X26-A02A2
using sonic/ultrasonic waves	W06-A02E	envelope manufacture	X26-A03B
Direction of movement, indicating		external electrode-type	X26-A01A
Direction of movement, indicating,		filling	X26-A02C
	S02-H	filling, gas	X26-A02C
Direction switch	V03-C06C	filter	X26-A02D
Disaster warnings and alarm system	nc	flashing control	X26-C01A
Disaster trainings and alarm system		fluorescent	X26-A01E1
I II 192	W05-B08	high pressure holder	X26-A01D
adverse weather conditions	W05-B08C		X26-F
earthquake alarm	W05-B08A	intensity control	X26-C01C
terrorist attack alarm	W05-B08G	:	U24-D05
utility failure	W05-B08J	inverter	X26-C01B2A
utility failure, commercial	W05-B08J5	leading-in conductor	X26-A02A1
utility failure, domestic	W05-B08J1	low pressure manufacture	X26-A01E
utility failure, industrial	W05-B08J3	manufacture, container	X26-A03
utility failure, producer	W05-B08J7	manufacture, container	X26-A03B X26-A03C
Disk computer memory	T01-H01B1		X26-A03C X26-A03A
RAID	T01-H01B1A	manufacture, end caps welding manufacture, materials recovery	X26-A03A X26-A03
Disc mill	P41-A03C	manufacture, materials recovery	X26-A03
Discharge (electrical)		microwave	X26-A03 X26-A01B
corona	X12-F04	multi-discharge paths-type	X26-A01B X26-A01A
investigating	S03-E10C	non-electronic starter	X26-C01B1
Discharge lamp		operation - see <b>Discharge lamp</b>	X20-C01D1
amalgam	X26-A02X	control/operation	X26-C01
arc	X26-A01A	packaging	X26-A03
ballast	X26-C01B1	phosphors	X26-A02D
bulb	X26-A02A2	plasma	X26-A01B
chamber	X26-A02A2	pressure maintenance	X26-A02X
choke	X26-C01B1	protection	X26-A02X
circuit, integral with bulb	X26-A02G	reactor	X26-C01B1
construction	X26-A02	. 50000	V02-G01C
container	X26-A02A2	reflector, integral with bulb	X26-A02F
inner	X26-A02A2A	screen	X26-A02B
outer	X26-A02A2B	seal	X26-A02A1
container manufacture	X26-A03B	shield	X26-A02B
control/operation	X26-C01	starter switch	X26-C01B1
control/operation, electrodeless	lamp	starting choke	X26-C01B1
,	x26-C01B3	testing	X26-A03
control/operation, electronic ball			V02-G01A
'	X26-C01B2	transformer	X26-C01B1
control/operation, flashlamp	X26-C01A	tube	X26-A02A2
control/operation, high pressure	X26-C01B4	tube-shatter prevention	X26-A02X
control/operation, ignition circuit	X26-C01B2	Discharge tube	
control/operation, inductive balla		analysing - see <b>Analysing tube</b>	V05-F01
·	X26-C01B1	anode (general)	V05-N03E
control/operation, intensity	X26-C01C	cathode ray tube - see <b>CRT</b>	V05-10103L V05-D
control/operation, inverter-type e	electronic	cathode ray tube - see CK1 cathode, thermionic (general)	V05-M02
ballast	X26-C01B2A	coatings applied to vessel (general	
control/operation, low pressure	X26-C01B5	coadings applied to vesser (genera	V05-M05F
control/operation, starter	X26-C01B		. 00 111001

cooling (general)	V05-M07	assembly	V05-L03C
electrodes (general)	V05-M03	by tube type - see <b>Discharge tub</b>	e
electron microscope - see Analy	ysing tube	manufacture, tube type	V05-L05
·	V05-F01A	cold cathode	V05-L01A
emitting electrode, non-thermic	onic	electrode system assembly	V05-L01B
(general)	V05-M03A	electrodes (general)	V05-L01
energy spectrometer	V05-J01A5	electron gun	V05-L01B
gas filling compositions	V05-M09	electron-optical systems	V05-L01B
gas-filled circuit protector	V05-A05	emitting electrodes	V05-L01A
gus imed en edit protector	X13-C03A	evacuating	V05-L03C
gas-filled switching tube	V05-A03	exhausting	V05-L03C
gas-inied switching tabe	X13-A04H	field emission electrode	V05-L03C
general details	V05-M	filling	V05-L012
	V05-M06	9	V05-L03C
getter (general)		general aspects of manufacture	
getter (general) - see <b>Discharg</b> e		getter flashing	V05-L03C
: 17	V05-M06	getter manufacture	V05-L06
grid (general)	V05-M03C	grid	V05-L01B
ion gun (general)	V05-M03G	image screen	V05-L02
ion microscope - see Analysing		inserting electrode system	V05-L03C
	V05-F01A2	inspecting finished screen (imagi	
lamp - see Discharge lamp	X26-A		V05-L02H
lead-ins (general)	V05-M05B	joining vessel parts	V05-L03C
Lenard tube	V05-J05	lamp - see <b>Discharge lamp</b>	X26-A03
manufacture - see Discharge tul	oe manufacture	life testing	V05-L07E
	V05-L	microfabricated cold cathode	V05-L01A
mass spectrometer	V05-J01A1	multistep processes	V05-L07A
microfabricated (complete devi-	ce) - see	non-emitting electrodes	V05-L01B
Microfabricated cold cathod	<b>le</b> V05-B05	packing	V05-L07E
microfabricated cold cathode (c	general)	plasma display electrode	V05-L01B
	V05-M03A1	' '	V05-L05A
photoelectric	V05-G	post sealing treatment	V05-L030
plasma display - see <b>Plasma dis</b>		pretreatment of vessel surfaces	V05-L03C
praema arepray	V05-A01	pretreatment of vessels, sealing	V05-L03C
plasma processing - see Proces		rectification	V05-L07E
plasma processing see Fields	V05-F05C	salvage of tube components/mat	
radiative cooling (general)	V05-M07A	Salvage of tabe components/mat	V05-L07E
screen (imaging, general)	V05-M01	screen (imaging)	V05-L02
screen separate from tube	V05-M01C	screen (non-imaging)	V05-L01B
seals (general)	V05-M01C V05-M05C	screen baking	V05-L01E
seals (general) solid thermionic cathode	V05-M03C V05-M02A	screen electrode	V05-L02L
testing - see <b>Discharge tube m</b>		screen material processing	V05-L02N
	V05-L07E1	sealing	V05-L030
testing, electric properties	S01-G02A	secondary emission electrode	V05-L01A
transit-time - see <b>Transit time t</b>		shadow mask	V05-L01E
vacuum locks	V05-M05D		V05-L05E
vessel	V05-M05A	shipping	V05-L07E
X-ray - see <b>X-ray tube</b>	V05-E01	slow wave structures	V05-L01B
X-ray microscope - see <b>Analysi</b> ı	ng tube	soak testing	V05-L07E
	V05-F01A3	sputter target	V05-L01B
charge tube getter			V05-L05F
CRT	V05-D07E	tension band fitting	V05-L030
general	V05-D07E V05-M06	tension band manufacture	V05-L03E
general lamp	X26-A02X	testing	V05-L07E
•		testing complete device	V05-L07E
charge tube manufacture	V05-L	testing electric properties	S01-G02
adjustment	V05-L07E5	testing imaging screen	V05-L02F
ageing	V05-L07E3	testing magning screen testing mfg. process/ apparatus	V05-L021
anode	V05-L01B3	testing mig. process/ apparatus testing part-finished tube	V05-L07E
applying coatings/marking to ve	essel	testing part-inished tube	V05-L07E
	V05-L03B	thermionic cathode	V05-L07E
applying conductive coatings	V05-L03B1		
applying markings	V05-L03B5	thermionic cathode heater	V05-L01A
	V05-L03B3	transport equipment moving bety	
applying optical coatings		processing	V05-L07C

tube filling	V05-L03C5E	chucking and clamping of disk	T03-F01B
tunnelling microscope probe ele	ectrode	3 1 3	T03-F02C3A
3 1 1	V05-L01B9	construction in general	T03-F02L
	V05-L05F1	contaminant trapping	T03-F02G1
type of tube	V05-L05	cooling/ventilation	T03-F02G
vessel coating/marking	V05-L03B	different size disk handling	T03-F01A7
vessel evacuation	V05-L03C5C	disk changing control system	T03-F01C
vessel part joining	V05-L03C5	disk size detection	T03-F01C
vessel per se	V05-L03A7	drive components	T03-F02C
vessel sealing	V05-L03A7 V05-L03C5A	drive components	T03-F02C1
vessel treatment, post-sealing	V05-L03C7C	drive motor	V06-M
workpiece holder	V05-L03C/C V05-L07B	ojection system	T03-F01A5
workpiece holder workpiece positioning	V05-L07D	ejection system handling different-size disks	T03-F01A3
		internal construction	T03-F01A7
Discharge tube manufacture, tube	type		
	V05-L05	lubricant dispenser for disk surfa	
analysis tube	V05-L05F1	magnetic (see <b>Magnetic disk dr</b> i	
camera tube	V05-L05D2		T03-A08A
cathode ray tube	V05-L05D		T03-F
cathode ray tube display	V05-L05D1B	magneto-optical	T03-D01K1
cold cathode devices	V05-L05B3		T03-F
electron multiplier tube	V05-L05K		W04-D20A
fluorescent display	V05-L05D1C	manual loading	T03-F01D
image converter	V05-L05D3	motor tilt control	T03-F02A5
image intensifier	V05-L05D3	multi-carrier type drive	T03-F02J
ion beam tube	V05-L05E	optical	T03-B10A
microfabricated cold cathode de			T03-F
microlabilicated cold cathode de	U11-C18B9		W04-C10A
	V05-L05B5	particle trapping	T03-F02G1
photoelectric tube	V05-L05B5 V05-L05G	PCMCIA	T03-A08A1E
	V05-L05G V05-L05F5	RAID	T03-A08A5A
processing tube radiation detector	V05-L05F5 V05-L05H	shutter opener	T03-F01A1
		speed control	T03-F02A1
spectrometer tube	V05-L05J	spindle	T03-F02C3
thermionic tube	V05-L05B1	turntable	T03-F02C3
transit time tube	V05-L05C	Disk drive for computer input	T04-P
X-ray generator	V05-L05E	Disk and for compater input	P28-C03
Discone antenna	W02-B01C5	Dishwasher	X27-D01B
Disconnector	X13-B01	component parts	X27-D01B3
Discrete article dispensing	T05-H04	casings	X27-D01B3C
•		dispensing systems	X27-D01B3D
Discrete cosine transform (DCT) vi		drive arrangements	X27-D01B3B
encoder	W04-P01A3	drying systems	X27-D01B3F
Discrete device intended for use in	n	liquid management systems	X27-D01B3E
integrated circuit	U12-Q	racks	X27-D01B3A
Discrete semiconductor device pa	ckage	soil collection & management	
Discrete semiconductor device pa	-	3011 concentor & management	X27-D01B3G
	U11-D01B	water heaters	X27-D01B3E
Disk cassette	T03-H01A	control systems	X27-D01B5L
	T03-N01	machine types	X27-D01B3 X27-D01B1
Disk drive	T03-F	built-in, wheeled	X27-D01B1 X27-D01B1A
air filter	T03-F02G1	drawer type	X27-D01B1A X27-D01B1B
automatic disk changing	T03-F01	non-electrical dishwasher, e.g. dr	
bearings	T03-F02C3C	basins	P28-C03
brake	T03-F02C5		
capacitive	T03-C01	Disinfection	X27-D10
Сарасніче	T03-F	medical	S05-G01
card type (PCMCIA) drive		Dislocations, semiconductors, mea	surement
card-type (PCMCIA) drive	T03-A08A1E T03-F02E	•	U11-F01A2
carrier pressure arrangement			
casing	T03-F02L1	Dispenser	S02-C04
centrifugal-action disk lubricant	T03-F02X		X25-F03B
	1113-51/4	_ :_	ヘンド にしつひつ
	103 1 02/	air	X25-F03B2
	103 1 02/	comestible	X25-F03B1

	expanding/contracting chamber ty	•	head	I-up for aircraft	W04-Q01K
	fuel	S02-C04A	bood	Lun gonoral	W06-B01B3
		X25-F03B2 S02-C04B		l-up, general	W04-Q01K W06-B01B3
	moving measuring chamber type other types	S02-C04X		I-up, aircraft instrumentation I-up, vehicle instrumentation	X22-E07
	stationary measuring chamber	S02-C04X	LCD	i-up, verncie instrumentation	T04-H03C2A
	vending machine	T05-H		control of for VDU	T04-H03C1A
	<del>-</del>	103-11		control of for VDU	T04-H03C1
DIS	pensing	TO/ D1F		guide	X26-D01F
	control	T06-D15	ligiti	galac	X26-U04A
	diagnata autialas constinas	X25-F03B	liquio	d crystal - see <b>LCD</b>	U14-K01
	discrete articles, vending	T05-H04		ix, (general)	W05-E01
	machine fluid or granular material, vending			ix, control of (general)	W05-E01A
	fiuld of granular material, vending	T05-H06		ix, control of for VDU	T04-H03B
	Pharmaceutical items	S05-M05	medi	ical diagnostic monitor	S05-D07
			MEM	=	T04-H03C8
Dis	placement measurement	S02-A10B	movi	ing band type (general)	W05-E02
	using electrical/magnetic method	S02-A02	navig	gation system	S02-B08E
	using machanical mathad	S02-A10B S02-A01	on-so	creen display (OSD) for TV red	ceiver
	using mechanical method	S02-A01 S02-A10B			W03-A13G
	using optical method	S02-A10B		el, gas discharge	V05-A01
	using optical method	S02-A03		ma control of for VDU	T04-H03C4A
ъ.	.1.	302 / (10)	plasn	ma, control of for TV receiver	
	play	MOE E03 V			W03-A08D
	advertising	W05-E03A	•	ma, control of for VDU	T04-H03C4
	arrangements, television receiver back lighting for computer type	T04-H03D	printe		S06-K07A1 W04-Q01
	back lighting for computer type	X26-U04A1		ection TV r systems	W04-Q01 W06-A04C
	back-lighting (general)	X26-U04A1		e beam CRT, control of	T04-H01A
	back-lighting (LCD)	U14-K01A4C		e character, control of	T04-H03A
	gg (=== ,	X26-U04A1		r systems	W06-A05C3A
	based on ceramics exhibiting Kerr			oscopic	T04-H06
	Pockels effect	U14-K04		hone construction aspects	W01-C01A2
	bendable	W05-E05F		phone display per se	W01-C01B3
		T04-H03N		ision receiver	W03-A08
	broadcast radio receiver tuning	W03-B01C	vehic	cle dashboard	X22-E
	cathode ray tube, for TV receiver	W03-A08A	Display.	electroluminescent	
	cathode ray tube, for VDU	T04-H01		e matrix switching elements	U12-J02E
	character forming (general)	W05-E01		its and drivers	U12-J03
	composite	W05-E05C	inorg	ganic	U14-J02D1
	construction	T04-H04	orgai	nic	U14-J02D2
		W05-E05G	Display t		
	CRT, control of for TV receiver CRT, control of for VDU	W03-A08A T04-H01		ode ray tube - see <b>CRT</b>	V05-D01B
	drive circuitry (general)	W05-E01A		rical testing of	S01-G02
	edge-lighting (general)	X26-U04A2	field	emission	V05-D01C3
	electrochromic - see <b>Electrochron</b>		fluore	escent - see Fluorescent displ	ay tube
	creed out the see Lieu out on	U14-K02			V05-D01C
	electroluminescent, control of for 3		plasn	ma - see Plasma display	V05-A01
	receiver	W03-A08J	Dissipati	ive regulator	U24-E02B2D
	electroluminescent, control of for \	/DU T04-H03C3	=	e measurement (see also Me	asuring)
	electronic, for clock or watch	S04-B04	lidar		W06-A06D1
	electrophoretic - see Electrophore	etic		vehicle use	S02-B12B
	display	U14-K03	radar		W06-A04A1
	electrophoretic, control of, for VDU		recor	rding device	S02-B12
	element arrangements (general)	W05-E01B	sona	<u> </u>	W06-A05D1
	facsimile	S06-K07A1	tacho	ometer	S02-B12A
	filters (general)	W05-E05A			X22-X06F
	flexible	W05-E05F	vehic	cles	S02-B12A
	fluorescent, control of	T04-H03C9	Distance	protection	X13-C01X
	foldable	W05-E05F T04-H03N		y/winery	
		I U-T-I IUUI N		nolic drinks manufacture	X25-P01B
			u.001		

Distribution control system   W1-A06E2B	bottling (electrical details)	X25-F03A1	Dividers, frequency	U23-B
Distortion correction, pincushion, for TV CRT         W03-A08A1D Distortion measurement         W04-C03D Distortion measurement         W04-C03D Distortion measurement         W04-C03D Distortion measurement         W04-C03D Distortion measurement         W05-C02 Distortion measurement         W01-C01DAC W0	bottling (general details)		analogue	
Distributed control system for telephone switching with the projector of				
Distortion measurement   S01-D03C5   Distortion reduction in amplifiers   U24-G03D5   Distributed antenna system   W02-C03C1F   Distributed computer-control system   T06-A07A1   T06-A0				
Distortion reduction in amplifiers U24-G03D5 Distributed antenna system W02-C03C1F Distributed computer-control system  T06-A07A1 Distributed constant devices W02-A Distributed control system for data networks W01-A06E2B Distributed control system for telephone switching W01-B02X Distributed elements, for transit-time tubes V05-C02C Distributed elements, for transit-time tubes V05-C02C Distributed numerical control T06-A04A2A Distribution electric system - see Electric power distribution/transmission system X12-H electronic system U24+H Distribution box X12-G04B Distribution frames, communications W01-B02 Distribution frames, communications W01-B02 Distribution frames, communications V05-C02C Distribution frames, communications V07-C02C Distribution frames, communications V07-E02A Distribution frames, communications V08-C03A Distribution frames, communications V08	****			
Distributed antenna system Distributed computer-control system T06-A07A1 Distributed constant devices W02-A Distributed control system for data networks W01-A06E2B Distributed control system for telephone switching Distributed elements, for transit-time tubes Distributed elements, for transit-time tubes Distributed numerical control T06-A04A2A Distributed numerical control T06-A04A2A Distributed numerical control T06-A04A2A Distribution ransinssion system X12-H electric system see Electric power distribution/transmission system X12-H electronic system U24-H Distribution transformer (see Power transformer also) Distribution frames, communications W01-B20 Distribution frames, communications W01-B20 Distribution, clock signal for digital computer T01-K varying clock frequency T01-K01 Distributor Connector V04-L09			Diving	Q24-X04
Distributed antenna system W02-C03C1F Distributed computer-control system T06-A07A1 Distributed constant devices W02-A Distributed control system for data networks W01-A06E2B Distributed control system for data networks W01-B02X Distributed control system for telephone switching W01-B02X Distributed elements, for transit-time tubes W05-C02C Distributed numerical control T06-A04A2A Distribution electric system - see Electric power distribution/transmission system X12-H electronic system U24-H low power system see Electric power distribution/transmission system X12-H low power system See Electric power distribution frames, communications Distribution box X12-G04B X13-E02 Distribution frames, communications W01-B02 Distribution transformer (see Power transformer also) X12-C01E Distribution, clock signal for digital computer Y01-K01 Distributor Cleengine X22-A01C1 pulse see Pulse distributor V22-D04 evincie X22-A01C1 pulse see Pulse distributor V22-D04 effectire circle distributor V22-D04 hybrid diversity W02-C03A4 food processor X27-B03 hybrid diversity W02-C03A4 polarisation diversity W02-C03A4 polarisation diversity W02-C03A4 space diversity W02-C03A4 space diversity W02-C03A1 since diversity W02-C03A3 polarisation diversity W02-C03A4 space diversity W02-C03A4 space diversity W02-C03A4 space diversity W02-C03A4 time diversity W02-C03A4 space diversity W02-C03A4 space diversity W02-C03A1 time diversity W02-C03A4 space diversity W02-C03A4 space diversity W02-C03A4 space diversity W02-C03A4 space diversity W02-C03A4 time diversity W02-C03A4 time diversity W02-C03A4 space diversity	•			W06-C09
Distributed constant devices   W02-A   Distributed control system for data networks   W01-A06E2B   Distributed control system for data networks   W01-A06E2B   Distributed control system for delephone   switching   W01-B02X   Distributed lements, for transit-time tubes   V05-C02C   Distributed numerical control   T06-A04A2A   Distributed numerical control   T06-A04A2A   Distribution   Glectric system - see Electric power   distribution/transmission system   X12-H   high power system   U24-H   high power system   U24-H   high power system   W01-B02   Distribution box   X12-G04B   X13-E02   Distribution frames, communications   W01-B20   Distribution frames, communications   W01-B20   Distribution transformer (see Power transformer also)   X12-C01E   Distribution   T06-A04A2A   Distribution frames, communications   W01-B20   Distribution transformer (see Power transformer also)   X12-C01E   Distribution transformer (see Power (see Power transformer (see Power (s	<del>-</del>		DLL (see also Delay lock loop)	
Distributed constant devices W02-A  Distributed control system for data networks W01-A06E2B  Distributed control system for telephone switching W01-B02X  Distributed elements, for transit-time tubes w05-C02C  Distributed numerical control T06-A04A2A  Distribution distribution/transmission system X12-H electronic system see Electric power distribution/transmission system X12-H low power system U24-H low power system U24-H low power system W01-B20  Distribution frames, communications W01-B20  Distribution frames, communications W01-B20  Distribution transformer (see Power transformer also)  Distribution, clock signal for digital computer connector V04-L09  IC engine X22-A01C1 pulse - see Pulse distribution V22-D06 wehicle W02-C03A4 frequency diversity W02-C03A4 frequency diversity W02-C03A4 poplarisation diversity W02-C03A4 poplarisation diversity W02-C03A4 shaped diversity W02-C03A4 shaped diversity W02-C03A4 speed with word wook wook wook wook wook wook wook woo	Distributed computer-control syste		= = =	
Distributed control system for data networks		T06-A07A1	J. J. J. G. G. J. G.	
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Distributed control system for telephone switching W01-B02X Distributed elements, for transit-time tubes  V05-C02C Distributed numerical control	Distributed control system for data	networks	DMD (Digital Mirror Device)	V07-F02A
switching W01-B02X Distributed elements, for transit-time tubes  V05-C02C Distributed numerical control T06-A04A2A  Distribution frames, see Electric power distribution/transmission system X12-H electronic system U24-H low power system See Electric power distribution box X12-G04B X13-E02  Distribution frames, communications  W01-B20  Distribution frames, communications  W01-B20  Distribution transformer (see Power transformer also)  Distribution, clock signal for digital computer  Varying clock frequency T01-K01  Distributor  connector V04-L09 IC engine X22-A01C1 Ploversity systems, (radio transmission)  W02-C03A direction diversity W02-C03A5 frequency diversity W02-C03A5 massive MIMO W02-C03A5 modulation diversity W02-C03A4 SDMA  W02-C03A Sideband diversity W02-C03A4 Space diversity W02-C03A4 Space diversity W02-C03A4 Space diversity W02-C03A2 Space diversity W02-C03A2 Space diversity W02-C03A2 Space diversity W02-C03A2 Space diversity W02-C03A4 Stime diversity W02-C03A2 Space diversity W02		W01-A06E2B		V07-K05
Distributed elements, for transit-time tubes		phone	projector	W04-Q01B3
Distributed numerical control T06-A04A2A  Distributed numerical control T06-A04A2A  Distribution electric system - see Electric power distribution/transmission system X12-H electronic system U24-H high power system U24-H low power system W01-A06E1N Document delivery systems T01-J11D  Distribution frames, see Electric power distribution/transmission system X12-H low power system W04-H Distribution box X12-Go4B X13-E02  Distribution frames, communications W01-B20  Distribution frames, communications W01-B20  Distribution, clock signal for digital computer T01-K varying clock frequency T01-K01  Distributor Connector V04-L09 IC engine X22-A01C1 Powersity systems, (radio transmission)  Distributor W02-C03A direction diversity W02-C03A4 frequency diversity W02-C03A5 massive MIMO W02-C03A5 modulation diversity W02-C03A4 modulation diversity W02-C03A4 polarisation diversity W02-C03A2 po	_		DNC	T06-A04A2A
Distributed numerical control  T06-A04A2A  Distribution electric system - see Electric power distribution/transmission system X12-H electronic system	Distributed elements, for transit-ti	ne tubes	DNS Proxy	W01-A06E1P
Distribution Distribution electric system - see Electric power distribution/transmission system X12-H electronic system - see Electric power distribution/transmission system X12-H low power system		V05-C02C	<u>-</u>	W01-A06E1N
Distribution electric system – see Electric power distribution/transmission system X12-H electronic system — see Electric power distribution/transmission system X12-H low power system — U24-H Distribution box — X12-G04B Distribution frames, communications  W01-B20  Distribution transformer (see Power transformer also)  Distribution, clock signal for digital computer  Varying clock frequency — T01-K01  Distribution  Connector — V04-L09 electric gridel — X22-A01C1 pulse - see Pulse distributor — V22-D06 vehicle — W02-C03A4 frequency diversity — W02-C03A4 frequency diversity — W02-C03A5 phybrid diversity — W02-C03A5 modulation diversity — W02-C03A4 MIMO — W02-C03A5 modulation diversity — W02-C03A4 polarisation diversity — W02-C03A4 SDMA — W02-C03A4 sideband diversity — W02-C03A2 space diversity	Distributed numerical control	T06-A04A2A		
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electronic system - see Electric power distribution/transmission system x12-H low power system U24-H low power system U24-H Distribution box x12-G04B x13-E02 Distribution frames, communications W01-B20 Distribution transformer (see Power transformer also)  Distribution, clock signal for digital computer varying clock frequency T01-K01 Distributor connector (Cengine x22-A01C1) pulse - see Pulse distributor vehicle x22-A01C1 Diversity systems, (radio transmission)  W02-C03A direction diversity W02-C03A5 frequency diversity w02-C03A5 modulation diversity W02-C03A4 microwave oven sideband diversity w02-C03A4 polarisation diversity w02-C03A4 polarisation diversity w02-C03A4 polarisation diversity w02-C03A4 sideband diversity w02-C03A4 space diversity w02-C03A4 polarisation diversity w02				101 3110
high power system - see Electric power distribution/transmission system X12-H low power system U24-H  Distribution box X12-G04B X13-E02  Distribution frames, communications W01-B20  Distribution transformer (see Power transformer also)  X12-C01E  Distribution, clock signal for digital computer varying clock frequency T01-K01  Distributor Connector IC engine X22-A01C1 pulse - see Pulse distributor vehicle X22-A01C1  Diversity systems, (radio transmission)  W02-C03A direction diversity W02-C03A4 frequency diversity W02-C03A5 modulation diversity W02-C03A5 modulation diversity W02-C03A4 food warner x27-B03 polarisation diversity W02-C03A4 food warner x27-B03 polarisation diversity W02-C03A4 food warner x27-B04 w02-C03A4 food processor x27-B03 polarisation diversity w02-C03A4 food warner x27-B09 sideband diversity receiver w02-C03A3 food warner x27-B01 toaster x27-B02 space diversity w02-C03A2 wobclease x27-B03 tumble drier x27-D014 washing machine x27-D014 washing machine x27-D014				document
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Distribution box X12-G04B X13-E02  Distribution frames, communications W01-B20  Distribution transformer (see Power transformer also)  X12-C01E  Distribution, clock signal for digital computer  Varying clock frequency T01-K01  Distributor  connector V04-L09  IC engine X22-A01C1 pulse - see Pulse distributor vehicle X22-A01C1  Diversity systems, (radio transmission)  W02-C03A4  direction diversity W02-C03A4  frequency diversity W02-C03A5  modulation diversity W02-C03A5  MIMO  MIMO  M0A  M0A  M0A  M0A  M0A  M0A  M0A  M			office, general	T04-J
Distribution frames, communications W01-B20  Distribution transformer (see Power transformer also)  X12-C01E  Distribution, clock signal for digital computer  T01-K varying clock frequency T01-K01  Distributor Connector IC engine Pulse - see Pulse distributor Vehicle  Diversity systems, (radio transmission)  W02-C03A4 frequency diversity W02-C03A5 massive MIMO W02-C03A5 modulation diversity W02-C03A4 MIMO W02-C03A4 MIMO W02-C03A4 SDMA W0	low power system	U24-H	Document shredder	T04-X
Distribution frames, communications W01-B20  Distribution transformer (see Power transformer also)  X12-C01E  Distribution, clock signal for digital computer Varying clock frequency  Distributor Connector IC engine pulse - see Pulse distributor vehicle  X22-A01C1  Diversity systems, (radio transmission)  W02-C03A4 direction diversity frequency diversity M02-C03A5 modulation diversity M0MO M02-C03A5 MIMO M00 SDMA MIMO W02-C03A4 Forequency M02-C03A4 MIMO M00 SDMA MMO W02-C03A4 MMO W02-C03A4 MMO W02-C03A5 MMMO W02-C03A5 MMMO W02-C03A5 MMMO W02-C03A4 MMO W02-C03A4 MMO W02-C03A5 MMMO W02-C03A5 MMMO W02-C03A5 MMMO W02-C03A6 MMO W02-C03A6 MMO W02-C03A6 MMO W02-C03A7 MMO W02-C03A4 MMO W02-C03A6 MMO W0	Distribution box		Doll	
Distribution transformer (see Power transformer also)  X12-C01E  Distribution, clock signal for digital computer  varying clock frequency  T01-K  connector  IC engine  pulse - see Pulse distributor  vehicle  W02-C03A  direction diversity  hybrid diversity massive MIMO  MO2-C03A5  MIMO  MW02-C03A5  MIMO  MW02-C03A4  MIMO  W02-C03A4  MIMO  W02-C03A4  MIMO  W02-C03A4  MIMO  W02-C03A5  MIMO  W02-C03A4  MIMO  W02-C03A5  MIMO  W02-C03A4  MIMO  W02-C03A4  MIMO  W02-C03A5  MIMO  W02-C03A4  MIMO  W02-C03A4  MIMO  W02-C03A5  MIMO  W02-C03A5  MIMO  W02-C03A4  MO2-C03A4  MO2-C03A4  MO2-C03A4  MO2-C03A5  MIMO  W02-C03A5  MIMO  W02-C03A6  MIMO  W02-C03A6  MIMO  W02-C03A7  MIMO  W02-C03A8  MIMO  W02-C03A84  MIMO  W02-C03A9  MIMO  W02-C03A9  MIMO  W02-C03A4  M02-C03A4  M1CC  Sideband diversity receiver  W02-C03A3B  Sideband diversity receiver  W02-C03A2  W02-C03A2  Muble drier  W02-C03A3  Muble drier  W02-C03A4  M02-C03AB1  Vacuum cleaner  W27-D04  Washing machine  X27-D04  Washing machine  X27-D01A	Distribution frames communication		Domestic air conditioning system -	
Distribution transformer (see Power transformer also)  X12-C01E  Distribution, clock signal for digital computer  T01-K  varying clock frequency  T01-K01  Distributor  Connector  IC engine  pulse - see Pulse distributor  vehicle  X22-A01C1  Diversity systems, (radio transmission)  W02-C03A4  direction diversity  massive MIMO  massive MIMO  MO2-C03A5  MIMO  M02-C03A5  MIMO  M02-C03A4  MIMO  M02-C03A5  MIMO  M02-C03A4  M02-C03A4  MIMO  M02-C03A4  M02-C03A4  Mimo  M02-C03A4  M02-C03A4  M02-C03A4  Mimo  M02-C03A4  Mimo  M02-C03A4  M02-C03A4  Mimo  M02-C03A4  M1  M1  M1  M1  M2-M2-M2-M2  M2-M2-M3  M2-M2-M3  M2-M2-M3  M2-M2-M3  M2-M2-M3  M2-M3  M2-M3	Distribution frames, communicatio			
also)  X12-C01E  Distribution, clock signal for digital computer  Varying clock frequency  Distributor  Connector  IC engine  pulse - see Pulse distributor  vehicle  X22-A01C1  Diversity systems, (radio transmission)  Diversity systems, (radio transmission)  W02-C03A  direction diversity  M02-C03A5  frequency diversity  M02-C03A5  MIMO  M02-C03A4  MIMO  M02-C03A5  MIMO  M02-C03A4  MIMO  M02-C03A4  MIMO  M02-C03A4  MIMO  M02-C03A4  MIMO  M02-C03A5  MIMO  M02-C03A4  MIMO  M02-C03A4  MIMO  M02-C03A5  MIMO  M02-C03A5  MIMO  M02-C03A4  MIMO  M02-C03A5  MIMO  M02-C03A5  MIMO  M02-C03A6  MIMO  M02-C03A7  MIMO  M02-C03A7  MIMO  M02-C03A8  MIMO  M02-C03A8  MIMO  M02-C03A9  MIMO  M02-C03A4  MIMO  M02-C03A5  MIMO  M02-C03A5  MIMO  M02-C03A6  MIMO  M02-C03A7  MIMO  M02-C03A8  MIMO  M02-C03A8  MIMO  M02-C03A4  Microwave oven  M27-B03  Mimolution diversity  M02-C03A4  Microwave oven  M27-B01  Microwave oven  M27-B01  Microwave oven  M27-C01  SDMA  M02-C03A1  Microwave oven  M27-C01  SDMA  M02-C03A2  washing machine  M27-B02  vacuum cleaner  M27-D01	Distribution transformer (co. ) Bours			
Distribution, clock signal for digital computer  T01-K varying clock frequency T01-K01  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmission)  direction diversity frequency diversity MD2-C03A4 frequency diversity MD3-C03A5 MIMO MIMO MD4-C03A6 MIMO MD6-C03A6 MIMO MD7-C03A7 MIMO MD7-C03A9 MD7-MD7-MD7-MD7-MD7-MD7-MD7-MD7-MD7-MD7-		er transformer		X27-C03
Distribution, clock signal for digital computer  T01-K varying clock frequency T01-K01  Distributor connector IC engine pulse - see Pulse distributor vehicle  W02-C03A4 direction diversity frequency diversity MDMIMO massive MIMO MIMO MO2-C03A5 MIMO MIMO MO2-C03A6 MIMO MO2-C03A4 MIMO MO2-C03A4 MIMO MO2-C03A4 MIMO MO2-C03A4  MIMO MO2-C03A4  MIMO MO2-C03A4  MIMO MO2-C03A5 MIMO MO2-C03A6 MIMO MO2-C03A6 MIMO MO2-C03A7 MIMO MO2-C03A7 MIMO MO2-C03A8 MIMO MO2-C03A9  MO2-C03A9 MIMO MO2-C03A9 MO2		X12-C01F		
varying clock frequency  T01-K  varying clock frequency  T01-K01  Distributor  connector			hottle enemer	V27 DA/I
varying clock frequency  Till-K01  Coffee machine dishwasher dishwasher connector V04-L09 IC engine pulse - see Pulse distributor vehicle  V02-C03A  Diversity systems, (radio transmission)  W02-C03A  direction diversity frequency diversity M02-C03A5 hybrid diversity M02-C03A5 MIMO M02-C03A5 MIMO M02-C03A5 MIMO M02-C03A4 MIMO M02-C03A5 MIMO M02-C03A4 MIMO M02-C03A5 MIMO M02-C03A5 MIMO M02-C03A6 MIMO M02-C03A7 MIMO M02-C03A8 MIMO M02-C03A9 MIMO M02-C03A9 MIMO M02-C03A4 MIMO M02-C03A4 MIMO M02-C03A4 MIMO M02-C03A5 MIMO M02-C03A4	Distribution clask signal for digita			
Distributor  connector IC engine pulse - see Pulse distributor vehicle  Noversity systems, (radio transmission)  W02-C03A  direction diversity frequency diversity hybrid diversity massive MIMO modulation diversity  W02-C03A5 MIMO modulation diversity  W02-C03A4  MIMO  W02-C03A4  M02-C03A4  MIMO  W02-C03A5  MIMO  W02-C03A5  MIMO  W02-C03A6  M02-C03A6  MIMO  W02-C03A7  MIMO  W02-C03A7  MIMO  W02-C03A8  MIMO  W02-C03A9  MIMO  W02-C03A9  MIMO  W02-C03A4  MIMO  W02-	Distribution, clock signal for digita	l computer	breadmaker	X27-C08
connector IC engine pulse - see Pulse distributor vehicle  Nucresity systems, (radio transmission)  Nucresity systems, electric traic selectric troeocole electric traic systems, or sucresity systems, r	_	l computer T01-K	breadmaker can/tin opener	X27-C08 X27-B04
IC engine x22-A01C1 pulse - see Pulse distributor vehicle x22-A01C1  Diversity systems, (radio transmission) electric cooker electric rice cooker electric tin opener x27-C04  direction diversity W02-C03A4 food processor x27-B04  frequency diversity W02-C03A5 heated mug x27-B09  massive MIMO w02-C03A5 juice extractor x27-B03  MIMO w02-C03A5 juice extractor x27-B03  modulation diversity w02-C03A4 refrigerator x27-B01  SDMA w02-C03A4 refrigerator x27-B02  sideband diversity receiver w02-C03A5 tumble drier x27-B02  sideband diversity receiver w02-C03A1 vacuum cleaner x27-D04  time diversity w02-C03A2 washing machine x27-D01A	varying clock frequency	l computer T01-K	breadmaker can/tin opener coffee machine	X27-C08 X27-B04 X27-B01
pulse - see Pulse distributor vehicle  N22-A01C1  Diversity systems, (radio transmission)  W02-C03A  direction diversity frequency diversity hybrid diversity massive MIMO modulation diversity polarisation diversity SDMA  W02-C03A4  W02-C03A5  W02-C03A5  W02-C03A5  MIMO W02-C03A5  MIMO W02-C03A5  MO2-C03A5  MO2-C03A6  MO2-C03A6  MO2-C03A7  MO2-C03A8  MO2-C03A8  MO2-C03A8  MO2-C03A8  MO2-C03A8  MO2-C03A4  MO2-C03A5  MO2-C03A5  MO2-C03A6	varying clock frequency  Distributor	l computer T01-K T01-K01	breadmaker can/tin opener coffee machine dishwasher electric fryer	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A
vehicle X22-A01C1  Diversity systems, (radio transmission)  W02-C03A electric rice cooker electric rice cooker sicssors with science cooker electric rice cooker sicssors with specific plane.  W02-C03A electric tin opener with sicssors with science crossor with science crossor with science crossor with science cream maker with science with science cream maker with scien	varying clock frequency  Distributor  connector	I computer T01-K T01-K01 V04-L09	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C
Diversity systems, (radio transmission)  W02-C03A  direction diversity  W02-C03A4  frequency diversity  W02-C03A3  frequency diversity  W02-C03A5  MIMO  W02-C03A5  MIMO  W02-C03A5  MO2-C03A5  MO2-C03A6  MO2-C03A6  MO2-C03A6  MO2-C03A7  MO2-C03A9  MO2-C03A4  MO3-C03A4  MO3-C0	varying clock frequency  Distributor  connector IC engine	T01-K T01-K01 V04-L09 X22-A01C1	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04
W02-C03A electric tin opener X27-B04 direction diversity W02-C03A4 food processor X27-B03 frequency diversity W02-C03A3 food warmer X27-B09 hybrid diversity W02-C03A5 heated mug X27-B09 massive MIMO W02-C03A5 ice cream maker X27-B03 MIMO W02-C03A5 juice extractor X27-B03 modulation diversity W02-C03A9 kettle X27-B01 polarisation diversity W02-C03A4 microwave oven X27-C01 SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity receiver W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor  connector IC engine pulse - see Pulse distributor	T01-K T01-K01 V04-L09 X22-A01C1 U22-D06	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02
direction diversity W02-C03A4 food processor X27-B03 frequency diversity W02-C03A3 food warmer X27-B09 hybrid diversity W02-C03A5 heated mug X27-B09 massive MIMO W02-C03A5 ice cream maker X27-B03 modulation diversity W02-C03A5 juice extractor X27-B03 modulation diversity W02-C03A4 microwave oven X27-C01 SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor  connector IC engine pulse - see Pulse distributor vehicle	T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04
frequency diversity W02-C03A3 food warmer X27-B09 hybrid diversity W02-C03A5 heated mug X27-B09 massive MIMO W02-C03A5 ice cream maker X27-B03 modulation diversity W02-C03A9 kettle X27-B01 polarisation diversity W02-C03A4 microwave oven X27-C01 SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor  connector IC engine pulse - see Pulse distributor vehicle	T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G
hybrid diversity W02-C03A5 heated mug X27-B09 massive MIMO W02-C03A5 ice cream maker X27-B03 MIMO W02-C03A5 juice extractor X27-B03 modulation diversity W02-C03A9 kettle X27-B01 polarisation diversity W02-C03A4 microwave oven X27-C01 SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss	T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion)	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04
massive MIMO W02-C03A5 ice cream maker X27-B03 MIMO W02-C03A5 juice extractor X27-B03 modulation diversity W02-C03A9 kettle X27-B01 polarisation diversity W02-C03A4 microwave oven X27-C01 SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity receiver W02-C03A3B tumble drier X27-D02 space diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss direction diversity	T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener food processor	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B03
modulation diversity W02-C03A9 kettle X27-B01 polarisation diversity W02-C03A4 microwave oven X27-C01 SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity receiver W02-C03A3B tumble drier X27-D02 space diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity	T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A3	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener food processor	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B03 X27-B09
polarisation diversity W02-C03A4 microwave oven X27-C01 SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity receiver W02-C03A3B tumble drier X27-D02 space diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity	To1-K To1-K To1-Ko1 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A3 W02-C03A5	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener food processor food warmer heated mug	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B03 X27-B09 X27-B09
SDMA W02-C03A4 refrigerator X27-F W02-K10 toaster X27-B02 sideband diversity receiver W02-C03A3B tumble drier X27-D02 space diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity massive MIMO	T01-K T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A5 W02-C03A5	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener food processor food warmer heated mug ice cream maker	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B03 X27-B09 X27-B09 X27-B09
W02-K10 toaster X27-B02 sideband diversity receiver W02-C03A3B tumble drier X27-D02 space diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity massive MIMO MIMO	T01-K T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A3 W02-C03A5 W02-C03A5 W02-C03A5	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener food processor food warmer heated mug ice cream maker juice extractor	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B03 X27-B09 X27-B09 X27-B03 X27-B03 X27-B03
sideband diversity receiver W02-C03A3B tumble drier X27-D02 space diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity massive MIMO MIMO modulation diversity polarisation diversity	T01-K T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A9	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric ven electric rice cooker electric rice cooker electric tin opener food processor food warmer heated mug ice cream maker juice extractor kettle microwave oven	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B03 X27-B09 X27-B09 X27-B03 X27-B03 X27-B03 X27-B03 X27-B03 X27-B03 X27-B03 X27-B03 X27-B03 X27-B01 X27-C01
space diversity W02-C03A1 vacuum cleaner X27-D04 time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity massive MIMO MIMO modulation diversity polarisation diversity	T01-K T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A4 W02-C03A4 W02-C03A4	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric veen electric rice cooker electric rice cooker electric scissors electric tin opener food processor food warmer heated mug ice cream maker juice extractor kettle microwave oven refrigerator	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B03 X27-B09 X27-B09 X27-B09 X27-B03 X27-B03 X27-B03 X27-B01 X27-C01 X27-F01
time diversity W02-C03A2 washing machine X27-D01A	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity massive MIMO MIMO modulation diversity polarisation diversity SDMA	T01-K T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A4 W02-C03A4 W02-C03A4 W02-C03A4	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric wen electric oven electric rice cooker electric scissors electric tin opener food processor food warmer heated mug ice cream maker juice extractor kettle microwave oven refrigerator toaster	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B03 X27-B09 X27-B09 X27-B03 X27-B03 X27-B03 X27-B01 X27-C01 X27-F
	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity massive MIMO MIMO modulation diversity polarisation diversity SDMA sideband diversity receiver	T01-K T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener food processor food warmer heated mug ice cream maker juice extractor kettle microwave oven refrigerator toaster tumble drier	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B04 X27-B09 X27-B09 X27-B09 X27-B03 X27-B03 X27-B03 X27-B01 X27-C01 X27-F X27-C01 X27-F X27-B02 X27-D02
	varying clock frequency  Distributor connector IC engine pulse - see Pulse distributor vehicle  Diversity systems, (radio transmiss  direction diversity frequency diversity hybrid diversity massive MIMO MIMO modulation diversity polarisation diversity SDMA  sideband diversity receiver space diversity	T01-K T01-K T01-K01 V04-L09 X22-A01C1 U22-D06 X22-A01C1 ion) W02-C03A W02-C03A4 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5 W02-C03A5	breadmaker can/tin opener coffee machine dishwasher electric fryer electric griddle electric knife electric oven electric rice cooker electric scissors electric tin opener food processor food warmer heated mug ice cream maker juice extractor kettle microwave oven refrigerator toaster tumble drier vacuum cleaner	X27-C08 X27-B04 X27-B01 X27-D01B X27-C03A X27-C03C X27-B04 X27-C02 X27-C04 X25-T04G X27-B03 X27-B09 X27-B09 X27-B03 X27-B03 X27-B01 X27-C01 X27-F X27-C01 X27-F X27-B02 X27-D02 X27-D02

Domestic heating system - see Hea	ating	Double-balanced mixer	
	X27-E01A	(frequency changing)	U23-J01C5C
Domestic pet	X27-H	Double beam spectrometry	S03-A02B
Domestic per	P14-E02C	Double layer capacitor	V01-B01D
animal training	P14-A01B		X16-L02
animal wear	P14-A04	manufacture - see Electrolytic ca	pacitor
aquarium	X27-H01	manufacture	V01-B01G8D
aquarium, food dispenser	X27-H02		X16-L02
aquarium, heater	X27-H01	stack of cells	V01-B01D1
aquarium, lighting	X27-H01	super-capacitor	V01-B01D5
aquarium, pump aquarium, water cleaner	X27-H01 X27-H01	Double-sided printed circuit board	
behaviour controller	X27-H03	(see also PCB manufacture)	V04-R05B
breeding equipment	P14-A05	DPSK	W01-A09B
feeding and drinking	P14-A02	DQDB	W01-A06F
food dispenser	X27-H02	DRAM - see RAM, dynamic	
harness	X27-H03	=	P36-C01
heated pet box	X27-H09	Draughts (game)	W04-X02B1
housing and fencing	P14-A01A	<b>5</b>	
restraints	P14-A99	Drawing metal wire	X25-A02E
training device	X27-H03	Drilling	
	P14-A01B	control, machine tool	T06-D06
transit box/cage	P14-A01A P14-A03		X25-A03B
washing and grooming		earth	X25-A03F X25-E01
Domestic refrigeration - see Refrig		earth, control	T06-D12
	X27-F	earth, control	X25-E01
Door	X25-U01	tool	X25-A03B
aircraft	Q25-A03C	Drinks cooler	X27-B
buildings	Q43-A05		X27-B X27-B
bells	W04-U09	Drinks heater	X27-B
	X27-X	Drive	<b></b>
boat	Q24-A03B	disk - see <b>Disk drive</b>	T03-F02
control lift	X25-U01 X25-F04	a a suba ad sitti a a	T03-N01
control, lift	X25-U01	earth drilling facsimile scanning	X25-E01 S06-D04
control, vehicle	X22-X05	laser printer scanning	S06-E03C
door switches	V03-B01C	Drive circuitry	300 2000
train	Q21-D15	electroluminescent display	T04-H03C3
vehicle	Q17-A06	electrolarimescent display	T04-H03E3
Doorbell	X27-X	facsimile printhead	S06-G03
Doped insulator laser	V08-A04C	integral with plasma display	V05-A01G1
		integral with plasma display, mou	ınting of
Doping, semiconductor alloying	U11-C02 U11-C02J4		V05-A01D7
combining diffusion and implant		LCD display, driver circuitry	T04-H03C2
combining amasion and implant	U11-C02J4		T04-H03F
diffusion	U11-C02A	LED	T04-H03C1
ion implantation	U11-C02B	places display sirevit details	T04-H03F
layers	U11-C02J	plasma display, circuit details	T04-H03C4 T04-H03F
structures	U11-C02J		V05-A01G
Doppler effect		Driving recording tone	T03-E07
compensation, radio systems	W02-C03E4	Driving recording tape	103-607
measuring fluid speed	S02-G02X	DRM (Digital Radio Mondiale)	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
optical radar	W06-A06D2	broadcast receiver broadcast system	W03-B06E W02-D05C1
RF radar	W06-A04A2	broadcast system	W02-B03C1
sonar	W06-A05D2	DDM /Digital Diabta Managara	
Dosimeters, nuclear(chemical, lum		DRM (Digital Rights Management)	1110 5 5 5 5 5
or photographic)	S03-G02A	audio recording aspects	W04-G01L
Dot-and-dash code, data transmiss	ion	broadcast radio receiver aspects	W03-B06J
	W01-A07A	interactive broadcast aspects	W02-F10N1
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TV receiver aspects	W03-A16C3	domestic, laundry	X27-D02
video recording aspects	W04-F01L	elongated/long materials	Q76-U21A
Drone, Delivery using -	X25-F12	food	Q76-U21E
Drop-out compensation for record		lithography, semiconductor manu	utacture U11-C04A1A
audio	W04-G01D	la aca matariala	Q76-U21B
video	W04-G01B W04-F02A	loose materials industrial	Q76-U21B
	VVO <del>T-</del> 1 02A	maustriai	X25-G
Drugs	000 = 4 4 4 4	in alcorated by the decision of a significance	
analysing	S03-E14A1	industrial laundry drying equipme	X25-T05
detection using NMR	S03-C02F1	pharmaceutical/medical	Q76-U13
detection using nuclear radiatio		plants	Q76-U21E2
detection, for airport baggage I		semiconductor wafers	U11-C06A1B
L.B. L. et a	W06-B02A5		
delivery by ventilator	S05-M04	DSLR camera	W04-M01B1S
delivery management systems	S05-M01	DSP	
medical, administering through	S05-J02	broadcast receiver application	W03-B07
modical analysina	S05-C05	communications receiver applicat	tion
medical, analysing medical, storage	S05-M		W02-G03K
monitoring patient compliance	S05-M02	computer aspects	T01-J08A2
pill counters	S05-M02	digital filter	U22-G01
screening/testing	S03-E09F	digital signal processing/network	
storage of medicines	S05-M03	hearing aid application	W04-Y03G
testing (drug -)	S03-W05	telephone speech processor	
= = =		application	W01-C01C7
Drum, clock or watch	S04-A02A	TV receiver application	W03-A11K
Drum mill	P41-A03J	DSSC - see Dye sensitized solar cell	s
Drum (musical instrument)	P86-A05		U12-A02A8
Drum (packaging container)	Q32-A05		X15-A02D1
Dry cell	X16-A01A		X16-A04
Dry cleaning		DTP	T01-J11B
Dry cicaning			
commercial	X25-H09	Dual port memories - see Memories	s, multiport
commercial	X25-H09 X25-T05	Dual port memories - see Memories	s, multiport U14-A08B1
commercial domestic scale	X25-H09 X25-T05 X27-D09		
domestic scale	X25-T05 X27-D09	Dual tuner broadcast receiver	U14-A08B1
domestic scale  Dry dock equipment	X25-T05 X27-D09 W06-C07A		
domestic scale  Dry dock equipment  Dry separation of solids	X25-T05 X27-D09 W06-C07A P41-E01	<b>Dual tuner broadcast receiver</b> radio broadcast receiver TV receiver	U14-A08B1 W03-B01D
domestic scale  Dry dock equipment  Dry separation of solids  Drying	X25-T05 X27-D09 W06-C07A P41-E01 Q76	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry	W03-B01D W03-A01D S03-E04A4
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04	Dual tuner broadcast receiver radio broadcast receiver TV receiver Dual wavelength spectrometry Dubbing audio/video recording	W03-B01D W03-A01D S03-E04A4 W04-H05A
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01	Dual tuner broadcast receiver radio broadcast receiver TV receiver Dual wavelength spectrometry Dubbing audio/video recording Ductility	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring	W03-B01D W03-A01D S03-E04A4 W04-H05A
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20	Dual tuner broadcast receiver radio broadcast receiver TV receiver Dual wavelength spectrometry Dubbing audio/video recording Ductility	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply  chamber  constructional details  control	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply  chamber  constructional details  control  drum	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G Q76-T01	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply  chamber  constructional details  control  drum  drying method	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste Duplex	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-02	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-02	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-02 ents	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-02 ents Q76-T06	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B03 Q76-B01 Q76-B01 Q76-O2 ents Q76-T06 Q76-G Q76-T06	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing DVB	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B03 Q76-B01 Q76-B01 Q76-O2 ents Q76-T06 Q76-G Q76-T06	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing DVB broadcast system	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-B01 Q76-O2 ents Q76-T06 Q76-T03 isinfecting X27-D07 Q76-A	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing DVB broadcast system receiver	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-B01 Q76-O2 ents Q76-T06 Q76-T03 isinfecting X27-D07 Q76-A	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing DVB broadcast system receiver  DVB-H	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24 W02-F07M1 W03-A11G
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-02 ents Q76-T06 Q76-G Q76-T03 isinfecting X27-D07 Q76-A is Q76-R	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing DVB broadcast system receiver  DVB-H broadcast system	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24 W02-F07M1 W03-A11G
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di pre-treatment recycling of drying components	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-B01 Q76-O2 ents Q76-T06 Q76-T03 isinfecting X27-D07 Q76-A G Q76-R	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing  DVB broadcast system receiver  DVB-H broadcast system receiver	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24 W02-F07M1 W03-A11G
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di pre-treatment recycling of drying components ventilation/cooling of drying ma	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-02 ents Q76-T06 Q76-G Q76-T03 isinfecting X27-D07 Q76-A is Q76-R	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing  DVB broadcast system receiver  DVB-H broadcast system receiver	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24 W02-F07M1 W03-A11G W01-C01D3C
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di pre-treatment recycling of drying components	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-02 ents Q76-T06 Q76-G Q76-T03 isinfecting X27-D07 Q76-A is Q76-R	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing  DVB broadcast system receiver  DVB-H broadcast system receiver receiver in mobile phone	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24 W02-F07M1 W03-A11G W01-C01D3C W01-C01P6G W03-A11G
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di pre-treatment recycling of drying components ventilation/cooling of drying maintenance  Drying (applications)	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-B01 Q76-B03 Q76-T06 Q76-T03 isinfecting X27-D07 Q76-A G Q76-R eachine Q76-T08	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing  DVB broadcast system receiver  DVB-H broadcast system receiver	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24 W02-F07M1 W03-A11G W01-C01D3C W01-C01P6G W03-A11G der
domestic scale  Dry dock equipment  Dry separation of solids  Drying  air/gas supply chamber constructional details control  drum drying method combination using heat without using heat heating/refrigeration arrangement maintenance material conveyor mixed mode drying/cleaning/di pre-treatment recycling of drying components ventilation/cooling of drying material  Drying (applications) domestic	X25-T05 X27-D09 W06-C07A P41-E01 Q76 Q76-T04 Q76-T01 Q76-T01 T06-D20 X25-G Q76-T01 Q76-B Q76-B03 Q76-B01 Q76-B03 Q76-B03 Q76-T06 Q76-T06 Q76-T03 isinfecting X27-D07 Q76-A s Q76-R eachine Q76-T08	Dual tuner broadcast receiver radio broadcast receiver TV receiver  Dual wavelength spectrometry Dubbing audio/video recording Ductility measuring  Dummy head for binaural stereo Dumping solid waste  Duplex multiple use of transmission path sheet feeding in printer  Duration, measurement Dust-proof casing  DVB broadcast system receiver  DVB-H broadcast system receiver receiver in mobile phone	W03-B01D W03-A01D S03-E04A4 W04-H05A S03-F02X S03-F02X W04-R01C1 P43-E03 W01-A03D S06-K02A S04-C03C2 V04-S24 W02-F07M1 W03-A11G W01-C01D3C W01-C01P6G W03-A11G

DVD - see Digital versatile disk	W04-C10A	E	
Dye lasers	V08-A04D	<del>-</del>	acabla
Dye sensitized solar cells	U12-A02A8	EAROM - see ROMs, electrically er	
•	X15-A02D1		U13-C04B2
	X16-A04	Ear-tag (animal)	P14-A99
Dynamic balancing	S02-J05	Earphone	V06-V04A4
Dynamic braking, electric machines	V06-N06	circuits jack	V06-V02S V06-V02H
	X13-H01B	lead-throughs	V06-V02F
Dynamic memory		ieda tirrougiis	V06-V02F
magnetic	T01-H01B4	Lead/connector	V06-V02H
magneto-optical	T01-H01B5	manufacture	V06-V03A
optical	T01-H01B6	transducer types - see <b>Acoustoe</b>	
Dynamic RAM - see RAM, dynamic		transducer	V06-V01
Dynamic range control, video signa	I	Earth drilling	X25-E
	W04-P01E8	control	T06-D12 X25-E01
Dynamic range extension		telemetry	W05-D07H
amplifier	U24-G03D3	Earth leakage	***************************************
radio receiver	W02-G03B4E	circuit breaker, moulded case	X13-D05
Dynamo - see Electric machine		measurement	S01-G04A5
Dynamo-electric relay	V03-D05E	protection circuit	X13-C01B
Dynamometers	S02-F02	Earthquake prediction	S03-C05
for vehicles	S02-F03B	E-book	T01-N01D5
		software	T01-J30E
		hardware	T01-M06A1C
		ECG	S05-D01A1
		Echo reduction	
		line systems, echo canceller	W02-C01C1B
		line systems, filter-based	W02-C01C1A
		radio systems	W02-C03E2 W01-C08E
		telephone systems, general	VVU I-CUOE
		ECL RAMs - see RAMs, static, with bipolar transitors	U14-A03A1
		ECM	X24-F01A
		E-commerce	T01-N01A2
		advertising auction	T01-N01A2C T01-N01A2A
		e-procurement	T01-N01A2B
		financial brokerage	T01-N01A2F
		marketing	T01-N01A2C
		mobile commerce	W01-C05B6
		online shop	T01-N01A2A T01-N01A2E
		shipping support value chain service provider	T01-N01A2L
		Eddy current flaw detection	S03-E11A
		<del>-</del>	
		Edge correction/crispening, video	•
			W04-P01E3
		Edge recognition, pattern recogni	
			T04-D03B
		EDGE telephone	
		subscriber set	W01-C01D3
		system aspects	W01-C01G6G W01-B05A1A

system aspects

W01-B05A1A W01-C05B3J W02-C03C1A

Edge-defined film fed growth,		Electric energy	
semiconductor	U11-B04	storage	X12-H06
Edge-lighting for displays	X26-U04A2		X16-L
EDID (TV / video display)	W03-A08S1	storage to balance power network	
Editing, recording			X12-H01A7 X16-L
audio/video	W04-H05E	storage, flywheel	X12-H06
audio/video, automatic	W04-H05E5		X16-L
audio/video, user-controlled	W04-H05E1	storage, heater	X16-L01
general	T03-K01		X27-E01A4
software editor	T01-J30F	storage, superconducting coil	X12-C05
EDM	X24-F01B		X12-H06 X16-L
Educational equipment	W04-W	Floatuia for	
computer aided instruction, (CAI)		Electric fan air conditioning	X25-L04 X25-L04
computer equipment	T01-N01B3 T01-J30A	an conditioning	X27-E01B1
computer equipment	T01-N01B3	Electric fan heater	X27-E01A2
computerised marking	T01-J30A		X25-X11
,	T01-N01B3A	Electric fence, general	A23-A11
demonstration	W04-W07C	Electric field	COE 403D
demonstration of electrical circuits		for medical therapy heating	S05-A03D X25-B02X
equipment	S01-H09	Electric filter	X23-D02X
medical procedures question and answer apparatus	S05-P W04-W01	active	U25-E01
training simulator	W04-W07A	all-pass	U25-E05Q
tuition support systems	T01-J30A	bandpass	U25-E05B
	T01-N01B3	biquadratic	U25-E01A
EEG	S05-D01A1	characterised by function	U25-E05
EEPROM - see ROM, electrically era	sable	comb (analogue)	U25-A03
Effects, special (audio/musical)	W04-U03E	comb (digital) - see <b>Digital filter</b> digital - see <b>Digital filter</b>	U22-G01B4 U22-G01
Efficiency, mechanical, measuring	S02-F02	electromechanical networks	U25-B
E-government	T01-N01A3	electromechanical resonator	V06-V01E
•			V06-V04D1
EHT power supply for TV CRT	W03-A07C W03-A08A1C	group/equalisation delay	U25-E05Q
FVC		highpass	U25-E05C U25-E05B1
EKG	S05-D01A1	LC resonant circuit, single lowpass	U25-E05A
Elasticity measurement of structure		N-path	U25-A01
ELCB	X13-D05	notch	U25-E05D
Electret - see Variable capacitor,		passive	U25-E02
non-mechanical	V01-B02B	SAW type	U14-G
Electrets	V01-B02B5		V06-V01E1 V06-V04D1
Electric bar heater	X27-E01A2	structurally associated componen	
	X25-B01D	caractarany accessated compension	U25-E02A
Electric bicycle/bike	X21-A01C	variable passband	U25-E05H
frame	Q17-A04	waveguide - see Waveguide filter	
Electric blanket	X27-E02		W02-A05
	X25-B01C3A	Electric forklift truck	X21-A01B
Electric cooker	X27-C02		X25-F05A
	X25-B01C1B	Electric fryer	X27-C03A
Electric current application, medica	I S05-A04	Electric generator - see Electric mad	hine
Electric depilator	X27-A02A3B	Electric golf cart	P36-A01
Electric discharge heating	X25-B03		P36-A08C
arc	X25-B03B		W04-X01F
electrode	X25-B03A		W04-X01K1L X21-A01E
glow power supply	X25-B03B X25-B03X	Clostais auid II -	
power suppry	7.25 DOS/	Electric griddle	X27-C03C
		Electric grill	X27-C03B

Vol. Mod8   Vol.	Electric hair clipper	X27-A02A3B	brushless DC, switched reluctance	
National Commutator type   Wolf-Mode Surshings   See Electric discharge   Nating dielectric   Wolf-Mode   Surshings   See Electric discharge   National Surshing   Wolf-Mode   Surshings   Wolf-Mode	• •			V06-M03B
heating   X25-B02X   disclectric   X25-B02X   discharge - see Electric discharge   A25-B03B   electron beam   X25-B03B   electron beam   X25-B03B   electron beam   X25-B03B   microwave - see Electric discharge   heating   X25-B03B   microwave - see Microwave heating   X25-B03B   microwave - see Microwave heating   X25-B01	_	arge		X11-H01B
discharge - see Electric discharge heating			clutches, dynamo-electric	
Selection beam   X25-B038   constructional details - see Electric machine, details   X06-M0   X11-H04   X11-H04   X11-H05   X25-B02X   machine, details   X06-M0   X11-H05   X	dielectric	X25-B02X		
machine, details	discharge - see <b>Electric discharge</b>		·	X11-H04
Neating   Mark   Neathing	electron beam	X25-B02X		
microwave - see Microwave heating X25-B02X resistance - see Electric resistance heating X25-B01	glow discharge - see Electric disc	harge	machine, details	
resistance - see Electric resistance heating X25-B01  Electric hob X27-C02 X25-B01C1B X25-B01C1B DC brushless (general) V06-M06J DC brushless, permanent magnet V06-M03 X11-H01 AC brushless, permanent magnet V06-M03 X11-H01 AC brushless, switched reluctance V06-M03A X11-H01 AC synchronous, with permanent magnet V06-M01A X11-H09 AC synchronous, with permanent magnet V06-M01B AC synchronous, with permanent magnet V06-M01B X11-H09 acyclic amplicitynes AC synchronous (induction) X11-H09 acyclic amplicitynes X11-H01 Ab brushless AC, switched reluctance V06-M03 X11-H01 Ab brushless AC, switched reluctance V06-M03 X11-H01 Ab brushless AC, switched reluctance V06-M03 AX11-H01 Ab brushless AC, switched reluctance V06-M06 AM01A X11-H09 acyclic amplicitynes X11-H09 acyclic amplicitynes X11-H09 anynchronous (induction) X06-M01B brushless AC, sensorless V06-M03 X11-H01 Ab brushless AC, switched reluctance V06-M03 X11-H01 Ab brushless AC, switched reluctance V06-M03 X11-H01 Ab brushless DC, permanent magnet V06-M03 X11-H0	heating	X25-B03B		X11-J
Electric hob  X25-801 C1B  Electric hob  X27-C02 X25-801C1B  Electric insulator - see Insulator  Electric insulator - see Insulator  Electric machine  AC asynchronous (induction) V06-M02B X11-H01A AC brushless, permanent magnet V06-M03A X11-H01A AC brushless, permanent magnet V06-M03A X11-H01A AC brushless, sensorless V06-M03A X11-H01A AC brushless, sensorless V06-M03A X11-H01A AC brushless, switched reluctance V06-M03B X11-H01A AC brushless, switched reluctance V06-M03B AC synchronous, with permanent magnet V06-M01A X11-H01A AC synchronous, with permanent magnet V06-M01A X11-G AC synchronous, with permanent magnet V06-M01A X11-G AC synchronous, with permanent magnet V06-M01A X11-B AC synchronous, with permanent magnet V06-M01A X11-B AC synchronous, without permanent magnet V06-M01A X11-B AC permanent m				V12 II
Electric hob	resistance - see Electric resistance		•	
Electric hoby		X25-B01		
SZS-B01C1B	Electric hob	X27-C02	9	
Electric insulator		X25-B01C1B		
Substitution	Electric hotplate	X27-C02	DC brusiliess (general)	
Electric insulator - see Insulator   Electric iron   X27-D03   Z27-D03   DC brushless, sensorless   V06-M03C   X11-H01C   AC brushless, general)   V06-M03   X11-H01   AC brushless, permanent magnet   V06-M03A   X11-H01A   AC brushless, sensorless   V06-M03A   X11-H01A   AC brushless, sensorless   V06-M03C   X11-H01C   AC brushless, switched reluctance   V06-M03B   X11-H01C   AC brushless, switched reluctance   V06-M03B   X11-H01B   AC commutator type   V06-M03B   X11-H01B   AC synchronous, hybrid   V06-M01C   X11-D05   AC synchronous, with permanent magnet   V06-M01A   X11-G   AC synchronous, without permanent magnet   V06-M01A   X11-B05   AC synchronous, without permanent magnet   V06-M01B   X11-B05   AC synchronous, without permanent magnet   V06-M01B   X11-B05   AC synchronous (induction)   V06-M01B   AC synchronous (in			DC brushless permanent magnet	
DC brushless, sensorless	Flortric inculator - coo Inculator	7.20 20 10 12	De brasiliess, permanent magnet	
DC brushless, switched reluctance   V06-M02B X11-H01B			DC brushless, sensorless	
AC asynchronous (induction) V06-M02B X11-E  AC brushless (general) V06-M03 X11-H01  AC brushless, permanent magnet V06-M03A X11-H01A  AC brushless, sensorless V06-M03A X11-H01C  AC brushless, switched reluctance V06-M03B X11-H01B  AC commutator type V06-M02B X11-H09  AC synchronous, hybrid V06-M01C X11-D05  AC synchronous, with permanent magnet V06-M01A X11-G  AC synchronous, without permanent magnet V06-M01B  AC synchronous, without permanent magnet V06-M01B  AC synchronous (induction) V06-M01B  AC intributed value fections (induction) V06-M06B  AC synchronous (induction) V06-M06B  AC synchronous (induction) V06-M01B  AC intributed value fections (induction) V06-M06B  AC synchronous (induction) V06-M06B  AC synchronous (induction) V06-M01B	Electric iron	X27-D03		
AC brushless (general)  AC brushless, permanent magnet  AC brushless, permanent magnet  AC brushless, sensorless  V06-M03A  X11-H01A  AC brushless, sensorless  V06-M03C  X11-H01A  AC brushless, sensorless  V06-M03C  X11-H01B  AC commutator type  V06-M03B  X11-H01B  AC commutator type  V06-M01A  X11-H019  AC synchronous, hybrid  X11-H09  AC synchronous, with permanent magnet  Magnet  X11-H09  AC synchronous, with permanent magnet  V06-M01A  X11-H09  AC synchronous, without permanent magnet  X11-H09  AC synchronous, without permanent magnet  X11-H09  AC synchronous (induction)  V06-M01B  X11-H09  acyclic  X11-H09  acyclic  X11-H09  acyclic  X11-H09  acyclic  X11-H09  acyclic  X11-H09  abrakes, dynamo-electric  V06-M01B  X11-H09  brushless AC (general)  V06-M03B  X11-H01A  brushless AC, sensorless  V06-M03C  X11-H01A  brushless AC, sensorless  V06-M03B  X11-H01A  brushless AC, sensorless  V06-M03B  X11-H01A  brushless DC (general)  V06-M03B  X11-H01A  brushless DC, permanent magnet  V06-M03B  X11-H01A  brushless DC, sensorless  V06-M03B  X11-H01A  brushless DC, sensorless  V06-M03C  X11-H01A  DC with electronic commutator  V06-M03A  X11-H01  DC with mechanical commutator  V06-M06A  X11-H01  DC with mechanical commutator  V06-M06C  X11-H01  belectro-active polymer  electro-active polymer  v06-M06G  voe-M06G  voe-M06G  x11-H01  brushless, witched reluctance v06-M01A  X11-H01  DC with mechanical commutator  V06-M06C  X11-H01  brushless, witched reluctance v06-M03B  X11-H01  brushless AC, sensorless  V06-M01A  X11-H01A  DC with electronic commutator V06-M06A  X11-H01  brushless, witched reluctance v06-M03B  X11-H01  DC with mechanical commutator V06-M06C  X11-H01  brushless, witched reluctance v06-M01B  X11-H01  DC with mechanical commutator V06-M06C  X11-H01  brushless, witched reluctance v06-M01B  X11-H01  brushless AC (general)  V06-M06B  X11-H01  Drushless AC (general)  V06-M06B  X11-H01			DC brushless, switched reluctance	V06-M03B
AC brushless (general)  AC brushless, permanent magnet  AC brushless, sensorless  V06-M03A  X11-H01A  AC brushless, sensorless  V06-M03C  X11-H01C  AC brushless, switched reluctance V06-M03B  AC commutator type  V06-M02B  X11-H09  AC synchronous, hybrid  V06-M01C  X11-D05  AC synchronous, with permanent magnet  V06-M01A  X11-G  AC synchronous, without permanent magnet  V06-M01B  X11-D0  acyclic  X11-H09  acyclic  X11-H09  acyclic  X11-H09  asynchronous (induction)  X11-B09  asynchronous (induction)  V06-M02B  X11-E  bearings  X11-B03A  brushless AC (general)  V06-M03B  brushless AC, sensorless  V06-M03C  X11-H01A  brushless AC, sensorless  V06-M03B  brushless AC, switched reluctance V06-M03B  brushless DC (general)  V06-M03B  brushless DC, permanent magnet  V06-M03B  brushless DC, sensorless  V06-M03C  X11-H01C  DC with eelectronic commutator  V06-M03C  X11-H01C  DC with mechanical commutator  V06-M06A  X11-H01C  Pelectro-active polymer  v06-M06A  X11-H01B  Pelectro-active polymer  v06-M06A  X11-H01B  Pelectro-active polymer  v06-M06A  X11-H01B  Pelectro-active polymer  v06-M06B  X11-H01B  Pole-M06A  X11-H01C  Pelectro-active polymer  v06-M06B  X11-H01B  Pole-M06A  X11-H01B  Pole-M06A  X11-H01B  Pole-M06A  X11-H01B  DC with mechanical commutator  V06-M06B  X11-H01B  Pole-M06A  X11-H01B  Pole-M06B  X11-H02B  AC synchronous  V06-M06B  X11-H03A  Pole-M06B  X11-H04  Pole-M06B  X11-H04  Pole-M06B  X11-H04  Pole-M06B  X	AC asynchronous (induction)			X11-H01B
X11-H01 AC brushless, permanent magnet V06-M03A X11-H01A AC brushless, sensorless V06-M03C AC brushless, sensorless V06-M03B X11-H01C AC brushless, switched reluctance V06-M03B X11-H01B AC commutator type V06-M02B X11-H09 AC synchronous, hybrid V06-M01C X11-D05 AC synchronous, with permanent magnet V06-M01B X11-H01 AC synchronous, without permanent magnet V06-M01B X11-D0 acyclic X11-H09 amplidynes X11-H09 amplidynes X11-H09 asynchronous (induction) V06-M02B X11-E bearings X11-J07A brakes, dynamo-electric V06-M03 brushless AC (general) V06-M03A X11-H01A brushless AC, switched reluctance V06-M03B brushless AC, switched reluctance V06-M03B brushless DC (general) V06-M03 brushless DC, permanent magnet V06-M03B brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03B brushless DC, sensorless V06-M03B brushless DC, sensorless V06-M03B brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03B brushless DC, sensorless V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A  DC with mechanical commutator V06-M06B X11-H01C electro-active polymer electrostatic V06-M06B X11-H01A brushlescroated victoricative V06-M06B X11-H01A brushlescroated vic			DC interrupter	V06-M06
AC brushless, permanent magnet X11-H01A X11-H01C AC brushless, sensorless X11-H01B AC commutator type X11-H01B AC synchronous, hybrid AC synchronous, with permanent magnet X11-H09 AC synchronous, without permanent magnet X11-H09 acyclic amplidynes AC x11-H09 asynchronous (induction) brushless AC, permanent magnet V06-M03A X11-H01 AC brushless, sensorless V06-M02B X11-H01B AC commutator type V06-M02B X11-H09 AC synchronous, hybrid V06-M01C X11-D05 AC synchronous, with permanent magnet V06-M01A X11-G X11-D05 AC synchronous, without permanent magnet V06-M01B X11-D05 AC synchronous, without permanent magnet V06-M01B X11-H09 asynchronous (induction) V06-M02B AC synchronous (induction) X11-H09 asynchronous (induction) V06-M02B X11-H09 asynchronous (induction) V06-M03A X11-H01 brushless AC, permanent magnet V06-M03A X11-H01A brushless AC, sensorless V06-M03B X11-H01C brushless DC, permanent magnet V06-M03B X11-H01C brushless DC, permanent magnet V06-M03B X11-H01C brushless DC, permanent magnet V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A  X11-H01A X11-	AC brushless (general)			X11-H09
AC brushless, sensorless V06-M03C X11-H01C AC brushless, switched reluctance V06-M03B X11-H01B AC commutator type V06-M02B X11-H09 AC synchronous, hybrid V06-M01C X11-D05 AC synchronous, with permanent magnet V06-M01B AC synchronous, without permanent magnet V06-M01B AC synchronous, without permanent magnet V06-M01B AC synchronous  with permanent magnet V06-M01B AC synchronous, with permanent without permanent magnet V06-M01B AC synchronous, with permanent wothout permanent without permanent without permanent wothout without permanent without permanent wothout without permanent without permanent without permanent without permanent without permanent wothout without permanent without per	ACI 11		DC with electronic commutator	
AC brushless, sensorless	AC brushless, permanent magnet			
X11-H01C AC brushless, switched reluctance V06-M03B X11-H01B AC commutator type V06-M02B X11-H09 AC synchronous, hybrid V06-M01C X11-D05 AC synchronous, with permanent magnet V06-M01A X11-H04 AC synchronous, without permanent magnet V06-M01B AC synchronous without permanent wagnet V06-M01B AC synchronous, with permanent wagnet V06-M01B AC synchronous, with permanent wagnet v06-M01A AC synchronous, without permanent wagnet v06-M01B AC synchronous, with permanent wagnet v06-M01B AD synchronous, with permanent wagnet v06-M01B AC synchronous v06-M01B AC synchronous v06-M01B AT1-H01B AD clectrostrictive v06-M06B AT1-H02B AT1-H03A A bolding devices, electrostatic v06-M06B AT1-H02B AT1-H03A A bolding devices, electrostatic v06-M06B AT1-H04 Abolding devices, device in the fire to the fire to	A.C. la mush lana ann an Israel		DC with mechanical commutator	
AC brushless, switched reluctance V06-M03B X11-H01B X11-H01B X11-H04 AC commutator type V06-M02B X11-H09 AC synchronous, hybrid V06-M01C X11-D05 AC synchronous, with permanent magnet V06-M01A X11-G AC synchronous, without permanent magnet V06-M01B X11-D acyclic X11-H09 amplidynes X11-H09 amplidynes X11-H09 asynchronous (induction) V06-M02B X11-E bearings X11-H01A brushless AC, sensorless V06-M03A X11-H01A brushless DC (general) V06-M03B X11-H01B brushless DC (general) V06-M03A X11-H01B brushless DC, permanent magnet V06-M03A X11-H01B brushless DC, permanent magnet V06-M03C X11-H01B brushless DC, permanent magnet V06-M03A X11-H01B brushless DC, sensorless V06-M03A X11-H01B brushless DC, permanent magnet V06-M03A X11-H01B brushless DC, permanent magnet V06-M03A X11-H01B brushless DC, permanent magnet V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03A X11-H01A brushless DC, sensorless V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A W11-D2B X	AC brushless, sensoriess			
X11-H01B	AC brushlass switched reluctance			
AC commutator type X11-H09 X11-H09 AC synchronous, hybrid AC synchronous, with permanent magnet W06-M01A X11-G AC synchronous, without permanent magnet W06-M01B X11-H09 AC synchronous, without permanent magnet W06-M01B X11-G AC synchronous, without permanent magnet W06-M01B X11-D acyclic X11-H09 asynchronous (induction) X11-H09 asynchronous (induction) W06-M02B X11-E bearings X11-J07A brakes, dynamo-electric W06-M03 X11-H01A brushless AC, permanent magnet W06-M03A X11-H01C brushless AC, switched reluctance V06-M03B brushless DC, permanent magnet V06-M03A X11-H01B brushless DC, permanent magnet V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M06B	AC brusiliess, switched reluctance		electrostatic	
X11-H09	AC commutator type		-ltthlfft	
AC synchronous, hybrid V06-M01C X11-D05  AC synchronous, with permanent magnet V06-M01A X11-G  AC synchronous, without permanent magnet V06-M01B X11-D05  AC synchronous, without permanent magnet V06-M01B X11-D0  acyclic X11-H09 and X11-H09 asynchronous (induction) V06-M02B X11-E  bearings X11-H09 induction, (asynchronous) V06-M02B X11-E  bearings X11-J07A brushless AC (general) V06-M03 X11-H01  linear, direct current V06-M06B1	Ac commutator type		The state of the s	
X11-D05	AC synchronous, hybrid			
AC synchronous, with permanent magnet V06-M01A X11-G  AC synchronous, without permanent magnet V06-M01B X11-D  acyclic X11-H09 asynchronous (induction) V06-M02B X11-E  bearings X11-J07A brakes, dynamo-electric V06-M03 X11-H01A brushless AC, sensorless V06-M03C X11-H01B brushless DC, general) V06-M03C X11-H01B brushless DC, permanent magnet V06-M03 X11-H01B brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03A X11-H01A brushless DC, sensorless V06-M03A X11-H01B brushless DC, sensorless V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A magnetic-fluid V06-M06K	, to cyncin one as, ny zma		71	
magnet V06-M01A X11-G  AC synchronous, without permanent magnet V06-M01B  AC synchronous, without permanent vof-M01B  X11-D  acyclic X11-H09  amplidynes X11-H09  asynchronous (induction) V06-M02B  X11-E  bearings X11-J07A  brakes, dynamo-electric V06-M06  X11-H03A  brushless AC (general) V06-M03A  X11-H01A  brushless AC, sensorless V06-M03B  brushless DC (general) V06-M03B  brushless DC (general) V06-M03B  brushless DC (general) V06-M03B  brushless DC, permanent magnet V06-M03A  X11-H01B  brushless DC, permanent magnet V06-M03A  X11-H01B  brushless DC, permanent magnet V06-M03A  X11-H01B  brushless DC, sensorless V06-M03A  X11-H01A  brushless DC, sensorless V06-M03A  X11-H01A  brushless DC, sensorless V06-M03A  X11-H01A  brushless DC, sensorless V06-M03C  X11-H01A  magnetic circuit X11-J01  holding devices, electrostatic V06-M06F  X11-H01A  hybrid, AC synchronous V06-M06E  X11-H05  X11-H05  X11-H05  induction generator V06-M02B  X11-E  interior permanent  magnet V06-M01A  X11-H02  X11-H01  linear (general) V06-M06B  X11-H02A  X11-H01A  linear, electrostatic V06-M06B9  linear, piezoelectric V06-M06B7  V06-M06B2  X11-H02B  X11-H01A  Mybrid, AC synchronous V06-M06B  X11-H05  X11-H05  X11-H05  X11-H05  X11-H05  X11-H05  X11-H05  X11-H06B  X11-H07  X11-H07  X11-H01A  X11	AC synchronous, with permanent		gears, dynamo-electric	
AC synchronous, without permanent magnet V06-M01B X11-D0 acyclic X11-H09 atychronous (induction) V06-M02B X11-E05 amplidynes X11-H09 asynchronous (induction) V06-M02B X11-E bearings X11-J07A brakes, dynamo-electric V06-M06 brushless AC (general) V06-M03 X11-H01		V06-M01A	holding devices electrostatic	
AC synchronous, without permanent magnet V06-M01B X11-D05 acyclic X11-H09 anylidynes X11-H09 asynchronous (induction) V06-M02B X11-E bearings X11-J07A brakes, dynamo-electric V06-M06B brushless AC (general) V06-M03 X11-H01 brushless AC, sensorless V06-M03C X11-H01C brushless AC, switched reluctance V06-M03B brushless DC (general) V06-M03B X11-H01B brushless DC, permanent magnet V06-M03A X11-H01A brushless DC, sensorless V06-M03C	_	X11-G	moraling devices, electrocation	
magnet V06-M01B X11-D induction generator V06-M02B X11-E05 amplidynes X11-H09 asynchronous (induction) V06-M02B X11-E  bearings X11-J07A interior permanent magnet V06-M03B induction, (asynchronous) V06-M02B X11-E  bearings X11-J07A magnet V06-M01A1 brakes, dynamo-electric V06-M06	AC synchronous, without permane	ent	hybrid, AC synchronous	
acyclic x11-H09 amplidynes x11-H09 induction, (asynchronous) V06-M02B x11-E05 wook-M02B x11-E  bearings x11-J07A magnet V06-M01A1 magnet V06-M01A1 magnet V06-M06B interior permanent magnet V06-M06B x11-H01A linear, asynchronous V06-M06B1 interior permanent magnet v06-M06B1 x11-H01A linear, asynchronous v06-M06B1 x11-H01A linear, direct current v06-M06B3 x11-H01C linear, electrostatic v06-M06B8 linear, electrostrictive v06-M06B9 brushless DC (general) v06-M03A x11-H01B linear, magnetostrictive v06-M06B9 brushless DC (general) v06-M03A x11-H01B linear, piezoelectric v06-M06B9 brushless DC, permanent magnet v06-M03A x11-H01A magnetic circuit x11-J01 brushless DC, sensorless v06-M03C x11-H01A magnetic circuit magnetic-fluid v06-M06K	magnet	V06-M01B	, ,	X11-D05
amplidynes asynchronous (induction) V06-M02B X11-E bearings X11-J07A magnet V06-M01A1 X11-G01			induction generator	V06-M02B
asynchronous (induction) V06-M02B X11-E  bearings X11-J07A magnet V06-M01A1			_	X11-E05
bearings X11-E bearings X11-J07A brakes, dynamo-electric V06-M06			induction, (asynchronous)	V06-M02B
bearings X11-J07A magnet V06-M01A1 brakes, dynamo-electric V06-M06 X11-H03A linear (general) V06-M06B brushless AC (general) V06-M03 X11-H01 linear, asynchronous V06-M06B1 X11-H01A brushless AC, sensorless V06-M03C X11-H01C linear, electrostatic V06-M06B7 X11-H01B linear, magnetostrictive V06-M06B7 X11-H01B linear, piezoelectric V06-M06B7 X11-H01 linear, piezoelectric V06-M06B7 X11-H01 linear, piezoelectric V06-M06B7 X11-H01 linear, synchronous V06-M06B7 X11-H01 linear, piezoelectric V06-M06B7 X11-H01 linear, synchronous V06-M06B7 X11-H01 linear, synchronous V06-M06B7 X11-H01A magnetic circuit X11-J01 wo6-M06K	asynchronous (induction)			X11-E
brakes, dynamo-electric V06-M06 X11-H03A Brushless AC (general) V06-M03 X11-H01 Brushless AC, permanent magnet V06-M03A X11-H01A Brushless AC, sensorless V06-M03C X11-H01C Brushless AC, switched reluctance V06-M03B Brushless DC (general) V06-M03 X11-H01B Brushless DC, permanent magnet V06-M03A X11-H01B Brushless DC, permanent magnet V06-M03A X11-H01B Brushless DC, permanent magnet V06-M03A X11-H01 Brushless DC, sensorless V06-M03A X11-H01 Brushless DC, sensorless V06-M03A X11-H01A Brushless DC, sensorless V06-M03C X11-H01A Brushless DC, sensorless V06-M06C	h a sui a su		interior permanent	
brushless AC (general)  brushless AC (general)  brushless AC, permanent magnet  brushless AC, sensorless  brushless AC, switched reluctance  brushless DC (general)  brushless DC, permanent magnet  brushless DC, sensorless  X11-H01A  brushless AC, switched reluctance  brushless DC (general)  brushless DC, permanent magnet  brushless DC, sensorless  X11-H01A  magnetic circuit  magnetic-fluid  X06-M06K			magnet	
brushless AC (general) V06-M03 X11-H01 linear, asynchronous V06-M06B1 X11-H02A X11-H01A linear, direct current V06-M06B3 X11-H02C X11-H01C linear, electrostatic V06-M06B8 brushless AC, switched reluctance V06-M03B X11-H01B linear, magnetostrictive V06-M06B7 X11-H01B linear, piezoelectric V06-M06B7 X11-H01 linear, synchronous V06-M06B7 X11-H01 linear, synchronous V06-M06B7 X11-H01 linear, synchronous V06-M06B2 X11-H02B X11-H01A magnetic circuit X11-J01 w06-M06K	brakes, dynamo-electric			
X11-H01 linear, asynchronous V06-M06B1 X11-H02A X11-H01A linear, direct current V06-M06B3 X11-H02C X11-H01C linear, electrostatic V06-M06B8 linear, electrostrictive V06-M06B7 X11-H01B linear, magnetostrictive V06-M06B9 brushless DC (general) V06-M03 linear, piezoelectric V06-M06B7 X11-H01 linear, synchronous V06-M06B7 X11-H01 linear, synchronous V06-M06B2 X11-H02B V06-M03A X11-H01A magnetic circuit X11-J01 v06-M06K	brushloss AC (gonoral)		linear (general)	
brushless AC, permanent magnet V06-M03A X11-H01A brushless AC, sensorless V06-M03C X11-H01C brushless AC, switched reluctance V06-M03B brushless DC (general) V06-M03 X11-H01B brushless DC, permanent magnet V06-M03A X11-H01 brushless DC, sensorless V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M03A X11-H01A brushless DC, sensorless V06-M03C X11-H01A Magnetic circuit M11-H01A Magnetic-fluid V06-M06K	brusiliess AC (general)		Paragraph and a second	
X11-H01A brushless AC, sensorless V06-M03C X11-H01C brushless AC, switched reluctance V06-M03B brushless DC (general) V06-M03 X11-H01B brushless DC, permanent magnet V06-M03A X11-H01 brushless DC, sensorless V06-M03C X11-H01A brushless DC, sensorless V06-M06B3 X11-H01A brushless DC, sensorless V06-M06B3 Linear, direct current V06-M06B3 X11-H02C V06-M06B7 Linear, piezoelectric V06-M06B7 Linear, piezoelectric V06-M06B7 X11-H01B Linear, piezoelectric V06-M06B7 X11-H01B Linear, direct current V06-M06B8 Linear, electrostatic V06-M06B7 Linear, piezoelectric V06-M06B7 X11-H01B Linear, piezoelectric V06-M06B7 V06-M06B7 X11-H01B Linea	brushless AC, permanent magnet		linear, asynchronous	
brushless AC, sensorless V06-M03C X11-H01C linear, electrostatic V06-M06B8 brushless AC, switched reluctance V06-M03B linear, electrostrictive V06-M06B7 X11-H01B linear, magnetostrictive V06-M06B9 brushless DC (general) V06-M03 linear, piezoelectric V06-M06B7 X11-H01 linear, synchronous V06-M06B2 brushless DC, permanent magnet V06-M03A X11-H01A magnetic circuit X11-J01 brushless DC, sensorless V06-M03C magnetic-fluid V06-M06K	2. ad. mede 7 te, permanent magnet		linear direct current	
X11-H01C brushless AC, switched reluctance V06-M03B brushless DC (general) brushless DC, permanent magnet brushless DC, sensorless  X11-H01C linear, electrostatic V06-M06B8 linear, electrostrictive V06-M06B7 linear, magnetostrictive V06-M06B9 linear, piezoelectric V06-M06B7 X11-H01 linear, synchronous V06-M06B2 X11-H01A magnetic circuit M11-J01 magnetic-fluid V06-M06K	brushless AC. sensorless		imear, direct current	
brushless AC, switched reluctance V06-M03B X11-H01B brushless DC (general) V06-M03 X11-H01 brushless DC, permanent magnet V06-M03A X11-H01A brushless DC, sensorless V06-M03B X11-H01A brushless DC, sensorless V06-M03B X11-H01A magnetic circuit magnetic-fluid V06-M06K	· · · · · · · · · · · · · · · · · · ·		linear electrostatic	
brushless DC (general)  brushless DC, permanent magnet  brushless DC, sensorless  X11-H01B  linear, magnetostrictive V06-M06B9  linear, piezoelectric V06-M06B7  linear, synchronous V06-M06B2  X11-H01A  magnetic circuit X11-J01  wagnetic-fluid V06-M06K	brushless AC, switched reluctance			
brushless DC (general) V06-M03 linear, piezoelectric V06-M06B7 X11-H01 linear, synchronous V06-M06B2 brushless DC, permanent magnet V06-M03A X11-H01A magnetic circuit X11-J01 brushless DC, sensorless V06-M03C magnetic-fluid V06-M06K			•	
brushless DC, permanent magnet V06-M03A X11-H01A brushless DC, sensorless V06-M03C magnetic circuit magnetic-fluid V06-M06K	brushless DC (general)	V06-M03		
brushless DC, permanent magnet V06-M03A X11-H02B X11-H01A magnetic circuit X11-J01 brushless DC, sensorless V06-M03C magnetic-fluid V06-M06K	_			
X11-H01A magnetic circuit X11-J01 brushless DC, sensorless V06-M03C magnetic-fluid V06-M06K	brushless DC, permanent magnet		. , . ,	
brushless DC, sensorless V06-M03C magnetic-fluid V06-M06K			magnetic circuit	
X11-H01C magnetostrictive V06-M06H	brushless DC, sensorless			
		X11-H01C		V06-M06H

Electric machine (continued)		regulation - see Electric machine	֥
magnetostrictive, generator	V06-M06H2	regulation/control	X13-H01
magnetostrictive, motor	V06-M06H1	rolling motors	V06-M06B
maintenance - see <b>Electric macl</b>		3 3 3 3	X11-H02
manufacture/testing/mainte		rotor	X11-J01B
	V06-M11M	Schrage motors	X11-H09
	X11-J08M	sectional motors	V06-M06
manufacture - see Electric mach		Scenorial motors	X11-H02
manufacture/testing/mainte	· = '	selsyns	V06-M06A
manufacture/ testing/manite	V06-M11	servomotors	V06-M06E
	X11-J08	shape memory alloy actuators	V06-M06L
material (soft, non-metallic) for c		shunt motor	V06-M00W
material (soit, non-metalic) for c		SMA actuators	V06-N02 V06-M06M
and a discourse	V02-A02B2		
metadynes	X11-H09	solenoidal motors	V06-M04
MHD generators	X11-H03B1	speed control/regulation - see <b>El</b>	
	V06-M06Q	machine, regulation/control	V06-N
microactuators	V06-M06G		X13-H
microactuators, electrostatic	V06-M06G1	stator	X11-J01A
microactuators, electrostatic, co		starter-generator	X11-H20
	V06-M06G1A	stepping motors, hybrid	V06-M05C
microactuators, electrostatic, wo		stepping motors, permanent mag	,
	V06-M06G1B		V06-M05B
microactuators, electro-thermal		stepping motors, variable relucta	nce
effect	V06-M06G3		V06-M05A
microactuators, magnetic excitat	tion	superconducting winding machin	es
	V06-M06G2		X11-H05
micromotors	V06-M06G	switched reluctance type	V06-M03B
micromotors, electrostatic excita	ation		X11-H01B
	V06-M06G1	synchronous, hybrid	V06-M01C
micromotors, electro-thermal			X11-D05
effect	V06-M06G3	synchronous, with permanent ma	gnet
micromotors, magnetic excitatio	n V06-M06G2		V06-M01A
motor-generator	X11-H20		X11-G
generate	X21-A07	synchronous, without permanent	
motor-generator sets	V06-M06	j,	V06-M01B
moter generater con	X11-H09		X11-D
multi-rotor/stator type	V06-M06	synchros	V06-M06A
	X11-H09	tachogenerators	V06-M06C
multidimensional motors	V06-M06P	testing - see <b>Electric machine</b> ,	
nanomotors	V06-M06G9	manufacture/testing/mainten	ance
nanoactuators	V06-M06G9	manadetare, testing, manter	S01-G07
non-electrodynamic type	V00-1V100G7		V06-M11M
details	V06-M16		X11-J08M
oscillating armature type	V06-M04	thermal-effect type	V06-M06
oscillating coil type		thermal-effect type	
	V06-M04A	th	X11-H04
oscillating magnet type	V06-M04	thermomagnetic	V06-M06
oscillating wave motors, piezoel		torque motors	V06-M06
	V06-M06D1	. 10:	X11-H09
pancake motors	V06-M06N	travelling wave motors	V06-M06D1
perpetual motion (electric/magr		triboelectric motors/generators	V06-M06F
	V06-M06	ultrasonic, electrostrictive	V06-M06D1
piezoelectric actuators	V06-M06D	ultrasonic, non-piezoelectric	V06-M06R
piezoelectric generators	V06-M06D2	ultrasonic, piezoelectric	V06-M06D1
piezoelectric motors	V06-M06D	universal motors	V06-M02
polarised armature type	V06-M04	vehicle alternator	X22-F02
printed circuit type motors	V06-M06N	vehicle starter motor	X22-A04
pumps, electrodynamic conduct	tion	vibrating armature	V06-M04
	X11-H03B	vibrating coil type	V06-M04A
pumps, electrodynamic inductio	n X11-H03B	vibrating magnet type	V06-M04
reciprocating armature type	V06-M04	vibration wave motors, piezoelect	ric
reciprocating coil type	V06-M04A		V06-M06D1
reciprocating magnet type	V06-M04	voice-coil motors	V06-M04A
- ·		windings	X11-J02

ctric machine, applications		ventilation, information equipr	
aerospace	X11-U04		V06-U04D
	X13-U03	video equipment	V06-U09
audio equipment	V06-U09	wind turbine generator	X11-U01E
aviation	X11-U04	Electric machine, details	
	X13-U03	auxiliary machines	V06-M10
boat	W06-C01C7		X11-J05B
	X11-U05	balancing arrangements	V06-M10
	X13-U04	balancing arrangements	X11-J05X
camera, digital	V06-U09	bearing supports	V06-M09
camera, film-based	V06-U13	bearing supports	X11-J07A
camera, video	V06-U09	la a sufa as allafadal as a configura	
chronograph timepiece	V06-U12	bearing-shield mountings	V06-M09
cooling	V06-U04D		X11-J07A
disk drive	V06-U04A	bearings	V06-M10
	V06-U07		X11-J05X
dispensing machine		bearing supports/shields/end	
domestic appliance	V06-U01		V06-M09
electric power generation	X11-U01	bearing lubrication	V06-M09
electronic equipment manufactu		brakes, mechanical	V06-M10
exercise machine	V06-U08		X11-J05A
facsimile machine	V06-U04C	brush holders/supports	V06-M09
game machine	V06-U08		X11-J07A
gas turbine generator	X11-U01C	brushes	V06-M12
graph plotter	V06-U04B	brushes	X11-J03
hydrogenerator	X11-U01B	brushes, protection	V06-M09
C engine generator	X11-U01D	brusiles, protection	X11-J07A
ndustrial machine/component	V06-U15	la se ella conservata	
aaatiiaiaaia, eepe.i.eii	X11-U07	brushes, supports	V06-M09
	X13-U06		X11-J07A
nformation equipment	V06-U04	cables	V06-M20
nstrumentation	V06-U12	casings	V06-M09
			X11-J07X
nachine tool	V06-U06	centering	V06-M11C
medical device	V06-U10	clutches	V06-M10
nicroturbine generator	X11-U01M		X11-J05A
nobile telephone	V06-U04E	coils, printed	V06-M08A
military	X11-U06	commutators	V06-M12
	X13-U05		X11-J03
optical switch	V06-U14	connectors, casing	V06-M09A
paper shredder (office)	V06-U01	Sermiousiers, saemig	X11-J07X1
personal article	V06-U02	cooling, ventilation	V06-M13
olotter, graph	V06-U04B	cooling, ventilation	X11-J06
printer	V06-U04B	d	
railway	X11-U03	detectors, position/rotation/di	
annay	X13-U02		V06-M14
	X23-A01A1		X11-J04
		enclosure	V06-M09
obotics	V06-U05	end-plate mountings	V06-M09
semiconductor manufacturing ec			X11-J07A
	V06-U11	explosion proofing	V06-M09
ship	W06-C01C7		X11-J07X
	X11-U05	fins, heat dissipation	V06-M09
	X13-U04	., ,	X11-J07X
sports	V06-U08	flywheels	V06-M10
steam turbine generator	X11-U01A	ysois	X11-J05X
switch, optical	V06-U14	gears	V06-M10
ape drive	V06-U04A	gears	X11-J05A
telecommunication	V06-U04E	ingulation	V06-M11C
toy	V06-U08	insulation	
vehicle (road) drive	X11-U02		X11-J02B
vernere (road) arive	X11-002 X13-U01	machine-mountings	V06-M09
	X21-A07		X11-J07X
		materials	V06-M15
chiele accessor:			
vehicle accessory vending machine	V06-U03 V06-U07		X11-J15 X11-J15A

naterials, conductive	V06-M15A	manufacture/testing/maintenan	ice
naterials, insulative	V06-M15C	balancing	V06-M1
·	X11-J15C		X11-J08
naterials, magnetic	V06-M15B	bearings	V06-M1
naterials, magnetic	X11-J15B	bearings	X11-J07
nechanical drivers			
nechanical drivers	V06-M10		X11-J08
	X11-J05B	brushes	V06-M1
nechanical loads	V06-M10		X11-J08
	X11-J05B	casings	V06-M1
nicrogears	V06-M10A		X11-J08
nicrotransmission	V06-M10A	centring	V06-M1
oise suppression	V06-M09	ğ ,	X11-J08
0.00 0466.000.0	X11-J07X	commutators	V06-M1
an alastraduramia tura matar		Commutators	
on-electrodynamic type motor	V06-M16	19 (19)	X11-J08
rotection, brushes	V06-M09	cooling, ventilation	V06-M13
	X11-J07A		X11-J06
rotectors	V06-M14	drying	V06-M1
	X11-J04		X11-J08
ulleys	V06-M10	demonstrating model	V06-M20
,	X11-J05A		W04-W0
FI suppressors	V06-M14	design, simulation	V06-M20
пзирргеззога	X11-J04	design, simulation	W04-W0
l l l l l		1 1 2 1 1	
bs, heat dissipation	V06-M09	end-shields	V06-M1
	X11-J07X		X11-J08
otors, magnetic circuit	V06-M07B	fault detection and diagnosis	V06-M1
	X11-J01B		X11-J08
eals	V06-M09	heating	V06-M1
	X11-J07X	ğ	X11-J08
hafts	V06-M10	impregnating	V06-M1
nais	X11-J05X	Impregnating	X11-J08
Parata aa		ta a dada a	
lip-rings	V06-M12	insulating	V06-M1
	X11-J03		X11-J08
tarters, mechanical	V06-M10	maintenance	V06-M1
	X11-J05A		X11-J08
tators, magnetic circuit	V06-M07A	micromachining	V06-M1
. 3	X11-J01A	microprocessor based	V06-M1
upports, brushes	V06-M09		X11-J08
apports, prasties	X11-J07A	monitoring	V06-M1
. Starley a		monitoring	
witches	V06-M14		X11-J08
	X11-J04	recycling	V06-M1
aping	V06-M11C		X11-J08
erminal-boxes, casing	V06-M09A	repair	V06-M1
· ·	X11-J07X1	·	X11-J08
entilation, cooling	V06-M13	rotors	V06-M1
entilation, coomig		101013	
the continue of a continue	X11-J06	alta ata aa	X11-J08
bration damping	V06-M09	slip-rings	V06-M1
	X11-J07X		X11-J08
vindings, conductor		stators	V06-M1
shape/form/construction/layou	: V06-M08A		X11-J08
	X11-J02A	supports	V06-M1
rindings, fastening/wedges/ties	V06-M08		X11-J08
manigs, rasterning, weages, acs	X11-J02C	testing	V06-M1
indings insulation/shielding/are		testing	
rindings, insulation/shielding/pro		constitution P	X11-J08
	V06-M08B	ventilation, cooling	V06-M1
	X11-J02B		X11-J06
vindings, layout	V06-M08A	windings	V06-M1
	X11-J02A	_	X11-J08
rindings, printed	V06-M08A1	Electric machine, resultation/	
	. 2000, (1	Electric machine, regulation/contr	
		AC motors	V06-N03
			X13-H01
		amplidynes	X13-H01

Electric machine, regulation/cor	ntrol (continued)	magnetic-fluid	V06-N14
asynchronous motors	V06-N03A	magnetostrictive	V06-N09
•	X13-H01F	metadynes	X13-H01C9
brakes, dynamo-electric	X13-H04	microactuators	V06-N22
braking	V06-N06	micromotors	V06-N22
S	X13-H01B	microprocessor control	V06-N26
chopper controllers	X13-H01C1	1	X13-H05
clutches, dynamo-electric	X13-H04	microturbine generator	X13-H02T6
corona motors	V06-N13	motor-generator	X13-H07
DC brushless (general)	V06-N04	multidimensional	V06-N20
De brusiness (general)	X13-H01E	multimotors	V06-N30
DC brushless, permanent magnet		maramotors	X13-H01X
De brusilless, permanent magnet	X13-H01E1	pancake motors	V06-N18
DC brushless, sensorless	V06-N04C	piezoelectric	V06-N17
DC brusilless, sensoriess	X13-H01E3	prime-mover controllers, genera	
DC havehless suitabaal aslustaasa		prime-mover controllers, genera	
DC brushless, switched reluctance		and a real reference to a real	X13-H02X
DC - ith	X13-H01E2	printed-circuit type	V06-N18
DC with mechanical commutator	V06-N02	PWM controllers	X13-H01C1
	X13-H01C	regenerative braking	V06-N06
diesel engine generator	X13-H02T3		X13-H01B
dynamic braking	V06-N06	remote motor control	V06-N35
	X13-H01B		X13-H06
dynamo-electric converters	X13-H04	resistive braking	V06-N06
dynamo-electric converters, brakii	ng		X13-H01B
	X13-H01B	reversing	V06-N06
dynamo-electric converters, startir	ng		X13-H01B
	X13-H01A	servomotors	V06-N10
electrostatic	V06-N08	shape-memory alloy	V06-N16
electrostrictive	V06-N07	starter-generator	X13-H07
field controllers, generators	X13-H02A	smart power IC controllers	V06-N24
frequency controllers	X13-H01D1A	starting	V06-N05
frequency controllers, generators		3	X13-H01A
gas turbine generator	X13-H02T4	stepping motors	V06-N01
generators, DC, low power	V06-N40B	stepping motors, hybrid	V06-N01C
generators, electrostatic	V06-N40F	stepping motors, permanent mag	
generators, field controllers	X13-H02A	stepping motors, permanent may	V06-N01B
generators, induction, low power	V06-N40C	stepping motors, variable relucta	
generators, low power	V06-N40	stepping motors, variable relacti	V06-N01A
generators, magnetostrictive	V06-N40E	stopping	V06-N01A
generators, MEMS type	V06-N40H	synchronous motors	V06-N03B
	V06-N40G	synchronous motors	X13-H01G
generators, MHD, low power	V06-N40H1		
generators, NEMS type		transformers, dynamo-electric	X13-H04 X13-H02T1
generators, piezoelectric	V06-N40D	steam turbine generator	
generators, prime-mover controlle		ultrasonic	V06-N36
	X13-H02X	universal motors	V06-N
generators, synchronous, (LP)	V06-N40A		X13-H01
hydrogenerator	X13-H02T2	vector controllers	V06-N37
IC engine generator	X13-H02T3		X13-H01D1C
integrated circuit controller	V06-N24	vibrating armatures/coil, machine	
integrated smart power circuit cor	ntroller		V06-N21
	V06-N24	voice coil motors	V06-N12
linear (general)	V06-N11	voltage controllers	X13-H01D1B
	X13-H01H	Ward-Leonard sets	X13-H01C9
linear, asynchronous	V06-N11A	wind turbine generator	X13-H02T5
	X13-H01H1	Electric machine, regulation/contro	ol
linear, direct current	V06-N11C	characterized by control device	V06-N45
	X13-H01H2	and determed by control device	X13-H10
linear, electrostatic	V06-N11F	characterized by AC-to-AC conve	
linear, electrostrictive	V06-N11D	characterized by AC-10-AC CONVE	V06-N45H
linear, magnetostrictive	V06-N11E		
linear, piezoelectric	V06-N11D		X13-H10H
linear, synchronous	V06-N11B		
23., 0,	X13-H01H2		

X13-H01H2

characterized by AC-to-DC conve		economics-based power exchang	
	V06-N45F	ala atrama anatia interference	X12-H07
ala area de la la DC de AC accesa	X13-H10F	electromagnetic interference	V10 1101 A 4
characterized by DC-to-AC conve		reduction	X12-H01A4
	V06-N45G	electromagnetic waves	X12-H01X
	X13-H10G	eliminating/reducing asymmetry	X12-H01A6
characterized by DC-to-DC conv		energy storage	X12-H06
	V06-N45J		X16-L
	X13-H10J	harmonics/ripple reduction	X12-H01A4
characterized by diodes	V06-N45A	HVDC	X12-H01D
	X13-H10A	interconnections	X12-H01B
characterized by BTs	V06-N45B	load balancing by energy storage	
	X13-H10A		X16-L
characterized by combination		load balancing by energy storage	
of switching devices	V06-N45E	battery	X12-H01A7
	X13-H10E		X16-G02
characterized by FETs	V06-N45C	load balancing by energy storage	
	X13-H10C	flywheel	X12-H01A7
characterized by IGBTs	V06-N45D		X16-L
	X13-H10B	load sharing control between con	nected
characterized by thyristors	X13-H10D	networks	X12-H01B
Electric motor - see Electric machin	ie.	measurements	S01-D
Electric oil-filled radiator	X27-E01A2		X12-H04
		measurements, current	S01-D01
Electric oven	X27-C02		X12-H04
Electric power distribution/transm	ission	measurements, energy transfer	S01-B
system	X12-H		X12-H04
Active power compensation	X12-H01A2	system measurements, fault data i	
aircraft	W06-B01C3		S01-D
	X12-H01B4		S01-G
bulk power interconnection	X12-H01B2		X12-H04
bulk power transfer	X12-H01B2	measurements, inter-tie energy tra	ansfer
circuit arrangement	X12-H01		S01-B
communications	W01		X12-H04
	W02	measurements, power	S01-D02
	X12-H03E		X12-H04
communications, economics-con	siderations	measurements, transients	S01-D
	X12-H03E1A		X12-H04
communications, (E)HV lines	X12-H03E1	measurements, voltage	S01-D01
communications, LV mains line	X12-H03E3		X12-H04
communications via Internet/Intra	anet	monitoring	X12-H03A
	X12-H03E7	multi-source network	X12-H01B
communications via radio netwo	k X12-H03E5	noise filter	U25-E
connecting different-frequency n	etworks		W02-H
9 1 3	X12-H01B3		X12-H01A4
connecting same-frequency,		non-contact power distribution	X12-H01E
different-source networks	X12-H01B	trading across networks owned	X12-H07
controlling converters' output sh		by different operators	
com oming convention carparent	X12-H01B	power transfer control	X12-H01B
	X12-J01A	reactive power compensation	X12-H01A2
	X13-H03	reducing/preventing power oscilla	ations
controlling generators' output sh			X12-H01A5
com oming gonerators suspenses	X12-H01B	remote control/monitoring	X12-H03A
	X13-H02	remote control/monitoring	X12-H03A1
controlling transformers' output		based on economic consideratio	
controlling dansionners output	X12-H01B	remote load switching	X12-H03A
	X13-H04	remote load switching using main	
DC	X12-H01D	signals	X12-H03A
distributed generators	X12-H01D X12-H01B1	remote metering	S01-B01
economics-based comms	X12-H01B1 X12-H03E1A	Tomote metering	X12-H04A
economics-based comms economics-based control	ATZ-HUSETA		
	V12 L02 A 1	remote metering applications	S01-B01
economics-based control	X12-H03A1	remote metering applications	S01-B01 X12-H04U

tric power distribution/transm	ission	hydroelectric	X11-B
itinued)	CO1 DO1	IC engine MEMS-scale	X11-C02
remote metering applications,	S01-B01		V06-P01
network control	X12-H03A	micro hydroelectric	X11-B05
	X12-H04U2	mini hydroelectric	X11-B05
remote metering applications,	S01-B01	nuclear .	X14-C
protection	X12-H04U1	pumped storage	X11-B06
	X13-C04A	rankine cycle plant	X11-C05
remote metering, Internet/	T01	sea	X15-C05/
Intranet-based	S01-B01	small-scale	V06-P02
	X12-H04B	small-scale (solar)	X15-A04
ship	W06-B01C3	solar	X15-A
	X12-H01B4	steam turbine (coal-fired)	X11-A
short circuit current limiter	X12-H01A3	thermoelectric	X15-D
	X13-C03B	tidal	X15-C02
	X13-C04A	wind	X15-B
simulator	W04-W07	wind, off-shore	X15-B03
	X12-H05	wind, on-shore	X15-B02
stability control	X12-H01A5	wind, small-scale	X15-B04
static compensation	X12-H01A2D	· ·	71.0 20 .
static VAR compensation	X12-H01A2D	Electric propulsion	14/07 55:
SVC	X12-H01A2D	aircraft	W06-B01
switching control for equipment		bicycle	X21-A010
	X12-HU3A3	bus	X21-A01I
connected to mains supply	1	car	X21-A01
synchronising generator to netw		electric motorcycle	X21-A01
	X12-H01B2A	FCV	Q19-P
synchronising generators	X12-H01B		X21-A01、
synchronising networks	X12-H01B	forklift truck	X21-A01I
raining simulator	W04-W07A		X25-F05A
	X12-H05	golf cart	W04-X01
system system VAR compensatio	n/control	5	W04-X01
	X12-H01A2		X21-A01
VAR compensation/control,		hybrid vehicle	X21-A01[
distribution side	X12-H01A2A	Trybrid vernere	X22-P04
VAR compensation/control, load	side	lorry/truck	X21-A01
•	X12-H01A2B	mobility vehicle	X21-A01
VAR compensation/control,		mobility verticle	S05-K01
transmission side	X12-H01A2A	and the same letter.	
VAR compensation/control, usin		motor vehicle	X21-A01F
thyristor-controlled reactor	X12-H01A2D	scooter	X21-A010
VAR compensation/control, using		ship	W06-C01
thyristor-switched capacitor	9 X12-H01A2D	train	X23-A01
		train/tram	X23-A01
/AR compensation/control, usin		trolley bus	X21-A011
/AB :: / . l :	X12-H01A2D	wheelchair	S05-G02/
VAR compensation/control, usin	g ICS		X21-A01
10.00	X12-H01A2D	Electric pulse duration measurer	ment
oltage control	X12-H01A1	= 1000110 paise dalidion medadiel	
oltage control by load shedding	g X12-H01A1A		S04-C030
voltage control by reactive powe		Electric railway	
regulation	X12-H01A1C	accessories	X23-A13
	X12-H05	air conditioning	X23-A10
tric power network training si	mulator	for station	X23-S99
po		ATC	X23-A020
	W04-W07A	ATC, signalling	X23-B02
	X12-H05	ATP	X23-A01E
tric power plant		ATP, signalling	X23-A011
oiomass	X15-E	ATF, signalling	X23-B02 X23-A01E
chip-scale	V06-P01		
	X11-C04	ATS, signalling	X23-B02
codeneration		automatic train control	X23-A020
combined cycle	X11-C03	automatic train protection	X23-A01E
cogeneration combined cycle diesel engine gas turbine			

baggage security	Electric railway (continued)		radio communication link	X23-B02C
brake, automatic	_ · · · · · · · · · · · · · · · · · · ·	X23-S01F		
brake, automatic X23-A0185 brake, edely current X23-A0181 brake, electrodynamic X23-A0183 brake, electromechanical X23-A0181 brake, regenerative X13-H018 brake, regenerative X13-H018 cargo (un)loading X23-A0183 cargo (un)loading X23-A0183 cargo (un)loading X23-A0183 cargo (un)loading X23-A0183 cargo (un)loading X23-A019 classification yard X23-B05 current collector/pick-up X23-A09 classification yard X23-B05 signalling see also <b>Signalling</b> 232-B03 signalling see also <b>Signalling</b> x23-B04 data bus X23-A02 environmental control X23-A10 integrated and central traffic control X23-A10 integrated and central traffic control x23-A10 integrated and central traffic control x23-A01 integrated and central traffic control x23-A01 integrated and central traffic control x23-A01 integrated and seemal x23-A02 monitoring system X23-A02 monitoring system X23-A03 monitoring system X23-A02 monitoring system X23-A03 monitoring system X23-A04 monitoring system X23-A04 monitoring system X23-A05 monitoring system X23-A05 monitoring system X23-A06 monitoring system X23-A07 monitoring system X23-A08 monitoring system X23-A08 traffic control X23-A01 integrated and central traffic control x23-A03 integrated	, 55 5		radio communication link for spec	
brake, eddy current			rail/road crossing system	
brake, electromechanical         X23-A01B1         for station         X23-S03           brake, electromechanical         X23-A01B1         security systems         X23-S01           brake, regenerative         X13-H01B         for baggage         X23-S01E           carrage cable connector         X23-A09         cassification yard         X23-B05         X23-B03           current collector/pick-up data bus         X23-A02E         signalling - see also Signalling         X23-B03           data bus         X23-A02E         station spard         X23-B03           data bus         X23-A02E         station spard         X23-B04E           data bus         X23-A02E         station safety         X23-B04E           darent promomental control         X23-A010         substation         X23-B04E           security states         X23-B04E         station safety         X23-B04E           signalling to portable warning unit x23-B04E         signalling to portable warning unit x23-B04E         signalling to portable warning unit x23-B04E           signalling to portable warning unit x23-B04E         signalling to portable warning unit x23-B04E         signalling to portable warning unit x23-B04E           signalling to portable warning unit x23-B04E         x23-B04E         signalling to portable warning unit x23-B04E           signalling t	· · · · · · · · · · · · · · · · · · ·			
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brake, regenerative X13-H01B X23-A01B3 cargo (un)loading X23-A16 x23-A01B3 cargo (un)loading X23-A16 to represonnel X23-S01E shunting devices X23-A08 signalling - see also <b>Signalling</b> X23-B05 current collector/pick-up X23-A02C dead man's handle x23-A02C environmental control X23-A02C environmental control X23-A01D3B X23-B02C1 heating control X23-A10 wintegrated and central traffic control X23-A10 lubrication X23-A01L4 marshalling system X23-B05 measuring system X23-A01A4 mortor control X13-H01 wintor x23-A01A mortor control X13-H01 off-board system X23-A02C monitoring system X23-A03 corporating points X23-B03 points X23-B03 points/signals interlocking x23-B04 transponder x23-B04 passenger information system, platform-based points/signals interlocking x23-B04 power supply system X23-A03 power supply system X23-B03 points/signals interlocking x23-B04 power supply system X23-B04 power supply system X23-B04 power supply system X23-B04 power supply system X23-B04 power supply system X23-B04 power supply system x23-B0				
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carriage cable connector	brake, regenerative			
carriage cable connector	/ M I			
classification yard   X23-B05   current collector/pick-up   X23-A02E   data bus   X23-A02E   clear man's handle   X23-A02E   signalling to portable warning unit X23-B04C   signalling to portable warning unit X23-B04C   signalling to portable warning unit X23-B04C   signalling to portable warning unit X23-B03   station safety   X23-B03   substation   X13-E03   x23-B03   substation				
Signalling to portable warning unit X23-804E1				
data bus				
dead man's handle X23-A02C environmental control X23-A10 (SMR- telephone (train crew) W01-C01D3B X23-B02C1 (SMR- telephone (train crew) W01-C01D3B X23-B02C1 (SMR- telephone (train crew) W01-C01D3B X23-B05C (SMR- telephone (train crew) W01-C01D3B X23-A01 (SMR- telephone (train crew) W01-C01D3B (SMR- telephone (train crew) W01				
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GSM-R telephone (train crew) W01-C01D3B X23-B02C1				
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heating control X23-A010 integrated and central traffic control X23-B05C lighting control X23-B05C lighting control X23-A0114 magnetic levitation X23-A0114 marshalling system X23-A026 measuring system X23-A026 monitoring system X23-A026 monitoring system X23-A026 monitoring system, data bus X23-A026 monitoring system, data bus X23-A026 monitoring system, data bus X23-A026 montor X23-A0141 motor control X13-H01 x23-B02 track circuit X23-B01C track circuit X23-A015 track circuit X23-B01C track circuit	GSM-R telephone (train crew)		substation	
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lubrication X23-A01L4 magnetic levitation X23-A01A4 marshalling system X23-B05 measuring system X23-A02G monitoring system X23-A02G monitoring system X23-A02G monitoring system, data bus X23-A02E motor Control X13-H01 motor control X13-H01 motor control X13-H01 off-board systems X23-S on-board power supply X23-A03C parsenger information system, platform-based partor door control X23-B03 paints/signals interlocking X23-B04A points/s/ignals interlocking, solid-state power converter X12-J power converter X12-J power supply system X23-A01A power supply system X23-A01A power rail X23-A01A propulsion diesel engine X23-A01A2C control X23-A01A propulsion, electric motor X23-A01A2 propulsion, motor X23-A0		X23-B05C	suspension systems	X23-A01C
magnetic levitation X23-A01A4 marshalling system X23-B05 measuring system X23-A05 monitoring system X23-A026 monitoring system, data bus X23-A02E motor X23-A01A1 motor control X13-H01 X23-A02A noise, vibration, harshness reduction  C21-N X23-N motor control X13-H01 off-board systems X23-S on-board power supply X23-A03C operating points X23-B03 pantograph X23-B03 points/signals interlocking X23-B03 points/signals interlocking, solid-state X23-A01A3 power line X23-A03A power supply system X23-A01A2 propulsion X23-A01A2C exhaust gas cleaning X23-A01A2C propulsion, electric motor X23-A01A2 control X23-A01A2 propulsion, electric motor X23-A01A2 control X23-A02A protection, motor X23-A01A1 propulsion, electric motor X23-A01A2 control X23-A02A protection, motor X23-A01A2 protection, motor X23-A01A2 protection, motor X23-A01A4 protection, motor X23-A01A5 protection, motor X23-A01A6 pr	lighting control	X23-A10	telephone (train crew)	W01-C01D3B
marshalling system X23-A05 measuring system X23-A05 monitoring system X23-A02G monitoring system, data bus X23-A0141 motor control X13-H01 x23-A01A0 motor control X13-H01 x23-N motor control X13-H01 off-board systems X23-N motor control X13-H01 off-board systems X23-S on-board power supply X23-A03C operating points X23-B03 pantograph X23-A03 passenger information system, x23-B03 pantograph X23-A04 passenger information system, on-board train X23-C01 passenger information system, platform-based x23-B01 personnel security/safety X23-S01A platform door control X23-B03 points/signals interlocking x23-B04A power converter X23-B04A power line X23-A013A power line X23-A03A power rail X23-A014 power supply system X23-A014 control X23-A0142 control X23-A0140 control X23-A0140 control X23-A0140 control X23-A02A propulsion, electric motor X23-A0141 control X23-A02A propulsion, electric motor X23-A0140 control X23-A02A propulsion, electric motor X23-A0140 control X23-A02A propulsion, motor X23-A02A flexible element for underfloor use X25-B01C3C	lubrication	X23-A01L		X23-B02C1
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monitoring system, X23-A02G monitoring system, data bus X23-A02E motor X23-A01A1 motor control X13-H01  X23-A02A noise, vibration, harshness reduction  C21-N  Motor control X13-H01  Motor control X23-B03  pantograph X23-A03C  passenger information system, platform-based X23-C01  passenger information system, platform-based X23-C02  personnel security/safety X23-S013  points X23-B03  points X23-B03  points/signals interlocking X23-B03  points/signals interlocking, solid-state  X23-B01  X23-B01  Electric razor X23-B01  Electric resistance heating X25-B01  Cable element X25-B01B  element, arrangement X25-B01B  element, arrangement X25-B01B  element, arrangement M23-B014  Train-end passage detection X23-B04  Transformer X23-A0145  Transformer X23-B01  Train-end passage detection X23-B01  Transformer X23-B01  T	marshalling system	X23-B05		X23-C01
monitoring system, X23-A02G monitoring system, data bus X23-A02E motor X23-A01A1 motor control X13-H01  X23-A02A noise, vibration, harshness reduction  C21-N  Motor control X13-H01  Motor control X23-B03  pantograph X23-A03C  passenger information system, platform-based X23-C01  passenger information system, platform-based X23-C02  personnel security/safety X23-S013  points X23-B03  points X23-B03  points/signals interlocking X23-B03  points/signals interlocking, solid-state  X23-B01  X23-B01  Electric razor X23-B01  Electric resistance heating X25-B01  Cable element X25-B01B  element, arrangement X25-B01B  element, arrangement X25-B01B  element, arrangement M23-B014  Train-end passage detection X23-B04  Transformer X23-A0145  Transformer X23-B01  Train-end passage detection X23-B01  Transformer X23-B01  T	measuring system	X23-A05	testing system	X23-A05
motor control X13-H01 motor control X13-H01 motor control X23-A02A noise, vibration, harshness reduction  Q21-N X23-N motor control X13-H01 motor control X23-N motor control X13-H01 off-board systems X23-S on-board power supply X23-A03C operating points X23-B03 pantograph X23-A03C passenger information system X23-C01 passenger information system, platform-based train X23-B01 patform-based X23-B03 points X23-B03 points X23-B03 points/signals interlocking X23-B03 points/signals interlocking X23-B03 points/signals interlocking, solid-state X23-A01A3 power converter X12-J power line X23-A01A2 power supply system X23-A01A2 power supply system X23-A01A2 power supply system X23-A01A2 propulsion, diesel engine X23-A01A2 control X23-A01A2 control X23-A01A2 control X23-A01A1 control X23-A02A protection, motor X13-C04C  traction increasing equipment X23-B01 traffic control X23-B01 traffic con		X23-A02G	track circuit	X23-B01C
motor control X13-H01	monitoring system, data bus	X23-A02E	track laying equipment	X23-X
motor control X13-H01 X23-A02A noise, vibration, harshness reduction  Q21-N X23-N  motor control X13-H01 off-board systems X23-S on-board power supply X23-A03A partograph X23-A04 passenger information system, platform-based X23-B01 personnel security/safety X23-S01 points/signals interlocking, solid-state X23-B04A power converter X12-J power converter X12-J power line X23-A01A3 power line X23-A03A power supply system power supply system portsion yestem X23-A01A power supply system x23-A01A2 power supply system x23-A01A2 propulsion, diesel engine X23-A01A2 control X23-A01A2 control X23-A01A2 propulsion, electric motor X23-A01A2 control X23-A01A2 propulsion, electric motor X23-A01A2 control X23-A01A2 propulsion, motor X13-C04C  signalling X23-B01 tration increasing equipment Q21-D10A X23-B01 traffic control X23-B01 train detector X23-B01 train end passage detection X23-B014 transformer X23-A01A5 transformer X23-B014 transformer X23-B015 train detector X23-B014 transformer X23-B014 transformer X23-B014 transformer X23-B014 transformer X23-B015 transformer X23-B01 tratific control X23-B01 train detector X23-B01 train detector X23-B014 transformer X23-B014 transforme	= -	X23-A01A1	track-side to train/tram-mounted o	levice
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motor control off-board systems X23-S on-board power supply X23-A03C operating points X23-B03 pantograph passenger information system x23-C passenger information system, platform-based x23-S01 paints/signals interlocking points/signals interlocking, solid-state power converter X12-J power line power supply system power supply system power supply system power supply system propulsion, diesel engine control propulsion, electric motor control propulsion, electric motor control porpopulsion, electric motor control porpopulsion, electric motor control porpopulsion, motor  X13-B01  train-end passage detection X23-B01A transformer X23-B04E Electric rezion X25-B01 cable element X25-B01 cable element X25-B01B element, arrangement element, arrangement or electric blanket X25-B01C3A X27-E02 flexible element for electric carpet X25-B01C3C flexible element for pad X25-B01C3C flexible element for pad X25-B01C3C flexible element for pad X25-B01C3C flexible element for underfloor use X25-B01C3C			traffic control	X23-B05
off-board systems X23-S on-board power supply X23-A03C operating points X23-B03 pantograph X23-A04 passenger information system X23-C passenger information system, on-board train X23-C01 passenger information system, platform-based X23-C02 personnel security/safety X23-S01A platform door control X23-S03 points points/signals interlocking X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state X23-B04A1 power converter X12-J x23-A01A3 power line X23-A03A power supply system power rail X23-A03A power supply system x23-A03A propulsion in the control X23-A01A2 control x23-A01A2 control X23-A01A2 propulsion, electric motor X23-A01A1 control X23-A02A protection, motor X13-C04C  transformer X23-A01A5 transponder X23-B02A tunnel, electric details x23-B04E  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X25-B01 cable element x25-B01 cable element in x25-B01 cable element in x25-B01 cable element x25-B01 cable element in x25-B01 cable eleme		X23-N	train detector	X23-B01
off-board systems X23-S on-board power supply X23-A03C operating points X23-B03 pantograph X23-A04 passenger information system X23-C passenger information system, on-board train X23-C01 passenger information system, platform-based X23-C02 personnel security/safety X23-S01A platform door control X23-S03 points points/signals interlocking X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state X23-B04A1 power converter X12-J x23-A01A3 power line X23-A03A power supply system power rail X23-A03A power supply system x23-A03A propulsion in the control X23-A01A2 control x23-A01A2 control X23-A01A2 propulsion, electric motor X23-A01A1 control X23-A02A protection, motor X13-C04C  transformer X23-A01A5 transponder X23-B02A tunnel, electric details x23-B04E  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X25-B01 cable element x25-B01 cable element in x25-B01 cable element in x25-B01 cable element x25-B01 cable element in x25-B01 cable eleme	motor control	X13-H01	train-end passage detection	X23-B01A
on-board power supply x23-A03C operating points x23-B03 pantograph x23-A04 passenger information system x23-C passenger information system, on-board train x23-C01 passenger information system, platform-based x23-B01A platform door control x23-S01A platform door control x23-B03 points x23-B04A points/signals interlocking x23-B04A power converter x12-J x23-A01A3 power line x23-A01A3 power supply system x23-A01A propulsion propulsion x23-A01A2 control x23-A01A2 exhaust gas cleaning x23-A01A2 propulsion, electric motor x23-A02A protection, motor x13-C04C transponder x23-B02A tunnel, electric details x23-S05 warning device along route x23-B04 tunnel, electric details x23-S05 warning device along route x23-B04 tunnel, electric details x23-S05 warning device along route x23-B04 tunnel, electric details x23-S05 warning device along route x23-B04 tunnel, electric details x23-S05 warning device along route x23-B04 tunnel, electric details x23-S05 warning device along route x23-B04 tunnel, electric details x23-B04 tunnel, electric details x23-B04 warning device along route x23-B04 tunnel, electric details x23-B04 tunnel, electric details x23-B04 tunnel, electric details x23-B04 warning device along route x23-B04E element x25-B01 along route x23-B04E element x25-B01D along route	off-board systems	X23-S		X23-A01A5
operating points X23-B03 pantograph X23-A04 passenger information system X23-C passenger information system, on-board train X23-C01 passenger information system, platform-based X23-S01A platform door control X23-S01A points X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state  X23-A01A3 power line X23-A03A power rail X23-A03A power supply system X23-A03 propulsion X23-A01A2 control X23-A01A2 exhaust gas cleaning X23-A01A2 crontrol X23-A01A1 control X23-A01A1 protection, motor  X23-A01A3 protection, motor  X23-A01A1 protection, motor  X23-A01A1 protection, motor  X23-A01A2 protection, motor  X23-A01A4 protectic details protection protecti		X23-A03C		X23-B02A
pantograph X23-A04 passenger information system X23-C passenger information system, on-board train X23-C01 passenger information system, platform-based X23-C02 personnel security/safety X23-S01A platform door control X23-B01A points X23-B03 points X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state		X23-B03	•	X23-S05
passenger information system, on-board train X23-C01 passenger information system, on-board train X23-C01 passenger information system, platform-based X23-C02 personnel security/safety X23-S01A platform door control X23-S03 points X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state X23-B04A power converter X12-J power line X23-A01A3 power line X23-A03A power supply system X23-A03 propulsion X23-A01A2 propulsion, diesel engine X23-A01A2 control X23-A01A2 propulsion, electric motor X23-A01A1 control X23-A01A1 protection, motor X13-C04C  Electric razor X27-A02A3B Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  Electric razor X27-A02A3B  cable element X25-B01 element, arrangement element, material x25-B01B  flexible element for electric carpet X25-B01C3C  flexible element for mattress X25-B01C3C  flexible element for pad X25-B01C3C  flexible element for underfloor use X25-B01C3B  flexible element for pad X25-B01C3C  fle		X23-A04	•	X23-B04E
passenger information system, on-board train X23-C01 passenger information system, platform-based X23-C02 personnel security/safety X23-S01A platform door control X23-S03 points X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state		X23-C		V27 A02A2D
train X23-C01  passenger information system, platform-based X23-C02 personnel security/safety X23-S01A platform door control X23-S03 points X23-B03 points/signals interlocking X23-B03 points/signals interlocking, solid-state		n-board		
passenger information system, platform-based X23-C02 personnel security/safety X23-S01A platform door control X23-S03 points X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state power converter X12-J power line X23-A01A3 power line X23-A03A power supply system X23-A03 propulsion X23-A01A propulsion, diesel engine X23-A01A2 control exhaust gas cleaning X23-A01A1 control protection, motor X13-C04C  parsonnel security/safety X23-S01A electrode X25-B01A element X25-B01B element, arrangement X25-B01B flexible element for electric blanket  X25-B01C3A X27-E02 flexible element for mattress X25-B01C3C flexible element for pad X25-B01C3C flexible element for pad X25-B01C3C flexible element for pate X25-B01C3C flexible element for plate X25-B01C3C flexible element for seat X25-B01C3C flexible element for underfloor use X25-B01C3B				
platform-based x23-C02 personnel security/safety x23-S01A platform door control x23-S03 points x23-B03 points/signals interlocking x23-B04A points/signals interlocking, solid-state power converter x12-J power line x23-A01A3 power line power rail x23-A03A power supply system propulsion propulsion, diesel engine x23-A01A2 propulsion, diesel engine x23-A01A2 control exhaust gas cleaning x23-A01A2 propulsion, electric motor control protection, motor x13-C04C  personnel security/safety x23-S01A power line x23-S03 propulsion x23-B04A1 power converter x12-J power converter x12-J power converter x12-J power supply system x23-A03A propulsion, diesel engine x23-A01A2 propulsion, electric motor x23-A01A2C propulsion, electric motor x23-A01A2C protection, motor x13-C04C  selement x25-B01B element, arrangement x25-B01B flexible element for electric blanket x25-B01C3A flexible element for mattress x25-B01C3C flexible element for pad x25-B01C3C x27-A02 x27-E02 flexible element for plate x25-B01C3C x27-A02 x27-E02 flexible element for seat x25-B01C3C flexible element for underfloor use x25-B01C3B				
personnel security/safety platform door control platform door control points points		X23-C02	electrode	
platform door control X23-S03 points X23-B03 points/signals interlocking X23-B04A points/signals interlocking, solid-state  X23-B04A1 power converter  X12-J power line power rail power supply system propulsion propulsion, diesel engine control exhaust gas cleaning propulsion, electric motor control propulsion, electric motor control propulsion, electric motor control propulsion, electric motor x23-A01A1 control protection, motor  X23-B04A1 plexible element for electric carpet X25-B01C3A X27-E02 flexible element for mattress X25-B01C3A X27-E02 flexible element for pad X25-B01C3C flexible element for personal pad X25-B01C3C X27-A02 X27-E02 flexible element for plate X25-B01C3C flexible element for plate X25-B01C3C X27-A03 X27-E02 flexible element for plate X25-B01C3C X27-A03 X27-E02 flexible element for underfloor use X25-B01C3B flexible element for underfloor use X25-B01C3B	•		element	X25-B01B
points yeights signals interlocking yeights/signals interlocking yeights/signals interlocking, solid-state yeights/signals interlocking yeights/signals interlocking yeights/signals interlocking yeights/signals interlocking yeights/signals interlocking yeights/signals interlocking y			element, arrangement	X25-B01B
points/signals interlocking X23-B04A points/signals interlocking, solid-state X23-B04A1 power converter X12-J			element, material	X25-B01B
points/signals interlocking, solid-state  X23-B04A1  power converter  X12-J  X23-A01A3  power line  power rail  power supply system  propulsion  propulsion, diesel engine  control  exhaust gas cleaning  propulsion, electric motor  control  propulsion, electric motor  x23-A01A1  control  propulsion, electric motor  x23-A01A2  propulsion, electric motor  x23-A01A1  control  x23-A01A2  propulsion, motor  X23-A01A1  control  x23-A01A2  propulsion, motor  X23-A01A1  control  x23-A02A  protection, motor  X23-B01C3A  X27-E02  flexible element for electric carpet  X25-B01C3B  X27-E01A3  flexible element for pad  X25-B01C3C  flexible element for personal pad  X25-B01C3C  flexible element for plate  X25-B01C3C  X27-E02  flexible element for seat  X25-B01C3C  flexible element for underfloor use X25-B01C3B  X27-E02  flexible element for pad  X27-E02  flexible element for pad  X27-E02  flexible element for underfloor use X25-B01C3B  X27-E02  flexible element for underfloor use X25-B01C3B  X27-E02  flexible element for mattress  X25-B01C3C  flexible element for mattress  X25-B01C3C  flexible element for underfloor use X25-B01C3B  X27-E02  flexible element for pad  X25-B01C3C  flexible element for pad  X27-E02  flexible element for pad  X27-E02  flexible element for underfloor use X25-B01C3B  X27-E02  X27-E02  X27-E03  AB  AB  AB  AB  AB  AB  AB  AB  AB  A			flexible element for electric blanke	et
x23-B04A1 power converter x12-J x23-A01A3 power line power rail power supply system propulsion propulsion, diesel engine control exhaust gas cleaning propulsion, electric motor control propulsion, electric motor control propulsion, electric motor x23-A01A1 propulsion, electric motor x23-A01A1 propulsion, electric motor x23-A01A1 propulsion, electric motor x23-A01A2 propulsion, electric motor x23-A01A1 propulsion, electric motor x23-A01A1 propulsion, electric motor x23-A01A1 propulsion, motor x23-A01A1 propulsion, electric motor x23-A01A1 propulsion, motor x23-A01A1 x27-E02 x27-E01A3 x27-E01A3 flexible element for electric carpet x25-B01C3C flexible element for pad x25-B01C3C x27-A02 x27-E02 flexible element for plate x25-B01C3C flexible element for plate x25-B01C3C flexible element for underfloor use x25-B01C3B				X25-B01C3A
power converter  X12-J  X23-A01A3  power line  power rail  power supply system  propulsion  propulsion, diesel engine  control  exhaust gas cleaning  propulsion, electric motor  control  propulsion, electric motor  control  propulsion, electric motor  x23-A01A1  propulsion, electric motor  x23-A01A2  propulsion, electric carpet X25-B01C3B  X27-E01A3  flexible element for mattress  X25-B01C3C  flexible element for pad  X25-B01C3C  X25-B01C3C  X27-A02  X27-E02  flexible element for personal pad  X27-E02  flexible element for plate  X25-B01C3C  X27-B01C3C  flexible element for personal pad  X27-E02  flexible element for underfloor use X25-B01C3B  X27-E01A3	points/signals interlocking, solid			
x23-A01A3 power line power rail power supply system propulsion propulsion, diesel engine exhaust gas cleaning propulsion, electric motor control propulsion, electric motor control propulsion, electric motor control propulsion, motor  x23-A01A3 flexible element for mattress x25-B01C3C flexible element for pad x25-B01C3C flexible element for personal pad x27-A02 x27-A02 x27-B01C3C flexible element for personal pad x25-B01C3C flexible element for personal pad x27-B01C3C flexible element for personal pad x27-B01C3C x27-A02 x27-B01C3C flexible element for personal pad x27-B01C3C flexible element for pad x27-B01C3C flexible element for personal pad x27-B01C3C flexible element for pad x27-B01C3C flexible element for pad x27-B01C3C flexible element for pad x27-B01C3C flexible element	nower converter		flexible element for electric carpet	X25-B01C3B
power line X23-A03A power rail X23-A03A power supply system X23-A03 flexible element for pad X25-B01C3C flexible element for pad X25-B01C3C flexible element for personal pad X27-A02 flexible element for personal pad X27-B02 flexible element for plate X25-B01C3C flexible element for personal pad X27-B02 flexible element for plate X25-B01C3C flexible element for personal pad X25-B01C3C flexible element for personal pad X27-B02 flexible element for personal pad X25-B01C3C flexible element for pad X25-B01C3C flexible element for pad X25-B01C3C flexible element for pad X25-B01C3C flexible ele	power converter			X27-E01A3
power rail power supply system propulsion propulsion, diesel engine control exhaust gas cleaning propulsion, electric motor control propulsion, motor  X23-A03A flexible element for pad X25-B01C3C X27-A02 X27-A02 X27-E02 flexible element for plate X25-B01C3C X27-A02 X27-E02 flexible element for plate X25-B01C3C X27-A02 X27-E02 flexible element for pad X25-B01C3C X27-A02 X27-E02 X27-E03 X27-E03 X27-E03 Flexible element for pad X25-B01C3C X27-B02 X27-E02 X27-B03 X2	nower line		flexible element for mattress	X25-B01C3C
power supply system X23-A03 X23-A01A X23-A01A X27-A02 X27-A02 X27-B01C3C propulsion, electric motor control protection, motor X23-A01A1 X23-A02A protection, motor X23-A03 flexible element for personal pad X25-B01C3C X27-A02 X27-B01C3C X27-A02 X27-B01C3C X27-A03 X27-B01C3C X23-A01A1 X27-B02 flexible element for seat X25-B01C3C X27-A03 X27-B01C3B flexible element for underfloor use X25-B01C3B X27-B01C3B	•		flexible element for pad	X25-B01C3C
propulsion X23-A01A propulsion, diesel engine X23-A01A2 control X23-A01A2B exhaust gas cleaning X23-A01A2C propulsion, electric motor X23-A01A1 control X23-A02A protection, motor X13-C04C  X27-A03 X27-A02 X27-A02 X27-B01C3 flexible element for plate X25-B01C3 flexible element for seat X25-B01C3C X27-A03 X27-E02 X27-B01A3	•		flexible element for personal pad	X25-B01C3C
propulsion, diesel engine X23-A01A2				
control X23-A01A2B shaust gas cleaning X23-A01A2C propulsion, electric motor control protection, motor X23-A02A protection, motor X13-C04C flexible element for plate X25-B01C3 flexible element for seat X25-B01C3C X27-A03 X27-E02 flexible element for underfloor use X25-B01C3B X27-E01A3				X27-E02
exhaust gas cleaning X23-A01A2C flexible element for seat X25-B01C3C X27-A03 X27-A03 Control X23-A02A protection, motor X13-C04C flexible element for underfloor use X25-B01C3B			flexible element for plate	X25-B01C3
propulsion, electric motor X23-A01A1 X27-A03 control X23-A02A protection, motor X13-C04C X27-B01A3				
control X23-A01A1 X27-E02 protection, motor X13-C04C				
protection, motor  X23-AUZA protection, motor  X13-C04C  flexible element for underfloor use X25-B01C3B	·			
protection, motor X13-C04C Y27 E01A2			flexible element for underfloor use	
XZ3-AUZ	protection, motor			
		AZJ-AUZ	I	

flexible element for vehicle seat	X22-J02C	battery remaining capacity	X21-A06D
	X22-J03A X25-B01C3C	bicycle boot (electrical details)	X21-A01C X21-X05
flexible element for wall	X25-B01C3C X25-B01C3B	brake	X21-A03 X21-A03
nexible element for wall	X27-E01A3	braking system, eddy current	X21-A03 X21-A03C
fluid current path	X27-L01A3 X25-B01E2	braking system, eddy current braking system, electrodynamic	X21-A03C X21-A03C
furnace element	X25-B01E1	braking system, electrodynamic braking system, electromechanica	
idiliace element	X25-C01	braking system, electromechanical	Q18-A
granular current path	X25-B01E	braking system, mechanical	X21-A03A
immersion, domestic water	X25-B01E2	braking system, regenerative	X21-A03A
minicision, domestic water	X27-E03A	braking system, regenerative	X21-A03C
immersion, water	X25-B01E2	collision imminence warning/alar	
infrared lamp	X25-B01H	g	X21-A05E7
r a company	X26-B	communications	X21-K
infrared lamp, cooking	X25-B01H1	connector	X21-D
1.	X26-B01B	current collector	X21-B03
	X27-C02A	design	X21-X20
infrared lamp, industrial application	on	door (electrical details)	X21-X05
	X25-B01H3	electric bus	X21-A01H
	X26-B01B	electric lorry	X21-A01H
non-flexible element for hotplate	X25-B01C1B	electric motorcycle	X21-A01G
	X27-C02	fault display	X21-A05E9
non-flexible element for panel	X25-B01C1A	forklift truck	X21-A01B
non-flexible element for windscre		fuel cell/FCV	Q19-P
demister	X22-J02A		X21-B01A
1	X25-B01C1C	fuel cell management system	X21-B01B
plate	X25-B01C	gearing	X21-A02
positive temperature coefficient	X25-B01F	general By-wire / (Semi)Autonom	
protective arrangements	X25-B01	مر و الم مرسل	X21-W
PTC	X25-B01F X25-B01D	golf cart	W04-X01F W04-X01K1L
rod tube	X25-B01D X25-B01D		X21-A01E
water	X25-B01E2	hybrid	Q19-Q
	V04-U	публа	X21-A01D
Electric screening			X22-P04
Electric shaver	X27-A02A3B	instrumentation	X21-A05E
Electric shielding	V04-U	inverter control	X12-J05
Electric soldering - see Soldering	X24-A		X13-H03A X21-A04C
Electric toothbrush	X27-A02A3A	lane deviation alarm	X21-A05E7
Electric train (see Electric railway)		lights	X21-F
Electric vehicle	Q19-P	maintenance	X21-X6
	X21-A01F	malfunction display	X21-A05E9
accessories	X21-C	manufacture	X21-X20
accessories, air conditioner	X21-C02	measurements	X21-A06
accessories, heating	X21-C01	monitoring	X21-A05E
accessories, in car entertainment	-	motor vehicle	X21-A01F
	X21-C13	navigational aid	X21-A05E6
accessories, in-car office/informat		noise/vibration/harshness reducti	on X21-N
accessories, passenger accommo	X21-C12	off-board battery charging	X16-G01
accessories, passenger accommo	X21-C03	on-board battery charging	X21-B01A1C
assembly	X21-X20	on-board battery charging	X16-G02
anti-collision	X21-A05A5	on-board battery charging	X21-B01A1A
autonomous/driverless	Q19-L	on-board IC engine-driven gener	
autonomous/anveness	X21-A01L	on bourd to engine anven gener	X21-B04C
battery	X21-B01A	other accessories	X21-C20
battery arrangement	X21-B01	parallel hybrid	Q19-Q01
battery charging	X16-G	1-2-2	X21-A01D1
, j g g	X21-B01A1		X22-P04A
battery exchange/leasing	X21-B01F	parking	X21-A05A5
battery management system	X21-B01B	pedestrian/passenger protection	
battery thermal management	X21-B01B1		
	Į.		

power converter	X12-J	Electrical energy storage	
	X21-B05	non-chemical	X16-L
power feed _	X21-B02	using double-layer capacitor	V01-B01D
power supply	X21-B		X16-L02
power supply line	X21-B02	Electrical equipment	
protection	X21-A05	battery holder compartment	X16-F06
rectifier control	X12-J04	Electrical equipment, computers for	T01- I08
	X13-H03B		
	X21-A04A	Electrical instrument	S01-H
remaining battery capacity	X21-A06D	calibrating	S01-H01
rental, hiring, sharing	X21-U	compensation	S01-H01A
of battery	X21-B01E	educational equipment (see also u	
safety	X21-A05A	educational)	S01-H09
internal view camera	X21-A05A2	electrical circuit	S01-H03
external view camera	X21-A05A2	fault detection	S01-H01
horn	X21-A05A3	fraudulent use detection	S01-H01
parking	X21-A05A5	for HF measurements	S01-H05
pedestrian/passenger protection		for high voltage/current networks interfacing	S01-H07A
	X21-A05A1	monitoring	S01-H01
noise generator	X21-A05A3 Q19-Q01	multimeters (see also under multin	
series hybrid		maitimeters (see also under maitin	S01-H04
a a mai a ima a /ka akina a	X21-A01D3	multiple-probe arrangement	S01-H03A
servicing/testing	X21-X16	noise compensation	S01-H01A
solar cell array	X15-A02 X21-B04A	noise reduction	S01-H01A1
augnonaign	X21-B04A X21-M	PCB	S01-H03
suspension switch	X21-IVI X21-E	probes/contacts	S01-H03
testing	X21-X16	processor controlled	S01-H07
traction motor	X21-A07	remote control	S01-H07A
traction motor control	X21-A07 X21-A04	single probe	S01-H03B
transmission system/ control	X21-A04 X21-A02A	temperature variation compensation	
trolley bus	X21-A01H	tomporatare variation componedati	S01-H01A
wheelchair	S05-G02A	testing	S01-H01
Wilderenan	X21-A01A	3	
wind turbine	X21-B04A	Electrical military equipment (gener	
Will'd tarbille	X15-B01A		W07-J
window (electrical details)	X21-X05	constructional details	W07-J05
wireless charging	X21-B01A1C	electrical installations, cables, conr	
Electric vehicle communications	X21-K		W07-J01
cellular V2P	X21-K06	power generation / distribution	W07-J03
inter-vehicle	X21-K05	Electrical safety alarm	W05-B07N
intra-vehicle	X21-K03	Electrical storage heater	X16-L01
vehicle to cloud (V2C)	X21-K02		X27-E01A4
vehicle to grid (V2G)	X21-K08G	Electrical winding (clock or watch)	S04-B01A
vehicle to gnd (V2G)	X21-K02		
vehicle to offboard/infrastructure		Electrically programmable ROM	U13-C04A1
vehicle to pedestrian (V2P)	X21-K06	Electrically-heated carpet	X25-B01C3B
Electric wave resonators			X21-A01D3
	V06-V01E		X27-E01A3
Electric wheelchair	S05-G02A	control	X25-B04
	X21-A01A		X27-E01A3
Electrical		Electricity dispensing and metering	T05-H06
clock or watch	S04-B	Electricity generation	
diagnosis, medical	S05-D	biomass combustion-type	X15-E
medical measurement, using curr	ent	coal-fired	X11-A
	S05-D01D	cogeneration plant	X11-C04
medical therapy using electric fiel		combined cycle plant	X11-C03
	S05-A03B	diesel engine plant	X11-C02
surgery	S05-B03	gas turbine plant	X11-C01
therapy, medical	S05-A04	geothermal energy	X15-G01
Electrical discharge machining	X24-F01B	hydroelectric plant	X11-B
<i>5</i> <b>5</b>		IC engine plant	X11-C02
		, , , , , , , , , , , , , , , , , , , ,	

microturbine plant X11-C15 mini hydroelectric plant X11-B05 nuclear energy X14-C05A ocean thermal energy currents X15-C OTEC X15-C piezoelectric device on road acted on by traffic X15-X potential of falling bodies-energy X15-X pumped storage plant X11-B06 sea energy X15-C solar energy, solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant X11-A thermoelectric/voltaic element U14-E05  Electrochemical storage X1 X1  Electrochromic display circuits, drivers U1 manufacture U1 materials U1  Electrochromic display circuits, drivers U1 manufacture U1 materials U1  Electrochromic display circuits, drivers constructional details U1 manufacture for current/voltage measurement S0  Electrode active material manufacture active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell	16-E01G 16-E01A1 16-E05 16-E03
mini hydroelectric plant nuclear energy x14-C05A ocean thermal energy currents X15-C OTEC piezoelectric device on road acted on by traffic potential of falling bodies-energy X15-X pumped storage plant sea energy x15-C solar energy, large scale solar energy, small scale steam turbine (coal-fired) plant thermoelectric/voltaic element X11-B05 X1 Electrochromic display circuits, drivers constructional details U1 manufacture materials U1 Electrochromic effect for current/voltage measurement S0 Electrode active material manufacture active polymer material, battery x1 alkaline accumulator x1 alkaline primary cell	16-B 14-K02 14-K02B 14-K02A1 14-K02A2 11-A03C 01-D01D5 16-E01G 16-E01A1 16-E05 16-E03
nuclear energy X14-C05A ocean thermal energy currents X15-C OTEC X15-C piezoelectric device on road acted on by traffic X15-X potential of falling bodies-energy X15-X pumped storage plant X11-B06 sea energy X15-C solar energy, solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant X11-A thermoelectric/voltaic element U14-E05  Electrochromic display circuits, drivers constructional details U1 manufacture materials U1 Electrochromic display circuits, drivers constructional details U1 manufacture for current/voltage measurement S0 Electrode active material manufacture active polymer material, battery x1 alkaline accumulator x1 alkaline primary cell	14-K02 14-K02B 14-K02A1 14-K02A2 11-A03C 01-D01D5 16-E01G 16-E01A1 16-E05 16-E03
ocean thermal energy currents X15-C OTEC X15-C piezoelectric device on road acted on by traffic X15-X potential of falling bodies-energy X15-X pumped storage plant X11-B06 sea energy X15-C solar energy, solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant X11-A thermoelectric/voltaic element U14-E05  Electrochromic display circuits, drivers constructional details U1 manufacture materials U1  Electrochromic display circuits, drivers constructional details U1 manufacture for current/voltage measurement S0  Electrode active material manufacture active polymer material, battery x1 alkaline accumulator x1 alkaline primary cell	14-K02B 14-K02A1 14-K02A2 11-A03C 01-D01D5 16-E01G 16-E01A1 16-E05 16-E03
OTEC X15-C piezoelectric device on road acted on by traffic X15-X potential of falling bodies-energy X15-X pumped storage plant X11-B06 sea energy X15-C solar energy X15-A solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant X11-A thermoelectric/voltaic element U14-E05  circuits, drivers U1 constructional details U1 manufacture materials U1  Electrochromic effect for current/voltage measurement S0  Electrode active material manufacture X1 active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell X1	14-K02A1 14-K02A2 11-A03C 01-D01D5 16-E01G 16-E01A1 16-E05 16-E03
piezoelectric device on road acted on by traffic X15-X potential of falling bodies-energy X15-X pumped storage plant X11-B06 sea energy X15-C solar energy X15-A solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant X11-A thermoelectric/voltaic element U14-E05 constructional details U1 manufacture U1 materials U1  Belectrochromic effect for current/voltage measurement S0  Electrode active material manufacture X1 active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell X1	14-K02A2 11-A03C 01-D01D5 16-E01G 16-E01A1 16-E05 16-E03
traffic X15-X manufacture U1 potential of falling bodies-energy X15-X pumped storage plant X11-B06 sea energy X15-C solar energy X15-A solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant X11-A thermoelectric/voltaic element U14-E05  manufacture materials U1  Electrochromic effect for current/voltage measurement S0  Electrode active material manufacture X1 active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell X1	11-A03C 01-D01D5 16-E01G 16-E01A1 16-E05 16-E03
potential of falling bodies-energy X15-X pumped storage plant X11-B06 sea energy X15-C solar energy X15-A solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant X11-A thermoelectric/voltaic element U14-E05  materials  Electrochromic effect for current/voltage measurement S0  Electrode active material manufacture X1 active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell X1	01-D01D5 16-E01G 16-E01A1 16-E05 16-E03
pumped storage plant X11-B06 sea energy X15-C solar energy, solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant thermoelectric/voltaic element U14-E05  Electrochromic effect for current/voltage measurement S0  Electrode active material manufacture X1 active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell X1	16-E01G 16-E01A1 16-E05 16-E03
sea energy X15-C solar energy X15-A solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant thermoelectric/voltaic element U14-E05  for current/voltage measurement S0  Electrode active material manufacture X1 active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell X1	16-E01G 16-E01A1 16-E05 16-E03
solar energy X15-A solar energy, large scale X15-A05 solar energy, small scale X15-A04 steam turbine (coal-fired) plant thermoelectric/voltaic element U14-E05  Electrode active material manufacture X1 active polymer material, battery X1 alkaline accumulator X1 alkaline primary cell X1	16-E01A1 16-E05 16-E03
solar energy, large scale X15-A05 active material manufacture X1 solar energy, small scale X15-A04 active polymer material, battery X1 steam turbine (coal-fired) plant thermoelectric/voltaic element U14-E05 alkaline primary cell X1	16-E01A1 16-E05 16-E03
solar energy, small scale X15-A04 active polymer material, battery X1 steam turbine (coal-fired) plant X11-A alkaline accumulator X1 thermoelectric/voltaic element U14-E05 alkaline primary cell X1	16-E01A1 16-E05 16-E03
thermoelectric/voltaic element U14-E05 alkaline primary cell X1	16-E03
and the primary cen X1	
	\
	)5-E01A1
	)5-E01A3
V4E 000	25-B03A
· CC CL · · · · · · · · · · · · · · · ·	05-M03
and the state of t	16-E
waste fuel combustion-type X15-E battery material, organic compounds wave energy X15-C01	
YAE D	16-E01A
capacitor vo	01-B03D1
1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16-E02
camo de s	)5-D05C
complex exists materials better. V1	16-E02 16-E01C1
conductive layer formation for	. O-LOTCT
apparatus/device /22-101	11-C05C
arc discharge X24-FUTB conductive material battony V1	16-E01E
electric circuits A24-F01 depolarizor batton, V1	16-E07
electrode AZ4-1 0Z details	)1-B02A1
electrode spacing control X24-FU2	)5-D05X
electrolytic medium X24-F01A discharge heating X2	25-B03A
spark discharge X24-101B X2	25-B03A
Electro-optical EEG S01	)5-D01A2A
	)5-D01A1A
data processing T01-E05A electrochemical measurements S03	)3-E03C
. 1. 1	)1-B03D1C
electrolysis cell Az	25-R01B
<b>Electroacoustic transducer - see</b> electrolysis, non-metal production X2	
, , ,	01-B01A
	05-D05
Floetrocardiograph COS DO1A1	)5-D01A2A )1-B03D1
electrodes SOF DOIA1A	01-B03D1 01-B01A5
tootal monitoring electrodes SUS DUI AIA	12-E02
CUE DUO I	)5-A02A
Electrochemical machining X24-F01A for semiconductor devices, metallurgi	
-	11-D03B2
Liceti delicilicati ilicada cilicili.	12-A02A4A
concentration cells S03-E03B2 formation, non-silicon substrate,	
	11-C05F3
coulometric titration \$03-E03A formation, semiconductor manufactur	re
	11-C05E
electrophoresis S03-E03E fuel cell X1	16-E06A
isoelectronic focussing S03-E03E glow discharge heating X2	25-B03A
measuring currents/voltages S03-E03B grid, battery X1	16-E02
membranes S03-E03C grids for discharge tubes, manufacture	
purudons 300 E00C	05-L01B1
pH sensor S03-E03B2 hybrid cell X1	16-E06C

Integranic compounds, battery				
lead-acid accumulator (114-0034 lithium-based primary cell (114-0034 lithium-based primary cell (114-0034 lithium-based primary cell (114-0034 lithium-based secondary cell (114-0034 lithium-based primary cell (114-0034 lithium-b	inorganic compounds, battery	X16-E01C	Electrography	S06-E08
Ithium-based secondary cell	. ,	X16-E04		S06-D09
Inthium-based secondary cell manufacture, discharge lamp panulacture, for capacitors, film material structure, battery with treatment, sintering variety of the part of the pa	lithium-based primary cell	X16-E03A1	•	X25-I 09
manufacture, discharge lamp manufacture, for capacitors, film treatment, sintering material composition, anode material structure, battery medical therapy S05-A02 metal-air hybrid cell X16-E06C1 metal-hydrogen cell X16-E06C2 metal-hydrogen cell X16-E06C3 metallic, testing s03-E14C1 metallic, testing solve	lithium-based secondary cell	X16-E08A		
menufacture, for capacitors, film treatment, sintering Wo1-B01G1 material structure, battery material structure, battery methalist hybrid cell metal-halogen hybrid cell metal-halogen hybrid cell metal-lic testing metallic testing metallic testing so3-E14C1 metallic testing so3-E14C1 nerve and muscle stimulation non-aqueous electrolyte cell non-metalic pattery x16-E05A non-metalic pattery x16-E01C1 photoelectrochemical cell x16-E05A non-metalic pattery x16-E01C1 photoelectrochemical cell x16-E05A non-metalic pattery x16-E01C1 photoelectrochemical cell x16-E05A non-metal productor manufacture y11-E05E2 primary cell x16-E03 primter for computer seemiconductor manufacture y11-E05E3 sintered, electrolytic capacitor solium-sulphur cell submicron, formation, semiconductor manufacture y05-L03A3 T-shaped gate, formation, semiconductor manufacture u11-C05E2 support, battery x16-E02 supports for discharge tubes, manufacture u11-C05E2 supports battery x16-E02 control control x26-A01B inductor x26-A02E inductor ballast x26-C01B3 inductor x26-A02E inductor ballast x26-C01B3 inductor x26-A02E operating circuit x26-C01B3 inductor x26-A02E operating circuit x26-C01B3 control control x26-A02E operating circuit x26-C01B3 control clearing, sincer and adaptive structure, with inorganic material structure, with inorganic materi	manufacture, discharge lamp	X26-A03C		
Treatment, sintering   wolf-British   material composition, anode   wolf-British   material structure, battery   wolf-British   wolf-Britis	manufacture, for capacitors, film		_	
material structure, battery         X16-E01H         503-E04D           medical therapy         S05-A02         electroluminescent materials         V11-A15           metal-lary hybrid cell         X16-E06C2         waterial-halogen hybrid cell         X16-E05C           metallic electrode testing         S03-E14C1         corganic/polymeric         U11-A15B           nerve and muscle stimulation         S05-A02B         display, control (general)         T04-H03C3           non-equeous electrolyte cell         X16-E05A         display, manufacture         U14-J01A           onon-aqueous electrolyte cell         X16-E01C1         display, control (general)         T04-H03C3           display, control (general)         M4-B03C3         M8-B03C3         M8-B03C3           plate, battery				
medical therapy         S05-AO2           metal-halogen hybrid cell         X16-E06C1           metal-halogen hybrid cell         X16-E06C2           metal-hydrogen cell         X16-E06C2           metal-lydrogen cell         X16-E05C           metallic dectrode testing         S03-E14C1           metallic, testing         S03-E14C1           merve and muscle stimulation         S05-A02B           nickel-cadmium cell         X16-E05A           non-aqueous electrolyte cell         X16-E08           non-aqueous electrolyte cell         X16-E08           non-mainting, manufacture         V05-L0189           poid plate, battery         X16-E01C1           photoelectrochemical cell         X16-E03           primer for computer         S06-J           resistance heating         X25-B01A           Schottly ohmic electrode manufacture, semiconductor manufacture         U11-C05E1           seef alignment, semiconductor manufacture         U11-C05E1           support, battery         X16-E10           support, battery         X16-E10           supports for discharge tubes, manufacture         U11-C05E2           supports for discharge tubes, manufacture         U11-C05E2           transit-time tubes         V05-C02A			Electroluminescence, materials inve	estigation
metal-air hybrid cell         X16-E06C2 metallic electrode testing         X16-E06C2 metallic electrode testing         X16-E06C2 metallic electrode testing         X16-E05C metallic electrode testing         X16-E05C metallic electrode testing         X03-E14C1 metallic, testing         X03-E14C1 metallic, testing         X03-E14C1 metallic, testing         X03-E14C1 metallic, testing         X03-E14C1 display, control (general)         X04-H03C3 display, control (general)         X04-H03C3 display, control (general)         X04-H03C3 display, manufacture         U14-J01A display, To receiver elective display, To receiver place and proposed display, To receiver place and place				S03-E04D
metal-halogen hybrid cell X16-E05C2 metallic electrode testing S03-E14C1 metallic electrode testing S03-E14C1 metallic electrode testing S03-E14C1 metallic, testing S03-E14C1 metallic, testing S03-E14C1 merve and muscle stimulation S05-A02B nickel-cadmium cell X16-E08A non-aqueous electrolyte cell X16-E08A non-aqueous electrolyte cell X16-E08 non-emitting, manufacture V05-101B9 noxide materials, battery X16-E01C1 photoelectrochemical cell X16-E09 plate, battery X16-E02 primary cell X16-E03 printer for computer S06-J resistance heating X25-B01A self alignment, semiconductor manufacture V111-C05E1 secondary emission, manufacture V05-101A5 self alignment, semiconductor manufacture v05-101A5 sodium-sulphur cell X16-E10 submicron, formation, semiconductor manufacture V05-103A3 T-shaped gate, formation, semiconductor manufacture V111-C05E2 supports for discharge tubes, manufacture V05-103A3 T-shaped gate, formation, semiconductor manufacture V111-C05E2 supports for discharge tubes, manufacture V05-103A3 T-shaped gate, formation, semiconductor manufacture V111-C05E2 supports for discharge tubes, manufacture V05-103B4 froil transit-time tubes V05-C02A Electrolusinescent device Electroluminescent device Electroluminescent device Electroluminescent device Electroluminescent device Electroluminescent device Electroluminescent device Structure, with inorganic material structure, with organic material structure, with inorganic material structure, with inorganic material structure, with organic material structure, with inorganic material structure, with inorganic material structure, with inorganic material structure, with organic material structure, with inorganic material structure, with organic material structure, with organic material structure, with inorganic solid parts with inclusion structure with organic materi				U11-A15
metal-hydrogen cell metallic electrode testing S03-E14C1 metallic, testing s03-E14C1 display, control (general) s04-Hol3C3 display, control (general) s04-Hol3C3 display, manufacture s14-Jo1C2 metallic, s04-E02 metallic, s04-E03 E03-E03-E03-E03-E03-E03-E03-E03-E03			5	U11-A15A
metallic electrode testing S03-E14C1 metallic, testing S03-E14C1 nerve and muscle stimulation S05-A02B display, control (general) T04-H03C3 display, control (general) T04-H03C3 display, manufacture W16-E05A non-aqueous electrolyte cell X16-E08 non-emitting, manufacture V05-L01B9 oxide materials, battery X16-E01C1 lighting X26-Uphotoelectrochemical cell X16-E09 plate, battery X16-E01C1 lighting X26-Uphotoelectrochemical cell X16-E09 primary cell X16-E03 printer for computer S06-J manufacture V05-L01A5 self alignment, semiconductor manufacture W11-C05E1 secondary emission, manufacture W05-L01A5 self alignment, semiconductor manufacture w11-C05E3 sintered, electrolytic capacitor V1-B01A1 sodium-sulphur cell X16-E10 submicron, formation, semiconductor manufacture w05-L03A3 T-shaped gate, formation, semiconductor manufacture w11-C05E2 supports for discharge tubes, manufacture w05-L03A3 T-shaped gate, formation, semiconductor manufacture w11-C05E2 supports for discharge tubes, manufacture w05-L03A3 T-shaped gate, formation, semiconductor manufacture w11-C05E2 supports for discharge tubes, manufactur			organic/polymeric	U11-A15B
metallic, testing nerve and muscle stimulation soS-A02B nickel-cadmium cell x16-E05A non-aqueous electrolyte cell x16-E08A non-aqueous electrolyte cell x16-E09 plate, battery x16-E02 pinture (14-J01A primary cell x16-E02 primary cell x16-E03 printer for computer secondary emission, manufacture secondary emission, manufacture u11-C05E1 self alignment, semiconductor manufacture secondary emission, manufacture u11-C05E3 sintered, electrolytic capacitor x16-E10 support, battery supports for discharge tubes, x16-E02 supports for discharge tubes, x16-E02 supports for discharge tubes u11-C05E2 supports for discharge tubes u11-C05E2 supports for discharge tubes u11-C05F1 construction - see Discharge lamp x26-A01B construction - see Discharge lamp x26-A02E inductive ballast x26-C01B3 hf coil x26-A02E inductor operating circuit x26-C01B3 toroidal coil x26-A02E inductor brake, electric vehicle brake, train/tram x26-D0184 transducers  S03-Hence x16-E02 x16			Electroluminescent device	
nerve and muscle stimulation S05-A02B nickel-cadmium cell X16-E08 non-aqueous electrolyte cell X16-E08 non-aqueous electrolyte cell X16-E08 non-adueous electrolyte cell X16-E09 photoelectrochemical cell X16-E09 plate, battery X16-E02 primary cell X16-E03 primer for computer S06-J primer for computer seconductor manufacture wescondary emission, manufacture V05-I01A5 self alignment, semiconductor manufacture seconductor manufacture wesconductor manufacture with sodium-sulphur cell x16-E01 submicron, formation, semiconductor manufacture with sodium-sulphur cell x16-E02 supports for discharge tubes, manufacture with sodium-sulphur cell x16-E02 supports for discharge tubes, manufacture with sodium-sulphur cell x16-E02 supports for discharge tubes, manufacture with constructive manufacture with sodium-sulphur cell x16-E02 supports for discharge tubes, manufacture with constructive with submicron, formation, semiconductor manufacture with sodium-sulphur cell x16-E02 supports for discharge tubes, manufacture with constructive with submicron formation, semiconductor manufacture with submicron formation, semiconductor manufacture with submicron for discharge tubes, manufacture with submicron formation, semiconductor manufacture with submicron formation, semiconductor manufacture with submicron for discharge tubes, manufacture with submicron formation, semiconductor manufacture with submicron for discharge tubes, manufacture with submicron formation, semiconductor manufacture with submicron, formation,			circuit, drivers	U14-J03
nickel-cadmium cell x16-E094 non-aqueous electrolyte cell x16-E094 non-emitting, manufacture v05-L01B99 oxide materials, battery x16-E01C19 photoelectrochemical cell x16-E099 plate, battery x16-E02 primary cell x16-E02 primary cell x16-E02 primary cell x16-E03 primer for computer secondary ensistion, manufacture v111-C05E1 secondary emission, manufacture v111-C05E1 self alignment, semiconductor manufacture u111-C05E2 support, battery x16-E02 supports for discharge tubes, manufacture v05-L01A3 T-shaped gate, formation, semiconductor manufacture v111-C05E2 supports for discharge tubes, manufacture v05-L02A Electrodeless lamp x26-A018 construction - see Discharge lamp x26-A02 control x26-C01B3 inductor sature v26-C01B3 inductor sature v26-C01B3 inductor coperating circuit x26-C01B3 starter x26-C01B3 tarter x26-C01			display, control (general)	T04-H03C3
non-aqueous electrolyte cell X16-E08 non-emitting, manufacture V05-L01B9 oxide materials, battery photoelectrochemical cell X16-E09 plate, battery X16-E012 primary cell X16-E03 primer for computer S06-J primer for computer S06-J resistance heating X25-B01A Schottky ohmic electrode manufacture secondary emission, manufacture V05-L01A5 self alignment, semiconductor manufacture set vol. L01A5 self alignment, semiconductor manufacture sodium-sulphur cell V11-C05E1 submicron, formation, semiconductor manufacture supports for discharge tubes, munfacture supports for discharge tubes, munfacture v05-L03A3 T-shaped gate, formation, semiconductor manufacture supports for discharge tubes, munfacture v05-L03A3 T-shaped gate, formation, semiconductor manufacture supports for discharge tubes, munfacture v05-L03A3 T-shaped gate, formation, semiconductor manufacture supports bettery supports b			display, manufacture	U14-J01A
non-emitting, manufacture v05-L01B9 oxide materials, battery v16-E01C1 photoelectrochemical cell v16-E02 primary cell primary cell v16-E02 primary cell v16-E03 printer for computer s06-J resistance heating v25-B01A Schottky ohmic electrode manufacture, semiconductor manufacture v05-L01A5 self alignment, semiconductor manufacture u111-C05E1 sintered, electrolytic capacitor v05-L01A5 submicron, formation, semiconductor manufacture v111-C05E2 supports for discharge tubes, manufacture u111-C05E2 supports for				W03-A08J
oxide materials, battery X16-E01C1 photoelectrochemical cell X16-E09 pilate, battery X16-E03 printer for computer S06-J resistance heating X25-B01A Schottky ohmic electrode manufacture, semiconductor manufacture W11-C05E1 secondary emission, manufacture V05-L01A5 self alignment, semiconductor manufacture U11-C05E3 sintered, electrolytic capacitor V01-B01A1 sodium-sulphur cell X16-E02 support, battery W11-C05E2 manufacture W11-C05E2 support, battery W11-C05E2 support battery W11-C0				U14-J02A
photoelectrochemical cell X16-E09 plate, battery X16-E02 primary cell X16-E03 primary cell X11-C05E1 secondary emission, manufacture V05-L01A5 self alignment, semiconductor manufacture U11-C05E3 sintered, electrolytic capacitor V01-B01A1 sodium-sulphur cell X16-E10 submicron, formation, semiconductor manufacture U11-C05E2 support, battery X16-E02 supports for discharge tubes, manufacture U11-C05E2 supports for discharge tubes, manufacture U11-C05F1 u11-C05F1 u11-C05F2 supports for discharge tubes, manufacture U11-C05F2 support, battery X16-E02 supports for discharge tubes, manufacture U11-C05F2 support for discharge tubes, manufacture U11-C05F2 support for discharge tubes, manufacture U11-C05F2 support for discharge tubes, manufacture U11-C05F2 cell Cutorium sexent device selectroluminescent device selectroluminescent device selectroluminescent device selectroluminescent device selectroluminescent device selectrolu				
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		,, ,,	molten salt, battery	X16-J03

	nanomaterial, battery	X16-J01E	Electron	nagnet	
	non-aqueous, battery	X16-J08		ture, linear actuator	V02-E02A3
	organic solid, battery	X16-J01A		ture, rotary actuator	V02-E02A4
	solid, battery	X16-J01		ture, relay	V02-E02A2
FI.	•	71.0001		ta. 5, 15.aj	V03-D03A
EIE	ctrolytic capacitor - see Electrolytic capac	itor	arma	ture-less	V02-E02X
	capacitor - see Electrolytic Capac	V01-B01	arma	ture-less using superconducti	ing coil
	device other than capacitor	V01-B01C		<b>.</b>	V02-E02X1
	transducers	V01-B01C	arma	ture-type	V02-E02A
<b>-1</b> -			arma	ture-type for dot matrix printe	er S06-F01
EIE	ctrolytic capacitor casing	V01-B01 V01-B01B7			V02-E02A2
	double layer capacitor	V01-B01B7 V01-B01D	arma	ture-type for impact printer	S06-F02
	double layer capacitor	X16-L02			V02-E02A2
	electrode foil composition	V01-B01A5A	arma	ture-type for valve	V02-E02A2
	electrode foil production	V01-B01A5A	1		X25-L01A
	excess pressure venting plug	V01-B01B7A		power	X12-C06
	foil electrode	V01-B01A5		power, superconducting coil agine fuel injector	V02-E02A1
	housing	V01-B01B7	ic en	gine idei injector	X22-A02A
	leadless	V01-B01E	low r	oower	V02-E02
	liquid dielectric	V01-B01B5	·	power, superconducting coil	V02-E02X1
	manufacture - see <b>Electrolytic cap</b>			oower, with armature	V02-E02A
	manufacture	V01-B01G		power, without armature	V02-E02X
	mounting kit	V01-B01B7C	relay		V02-E02A2
	paper tape to secure winding	V01-B01B7			V03-D03A
	paste dielectric	V01-B01B5	valve	,	V02-E02A1
	protection by integral fuse	V01-B01F1			X25-L01A
	protection by mechanical disconn	V01-B01F5	vehic	cle fuel injector	V02-E02A1
	protection by pressure venting	V01-B01F3 V01-B01B7A			X22-A02A1
	seal	V01-B01B7A		ing manufacture	V02-H01C
	separator	V01-B01B3	wind	ing manufacture, EM relay	V02-H01C1
	sintered electrode	V01-B01A1		:	V03-D06B
	solid dielectric	V01-B01B1	wind	ing manufacture, EM valve	V02-H01C2
	super-capacitor	V01-B01D5	اممنيي	ing manufacture printer	X25-L01A V02-H01C3
		X12-B	Willa	ing manufacture, printer	S06-F
	surface mounting	V01-B01E			300-1
	tape to secure winding	V01-B01B7	Electron		CO1 DO7D1
	terminals	V01-B01A7		nna radiation pattern measurement	S01-D07B1 S01-D07B
	ultracapacitor	V01-B01D5		measurement, using optical	301-0076
		X12-B		chniques	S01-D07B3
	wound capacitor securing tape	V01-B01B7	heati	•	X25-B02
Ele	ctrolytic capacitor manufacture	V01-B01G		ference suppression	W02-H
	ageing	V01-B01G7A		ical therapy	S05-A03E2
	assembly	V01-B01G5	pros	pecting	S03-C02
	attaching leads	V01-B01G5C	pum	p - low power	V06-M06K
	characterised by type	V01-B01G8	pum	p - high power	X11-H03B
	chip capacitor double layer capacitor	V01-B01G8E V01-B01G8D	relay		V03-D04
	encapsulation	V01-B01G6D V01-B01G5A	scree	ening	V04-U
	forming	V01-B01G3A V01-B01G7A	shiel	9	V04-U
	impregnation	V01-B01G3	valve		X25-L01A
	laminating	V01-B01G3	valve	, IC engine fuel injection	X22-A02A
	lead manufacture	V01-B01G5	Electron	nagnetic compatibility (EMC	
	leadless capacitor	V01-B01G8E	testing	_	S01-G08C
	liquid/paste dielectric capacitor	V01-B01G8B	Electron	nechanical networks	U25-B
	multistep process	V01-B01G6A	Electron	nigration prevention, for	
	solid dielectric capacitor	V01-B01G8A		onnections, semiconductor (	devices
	surface mounting capacitor	V01-B01G8E			U11-D03B2
	testing	S01-G12C	Electron		
		V01-B01G7C		g, for analysis	S03-E06
	winding	V01-B01G3	multi		V05-K01
			1	L z.	

Electron beam	ļ Eld	ectron tube	
deflection arrangements for CRT	V05-D06B	analysing - see Analysing tube	V05-F01
focusing components of CRT	V05-D06A3	cathode ray tube - see <b>CRT</b>	V05-101 V05-D
intensity control element in CRT	V05-D06A2	classical vacuum tube - see <b>Vacuu</b>	
lithography apparatus, semicondu		ciassical vacualii tube - see <b>vacuu</b> i	V05-B
treatment, semiconductor	U11-C03B	cold cathode - see Cold cathode t	
tube for analysing	V05-F01	cold cathode - see cold cathode (	V05-B03
tube for processing	V05-F05A7A	manufacture - see <b>Discharge tube</b>	
welding/cutting	V05-F05A7A	manufacture	V05-L
welding/cutting	V05-F08E3	microminiature - see Microfabrica	
	X24-D01	cold cathode device	V05-B05
		processing - see Processing tube	
Electron beam cutting - see Welding		processing - see Frocessing tube	V05-F05A7A
electron beam	X24-D02	testing	S01-G02A
masks	U11-C04F2	testing	V05-L07E1
method, apparatus	U11-C04F1	thermionic - see <b>Thermionic tube</b>	
Electron beam lithography, for			V03-D01
semiconductor manufacture	U11-C04F	ectron-optical arrangements	
apparatus	U11-C04F1	analysing/processing tubes	V05-F04C
masks	U11-C04F2	cathode ray tube	V05-D06A
Electron beam tube		discharge tubes (general)	V05-M04
analysing - see Analysing tube	V05-F01	electrostatic, discharge tubes	V05-M04A
cathode ray - see <b>CRT</b>	V05-D	ectron-optical system for analysing	g/
processing - see Processing tube		processing tubes	V05-F04C
thermionic - see <b>Thermionic tube</b>		beam aberration correction	V05-F04C3
vacuum - see <b>Vacuum tube</b>	V05-B	electromagnetic	V05-F04C1A
workpiece treatment	V05-F05A7A	electrostatic	V05-F04C1E
Electron beam welding - see Welding	_	for confinement	V05-F04C8
electron beam	y, X24-D02	for deflection	V05-F04C5
		for deflection, manufacture	V05-L01B4A
Electron cyclotron resonance CVD	U11-C01B	for focusing	V05-F04C3
Electron diffraction tube	V05-F01A1	for particle selection	V05-F04C7
			\/\ne E\/\c1\
Electron gun		magnetic	V05-F04C1A
Electron gun CRT	V05-D06A	magnetic type of	V05-F04C1A V05-F04C1
_		type of ectron-stream lamp	V05-F04C1 X26-A01A
CRT general	V05-M03G	type of	V05-F04C1 X26-A01A
CRT	V05-M03G Elemanufacture	type of ectron-stream lamp construction - see Discharge lamp	V05-F04C1 X26-A01A X26-A02
CRT general	V05-M03G Ele manufacture V05-L01B4 Ele	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic	V05-F04C1 X26-A01A X26-A02
CRT general manufacture - see <b>Discharge tube</b>	V05-M03G Ele manufacture V05-L01B4 Ele	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast	V05-F04C1 X26-A01A X26-A02 : equipment
CRT general manufacture - see <b>Discharge tube</b> transit time tube X-ray tube	V05-M03G Ele manufacture V05-L01B4 Ele V05-C02A5 Ele	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp	V05-F04C1 X26-A01A X26-A02 <b>equipment</b> X26-C01B2
CRT general manufacture - see <b>Discharge tube</b> transit time tube	V05-M03G Ele manufacture V05-L01B4 Ele V05-C02A5 V05-E01D1 S03-E06B1	type of  ectron-stream lamp  construction - see Discharge lamp  ectronic apparatus - see electronic  ectronic ballast  discharge lamp  discharge lamp, inverter-type	V05-F04C1 X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B2A
CRT general manufacture - see <b>Discharge tube</b> transit time tube X-ray tube <b>Electron microscope</b>	V05-M03G Ele manufacture V05-L01B4 Ele V05-C02A5 Ele	type of  ectron-stream lamp  construction - see Discharge lamp  ectronic apparatus - see electronic  ectronic ballast  discharge lamp  discharge lamp, inverter-type electrodeless lamp	V05-F04C1 X26-A01A X26-A02 <b>c equipment</b> X26-C01B2 X26-C01B2A X26-C01B3
CRT general manufacture - see Discharge tube transit time tube X-ray tube Electron microscope Electron microscopes	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1	type of  ectron-stream lamp  construction - see Discharge lamp  ectronic apparatus - see electronic  ectronic ballast  discharge lamp  discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp	V05-F04C1 X26-A01A X26-A02 <b>c equipment</b> X26-C01B2 X26-C01B2A X26-C01B3 X26-C01B4
CRT general manufacture - see <b>Discharge tube</b> transit time tube X-ray tube <b>Electron microscope</b>	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1	type of  ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp	X26-A01A X26-A02 <b>c equipment</b> X26-C01B2 X26-C01B2A X26-C01B3 X26-C01B4 X26-C01B5
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1	type of  ectron-stream lamp  construction - see Discharge lamp  ectronic apparatus - see electronic  ectronic ballast  discharge lamp  discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B2A X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1C V05-F01A1B	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1C V05-F01A1B	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard ectronic cigarette	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B2A X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Ele	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A Elic V05-D06E FI	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard ectronic cigarette	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B2A X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Elic V05-D06E V05-K01C	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard ectronic cigarette packaging ectronic circuits, testing	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes manufacture	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Elic V05-D06E V05-K01C V05-L05K	type of  ectron-stream lamp     construction - see Discharge lamp  ectronic apparatus - see electronic  ectronic ballast     discharge lamp     discharge lamp, inverter-type     electrodeless lamp     high pressure discharge lamp     low pressure discharge lamp ectronic blackboard  ectronic cigarette     packaging ectronic component (general)	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes manufacture microchannel plates	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Eli V05-D06E V05-K01C V05-K01A	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes manufacture microchannel plates tube per se	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Elic V05-D06E V05-K01C V05-L05K V05-K01A	type of  ectron-stream lamp     construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast     discharge lamp     discharge lamp, inverter-type     electrodeless lamp     high pressure discharge lamp     low pressure discharge lamp ectronic blackboard  ectronic cigarette     packaging ectronic component (general)     cleaning     container	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01A
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes manufacture microchannel plates	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Elic V05-D06E V05-K01C V05-L05K V05-K01A	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard  ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning container drying	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01A V04-X01E
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes manufacture microchannel plates tube per se	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Elic V05-D06E V05-K01C V05-K01C V05-K01A V05-K01A V05-K01A V05-K01 see EPR	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard  ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning container drying manufacture	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01A
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes manufacture microchannel plates tube per se  Electron Paramagnetic Resonance -	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1B V05-F01A1A  Elic V05-B06E V05-K01C V05-L05K V05-K01A V05-K01 See EPR sements	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard  ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning container drying	V05-F04C1 X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01D V04-X01E V04-X01F V04-X
critical desired control of the cont	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  ng V05-F01A1C V05-F01A1B V05-F01A1A  Elic V05-D06E V05-K01C V05-K01C V05-K01A V05-K01A V05-K01A V05-K01 see EPR	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard  ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning container drying manufacture marking	X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01A V04-X01E V04-X01F
CRT general manufacture - see Discharge tube transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier CRT electron gun component dynodes manufacture microchannel plates tube per se  Electron Paramagnetic Resonance -	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1B V05-F01A1A  Elic V05-B06E V05-K01C V05-L05K V05-K01A V05-K01 See EPR sements	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard  ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning container drying manufacture marking materials nanomaterials	V05-F04C1 X26-A01A X26-A02 <b>equipment</b> X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01D V04-X01E V04-X01F V04-X V04-X01B
critical desired control of the cont	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1B V05-F01A1A  Elic V05-B06E V05-K01C V05-L05K V05-K01A V05-K01 See EPR sements	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning container drying manufacture marking materials nanomaterials packaging	V05-F04C1 X26-A01A DX26-A02 E equipment X26-C01B2 X26-C01B2A X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01D V04-X01E V04-X01F V04-X01B V04-X01B1 V04-X01A
critical desired control of the cont	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1B V05-F01A1A  Elic V05-B06E V05-K01C V05-L05K V05-K01A V05-K01 See EPR sements	type of  ectron-stream lamp     construction - see Discharge lamp  ectronic apparatus - see electronic  ectronic ballast     discharge lamp     discharge lamp, inverter-type     electrodeless lamp     high pressure discharge lamp     low pressure discharge lamp  ectronic blackboard  ectronic cigarette     packaging  ectronic component (general)     cleaning     container     drying     manufacture     marking     materials     nanomaterials     packaging     recovery of materials	V05-F04C1 X26-A01A X26-A02 E equipment  X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01D V04-X01E V04-X01E V04-X01B V04-X01B V04-X01A V04-X01B V04-X01A V04-X01B V04-X01A V04-X01B
critical desired control of the cont	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1B V05-F01A1A  Elic V05-B06E V05-K01C V05-L05K V05-K01A V05-K01 See EPR sements	type of ectron-stream lamp construction - see Discharge lamp ectronic apparatus - see electronic ectronic ballast discharge lamp discharge lamp, inverter-type electrodeless lamp high pressure discharge lamp low pressure discharge lamp ectronic blackboard  ectronic cigarette packaging ectronic circuits, testing ectronic component (general) cleaning container drying manufacture marking materials nanomaterials packaging recovery of materials recycling of materials	V05-F04C1 X26-A01A X26-A02 <b>cequipment</b> X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01D V04-X01E V04-X01F V04-X01B V04-X01B V04-X01A V04-X01A V04-X01A V04-X01B V04-X01A V04-X01A V04-X01A V04-X01A V04-X01A V04-X01B V04-X01A V04-X01C V04-X01C
cray general manufacture - see Discharge tuber transit time tube X-ray tube  Electron microscope  Electron microscopes combined transmission and scann scanning transmission  Electron multiplier  CRT electron gun component dynodes manufacture microchannel plates tube per se  Electron Paramagnetic Resonance - Electron secondary emission measure	V05-M03G manufacture V05-L01B4 V05-C02A5 V05-E01D1 S03-E06B1 V05-F01A1  mg V05-F01A1B V05-F01A1A  Elic V05-B06E V05-K01C V05-L05K V05-K01A V05-K01 See EPR sements	type of  ectron-stream lamp     construction - see Discharge lamp  ectronic apparatus - see electronic  ectronic ballast     discharge lamp     discharge lamp, inverter-type     electrodeless lamp     high pressure discharge lamp     low pressure discharge lamp  ectronic blackboard  ectronic cigarette     packaging  ectronic component (general)     cleaning     container     drying     manufacture     marking     materials     nanomaterials     packaging     recovery of materials	V05-F04C1 X26-A01A X26-A02 E equipment  X26-C01B2 X26-C01B3 X26-C01B4 X26-C01B5 S06-K99G W04-W05 X27-A02F Q34-M02 S01-G01 V04-X V04-X01D V04-X01D V04-X01E V04-X01E V04-X01B V04-X01B V04-X01A V04-X01B V04-X01A V04-X01B V04-X01A V04-X01B

testing	V04-X01F	component arrangement on cond	ductive
transportation	V04-X01A	chassis	V04-T01C
waste decontamination	V04-X01/A V04-X01G	component arrangement on insul	
waste disposal	V04-X01G	board	V04-T01C
Electronic connector - see Connect		component arrangement on insul	
		perforated board	V04-T01C
Electronic copier	S06-K99B	constructional details	V04-T
Electronic documentation	T01-J11C	cooling	V04-T03
help documentation	T01-J11C2	· ·	V06-U04D
Electronic equipment		cooling, compressor	V04-T03B2
adjustable feet	V04-S		X25-L03B
air cleaning	V04-T03K	cooling, cryogenic	V04-T03B3
3	T04-L08	cooling, fan	V04-T03B1
air filtering	V04-T03K		X25-L04
base/cabinet/cover/drawer/hous	ing - see	cooling, forced fluid circulation	V04-T03B
Electronic apparatus, casing	V04-S	cooling, heat conductive plate	V04-T03A
battery holder compartment	V04-S03	cooling, heat pipes	V04-T03H
	X16-F06	cooling, heat sink	V04-T03A
bracket	V04-S09	cooling/heating, manufacture	V04-T03Q
card ejector	V04-T02	cooling/heating, materials	V04-T03P
casing (see also specific apparatu		cooling/heating, monitoring cooling/heating, testing	V04-T03Q V04-T03Q
	V04-S		V04-T03Q V04-T03G
casing, back panel interconnection		cooling, hybrid cooling, MEMS based	V04-T03G V04-T03F
and the best and a second second	V04-T02	cooling, MEM3 based cooling, natural fluid circulation	V04-T031 V04-T03A
casing, battery compartment	V04-S03	cooling, natural hald circulation cooling, other cooling aspects	V04-T03A V04-T03X
casing, board guide	X16-F06 V04-T02	cooling, Peltier elements	V04-T03C
casing, board guide casing, board locating strip	V04-102 V04-T02	eeemig, r ender eremente	U14-E05A2
casing, board rocating strip	V04-T02 V04-T02	cooling, pump	V04-T03B2
casing, board rannel casing, board spacer element	V04-T02	3/1 1	X25-L03A
casing, fire-proof	V04-S22	cooling, radiative	V04-T03A
casing, framework	V04-T02	cooling, refrigeration	V04-T03B2
casing, handles	V04-S30	cooling, solid state heat pump	V04-T03C
casing, hinges	V04-S30		U14-E05A2
casing, inserts	V04-S30	cooling, thermoelectric	V04-T03C
casing, insulating material	V04-S02		U14-E05A2
casing, insulating material,		dehumidifiers	V04-T03L
hermetically sealed	V04-S02A	heating	V04-T03J
casing, insulating material,		hybrid electronic/optical board	\ (0.4 T0.4
with conductive coating	V04-S02B	arrangements	V04-T04
casing, locks	V04-S30	modular components	V04-T01C1
casing, manufacture	V04-S10	mounting supporting structure in	V04-T02
casing, materials	V04-S15	mounting supporting structure or	
casing, mechanical details	V04-S30	mounting supporting structure or	V04-T02
casing, metal casing, metal, hermetically seale	V04-S01	nameplate details	V04-102 V04-S09
casing, metal, metherically seale casing, metal, with insulating coa		panel	V04-S
casing, metal, with insulating coa	V04-S01C	protection	U24-F
casing, motherboard/	V04-301C	protection, analogue	U24-F04
daughter board arrangement	V04-T02	protection, automatic	U24-F01
casing, non-metallic conductive r		protection, digital	U24-F05
<i>J</i> ,	V04-S04	protection, electrostatic	U24-F06
casing, panel spacer element	V04-T02	protection, overcurrent limiting	U24-F02
casing, plastics	V04-S02	protection, overvoltage limiting	U24-F02
casing, plastics hermetically seale	edV04-S02A	protection, power supply	U24-D01B
casing, unspecified material	V04-S09		U24-F
casing, transparent	V04-S20	protection, smart	U24-F05
circuit module (de)mounting tool	V04-T02	protection, surge	U24-F02
circuit modules arrangement	V04-T02	protection, thermal	U24-F07
clip	V04-S09	rack construction	V04-T02
component (de)mounting	V04-T01C	ventilation slot	V04-S
component arrangement	V04-T01C	vibration damper	V04-S09
		wiring	V04-T01A

Electronic equipment (continued)		control	U21-B02A
wiring, bus-bar	V04-T01A	eliminating noise/interference	U21-B02F
wiring, bus bui	V04-T01A V04-T01A	introducing delay with capacitor	U21-B02A1
wiring, addi wiring, embedding	V04-T01A	introducing delay with counter/co	
wiring, grommet	V04-T01A	mareading delay with counter ex	U21-B02A2
wiring, harness	V04-T01A	point/instant control	U21-B02A
wiring, identification marker	V04-T01A	power-on resetting	U21-B02B
wiring, tie	V04-T01A	proximity - see <b>Proximity switch</b>	
wiring, tool	V04-T01A	proximity does resiminely current	U21-B02C
wiring, trough	V04-T01A	sample-and-hold circuits	U21-B03
wiring, trunking	V04-T01A	switch protection	U21-B02E
Electronic funds transfer	T01-N01A1	switching speed acceleration	U21-B02D
Liectionic Iunus transfer		switching speed acceleration, usi	ng
	T05-L02	series/parallel switches	U21-B02D1
telephone line communication as		technology - see Electronic swite	ching by
	W01-C05B3C	active device	U21-B01
Electronic imaging - see Image		testing	U21-B02J
Electronic mail	T01-N01C	threshold switching	U21-B02A3
Electronic metronome	S04-C09	Electronic switching application	U21-B05
Electronic office		analogue	U21-B05A
	T04-L07	high power	U21-B05B
Electronic paper	W05-E10	high speed	U21-B05B
	U14-K09	logic	U21-B05D
Electronic Patient Record (EPR)	S05-G02G1	multiplexer	U21-B05E
			W02-K02
Electronic payments	T01-N01A1	power converter	U21-B05C
	T05-L02	pulse distributor	U21-B05X
Electronic photo frame	W04-E30A5A	telephony	U21-B05E
Electronic power distribution/trans	smission		W01-B02
system	U24-H	Electronic switching by active elem	nent
Electronic program guide (EPG)			U21-B01
analog radio broadcast system	W02-E01B1	bipolar transistor	U21-B01A
broadcast radio receiver	W03-B08C5	chalcogenide materials	U21-B01P
digital radio broadcast system	W02-D05C	compound (mixed technology)	U21-B01D
· ·	W02-D07E	diode	U21-B01A
TV broadcast system	W02-F10E5	field effect transistor	U21-B01B
TV receiver	W03-A13J	galvano-magnetic/Hall effect dev	
Electronic still-picture camera	W04-M01B1		U21-B01X
detachable lens	W04-M01C1D	IGBT	U21-B01A1
digital/static recording type	W04-M01B1C	nano-tubes	U21-B01T
dynamic recording type	W04-M01B1A	opto-electronic device	U21-B01E U21-B01P
integral hard copy unit	W04-D10	phase-change materials superconductive device	U14-F02C
	W04-M01K	superconductive device	U21-B01X
interchangeable lens	W04-M01C1D	thyristor	U21-B01X
interfacing with PC	W04-M01B1C	transformer coupling	U21-B01D1
	W04-M01D8C	, ,	021 00101
	W04-K08	Electronic tag antitheft	\A/OF DO1 A 2
video recording aspects	W04-M01B1E		W05-B01A2 T04-K03B
Electronic switching	U21-B	RF transponder aspects	W02-G05A
accelerating speed	U21-B02D		W02-G03A W06-A04B
affecting state	U21-B02B	workpiece	T05-G02B1A
analogue	U21-B05A	workpiece	W06-A04B5E
applications - see <b>Electronic swi</b>		Flootoonically Address-life of the	
application	U21-B05	Electronically Addressable shelf ed	ige display
bidirectional switching	U21-B02H		T05-L01F
characterised by active device - s		Electro-optical detection	
Electronic switching by activ		materials investigation	S03-E04A1
	U21-B01		COO 404B
		photometry	S03-A01B
circuit details	U21-B02	photometry	S03-A01B
circuit details compensating for physical paran variations	U21-B02	photometry	S03-A01B

U21-B02G

variations

Electrophoresis		light source	S06-D02
analysis	S03-E03E		S06-E03A
coating	X25-R07		X26
detectors	S03-E09C7	light source biasing	S06-E03E
recording by	S06-E08	line scanning, exposure	S06-E03B
Electrophoretic display	U14-K03	liquid toner material	S06-E04B1
driving circuitry	U14-K03B	lithographic plate manufacture	S06-E01X
manufacture	U14-K03A2	lustre control	S06-E06D
structural arrangements	U14-K03A1	magnetic brush developing	S06-E04C
Electrophoretic display control	T04-H03C9	magnification, mechanical	S06-D10A
Electrophotographic technology d		mirror	S06-D03 S06-E03B
Liectrophotographic technology a	• •	multicolour	S06-E03B
	S06-E	not using charge patterns	S06-E08
	W05-E08	organic photoconductor	S06-E01A1
Electrophotography	S06-E	ozone removal	S06-E01A1
belt photoconductor	S06-E01A9	paper manufacture	S06-R00B
binding, cutting, stapling of shee		photoconductive layer	S06-E01A
CCD photosensor	S06-D05	photoconductor carrier	S06-E01B
charge elimination	S06-K06B	photoconductor intermediate or c	
charging photoconductor	S06-E02	layers	S06-E01B
cleaning aspects	S06-K06C	photoconductor sensitiser and bin	
clearing paper jam	S06-K02B	prioreconductor contention and sin	S06-E01A3
colour	S06-K01	photoelectric layer	S06-E01X
construction of apparatus	S06-K03	photosensor	S06-D05
control system	S06-K07A	pick-up	S06-D05
cooling	S06-K03C	power supply	S06-K07A2
copy prevention	S06-K07A3	pre-fixing	S06-E06P
corona charger	S06-E02	prism	S06-D03
alassalassas asaatasial liassial	X12-F04	· ·	S06-E03B
developer material, liquid	S06-E04B1	raster scanning exposure	S06-D01B
developer material, solid	S06-E04A1 S06-E04B	recording member	S06-E01
developing using liquid toner developing using solid toner	S06-E04B	sensitising	S06-E02
digital copier	S06-L04A S06-K99B	sheet collator	S06-K02C
discharging photoconductor	S06-K77B	sheet decurling	S06-K02E
display	S06-K07A1	sheet feeding	S06-K02
doctor blade for cleaning	S06-K06C1	sheet feeding, different paper size	
editing copier	S06-K99B	sheet feeding, duplex	S06-K02A
electronic copier	S06-K99B	sheet shredding	S06-K05C
exposure driver	S06-D04	sheet sorter	S06-K02C
- p	S06-E03C	sheet storage	S06-K03B1
fault detection	S06-K07B	slit scanning exposure	S06-D01A
feeding, duplex or multicopy	S06-K02A	solid developer material	S06-E04A1
fixing belt	S06-E06B1	solid toner supply and storage	S06-K07B1
fixing belt driving	S06-E06B1	synchronisation, during exposure	
fixing roll driving	S06-E06B	thermal output	S06-K99B
frame scanning, exposure	S06-D01A	thermoplastic layer toner fixing	S06-E02
full colour printing	S06-K01A	toner level detector	S06-E06
fuser oil application	S06-E06C	toner recycling	S06-K07B1 S06-K06C2
fuser oil composition	S06-E06C1	toner removal	S06-K06C2
heat and pressure fixing	S06-E06A	transfer apparatus	S06-E05
highlight printing	S06-K01B	care of	S06-E05D
humidifying	S06-K03C	two colour printing	S06-E03D
image reduction and magnificati		unusual input and output arranger	
mechanical	S06-D10A	and such impactant output arranger	S06-K99B
image transfer	S06-E05	user input	S06-K77B
inorganic photoconductor	S06-E01A2	using magnetic patterns	S06-R07A1
lamp	S06-E03E1	using microcapsule sheet	S06-B04A1
	X26	using thermoplastic layers	S06-E07
laser printer	S06-K99C	ventilation	S06-K03C
lens for exposure	S06-D03	x-ray	S06-D09
	S06-E03B	ı	

Flacture alatin a	VOE DO4	Flashwak anama	COE A O 4
<b>Electroplating</b> conductive layer formation,	X25-R04	Electrotherapy	S05-A04 S05-A03B
semiconductor manufacture	U11-C05C6	using electric fields  Electrothermal relay	V03-D05D
for magnetic record carrier manu		Electrowetting displays	U14-K05
	T03-A02A1		
hybrid/thick film circuit substrates	U14-H04A2	Elevation, measuring Elevator - see Lift	S02-B05 X25-F04
interconnections for hybrid circu			
magnetic record carrier	V02-H02C	Eliminating/reducing asymmetry in	
Electrorheological fluid	X25-L09	polyphase networks	X12-H01A6
Electrostatic	7120 207	Ellipsometry	S03-A02C
actuators	V06-M06F		S03-E04B5
clutches	V06-M06F	EM compatability	S01-G08C
	X11-H04	EM field strength measurement	S01-D07B
digital marking	T04-A02A	using optical techniques	S01-D07B3
discharge tubes	V05-M04A	Embroidery machine	X25-T04C
field measurement	S01-D07A	Emergency broadcasting	
field measurement, using optical		radio (sound)	W02-D07A
	S01-D07A1	TV	W02-F05D
generators	V06-M06F	Emergency broadcast reception radio receiver	W02 D00C7
holding devices motors	V06-M06F V06-M06F	TV receiver	W03-B08C7 W03-A18A5J
printer, for computer	S06-J	Emergency exit signs	W05-A03
protection, low power electronic			
p	U24-F06	Emergency supply - see Standby po	
protection casing	V04-U21	EMI shielding(screening)	V04-U
reading, digital	T04-A03A	building, for	V04-U02
recording methods	T03-C01	cable, for, (integral) cable, for, (mountable)	X12-D03E V04-U
	W04-D	cans	V04-U
relays 	V03-D05C	casings	V04-U03
separation	X25-H02	computer equipment, for	T01-L02D
spraying equipment transducers, acoustoelectric	X25-K01 V06-V01C	elements	V04-U04
writing, digital	T04-A02A	EMC testing	V04-U20
Electrostatic chuck, semiconductor		Faraday cage, building	V04-U02
handling	U11-F02A2	Faraday cage, room	V04-U02
Electrostatic deflection, CRT	V05-D06B5	gaskets manufacture	V04-U04
with electrodes on tube surface	V05-D06B5 V05-D06B5A	manufacture materials	V04-U15 V04-U01
	X15-E	materials, superconducting	U14-F01
Electrostatic precipitator		atomato, supercontacting	V04-U01A
Electrostatic separation	X25-H02		X12-D06B
constructional details from gas	X25-H02A2 X25-H02A	measuring instruments, for	S01-J02C
from liquids	X25-H02B	panels	V04-U04
from solids	X25-H02B	panels, casing	V04-U04
from vapour	X25-H02A	PCB, for, (non-track type)	V04-Q02A5
plant or installations	X25-H02A1	PCB, for, (track type)	V04-Q05A V04-U02
Electrostrictive		telephone, for	W01-C01A4
actuators	V06-M06D	testing for EMC	V04-U20
materials	U11-A02	EMI suppression	W02-H
	V06-V02R	Emission sources	
motors	V06-M06D		V05-F04A9
relays	V03-D05A V06-V01B	Emission spectrometry	S03-A02X
resonators	V06-V01B V06-V01E	Emissivity measurement, thermal	S03-E01E
transducers (general)	V06-V01E V06-V01B	Emitting electrodes	
transducers (general) transducers, acoustoelectric	V06-V01B V06-V01B	cold cathodes	V05-M03A
ultrasonic motors	V06-M06D1	manufacture, for discharge tubes	
ultrasonic transducers (general)	V06-V01B	encapsulants for semiconductor of	
.5 ,	V06-V01N		U11-A07
vibrators	V06-V01B		
	V06-V04C		

Emotional state determination	S05-D01X	Endpoint detection, semiconductor	processina
voice analysis-based	W04-V04A4	CMP	U11-C06A1C
		wet etching	U11-C07B1
Encapsulation, resin, for semicondupackages	U11-E02A1	Energy, measuring electrical	S01-D02
Enclosures		Energy-assisted magnetic recording	g T03-A06N
for loudspeakers	V06-V02F	Energy spectrometers	V05-J01A5
	V06-V04A1		S03-E10B
	W04-S01E	Engine	
for semiconductor devices	U11-D01	aircraft, control	W06-B01A1
Encoders, digital position	U21-A03J	aircraft, external combustion	Q25-C02B
absolute	U21-A03J5	aircraft, internal combustion	Q25-C02A
capacitive	U21-A03J9	bed	Q68-A02
conductive tracks	U21-A03J9	exhaust system	Q17-E09
inductive	U21-A03J2		Q51-J
magnetic	U21-A03J2	gas turbine, testing	S02-J01C
optical .	U21-A03J1	gas turbine, testing, for aircraft	S02-J01C2
photoelectric	U21-A03J1	IC .	Q51
Encoding		alcohol	Q51-D07C
audio, general	W04-V10	bio fuel	Q51-D07C
code conversion	U21-A05	diesel	Q51-D03
error detection/correction, data		free-piston	Q51-B05A
transmission	W01-A01B	gaseous fuel multicylinder	Q51-D07A Q51-A01B
error detection/correction, gener		oscillating piston	Q51-A01B
	U21-A06	petrol	Q51-D03
error detection/correction, record	9	rotary engine	Q51-B01
	U21-A06	single cylinder	Q51-A01A
( : : 1 -	T03-P01A	two-stroke	Q51-A01J
facsimile	S06-K07A4D	variable compression ratio	Q51-A01G
hybrid coding systems for video s	W04-P01A4	variable cycle	Q51-A01X
JPEG	W04-P01A3	knock detection	S02-F04D3A
movement detection systems	W04-P01A1		X22-A05A2
MPEG	W04-P01A4	misfire detection	S02-F04D3A
predictive, for video signal	W04-P01A5		X22-A01D
speech	W04-V05G	railway train, control	X23-A01A2B
subsampling, for video signal	W04-P01A7	rocket engine	Q52-B03
transform, for video signal	W04-P01A3		W06-B03
Encryption	T01-D01	rocket motors and ion propulsion	
algorithm	T01-D01A		S02-J01F
data transmission	W01-A05	ship, control	W06-C01A1
hashing	T01-E04	ship, external combustion	Q24-E02B
	T01-N02B1A	ship, internal combustion	Q24-E02A
remote control/measurement sys		steam	Q51-C01
•	W05-D05B1	steam turbine	Q52-A01S
End cap for insulating direct conne	ction	steam turbine, testing	S02-J01E
End cap for misulating direct conne		Stirling	X11-A10 X25-X08
	V04-A08	vehicle external combustion engi	
End cap for lamp		verlicle external combustion engli	Q17-E
discharge lamp	X26-A02A		Q52
incandescent lamp	X26-B02A1		X22-P03
Endoscope		vehicle internal combustion engir	
keyhole surgery	S05-B05	3	Q17-E
medical	S05-D04		Q51
medical imaging	S05-D04B		X22-A
optical fibre details	V07-N02	Engraving	
photographic attachments	S06-B09	coin or card actuated	T05-H05E
positioning/moving in medical ap		engraving systems	X25-X10
	S05-D04A	punching / stamping	X25-A02D
		Entertainment venues	P36-F
		Entertainment venues	W04-X03G
		l	+ 7.000

Entry or exit register	1	Error detection	
card or badge access	T05-D01A	coding systems	U21-A06
human feature detection	T05-D01B	digital computer checking codes	
personnel control	T05-D01	parity, computing	T01-G01A1
vehicles	T05-D02	pattern recognition	T04-D05
ENUM	W01-C05B4C	Error detection/correction	101 200
Environmental suit		coding systems	U21-A06
	P35-A03C	coding systems, block codes	U21-A06A
EPG (electronic program guide)		coding systems, convolution code	
analog radio broadcast system	W02-E01B1	g -y,	U21-A06C
broadcast radio receiver	W03-B08C5	coding systems, CRC	U21-A06A1
digital radio broadcast system	W02-D05C3	coding systems, Hamming codes	
TV broadcast system	W02-F10E5	coding systems, interleaving	U21-A06E
TV receiver	W03-A13J	coding systems, parity bit	U21-A06A2
Epitaxial layer	U11-C01J1	coding systems, Reed Solomon co	
Epitaxy	U11-C01		U21-A06A4
liquid phase epitaxy	U11-C01H	coding systems, Trellis coding	U21-A06C3
molecular beam apparatus	U11-C09D	coding systems, turbo coding	U21-A06C2
molecular beam method	U11-C01A2	coding systems, using multiple	
vapour phase epitaxy	U11-C01A1	coding techniques separately	U21-A06G5
		coding systems, using multiple	
EPR (Electronic Paramagnetic Reso	nance)	coding techniques together	U21-A06G1
- see also NMR for common		coding systems, Viterbi coding	U21-A06C1
aspects/components	S03-E07E	data transmission	W01-A01
<b>EPR (Electronic Paramagnetic Reso</b>	nance)	data transmission, block codes	W01-A01B1
- see NMR for common		data transmission, codes	W01-A01B
aspects/components	S01-E02A4	data transmission, convolution co	des
•	S05-G02G1		W01-A01B2
EPR-(Electronic Patient Record)		data transmission, diversity, repea	
EPROM - see ROM, erasable progra	mmable	or returning	W01-A01A
Equal-length code, data transmission	on W01-A07B	data transmission, format	W01-A01B3
Equalizing		data transmission, hybrid coding	W01-A01B4
audio/video magnetic recording	W04-B	data transmission, interleaving	W01-A01B5
cable and line systems	W02-C01B2	data transmission, parity	W01-A01B1A
data transmission (baseband)	W01-A08B2	data transmission, quality measure	
delay network	U25-E05Q		W01-A01C
DSP-based	U22-G03E3C	recording, audio	W04-G01F1
general data recording	T03-P01D	recording, general	T03-P01A
infrared communications systems		recording, video	W04-F01F5
magnetic recording	T03-A06D		W01-A01B2E
optical communications systems	W02-C04A7A	telemetry	W05-D05
radio links	W02-C03E1	Esaki diode	U12-C01E
TV receiver, video signal	W03-A04G	Escalator - see Lift	X25-F04
Equation solving, by computer	T01-J04A	Escape chutes and slides	
Erasing		aircraft	Q25-B09E
audio/video	W04-E20G	buildings and general	P35-A01E
magnetic records	T03-A06E	ESG (environmental, social & gover	
magnetic records	W04-B	N01A3	
magneto-optical records	T03-D01E	ESR - see also NMR for common	
•	103-D01L	aspects/components	S01-E02A4
Erasure	T04 400	aspects/components	S03-E07E
of digital marks	T04-A02	e. I	303-LU/L
of magnetic recording	T03-A06E	Etchants	
Error concealment, video signal	W04-P01F3	dry, semiconductor manufacture	U11-A10 U11-C07A1
Error correction		wet, for semiconductor manufactu	
coding systems	U21-A06	wet, for semiconductor manufactu	U11-C07B
data transmission	W01-A01B	· ·	011-00/0
TV receiver signal decoder	W03-A11D1	Etching	1144 007045
TV receiver teletext	W03-A10A1	All-BVI compound layer	U11-C07C4B
		AIII-BV compound layer	U11-C07C4A
		AIV element/compund layer	U11-C07C4C

beam scribing, semiconductor m	anufacture	Evanescent RF waveguide filter	W02-A05F
	U11-C07A4	Evaporation, semiconductor physic	al
conductive layer, semiconductor	manufacture	deposition	U11-C01A1
	U11-C07C2	Excavator	Q19-E
dry, apparatus for semiconducto		Excavator	X25-D01
	U11-C07A1	control	T06-D08E
	U11-C09C	Control	X25-D01
dry, control, semiconductor man			
	U11-C07A3	Exchanges, telephone	W01-C02
dry, detecting end point, semico	nductor	automatic call distribution centre	
manufacture		call centre	W01-C02G3B
	U11-C07A3	central office type	W01-C02G1
dry, semiconductor manufacture		centrex	W01-C02G5
for planarisation, semiconductor		faller for an electronally consistence	W01-C03
	U11-C07D3	failsafe and standby systems	W01-C02A1C
insulating layer, semiconductor r		intelligent network	W01-C02A7A
	U11-C07C3	private automatic branch exchang	
laser scribing, semiconductor ma		atatiatiaal sa atasia a	W01-C02G5A
	U11-C07A4	statistical metering subscriber services	W01-C02A1A W01-C02B
localised, laser induced, semicor	ductor		W01-C02B
manufacture	1111 00740	testing	
La callacado a callada de casa facilista de	U11-C07A2	Exchanges, data	W01-A06
localised, particle beam induced		bus	W01-A06B1
semiconductor manufacture magnetic head manufacture	U11-C07A2 T03-A04A1E	connections between exchanges	W01-A06G3
	U11-C04D	failsafe and standby systems	W01-A06A1
masking techniques details	U11-C04D	fault detection, isolation	W01-A06A2
plasma, apparatus for semicondu		loop	W01-A06B2
plasma, apparatus for sermeonat	U11-C07A1	medium	W01-A06C
	U11-C09C	monitoring	W01-A06A
	X14-F02	operation, logical structure	W01-A06B8
plasma, semiconductor manufac		star	W01-A06B3 W01-A06B
processing tube function	V05-F08E1	structure	W01-A06A
reactive ion beam, semiconducto		testing tree	W01-A06B4
	U11-C07A1		
reactive vapour, semiconductor r		Excimer laser (see also Lasers)	V08-A04B
,	U11-C07A1	Execution, program control	T01-F03
silicon layer, semiconductor man	ufacture	branching	T01-F03A
•	U11-C07C1	concurrent	T01-F03B1
sputter, semiconductor manufact	ture	Execution, subprogram	T01-F03C
	U11-C07A1	Exercise	
thin film, semiconductor manufac		bicycle, static	P36-A06
	U11-C07C5	2.0ye.e, etalie	W04-X01A5A
to produce finer details, semicon		equipment	P36-A06
manufacture	U11-C07D1		W04-X01
to produce taper/structural profi		eye, medical	S05-A07
semiconductor manufacture	U11-C07D2	treadmill	P36-A06
to produce trenches, semicondu			W04-X01A5C
	U11-C07D4	Expanding aerial	
using special masking technique	•	aerial per se	W02-B08K
semiconductor manufacture	U11-C07D1	aerial support	W02-B07A5
wet, control, semiconductor man		Expanding amplitude-compressed	
	U11-C07B1	Expanding amplitude-compressed	_
wet, detecting end point, semico manufacture	U11-C07B1		U24-C02B
wet, semiconductor manufacture		Expanding facsimile data	S06-K07A4D
•		Expansion, amplification	U24-C02B
Ethernet®	W01-A06F1A	Expert control system	T06-A05A
Euphonium (instrument)	P86-A01A3	•	
Evaluation, analogue	T02-A04B3	Expert systems	T01-J16A
Evanescent coupler - see Optical co		knowledge base	T01-J16A
Evanescent coupler - see Optical Co		Explosively-actuated switch	X13-A04X
	V07-G11	Explosion-proof casing	V04-S22

Explosives		F	
detection using nuclear radiation	S03-C03	_	
investigation	S03-E14E3	Fabric manufacture	X25-T04B
Exposure		control	T06-D03C
photographic camera, control	S06-B02		X25-T04B
photographic printing, control	S06-B04A5	embroidery machine	X25-T04C
time calculation, in photography	S06-B02B	knitting machine	X25-T04B2
Exposure apparatus for CRT screen		non-woven fabric	X25-T04B3
light source	V05-L02E5C	sewing machine	X25-T04C
optical system	V05-L02E5C V05-L02E5A	weaving machine	X25-T04B1
· · · · · · · · · · · · · · · · · · ·		Face/facial expression detection,	
Exposure, semiconductor lithograp		digital/video camera	W04-M01D2F
also Lithography, semiconductor		Face covering/protecting masks	
focussing	U11-C04C2	headwear	P21-F
tilt control	U11-C04C3	protective clothing	P35-A03C
vertical alignment	U11-C04C3	Face/palm recognition	T04-D07F2
Extended display identification		=	
data (TV / video display)	W03-A08S1	Facsimile	S06-K99D
Extender for remote control		CCD recording head	S06-D05
AV equipment RC	W03-G05A8	changing magnification	S06-K07A4B T05-H05C
general RC	W05-D08R	coin freed colour and highlight	S06-K01
Extensible aerial		confidential document handling	S06-K07A3
aerial per se	W02-B08K	construction	S06-K07A3
aerial support	W02-B07A5	control of operation	S06-K07A
Extensible cable	X12-D03A2	data compression, reduction, enco	
		data compression, reduction, enco	S06-K07A4P
External combustion engine	X11-C01	data preparation for transmission	
External electrode lamp	X26-A01A	display	S06-K07A1
construction - see Discharge lam	<b>p</b> X26-A02	electrical connectors	S06-K03F
External rotor type		image acquisition	S06-K07A4
motor	V06-M06T	image output	S06-K07A4C
Eye		image processing	S06-K07A4
exercise, medical	S05-A07	image sensor reading circuitry	S06-D05A
medical testing	S05-D05	ink-jet printing	S06-G
movement measurement (non-me	edical)	integrated with telephone apparat	
	S05-D01C5A	interfacing	S06-K07C2
for vehicle driver/passager	X22-E04	laser printhead	S06-E03A3
Eye diagram measurement	W01-A01C5	LED printhead	S06-E03A2
Eye gaze determination		memory	S06-K07A4
eye examination	S05-D05	monitoring operation	S06-K07B
eye examination	S05-D01C5	optical printing	S06-E
general application	S05-D01C5A	picture processing power supply	S06-K07 S06-K03
general application	T04-D07F1A	preventing illegal use	S06-K07A3
photgraphic camera subject dete		printhead drive circuitry	S06-G03
priorgrapinio damora dabje de adre	S06-B01E	priority setting, for transmission	S06-K07C4
video camera subject determinati		reception	S06-K07C5
,	W04-M01D2G	recording image sensors	S06-D05
Eyeglasses	X27-A02D	recording or reading of data	S06-D
lenses	P81-A01	remote monitoring	S06-K07C6
1011303	P81-A50G	scanning arrangements	S06-D
5		scanning drive	S06-D04
Eyeglasses for 3D viewing	X27-A02D	scanning optics	S06-D03
with filters	W03-A08E7E	scanning synchronisation	S06-D04A
with polarizers	W03-A08E7E	secrecy of transmission	S06-K07C7
with shutters	W03-A08E7C	sheet counting	S06-K07A5
Eye pattern measurement	W01-A01C5	sheet feeding	S06-K02
		sheet stapling/binding	S06-K05
		signal processing	S06-K07
		signal scrambling	S06-K07C8
		store and forward exchange	S06-K07C2B

telephone, linked with	W01-C05B1C	Fastening elements	Q61
	S06-K07C2A	anti-tamper	Q61-F
thermal printing	S06-H	bolt	Q61-A03
transmission, general	S06-K07C	clamps	Q61-B
user interface	S06-K07A1	deformable r · · ·	Q61-G
Factory automation	T06-A04A2A	friction grip	Q61-B
	T06-A04B7	glued/stuck connection	Q61-J
automatic warehousing	X25-F07	hooks and eyes	Q61-X
goods tracking	X25-F11	locking male/female groove connections	Q61-A07A Q61-X
inventory/stock control	X25-F09	nail	Q61-X
malicious software protection	14/05 D.05D5.0	nut	Q61-A01
in FA network	W05-D05B5C	rivet	Q61-D
	W05-D07B	screw	Q61-A05
robot	T06-D07B X25-F05A	self-tapping	Q61-A07E
transmission systems for FA	W05-D07B	staple	Q61-E
unauthorized access protection	VV03-D07B	suction cups	Q61-X
in FA network	W05-D05B5E	tenons	Q61-X
III I A THE WORK	W05-D07B	threaded	Q61-A
Fail-safe and standby systems		torque limiting	Q61-A07C
data exchange	W01-A06A1	washers	Q61-H
data exchange data exchange hot standby	W01-A06A1A	welded connection	Q61-J
general hot standby systems	W02-G08A	Fat tree data network	W01-A06B4A
line transmission systems	W02-C01D3		W01-A06G1
line transmission systems hot stan	dby	Fatigue testing (see also Thermal ar	nalysis)
,	W02-C01D3A	applying impulsive forces	S03-F02E
network	W01-A06A1	bending/twisting/shearing	S03-F02D
network hot standby	W01-A06A1A	steady tension/compression	S03-F02C
telecontrol/telemetry	W05-D05C	Fault detection, location	
telephone exchange	W01-C02A1C	cables installations (see also Cable	e)
Fail-safe circuits			S01-G05
computing	T01-G05		X12-G01C
logic	U21-C03C	communication lines	W02-C01D1
using additional processors	T01-G05B	data communications equipment	
Fairground equipment	W04-X03G3	data exchanges data networks	W01-A06A2 W01-A06A2
Fall-out measurements	S03-D06	electrical (general)	S01-G
False alarm		electrical (general)	S01-G05
alarm systems, prevention of	W05-C02C5	electrophotographic copier	S06-K99B
constant rate (CFAR) radar system		radar equipment	W06-A04E3A
•	W06-A04E5	semiconductor manufacturing equ	uipment
Fan		<u> </u>	U11-C09F1
electrical details	X25-L04	Fault indicator	X13-C01X
fan-assisted electric oven	X27-C02C	cable installation	X12-G01C
hand-held fan	P24-A03	fault simulation, digital computer	T01-G07
Fan heater, electric	X27-E01A2	line installation	X12-G01C
Faraday cage	V04-U02	other types of fault simulation	T01-G07X
electromagnetic screening	V04-U02	Fax - See facsimile	
electromagnetic screening for tes	ting	FDD (frequency division duplex)	W02-K01C
equipment	S01-G08B5	FDDI, data network	W01-A06B2
magnetic screening	V04-U02	i DDi, data network	W01-A06C1
Faraday cup		FDM	W02-K01
for current/voltage meaurement	S01-D01D3	data network access	W01-A03E5
Faraday effect - see Optical modula	tion,	multichannel access	W02-C03C3E
magneto-optic control	V07-K03		W01-C01G8
Faraday rotation		Feature phone Feature recognition	VVU 1-CU 1G8
		. catare recognition	
tor current/voltage measurement	S01-D01D5	general	T04-D
for current/voltage measurement for magnetic field measurement	S01-D01D5 S01-E01C	general human	T04-D S05-D01C5A
for magnetic field measurement	S01-E01C	human	
		3	S05-D01C5A

heterostructure MISFET

U12-D02A5

	_		
Feedback oscillator, pulse generati	ion	heterostructure, HEMT	U12-D02D2
	U22-A04A3	heterostructure, MODFET heterostructure, quantum well	U12-D02D2 U12-D02D2
Feedforward amplifier	U24-G03B1	heterostructure, quantum wen	U12-D02D2
Feeding		HIGFET	U12-D02A5
record carrier	T04-A05	IGFET	U12-D02A
paper	T04-J01	integrated circuit structures	U13-D02
Femtocell (cellular radio)	W02-C03C1K	ISFET	U12-D02A
Fence, electric		JFET	U12-D02B
general fencing	X25-X11	lightly doped drain (LDD)	U12-D02A3
livestock fencing	X25-N02C	MESFET	U12-D02B
Fencing (sport)	P36-A04	MIOS structures modulation doped FET	U12-D02A2 U12-D02D2
3 (4)	W04-X01K4C	MOSFET	U12-D02D2
Ferrodynamic relay	V03-D05E	negative resistance	U12-D02J1
Ferroelectric capacitor		one-dimensional charge carrier	U12-D02D1
discrete	V01-B02B9	pn-junction gate	U12-D02B
integrated circuit	U12-C02F	quantum-wire	U12-D02D1
Ferroelectric memories - see Memo		Schottky barrier gate	U12-D02B
with ferroelectric elements	U14-A03F	SISFET	U12-D02A5
Ferroelectric transistor		SOI substrate	U12-D02A4
	U12-D02A7	static induction	U12-D02C U12-D02A9
Ferrofluid	V02-A04	superconductive FET	U14-F02B
Ferromagnetic		testing	U11-F01C5
waveguide filter	W02-A05E	testing	U12-D02A
waveguide phase shifter	W02-A06C2	trench gate	U12-D02A9
waveguide switch	W02-A04A1	vertical MOSFET	U12-D02A9
FET - see Field effect transistor		Field emission cathode - see cold ca	athode
FFT - see Fourier		field emitting structures, manufac	
FFT implementation	TO1 104D1		
FFT implementation	T01-J04B1	Field emission display	V05-D01C3
•		Field emission display anodes	V05-D01C3 V05-D05F
Fibre Distributed Data Interface, da network			
Fibre Distributed Data Interface, da	ata	anodes cathodes cathode current limiting arranger	V05-D05F V05-D05C5
Fibre Distributed Data Interface, da	wo1-A06B2	anodes cathodes cathode current limiting arranger D05C5C	V05-D05F V05-D05C5 nent V05-
Fibre Distributed Data Interface, danetwork  Fibre manufacture	w01-A06B2 W01-A06C1 X25-T04A	anodes cathodes cathode current limiting arranger	V05-D05F V05-D05C5 ment V05- e structure
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer	wo1-A06B2 W01-A06C1	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics	W01-A06B2 W01-A06C1 X25-T04A S03-B01G	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics converting sensor output	W01-A06B2 W01-A06C1 X25-T04A S03-B01G	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A1E
Fibre Distributed Data Interface, da network  Fibre manufacture Fibre optic thermometer Fibre optics converting sensor output for imaging tubes	W01-A06B2 W01-A06C1 X25-T04A S03-B01G	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics converting sensor output	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A1E V05-D06A2 V05-D05C5A
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A1E V05-D06A2
Fibre Distributed Data Interface, danetwork  Fibre manufacture  Fibre optics  converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A1E V05-D06A2 V05-D05C5A U14-A01X U14-A08B1
Fibre Distributed Data Interface, danetwork  Fibre manufacture  Fibre optics  converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre  Field disturbance intruder alarm	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A1E V05-D06A2 V05-D05C5A U14-A01X U14-A08B1
Fibre Distributed Data Interface, danetwork  Fibre manufacture  Fibre optics  converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre  Field disturbance intruder alarm  Field effect transistor	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A1E V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see
Fibre Distributed Data Interface, da network  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor     analogue integrated circuit form	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording)	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see
Fibre Distributed Data Interface, danetwork  Fibre manufacture  Fibre optics  converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre  Field disturbance intruder alarm  Field effect transistor	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H
Fibre Distributed Data Interface, danetwork  Fibre manufacture  Fibre optics  converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre  Field disturbance intruder alarm  Field effect transistor  analogue integrated circuit formalogue integrated circuits,	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see FET U13-B02	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor     analogue integrated circuit form     Analogue integrated circuits, ballistic	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see FET U13-B02 U12-D02J2 U12-D02J2	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor     analogue integrated circuit form     Analogue integrated circuits, ballistic     CHEMFET     complete manufacture of discrete	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see FET U13-B02 U12-D02J2 U12-D02J2 U12-D02J2 U11-C18A3	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture Film parameter investigation	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor     analogue integrated circuit form     Analogue integrated circuits,     ballistic     CHEMFET     complete manufacture of discrete     digital integrated circuit form - see	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see FET U13-B02 U12-D02J2 U12-D02J2 U12-D02A - device U11-C18A3	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture  Film parameter investigation (semiconductor)	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A
Fibre Distributed Data Interface, da network  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor     analogue integrated circuit form - Analogue integrated circuits, ballistic     CHEMFET     complete manufacture of discrete digital integrated circuit form - see     Digital integrated circuit, FE	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see FET U13-B02 U12-D02J2 U12-D02J2 U12-D02A e device U11-C18A3	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture Film parameter investigation	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A U11-F01B T04-D07
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor     analogue integrated circuit form     Analogue integrated circuits, ballistic     CHEMFET     complete manufacture of discrete     digital integrated circuit form - see     Digital integrated circuits, FE	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see U12-D02J2 U12-D02J2 U12-D02J2 U12-D02A - device U11-C18A3	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture  Film parameter investigation (semiconductor) by image recognition	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A U11-F01B T04-D07 U11-F01B3
Fibre Distributed Data Interface, da network  Fibre manufacture Fibre optics  converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor  analogue integrated circuit form Analogue integrated circuits, ballistic  CHEMFET  complete manufacture of discrete digital integrated circuit form - see Digital integrated circuits, FEDMOS doping	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see U12-D02J2 U12-D02J2 U12-D02A e device U11-C18A3 ee U11-C18A3	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture Film parameter investigation (semiconductor) by image recognition	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A U11-F01B T04-D07 U11-F01B3 - see
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optic thermometer Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm  Field effect transistor     analogue integrated circuit form     Analogue integrated circuits,     ballistic     CHEMFET     complete manufacture of discrete  digital integrated circuit form - see     Digital integrated circuits, FE DMOS     doping     electrode manufacture	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see U12-D02J2 U12-D02J2 U12-D02A - device U11-C18A3	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture Film parameter investigation (semiconductor) by image recognition  Film resistor (discrete device only) Resistor	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A U11-F01B T04-D07 U11-F01B3 - see V01-A02C
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm  Field effect transistor     analogue integrated circuit form     Analogue integrated circuits,     ballistic     CHEMFET     complete manufacture of discrete  digital integrated circuit form - see     Digital integrated circuits, FE  DMOS     doping     electrode manufacture     ferroelectric transistor	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see U12-D02J2 U12-D02J2 U12-D02A - device U11-C18A3 - e U11-C18A3 - e U11-C02J6 U11-C02J6 U11-C05F1 U12-D02A7	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture Film parameter investigation (semiconductor) by image recognition	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D10 V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A U11-F01B T04-D07 U11-F01B3 - see
Fibre Distributed Data Interface, da network  Fibre manufacture Fibre optics  converting sensor output for imaging tubes for temperature measurement transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm Field effect transistor  analogue integrated circuit form Analogue integrated circuits, ballistic  CHEMFET complete manufacture of discrete digital integrated circuit form - see Digital integrated circuits, FEDMOS doping electrode manufacture ferroelectric transistor field effect oxide manufacture	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see U12-D02J2 U12-D02J2 U12-D02J2 U12-D02A - device U11-C18A3 - e U11-C18A3 - e U11-C05F1 U12-D02A7 U11-C05B9A	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture Film parameter investigation (semiconductor) by image recognition  Film resistor (discrete device only) Resistor	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A U11-F01B T04-D07 U11-F01B3 - see V01-A02C
Fibre Distributed Data Interface, danetwork  Fibre manufacture Fibre optics     converting sensor output     for imaging tubes     for temperature measurement     transducers  Fibres, optical - see Optical fibre Field disturbance intruder alarm  Field effect transistor     analogue integrated circuit form     Analogue integrated circuits,     ballistic     CHEMFET     complete manufacture of discrete  digital integrated circuit form - see     Digital integrated circuits, FE  DMOS     doping     electrode manufacture     ferroelectric transistor	W01-A06B2 W01-A06C1 X25-T04A S03-B01G S02-K03B1 V05-D07C5C S03-B01G S02-K03B1 V07-F01A1 W05-B01A1 U12-D02A - see U11-C02J2 U12-D02J2 U12-D02J2 U12-D02J2 U12-D02J2 U11-C18A3 - U11-C18A3 - U11-C05F1 U11-C05F1 U11-C05F1 U11-C05B9A U12-D02A1	anodes cathodes cathode current limiting arranger D05C5C complete emitter, gate and anod drive circuitry emitter arrangements gate electrodes microminiature cathodes  FIFO  Fifth Generation (5G) mobile phone 5G Filament transport (recording) Film circuits Film formation, magnetic for record carrier manufacture Film parameter investigation (semiconductor) by image recognition  Film resistor (discrete device only) Resistor	V05-D05F V05-D05C5 ment V05- e structure V05-D06A1F V05-D06A1E V05-D06A2 V05-D05C5A U14-A01X U14-A08B1 e systems- see T03-E U14-H V02-H02 T03-A02A U11-F01B T04-D07 U11-F01B3 - see V01-A02C P83-B

conveyance	P82-T07	Fire-fighting equipment	P35-C01
· · · · · · · · · · · · · · · · · · ·	S06-B04E		X25-X05
magnetically marked, material manufacture	S06-B09 S06-B04B	fire engine	P35-C01C5
marking process, in camera	S06-B01B2		Q19-H02 X22-P10
processing	S06-B04B	fire extinguisher	P35-C01
sensitivity, in exposure control	S06-B02B1	-	X25-X05
speed reading, in exposure contro camera	S06-B02B	for aircraft	P35-C01C7A Q25-B09A
winding, in camera	P82-T07	for ship	P35-C01C7E
	S06-B08A		Q24-B09A
Film, semiconductor, measurement		for spacecraft	P35-C01C7A
Semiconductor film measuremen	t	for railway station	Q25-S06 P35-C01C3
Film, thick - see Thick film		Tor ranway station	X23-S03
Film, thin - see Thin film		for railway train	P35-C01C7F
<b>Filter</b> discharge lamp coating	X26-A02D	for vehicle	X23-A09 P35-C01C7C
electric - see Electric filter	720-A02D	for verticle	Q14-C20
light fixture	X26-D01C	hose	P35-C03
incandescent lamp coating optical - see Optical filter	X26-B02X	sprinklers	P35-C01C3
Filter coil (noise)	U25-E02		P35-C03 X25-X05
Filter Coll (noise)	V02-F01J	Fire-prevention equipment	P35-C05
	W02-H	Fire-proof clothing	P35-A03C
Filter connector - see Connector			P35-C05
Financial		Fire-proof casing	V04-S22
banking	T01-N01A1	Fireworks	Q79-F
business business models	T01-N01A T01-J05A2A	bursting charge shell/container	Q79-F03 Q79-F01
data analysis	T01-J05A2C	star pellets	Q79-F02
EFT	T01-N01A1	First-aid kit	P32-A60
insurance internet business models	T01-J05A2E T01-N01A2	First in first out - see FIFO	U14-A01X
inventory monitoring/manageme		Fishing	
J05A2D		angling (sport/leisure)	P14-B02
investment	T01-J05A2F	business model	W04-X01K7A T01-J05A4
stock and shares technology	T01-J05A2F T01-N01A1	commercial	P14-B02
workflow	T01-J05A2B		X25-N02
Financial computer systems	T01-J05A1	Fishpond	X27-H
Fingerprint identification	S05-D01C5A	Fifth generation (5G) mobile phone	e
	T04-D07F2	system	W01-B05A1A
telephone	W01-C01Q5X	<b>-</b>	W02-C03C1L
Finishing apparatus	S06-K05	Fitness training equipment	P36-A06 W04-X01A5
Finite state machine FinTech	U21-C03B4	Fixed capacitor	7.0.7.0.7.0
Firewall	T01-N01A1 T01-N02B1D	low power - see Capacitor	V01-B
Fire alarms	W05-B02	low power, manufacture - see Ca	pacitor
combustion products detection	W05-B02 W05-B02A5	manufacture	V01-B01G
electric switch	W05-B02D		V01-B04
false alarm prevention	W05-B02	power	X12-B
inflammable gas detection	W05-C02C5 W05-B02A5	Fixed pattern noise suppression	W04-M01B7
infrared heat radiation detection	W05-B02B1		W04-M01D6 W04-P01H1
mechanically actuated	W05-B02C	Fixed resistor - see Resistor	V04-P01H1 V01-A02
radiation detection from fire ultraviolet flame detection	W05-B02B W05-B02B5		
ultraviolet harne detection	VVUO-DUZDO	Fixed-program memories - see RO fixed program	WIS, U14-A06B
	ı		

Fixing toner in electrophotography	S06-E06	Flip-flop memories - see RAMs, stat	tic, with
heat or pressure application	S06-E06A	bistable FET cells	U14-A03B1
pre-fixing	S06-E06P	Flip-flop pulse generator	U22-A02D
roll and roll driving	S06-E06B	Float switch	V03-C06X
Flame detection	S03-E14R	Floating gate FET - see Field effect	transistor
Flame trap	P35-C05	liousing gate (2) see field effect	U12-D02A1
Flame welding	X24-D05		
Flanging, metal	X25-A02F	Floating zone, semiconductor cryst	_
Flash EEPROM - see ROMs, electric	allv		U11-B02A
erasable	U13-C04B2	Floats, level indicating	S02-C06A
	U14-A03B7	Flocking (coating process)	P42-E05A
Flash, photographic	S06-B03	Floors - see Buildings, general med	
discharge tube	S06-B03A	construction and structural elemen	ts
9	X26-A01	Floor mat switch	V03-B01D
	X26-A02	Floppy disk	T03-N01
electronic	S06-B03A	drive/positioning	T03-A08A1A
incandescent lamp	S06-B03B		T03-F02
	X26-B02	loading	T03-A08A1A
Flash, video camera	W04-M01H5		T03-F01A
Flashlamp control	X26-C01A	magnetic record carrier manufact	ure T03-
Flashlight	X26-E01A	A02E1C	
_	S03-E01B	magnetic record carrier per se	T03-A01C1C
Flashpoint measurement		Flour mill (disc mill)	P41-A03C
Flat cable	X12-D03A1		P41-V60A
Flat plate capacitor - see Capacitor	V01-B03C3	Flow cytometry	S03-E04H
Flaw detection			S03-F05C S03-F06C
capacitive	S03-E02C3	using optical fluorescence	S03-F06C S03-E04D
eddy current	S03-E11A	using optical fluorescence using optical scattering	S03-E04D S03-E04C1
electron absorption	S03-E06A1		
electron diffraction	S03-E06C1	Flow properties investigation (see	
gamma ray absorption	S03-E06A1	Viscometer)	S03-F03
general	S03-F09B	Flow switch	V03-C06D
microwave neutron absorption	S03-E05C S03-E06A1	Flower handling, preserving	P13-A10
neutron diffraction	S03-E06C1	Flowing material, sampling	S03-E13B2
optical	S03-E04F2		
radiation back scattering	S03-E0412	Flowmeters	S02-C
thermal	S03-E01B	calibrating	S02-C07 S02-C07
ultrasonic	S03-E08A	compensation compound meters	
using pattern recognition	T04-D07A	continuous	S02-C03 S02-C01
using radiation, secondary emissi		Coriolis	S02-C01
X-ray	S03-E06A1	discontinous, volume	S02-C011
Flexible cable	X12-D03A2	electric/magnetic	S02-C02
		electrical or magnetic effects	S02-C01B4
Flexible printed circuit board manu		Karmann type	S02-C01A9
PCB manufacture)	V04-R05D	measuring relative flow	S02-C03
FlexRay vehicle data network	W05-D06F	mechanical, continuous	S02-C01A
	W05-D07D	mechanical, using pressure different	
	X22-K03	measurement	S02-C01A1
Flip chip	U11-E01C	mechanical, using pressure meas	
bonding	U11-E01C	37	S02-C01A1
bonding pads, manufacture	U11-C05G2B	mechanical, using rotating vanes	S02-C01A1
31 ,	U11-E01C	rotameter	S02-C01A9
bonding pads, structure	U11-D03B1	swirl type	S02-C01A9
Flip-flop		testing	S02-C07
astable	U22-A04A	thermal - see also thermal flowme	
bistable	U22-A04A U22-A04C		S02-C01B7
monostable	U22-A04C	ultrasonic	S02-C01B1
monostable	022 A040	using wave effects e.g. sound	S02-C01B1
		vending machine	T05-H06

venturi	S02-C01A	Flux-sensitive magnetic head	T03-A03C
vortex type	S02-C01A1	ballistic magnetoresistive head	T03-A03C3G
Fluid driving for spraying or other		biasing arrangements	T03-A03C9N
liquid application	P42-T05C	colossal magnetresistive head combined with write head	T03-A03C3X T03-A03C1
Fluid pressure measuring- see press	ure	exchange layer	T03-A03C1
measurement	S02-F04	Hall effect type	T03-A03C5
Fluid speed measurement	S02-G02	magnetic layers	T03-A03C9A
by measuring fluid force	S02-G02B	magnetoresistive material type	T03-A03C3
by measuring pressure differences	s S02-G02B	shielding layer	T03-A03C9J
electric	S02-G02A	spacer layer	T03-A03C9C
thermal	S02-G02A	tunnel barrier layer tunnel junction magnetoresistive l	T03-A03C9E
ultrasonic	S02-G02X	tunner junction magnetoresistive r	T03-A03C3C
using Bernoulli effect using Doppler effect	S02-G02B S02-G02X	Fluida ale da da agrecada e	
		Flyback dc-dc converter control	U24-D02B1 U24-D01A
Fluid-tightness testing acoustic/ultrasonic	S02-J06 S02-J06A3	CONTROL	U24-D01A
by detecting leakage fluid	S02-J06A	Focal plane array	U13-A01X
by electrically detecting leakage fl		Focus detection	01071017
	S02-J06A1	magneto-optical recording head	T03-D01D1A
by measuring fluid loss/gain rate		optical recording head	T03-B02A1C
immersion testing	S02-J06A9	photographic camera	S06-B01A
using pressure drop	S02-J06X	video camera	W04-M01D2E
using tracer to detect leakage fluid	1502-JU0A5	Focussing	
Fluidized bed furnace	Q77-A07	components of CRT for electron b	eam
used in combustion system	Q77-A07 Q73-T10		V05-D06A3
Fluorescence for materials investiga	-	exposure apparatus, semiconduct	
riuorescence for materiais investiga		lithography magneto-optical recording	U11-C04C2 T03-D01D1
	S03-E04D	optical fibre	V07-G04
Fluorescent display tube	V05-D01C	optical recording	T03-B02A1C
control aspects	T04-H03C9 V05-D01C5	photographic camera	S06-B01
dot matrix display for displaying character only	V05-D01C3 V05-D01C1	video cameras	
integral drive circuitry	V05-D10	automatic control	W04-M01D5D
manufacture (see also <b>Discharge</b> t		focus detection	W04-M01D2E
manufacture)		moving image sensor moving lens	W04-M01B8B W04-M01C1B
	V05-L05D1C	<del>-</del>	
seven segment display	V05-D01C1	Foil electrodes, capacitor - see Capa for electrolytic capacitor	V01-B01A5
Fluorescent lamp	X26-A01E1	for fixed capacitor	V01-B01A3
construction - see Discharge lamp		for power capacitor	X12-B
control	X26-C01B X26-C01B5A	Folded bit line architecture - see Me	emories.
electronic ballast	X26-C01B3A X26-C01B2	interconnection layout	U14-C01
	X26-C01B5A	Folded capacitor - see Capacitor	V01-B03C3
inductive ballast	X26-C01B1A	Folded Clos data network	W01-A06G1
	X26-C01B5A	Folded dipole antenna	
operating circuit	X26-C01B	linear type	W02-B01B1A
remote control	X26-C01B5A W05	ring type	W02-B01B2A
remote control	X26-C01B5A	Folder, batch, in printing	S06-C09
	X26-C01E	Folders & Files	P76-F
starting circuit	X26-C01B	Food & drink testing	
	X26-C01B5A	_	S03-E14A2
Fluoroscopy, x-ray	S03-E06B3	Food processing  bulk	X25-P01
medical	S05-D2A5B	control	T06-D02
Flute (instrument)	P86-A01A5	Control	X25-P01
Flux guide for magnetic head	T03-A03J3A	food packing/ canning	X25-F03A
Flux, soldering	X24-A01A	food packing/ canning	X25-P01X
Flux-gate sensor	S01-E01X	general food processing	X25-P01X
g	-30.//		

industrial cooking / baking equip	ment	Force measurement, special purpos	ses
	X25-P01A		S02-F03
meat slicing	X25-P01X	belt tension	S02-F03A
milk processing	X25-P01C	calibration, compensation and tes	
oil pressing	X25-P01X		S02-F03X
packaging	Q34-C	muscular	S02-F03A
Food processor	X27-B03	rope tension	S02-F03A
Food serving trolley	X27-B09	ski binding release force	S02-F03A
Food temperature history (see also		Forecourt petrol dispenser	X25-F03B2
Thermometers)	S03-B01	Forestry	
mermometers)	S03-E14A	business model	T01-J05A4
Food warmer	X27-B09	Forging, metal	X25-A02C T06-D05A
Foot pedal switch	V03-B01B	control	X25-A02C
Football (soccer)	P36-A01	Forklift truck	Q19-C06
	W04-X01K1J	1 OIRIII CIUCK	X22-P05F
goal-line technology	W04-X01C1C		X25-F05A
	W04-X01K1J	control	T06-D08F
Footwear	P22	CONTROL	X25-F05A
boots	P22-B	electric	X21-A01B
cleaning equipment (non-electric	· ·	Ciccurc	X25-F05A
cleaning equipment (electrical)	X27-D01A	F	7.20 . 007 .
constructional details	P22-T	Format, data transmission, error	W01 A01D2
electrical details	X27-A02B1	detection/correction	W01-A01B3
insert	P22-T01	Format Conversion	T01-N03B4
laces	P22-T05	Formatting record carrier	
manufacture	P22-M	magnetic	T03-A06F
novel footwear materials	P22-T50	magneto-optical	T03-D01E7
safety arrangements	P22-T06	optical	T03-B05F
shoes, sandals	P22-A	Forward DC-DC converter	U24-D02B1
shoe cabinet	P25-C01X	control	U24-D01A
sport shoes	P22-F03		U24-D02B1
socks	P22-C	Four pole characteristics, measuring	~ S01 D05C
soles, insoles and heels stiffener	P22-T01	- · · · · · · · · · · · · · · · · · · ·	<b>9</b> 30 1-203C
	P22-T01 P22-F	Fourier	
types of footwear babies and children	P22-F01	analysis for electrical frequency	604 50060
dolls and other toys	P22-F01 P22-F02	measurement	S01-D03C3
orthopaedic shoes	P22-F05	transform, computer processing	T01-J04B1
safety shoes	P22-F04	transform, optical spectrometry	S03-E04T
sport shoes	P22-F03	Fourth Generation (4G) mobile pho	ne
uppers, boot legs and tongues	P22-T03	system- see 4G	W01-B05A1A
welt and lining	P22-T04	•	W02-C03C1H
Force measurement		Fractal image coding	T01-J10D
by counter-balancing	S02-F01A		W04-P01A8
by deformation of gauges	S02-F01A	Frame/casing (general)	Q68-A01
capacitive	S02-F01B	portable frame (e.g. trolley jack)	Q68-A01A
Force Measurement	S02-F01	Frame scanning	200710171
hydraulic	S02-F01A		S06-D01A
inductive	S02-F01B	electrophotography	
magnetic	S02-F01B	Frame store for video signal	W04-P01C
piezoelectric	S02-F01E	memory addressing and control	W04-P01C5
•	V06-V01B	novel memory aspects	W04-P01C1
	V06-V04G	Frames, telephone distribution	W01-B20
piezoresistive	S02-F01C	Franking apparatus, postal	T05-C05
pneumatic	S02-F01A		
resistance strain gauge	S02-F01C	Fraud protection, smart card	T01-H01C1
special purpose	S02-F03A	Free electron laser	V08-A04E
using variations in vibration frequ		Free space optical communication	
	S02-F01B	alignment	W02-C04A8
		data interface	W01-A07H3

	14/04 40/00		
data network	W01-A06C3 W02-C04B2	Frequency selective network distributed constant	W02-A05
general telemetry or telecontrol signal	VVUZ-CU462	lumped constant	U25-E
transmission using free space	W05-D06A3	'	
tracking	W02-C04A8A	Frequency shift keying	W01-A09A2 U23-P01A1
Freeze-frame display for TV receive		Frequency synthesis using PLL	U23-D01B
	W03-A13C	division circuit	U23-D01B1
Freezer - see Refrigeration		dual loop (using)	U23-D01B7
French horn (instrument)	P86-A01A3	fractional synthesis	U23-D01B1A
Frequency		output signal purity improvement	
measuring, by conversion to amp	litude	reference oscillator	U23-D01B3
eacag, 2) conversion to amp	S01-D03A	variable ratio divider	U23-D01B1
measuring, by conversion to phas	e shift	Frequency synthesis, direct	U23-F03
	S01-D03A	analogue circuitry	U23-F03A7
measuring, by pulse counting	S01-D03B	D/A and A/D aspects	U23-F03A5
measuring, electrical	S01-D03	improve spectral purity improving frequency resolution	U23-F03B5
measuring, optical (see also <b>Opti</b>		increasing frequency transition	U23-F03B1 U23-F03B3
	S03-A09	memory aspect and look-up tables	
measuring, panoramic receiver	S01-D03C1	phase accumulators	U23-F03A3
measuring, spectral analysis of measuring, using Fourier analysis	S01-D03C	synthesiser performance	U23-F03B
measuring, using rouner analysis		Frequency-deviation protection	X13-C01X
medsaring, dsing spectrum analys	S01-D03C1		
measuring, using sweeping appar		Friction welding	X24-D07
spectral analysis, electrical	S01-D03C	FSK	U23-P01A1
varying clock rate in computer	T01-K01	FTIR spectrometer	S03-A02F
Frequency changing	U23-J05	Fuel analysis	S03-E14E1
Frequency comparators		Fuel cell	X16-C
analogue	U23-C01	alkaline	X16-C03
digital	U23-C02	anode and cathode gases separate	or
Frequency compressive feedback F	M radio		X16-C16
receiver	W02-G03B7	bio(-catalyst)	X16-C06
Frequency control, lasers	V08-A03C	catalyst temperature control	X16-C09 X16-K
Frequency control, musical tone	W04-U03A	control	X16-C09
Frequency control/synchronisation		electrode	X16-E06A
automatic	, U23-D	electrode details	X16-E06A5
Frequency converter (power supply		electrode details, catalyst	X16-E06A5A
riequency converter (power suppr	X12-J03	electrode details, gas diffusion laye	
matrix	X12-J03A	l . l l . l . NATA	X16-E06A5E
Frequency divider		electrode details, MEA	X16-E06A5C
analogue	U23-B01	electrode details, membrane electrode assembly	X16-E06A5C
counting chain implementation	U21-D	electrode assembly	X16-E06A1
digital, for pulse signals	U22-D05A	electrode materials, nanoscale	X16-E06A1A
digital, for sinusoidal signals	U23-B02	electrode separator	X16-F02
PLL synthesizer	U23-D01B1	flat	X16-C07
Frequency division multiplex		for electric vehicle	X21-A01J
data transmission	W01-A03E5		X21-B01A
frequency division duplex	W02-K01C	fuel processing	X16-C17
general	W02-K01	fuel processing, catalyst	X16-C17C
orthogonal (OFDM)	W02-K07C	3.	X16-C17E
satellite communication system	W02-K01A	fuel processing, hydrogen manufac	cture X16-C17A
Frequency hopping			X16-C17A
- see Spread spectrum	W02-K05A6	3.	X16-C17A1
Frequency multiplier			X16-C15A
analogue	U23-B02		X16-C15A2
digital for pulse signals	U22-D05A		X16-C15A2
digital for sinusoidal signals	U23-B02	fuel/gas supply, manifolds	X16-C15A1
optical	V07-K04	fuel/gas supply, pumping	X16-C15A4

fuel/gas supply, wicking fuel storage	X16-C15A3 X16-C15C	Full-wave ac-dc converter	U24-D04C X12-J04C
fuel storage, bulk fuel storage, hydrogen	X16-C15C1 X16-C15C3	control	U24-D01A U24-D04C
absorbing/storing material	X10 C13C3		X12-J01A
fuel storage, replaceable containe	erX16-C15C2		X12-J04C
fuel storage, nanomaterial/nanot	ube		X13-H03B
gas/air circulation control	X16-C15C3A X16-C09	Funds transfer, electronic	T05-L02
gas/air circulation control gas diffusion layer	X16-C09 X16-E06A5E	Funeral apparatus	P33-A40
housing	X16-C18	Furnace resistance-heating element	: X25-B01E1
hydrogen generation	X16-C17A	Furnace, semiconductor manufactur	
micro	X16-C07	sintering/ curling furnaces	U11-C09E
molten carbonate	X16-C02	Furnace treatment, semiconductor	U11-C03A
PEM	X16-C01C	,	
phosphoric acid	X16-C04	Furnace	X25-C Q77
proton exchange membrane	X16-C01C	air blower	Q77-T02
seal	X16-C18	blast furnace	Q77-102 Q77-A01
separator, electrodes	X16-F02	burner	Q77-T03
separator, gases solid oxide	X16-C16 X16-C01A	casing	Q77-T01
solid oxide solid oxide, monolithic	X16-C01A3	drum	Q77-T01
solid oxide, monontric	X16-C01A1	dust collector	Q77-T08
solid polymer	X16-C01C	feeder/hopper	Q77-T05
solid polyethylene	X16-C01C	flue-gas stack	Q77-T07
SPE	X16-C01C	fuel used	
stack	X16-C18	coal	Q77-B01
Fuel injector		gas	Q77-B03
IC engine	Q51-H01B	oil	Q77-B02
3	X22-A02A1	wood	Q77-B04
vehicle	Q17-E	constructional details control	Q77-T Q77-T20
	X22-A02A	control control	X25-C03
Fuel pump		cooling arrangements	Q77-T10
IC engine	X22-A02D	heat exchanger	Q77-T06
vehicle	X22-A02D	lining	Q77-T01
Fuel system		maintenance	Q77-G
vehicle	X22-A02	monitoring	X25-C03
Fuel/primary cell combination	X16-D	radiant coils/tubes recycling of furnace components	Q77-T04 Q77-R
Fuel/secondary cell combination	X16-D	repair	Q77-K Q77-G
Full colour printing	S06-K01A	roof/wall	Q77-T01
Full frame scanning		safety	Q77-T20
electrophotography	S06-D01A	soot blower	Q77-T08
	U24-D05A	tuyere	Q77-T02
Full-bridge dc-ac converter	X12-J05A	types of furnace	
control	U24-D01A	arc	X25-C02
30	U24-D05A	blast furnace	Q77-A01
	X12-J01A	discharge	X25-C02 Q77-A07
	X12-J05A	fluidized bed hearth-type	Q77-A07 Q77-A03
	X13-H03A	horizontal	Q77-A03
Full-bridge dc-dc converter	U24-D02B5	induction	X25-C05
•	X12-J02B	muffle	Q77-A04
control	U24-D01A	resistance	X25-C01
	U24-D02B5	retort	Q77-A04
	X12-J01A	vacuum	Q77-A99
	X12-J02B	vertical furnaces	Q77-A01
	X13-H03X	waste heat management	Q77-D
		Furnace (applications)	
		glass manufacture	Q77-U40
		industrial	X25-C
			Q77-U40

laboratory	Q77-U14	multi-purpose furniture	P25-L
metallurgy	Q77-U26	office furniture	P25
waste disposal/treatment	Q77-U20	picture frame	P27-B01
Furniture	277 020	shelf (cabinet)	P25-C02B
	P26-F	shoe cabinet	P25-C01X
accessories, e.g. throw	P27-B02	ski rack	P25-C01X
armchair	P26-B01	sofa	P26-B01
bean bag	P26-A01X	sofa-bed	P26-B03
bed	P26-B02	stackable furniture	P25-L
bed linen	P27-B02	table	P25-A
bed interior	P25-A01B	table top	P25-A02A
bedside cubinet/tubie	P25-C01C	tea trolley	P25-A01X
bench	P26-A	umbrella stand	P25-X
blackboard	P25-X	vehicle cabin	Q14-T
blind	P27-C	wardrobe	P25-B
book trough	P25-C02B	Fused deposition modeling	X25-A08C2
cabinet	P25-C	Fuses, electrical	X13-D01
carpet, rug	P27-B04	caps	X13-D01 X13-D01B
chair	P26-A	cartridge fuses	X13-D01B X13-D01T2
construction		casings	X13-D0112
leg and feet	P26-A10B	elements	X13-D01B X13-D01A
seat/armrest/backrest/headrest	P26-A10A	expulsion fuses	X13-D0173
types of chairs/benches		fillings	X13-D01A
cinema/theatre chair	P26-A01C	film fuses	X13-D01T5
dentist chair	P26-A01B	for vehicle	X22-X01C
folding chair	P26-A01D	fuse resistors	X13-D01T6
gaming chair	P26-A01A	fuse-switch	X13-B01
hairdresser chair	P26-A01B	fusible-links	X13-D01A
home/office chair	P26-A01A	holders	V04-K03
inflatable chair	P26-A01D	housings	X13-D01B
stackable chair	P26-A01D	indicators, operation	X13-D01B
vehicle seat	P26-A01F	manufacture	X13-D01C
child-proofing arrangement	P26-E	manufacture, integrated circuit	U11-C05G2A
children, furniture for -	P26-E P27-B05	markings, distinguishing	X13-D01B
clothes hanger/rack	P25-L	materials, fusible member	X13-D01A
convertible furniture curtain	P27-C	memory	U14-A06B1
cushion	P26-C	monitoring	X13-D01C
desk	P25-A01A	printed fuses	X13-D01T5
door (cabinet)	P25-C02C	semi-enclosed fuses	X13-D01T1
drawer (cabinet)	P25-C02C	SF6 fuses	X13-D01T9
drawer (table)	P25-A02C	SMT fuses striker fuses	X13-D01T7
easel	P25-X		X13-D01T4 U12-C04
electrical aspects	X27-A03	structure, integrated circuit switch-fuse	X13-B01
electrical heater	X27-A03	terminals	X13-D01 X13-D01A
	X27-E	testing	X13-D01A X13-D01C
electronic office	T04-L07	thick film fuses	X13-D01C X13-D01T5
fittings for shops, restaurants and	warehouses	thin film fuses	X13-D0115
·	P27-A	vacuum fuses	X13-D01T8
game table	P25-A01X	Fuses, thermal	
gaming chair	P26-A01A	manufacture	X13-D12 X13-D08
garden (electrical details)	X27-A01B	testing	X13-D08
gun rack	P25-C01X	· ·	
handle (cabinet)	P25-C02D	Fuses (thermal/electrical) application	
high chair	P26-A01A	aerospace	X13-U03
	P26-E	aviation	X13-U03
	-	la a a ta	
home furniture	P25	boats	X13-U04
leg (table)	P25 P25-A02B	industrial machines	X13-U06
	P25 P25-A02B P25-M	industrial machines military	X13-U06 X13-U05
leg (table) manufacture	P25 P25-A02B P25-M P26-M	industrial machines military railway	X13-U06 X13-U05 X13-U02
leg (table)	P25 P25-A02B P25-M	industrial machines military	X13-U06 X13-U05

## **Fuse layer formation, semiconductor**

U11-C05G2

ruse programmi	ing for memorie	es - see
ROMs, non-re	programmable.	, using fuses

nome, non reprogramm	idale, doing idaes
	U14-A06B1
Fuser oil	S06-E06C
Fusion reactor	X14-A03
poloidal coil	X12-C01B1
	X12-C01F
	X14-A03
toroidal coil	X12-C01B1
	X12-C01F
	X14-A03

#### Fuze

blasting	X25-D01
weapon	W07-C01
Fuze actuation (weapons)	W07-C03
impact switch	W07-C03
responsive to sensed proximity	W07-C03C
responsive to sensed vibration	W07-C03A
time delav	W07-C03E

#### **Fuzzy control system**

fuzzy logic control system	106-A05A1
for vehicle	X22-Q
for vehicle engine	X22-A03K

#### **Fuzzy logic**

analogue elements and systems	T02-A04B6
computer data processing system	sT01-J16B
elements	U21-C03B1B

## G

Gain control	U24-C
amplitude-locked loop	U24-C01G
automatic (AGC)	U24-C01
combined with tone control	U24-C05D
companders	U24-C02B
control signal derivation	U24-C01C
DC limiting	U24-C02A5
digital/computer control details	U24-C05B
limiters	U24-C02A
manual	U24-C05A
manual, continuously-variable	U24-C05A1
manual, stepped variation	U24-C05A5
muting	U24-C05C
muting, radio receiver	W02-G03B1
peak detector	U24-C03A
signal rectifier, general	U24-C03
stepped variation, manual	U24-C05A5

# **Gallium aluminium arsenide-** see **AIII-BV compounds**

Gallium arsenide- see AllI-BV compounds
Gallium indium arsenide- see AllI-BV compounds
Gallium nitride - see AllI-BV compounds
Gallium phosphide- see AllI-BV compounds
Galvano-magnetic device (see also Transducers)

U12-B01 magnetic field measurement application S01-E01B1

	SUI-EUIBI
Games	P36-C W04-X02
amusement-with-prizes (AWP)	T05-H05E W04-X02A3
arcade	P36-C T05-H05E
	W04-X02A8
betting	W04-X02A6
board	P36-C01
board	W04-X02B1
card playing equipment	P36-C05
5 1 1 3 5 1 1	W04-X02B5
casino equipment	P36-C09
	W04-X02E
chess	P36-C01
	W04-X02B1
coin operated	P36-C
	T05-H05E
	W04-X02A
computer/ video games	T01-P02A
	W04-X02C
dealing equipment (cards)	P36-C05
	W04-X02B5
draughts	P36-C01
f :- 1:	W04-X02B1
fruit machine	T05-H05E W04-
Integrated with talenhane	X02A3 W01-C01P6L
Integrated with telephone interactive broadcasting	W01-C01F6L W02-F10G
interactive broadcasting	W04-X02C
lottery equipment	T05-F
iottory equipment	100-1

W04-X02G

mahjong	P36-C03	Gas utility failure alarm	W05-B08J
	W04-X02B	commercial	W05-B08J5
pachinko	P36-C13	domestic	W05-B08J1
	W04-X02A1	industrial	W05-B08J3
pinball	P36-C13	producer	W05-B08J7
	W04-X02A1	Gas analysis, optical, non-dispersiv	<b>e</b> S03-E04B1A
playing card dealing equipment	P36-C05	Gas chromatography	S03-E09C1
	W04-X02B5		303-L07C1
roulette	P36-C09	Gas circuit breaker	\/40 D00D
	W04-X02B	with built-in arc control	X13-B02B
	W04-X02E	with separate arc control	X13-B03A1
video	W04-X02C	Gas cooker	X27-C05
with physical interaction	W04-X02A5	Gas discharge display - see Plasma	display tube
Gamma camera - see also nuclear in	maging		V05-A01
	S03-G02B3	Carallashanna talka	V 00 7 10 1
for medical diagnosis	S05-D02C	Gas discharge tube	- \/OF AO1
scintillator	S03-G02B1	display - see Plasma display tube	
semiconductor detector	S03-G02B2G	manufacture	V05-L05A
Gamma correction, video signal		surge protection tube switching tube	V05-A05 V05-A03
general	W04-P01E1	<u> </u>	VU3-AU3
TV receiver	W03-A04A	Gas filling	
		analysing/processing (e.g. plasma	
Gamma ray analysis (see also Nucle			V05-F04E
	S03-E06	discharge tube (general)	V05-M09
GAN (Generic Access Network)	W01-C05B4C	Gas holder	
Gang bonding		constructional details	Q69-T
bonds	U11-D03A2	discharging method/apparatus	Q69-D
for semiconductor device packag	es U11-E01B	filling method/apparatus	Q69-C
Garage	Q46-B04	fixed capacity gas holder	Q69-B
<u> </u>	Q+0 D0+	manufacturing details	Q69-M
Garbage disposal	V2E M/01	pressure vessel	Q69-B01
industrial/large scale	X25-W01 X27-K	steam trap	Q69-X Q69-A
domestic	727-N P43-E	variable capacity gas holder	
general general, by burning	P43-E01	Gas lasers - see Lasers	V08-A04B
general, by burning general, by burying or dumping	P43-E03	remote reading	S02-K08A
general, by burying or dumping general, by treating or converting		Gas sampling (see also Pollution an	d Air
		quality)	S03-E13C
Garden equipment	X27-A01	Gas sensor	S03-E14P
furniture	X27-A01B	electrochemical (see also under	
hedge clipper	X27-A01A X27-A01A	electrochemical)	S03-E03
lawn mower sprinkler	X27-A01A X27-A01	for combustion products - see als	0
table	P25-A01C	Vehicle and IC engine	
		for chemical reaction products	S03-E14P1
Garment - see Personal article, clot		for other products	S03-E14P9
electrical details	X27-A02B1	semiconductor	S03-E02A
non-electrical details	P21		U12-B03E
Gas		semiconductor manufacture	U11-C15B1
consumption meter	S02-C02C	Gas tank - see Gas holder	
prospecting	S03-C	Gas turbine	Q52
Gas alarms	W05-B02A	control, aircraft	W06-B01A1
carbon monoxide detection	W05-B07L1	electric power generation	X11-C01
combustion products detection	W05-B02A5	carbon footprint reduction	X11-C08
inflammable gas detection	W05-B02A5	catalytic converter	X11-C08
ionisation chamber	W05-B02A3	environmental protection	X11-C08
personal safety gas alarm	W05-B07L	monitoring, operation and cont	
Gas analysis	S03-E14P	3. 1	X11-C10
Gas detection	S03-E14P	gas turbine generator, applicat	ion
200 400000011	555 E 1 T1		X11-U01C
		engine testing	S02-J01C
		engine testing, for aircraft	S02-J01C1
		for aircraft	Q25-C02B

for ship	Q24-E02B	component magazine	V04-V01A
for train	Q21-C01C	component value changing tool	V04-V09
Gas welding	X24-D05	cutting component leads	V04-V02A
Gas-filled tube		feeding components	V04-V01
anodes, electrodes	V05-A07A1	forming component leads	V04-V02A
cathodes, electrodes	V05-A07A1 V05-A07A3	mounting components	V04-V01
· · · · · · · · · · · · · · · · · · ·		orienting components	V04-V01
complete novel device	V05-A07G	removing electronic components	V04-V01
control of electrodes	V05-A07A5	shaping component leads	V04-V02A
details	V05-A07	trimming component leads	V04-V02A
electrodes	V05-A07A	wiring	V04-V02
gas filling	V05-A07C	General circuit manufacture (see V0	4-R for PCB
grids, electrodes	V05-A07A5	manufacture in particular)	- K.O C2
heated cathodes, electrodes	V05-A07A3A	_	
lead-ins	V05-A07B	Generator	TO2 AO4D4
seals	V05-A07B	arbitrary function, analogue	T02-A04B4
switching	V05-A03	character or stroke	T04-H01A1
	X13-A04H	diesel-electric locomotive	X23-A01A2
vessels	V05-A07B	digital function	T01-J17 V05-E05A
Gate arrays	U13-C04D	ion beam for propulsive effect	
wiring aspects	U11-D03C2	ion for processing tube	V05-F04A5
Gate turn-off thyristor - see Thyrist	ors,	pattern (video)	W04-M07 U22-A
gate turn-off	U12-D01B3	pulse - see Pulse generation synchronising pulse, TV	W04-M05
Gated amplifier	U24-G02F1	synchrotron	V05-E03A
•		vibration, general	P43-A01
Gates, logic - see Logic gates	U21-C03B	vibration, general vibration, industrial scale	X25-L05
Gauges		vibration, modstrial scale	V06-V04C
mechanical	S02-A01B	video	W04-M
precipitation	S03-D02A	welding (see also X11)	X24-G
pressure- see Pressure gauges	S02-F04	wind power	X15-B01B
vacuum	S02-F04D1	X-ray, for medical purposes	S05-D02A3
vehicle	X22-E		
wind direction	S03-D01	Generator, electromechanical - see	
wind direction wind speed	S03-D01 S03-D01	Generic Access Network (GAN)	W01-C05B4C
		Generic Access Network (GAN) Genetic Algorithms	W01-C05B4C T01-J16C4
wind speed  Gaussian phase shift keying	S03-D01	Generic Access Network (GAN)	W01-C05B4C T01-J16C4 S03-C
wind speed  Gaussian phase shift keying  Gear	S03-D01 W01-A09B	Generic Access Network (GAN) Genetic Algorithms Geomodelling	W01-C05B4C T01-J16C4 S03-C T01-J13
wind speed  Gaussian phase shift keying	S03-D01 W01-A09B V06-M06	Generic Access Network (GAN) Genetic Algorithms	W01-C05B4C T01-J16C4 S03-C
wind speed  Gaussian phase shift keying  Gear  dynamoelectric	S03-D01 W01-A09B V06-M06 X11-H03A	Generic Access Network (GAN) Genetic Algorithms Geomodelling	W01-C05B4C T01-J16C4 S03-C T01-J13
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven	S03-D01 W01-A09B V06-M06 X11-H03A X25-L02	Generic Access Network (GAN) Genetic Algorithms Geomodelling Geographical Information systems	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing	S03-D01 W01-A09B V06-M06 X11-H03A X25-L02 S02-J03A	Generic Access Network (GAN) Genetic Algorithms Geomodelling Geographical Information systems Geophones	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing	S03-D01 W01-A09B V06-M06 X11-H03A X25-L02 S02-J03A Q64-C	Generic Access Network (GAN) Genetic Algorithms Geomodelling Geographical Information systems Geophones testing	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft	S03-D01 W01-A09B V06-M06 X11-H03A X25-L02 S02-J03A Q64-C Q25-C03A	Generic Access Network (GAN) Genetic Algorithms Geomodelling Geographical Information systems Geophones testing Geophysics- see prospecting	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships	S03-D01 W01-A09B V06-M06 X11-H03A X25-L02 S02-J03A Q64-C Q25-C03A Q24-E03A	Generic Access Network (GAN) Genetic Algorithms Geomodelling Geographical Information systems Geophones testing Geophysics- see prospecting Geothermal power generation	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft	S03-D01 W01-A09B V06-M06 X11-H03A X25-L02 S02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle	S03-D01 W01-A09B V06-M06 X11-H03A X25-L02 S02-J03A Q64-C Q25-C03A Q24-E03A	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle  Geiger-Muller tube	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle  Geiger-Muller tube nuclear radiation measurement	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle  Geiger-Muller tube nuclear radiation measurement tube per se	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and the	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle  Geiger-Muller tube nuclear radiation measurement	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle  Geiger-Muller tube nuclear radiation measurement tube per se	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and the	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and tecompounds	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle  Geiger-Muller tube nuclear radiation measurement tube per se  Gender determination	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds Getter	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09 ents, apparatus V04-V01 X24-A02	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp	W01-C05B4C T01-J16C4 \$03-C T01-J13 T01-J06B1 \$03-C01B \$03-C09 \$03-C10 \$03-C X15-G X15-W X15-V X15-G01 X15-G02 their
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09 ents, apparatus V04-V01 X24-A02	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp discharge tube	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02 Cheir  V05-D07E X26-A02X V05-M06
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09 ents, apparatus V04-V01 X24-A02	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp discharge tube incandescent lamp manufacture	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02 their  V05-D07E X26-A02X V05-M06 X26-B02X
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09 Pents, apparatus V04-V01 X24-A02 Pents, V04-V01 X24-A01	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp discharge tube incandescent lamp manufacture  Gettering	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02 Cheir  V05-D07E X26-A02X V05-M06 X26-B02X V05-L06
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09 Pents, apparatus V04-V01 X24-A02 Pents, V04-V01 X24-A01	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp discharge tube incandescent lamp manufacture	W01-C05B4C T01-J16C4 S03-C T01-J13 T01-J06B1 S03-C01B S03-C09 S03-C10 S03-C X15-G X15-W X15-V X15-G01 X15-G02 their  V05-D07E X26-A02X V05-M06 X26-B02X
wind speed  Gaussian phase shift keying  Gear	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09 Pents, apparatus V04-V01 X24-A02 Pents, V04-V01 X24-A01C otts	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp discharge tube incandescent lamp manufacture  Gettering discharge tubes	W01-C05B4C T01-J16C4 \$03-C T01-J13 T01-J06B1 \$03-C01B \$03-C09 \$03-C10 \$03-C X15-G X15-W X15-V X15-G01 X15-G02 Cheir  V05-D07E X26-A02X V05-M06 X26-B02X V05-L06
wind speed  Gaussian phase shift keying  Gear dynamoelectric electrically-driven testing  Gearing aircraft ships vehicle  Geiger-Muller tube nuclear radiation measurement tube per se  Gender determination  General circuit manufacture (de)soldering electronic component method assembling electronic component	\$03-D01 W01-A09B V06-M06 X11-H03A X25-L02 \$02-J03A Q64-C Q25-C03A Q24-E03A Q13-A24 Q64-C \$03-G02B2A V05-H \$05-D09 Pents, apparatus V04-V01 X24-A02 Pents, V04-V01 X24-A01C otts V04-V01	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp discharge tube incandescent lamp manufacture  Gettering discharge tubes	W01-C05B4C T01-J16C4 \$03-C T01-J13 T01-J06B1 \$03-C01B \$03-C09 \$03-C10 \$03-C X15-G X15-W X15-V X15-G01 X15-G02 Cheir  V05-D07E X26-A02X V05-M06 X26-B02X V05-L06
wind speed  Gaussian phase shift keying  Gear	\$03-D01 \$00-A09B \$00-A09	Generic Access Network (GAN) Genetic Algorithms Geomodelling  Geographical Information systems Geophones testing  Geophysics- see prospecting Geothermal power generation constructional details control, monitoring & testing electricity generation thermal power/heating  Germanium- see AIV elements and toompounds  Getter CRT discharge lamp discharge tube incandescent lamp manufacture  Gettering discharge tubes	W01-C05B4C T01-J16C4 \$03-C T01-J13 T01-J06B1 \$03-C01B \$03-C09 \$03-C10 \$03-C X15-G X15-W X15-V X15-G01 X15-G02 Cheir  V05-D07E X26-A02X V05-M06 X26-B02X V05-L06

Ghost control reference signal	W00 505 0	GPS	W06-A03A
transmission	W02-F05C	absolute position determination anti-jamming systems	W06-A03A5C W06-A03A5M
Ghost suppression circuit (TV receiv		differential global positioning syst	
Girders- see Buildings, general med		3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	W06-A03A5A
construction and structural element	is .	jamming systems	W06-A03A5M
Glass	CO2 E14D4	novel GPS receiver	W06-A03A5R
analysis working	S03-E14D4 X25-A05	novel infrastructure	W06-A03A1
Glassware	P27-B03	position determination for second purpose	w06-A03A5E
		receiver integrated with telephone	W01-C01P7
Global Positioning System	S02-B08C W06-A03A5	use as a frequency standard use as a time standard	W06-A03A5J W06-A03A5G
Glow discharge heating	X25-B03B	Gradient coil for MRI/NMR	S01-E02A8A
GMSK	W01-A09B		S03-E07
Goal-line technology, football (soco	er)		V02-F01G1
	W04-X01C1	medical-use	S03-E07
	W04-X01K1J		S05-D02B1 V02-F01G1
Goggles	X27-A02D	C	V02-1 0 1 G 1
for protection against laser radiati		Gradient freeze crystal growth, for semiconductor manufacture	U11-B02X
aiahr daiaa	V08-A10	Grading and sorting objects	P41-K
night vision	W07-G01	Grading and sorting objects	T05-K
Golf	P36-A01		X25-F06
analysis of swing	W04-X01K1L S02-H	based on density	P41-K01E
analysis of swing	W04-X01A1	based on dimensions	P41-K01A
cart	W04-X01F	based on weight	P41-K01C
golf gloves	P21-D	Grain	
	P21-H	analysis	S03-E14J
portable hole distance measuring equipment	W04-X01C1	buhrstone	P41-A03C
equipment	W04-X01E		P41-T01H
swing training	W04-X01A		P41-V60A
training simulator	W04-X01A3	dehusking	P41-A07A
angle/orientation measurement	S02-A10D1	: II ( dia a: II)	P41-V60A
using optical method	S02-A03	mill (disc mill)	P41-A03C P41-V60A
Goods	X25-F	millstone	P41-A03C
automated warehousing conveying vehicle	X25-F07 X25-F05A		P41-T01H
control	T06-D08F		P41-V60A
inventory control	X25-F09	Gramophone pick-up	V06-V04A3
labelling	X25-F03A3C		W04-A02
packaging	X25-F03A1	Graph	
smart packaging packages	X25-F03A3A	reading, for computer input	T04-E
smart packages	X25-F03A3 X25-F03A3A	graph generation	T01-J10C1
RFID tagging	W06-A04B5G	Graphic equalisers	W03-C05C
shelves in warehouses or shops	P27-A01	Graphics, computer	T01-J10C5
stock management	X25-F09	Gratings, diffraction - see Optical	
tagging	X25-F03A3C		V07-F02B
tracking	X25-F11	Gratzel cell	X15-A02D1
Government	T01-J05A3	Gravimetric	
e-government	T01-N01A3	analysis	S03-E12A
GPRS	W01 C01D3C	prospecting	S03-C04
mobile phone aspects	W01-C01D3C W01-C01G6G	Gravitational	CO2 CO4
system aspects	W01-B05A1A	field/waves, measuring timepiece	S03-C04 S04-A09
	W01-C05B3J	•	
	W02-C03C1A	Grinding (metals)	P54-D05 X25-A03C2
		applications	P54-U
	Į.	1.1	

building/construction industry	P54-U17	with blast material	P61-A20C
industrial	P54-U40	Group delay correction network (lu	mned
personal items	P54-U50	constant)	U25-E05X
vehicles	P54-U03	•	
weapons	P54-U31	Group delay measurement	S01-D05C
constructional details	P54-T	Grouting sleeve	Q44-A01G
cooling/lubrication	P54-T22	Growth measurement	S03-F20
debris disposal	P54-T99	GSM telephone handset	W01-C01D3C
drives/gears	P54-T02	GSM telephone system	W01-B05A1A
frames/casing	P54-T05	Com telephone system	W02-C03C1A
safety/control (mechanical deta tools/tool holders		6111	
	P54-T03 P54-T25	GUI	T01-J12
workpiece feeding/guiding honing	P54-D05	digital camera control	W04-M01B1
lapping	P54-D05	TV receiver application	W04-M01D1C W03-A02C5A
maintenance	P54-G	TV receiver application video camera control	W04-M01D1C
			W04-W01D1C
Grinding (non-metals)	P61-A20	Guidance	
and Park and	X25-A03C2	systems for weapons	W07-A01
applications	P61-U	vehicle	T07-D
agriculture/farming/logging	P61-U05 P61-U17	vehicle, on-board computer	T01-J06B
building/construction industry domestic		Guitar pick-ups	W04-U02A1
food	P61-U01	Gull-wing leads	U11-D03A3
furniture	P61-U07 P61-U19	Gun	
medical	P61-U13	air gun	Q79-A01X
mining/drilling	P61-U18	ammunitions	Q79-T02
pharmaceutical	P61-U13	artillery gun	Q79-A02D
tobacco	P61-U08	cleaning/maintenance	Q79-G
vehicles	P61-U03	constructional details	Q79-T
waste disposal/waste treatment		decommissioning	Q79-S
waste alsposali waste a califfern	P61-U20	electrical details	W07-C
constructional details	P61-T	firearm	Q79-A02
cooling/lubrication	P61-T13	machine gun	Q79-A02C
debris collection	P61-T12	manufacture	Q79-M
drives/gears	P61-T04	materials	Q79-T50
dust extraction	P61-T12	non-lethal gun	Q79-A02F
frames/casing	P61-T01	pistols	Q79-A02A
safety/control (mechanical deta	ils)	safety features	Q79-T10
	P61-T10	training/practice weapon/facility	Q79-E
control (electrical details)	T06-D07A	rack	P25-C01X
	X25-A03C2	ray-gun	Q79-A99
	X25-A03F	spring gun	Q79-A01X
honing	P61-A01B	water pistol	Q79-A01X
lapping	P61-A01C	Gunn-effect devices	U12-B02A
linear	P61-A20B	Gymnastics	P36-A06
maintenance/cleaning	P61-G	•	W04-X01A5
measuring/indicating/controlling	grinaing	Gyrators	U25-C
equipment	P61-F	=	
mechanism	P61-A20	Gyratory crusher	P41-A01G
polishing	P61-A03	Gyroscope	S02-B07
portable/hand-held	P61-A20G		W06-A07
recycling	P61-R	inertial navigation system	W06-A07
rotary	P61-A20A	optical	S02-B07B
sharpening	P61-A01A	ring resonators	V08-A01A1
semiconductor wafers	U11-C06A1A	using optical fibres	V07-N01
specific materials	P61-V	with electrical transducer	S02-B07A
ceramics/porcelain/concrete	P61-V20	Gyrotron	V05-C01D
glass	P61-V15	manufacture	V05-L05C
plastic/rubber/resing	P61-V13	tube details	V05-C01D1
stone/rock/ores/slate/minerals	P61-V22		
wood	P61-V11		
	·		

Н		spanner, wrench	P62-A02
	D00 A	stapler	P62-A06
Haberdashery	P23-A	vice/clamps	P62-D02
Hair		workbench	P62-D01
clipper	X27-A02A3B	Hand scanner for computer input	T04-M02
curler	X27-A02A1 X27-A02A3B	Hand written character	
depilatory tool drier	X27-A02A3B X27-A02A1	computer input	T04-F04
laser removal	S05-A03A2	recognition	T04-D07E
tong	X27-A02A1	Hand-off for mobile radio system	
Hairdressing equipment	P24-C01	cellular	W02-C03C1D
= : :		non-cellular	W02-C03C3D
Half-bridge dc-ac converter	U24-D05A	Handicapped person, aid device	S05-K
control	X12-J05A U24-D01A	for motor vehicle	X22-X
Control	U24-D05A	for computer	T01-J31
	X12-J01A	mobility aid	S05-K01
	X12-J05A	Handling	Q36
	X13-H03A	advancing/delivering articles duri	
Half-bridge dc-dc converter	U24-D02B3	11. 25 25.1	Q36-E
control	U24-D01A	collating articles	Q36-E
	U24-D02B3	coils	X25-F02 X25-F02A
Half-duplex data transmission	W01-A03D1	envelope filamentary materials	Q36-D
Half-wave ac-dc converter	U24-D04A	mining materials	X25-D02A
Hall-wave ac-ac converter	X12-J04A	paper strip	X25-F02A
control	U24-D01A	piles	Q36-A
	U24-D04A	strips	X25-F02
	X12-J01A	thin materials	Q36-C
	X12-J04A	webs	Q36-B
	X13-H03B		X25-F02
Hall effect		Handling semiconductor componer	its
conversion of sensor output	S02-K03A5E		U11-F02
devices	U12-B01A	conveyors	U11-F02A
magnetic field measurement	S01-E01B1	semiconductor die handling	U11-F02A3
magnetic heads transducers	T03-A03C5 S02-K03A5E	wafer holders, electrostatic chuck,	
		inside processing apparatus	U11-F02A2
Hammer crusher	P62-A07	Hands, clock or watch	S04-A02A
mill	P41-A01J P41-A03G	Hanging dot interference suppressi	on
		(colour TV receiver)	W03-A05B5
Hammering control	X25-A02D T06-D05A	Haptic systems	
Control	X25-A02D	force feedback for input device	T04-F03
engraving systems	X25-X10	telephone set, signal processing	W01-C01Q6E
Hamming code error detection/co		telephone set, transducer systems	
riamining code error detection/cor	U21-A06A3	virtual reality systems	W04-W07E5
		Harbor equipment	MO ( CO7 A
Hand tools	P62 P62-B10	electrical aspects general	W06-C07A Q24-R
axe, hatchet chisel	P62-B10 P62-A08	5	
constructional details	P62-T	Hard copy video recording	W04-D10 W04-D10
cleaning of	P62-G	integral with video camera	W04-D10 W04-M01K
fastening tools	P62-A05	printer details	S06
for specific materials	P62-V	printer details	W04-D10
hammer	P62-A07	signal processing	W04-D10
knives	P62-B05	3 - 1 3	W04-F01
	5/0 40/		W04-P01
nailing tools	P62-A06		VVO4-1 0 1
pliers, tweezers	P62-A01	Hard disk	VV04-1 0 1
pliers, tweezers punch	P62-A01 P62-B01	Hard disk audio recording system	W04-F01
pliers, tweezers punch razor	P62-A01 P62-B01 P62-B09		
pliers, tweezers punch	P62-A01 P62-B01	audio recording system	W04-B14C1

drive	T03-A08A1C	scanning format setting based on	
	T03-A08A5	detected standard	W03-A11B1A
	T03-F	standard recognition	W03-A11B
magnetic record carrier manufact	T03-A02E1A	HDTV signal processing for video re	cording
magnetic record carrier per se	T03-A02L1A		W04-F01H5
portable hard disk drive	T03-A08A1G	Head positioning, general recording	T03-G
set-top box recorder	W03-A16E1	magnetic	T03-A05
video recording system	W04-B14C3	optical	T03-B02A3
Hardware (Digital Computing)		Head, dummy for binaural recording	9
Defective hardware location	T01-G02A		V06-V02G
monitoring, computer	T01-G05		W04-R01C1
testing, computer, idle time testing, vibration	T01-G02 T01-G04	Head, dynamic recording - see	
<del>-</del>		Recording/reproducing head (dyr	namic)
Hardware for antenna mounting	W02-B07A1C	Head-up display	W04-Q01K
Harmonic distortion reduction in		for aircraft	W04-Q01K
amplifiers	U24-G03D5A		W06-B01B
Harmonic generation in frequency		vehicle	X22-E07
multipliers	U23-B	Headphone automatic cord winders	V06-V04A4
Harmonica	P86-A01A1	circuits	X12-G10 V06-V02S
Harmonics, measuring	S01-D03C5	cordless connection system	W03-G05C5A
Harmonics, reduction in RFI suppre	ession	jack	V06-V02H
•	W02-H01G1	lead/connector	V06-V02H
Harness, general safety	P35-A03A	manufacture	V06-V03A
Harvesting	P12	and a managed than	V06-V04A4
cleaning, maintenance/repair of t		noise-cancelling	V06-V04A4 W04-V07C1
machines	P12-G	testing	V04-V07C1
constructional details of machine control	T06-D01A		V06-V04A4
Control		transducer types - see Acoustoele	ectric
machinery/instruments	X25-N01A P12-A	transducer types - see <b>Acoustoele transducer</b>	e <b>ctric</b> V06-V01
machinery/instruments taps & collectors	X25-N01A	- · ·	
machinery/instruments taps & collectors tobacco	X25-N01A P12-A P12-T15 P15-L01	transducer	V06-V01
machinery/instruments taps & collectors tobacco type of crop harvested	X25-N01A P12-A P12-T15 P15-L01 P12-E	transducer  Health care administration  Hearing aid  audio amplifier	V06-V01 S05-G02G2 W04-Y W04-Y03A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03	transducer Health care administration Hearing aid audio amplifier battery	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03	transducer  Health care administration  Hearing aid  audio amplifier  battery  behind-the-ear type  carried outside auditory meatus	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08	transducer  Health care administration  Hearing aid audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03	transducer  Health care administration  Hearing aid  audio amplifier  battery  behind-the-ear type  carried outside auditory meatus	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E03 P12-E07	transducer  Health care administration  Hearing aid audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04	transducer  Health care administration  Hearing aid audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y03 W04-Y05A5
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E04 P12-E09A	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y03 W04-Y05A5 W04-Y05A5 W04-Y01
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E07	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y03 W04-Y05A5 W04-Y01 W04-Y01
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09A P12-E09B	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y03 W04-Y01 W04-Y01 W04-Y01A1 W04-Y03G
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09A P12-E09B P12-E06	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y03 W04-Y05A5 W04-Y01 W04-Y01
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09A P12-E09B P12-E06 P12-E06	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01 W04-Y01 W04-Y01A1 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y02 W04-Y05A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E04 P12-E09A P12-E09B P12-E066 P12-E02 X25-F05 P35-A03C	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01 W04-Y01 W04-Y01 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y02 W04-Y05A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09A P12-E09B P12-E06 P12-E02 X25-F05 P35-A03C T01-J12	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus caried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01 W04-Y01 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y02 W04-Y05A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E04 P12-E09A P12-E09B P12-E066 P12-E02 X25-F05 P35-A03C	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus caried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01A1 W04-Y03G V06-V04A4 W04-Y02 W04-Y05A5 M04-Y05A5
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC HDMI (High definition multimedia	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09A P12-E09A P12-E06 P12-E06 P12-E02 X25-F05 P35-A03C T01-J12 W01-A06F	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus caried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01A1 W04-Y03G V06-V04A4 W04-Y05A n W04-Y01A1 W04-Y05A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC HDMI (High definition multimedia interface)	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E04 P12-E09A P12-E09B P12-E06 P12-E02 X25-F05 P35-A03C T01-J12 W01-A06F	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus caried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01A1 W04-Y03G V06-V04A4 W04-Y02 W04-Y05A5 M04-Y05A5 M04-Y01A1 W04-Y03G V06-V04A4 W04-Y05A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC HDMI (High definition multimedia interface) HDTV receiver	X25-N01A P12-A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E07 P12-E04 P12-E09A P12-E09B P12-E06 P12-E06 P12-E02 X25-F05 P35-A03C T01-J12 W01-A06F  W03-G05C3 W03-A11	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by constructio  feedback reduction by psp feedback reduction by gain control	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y03 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y02 W04-Y05A n W04-Y01A1 W04-Y03G V06-V04A4 W04-Y03G V06-V04A4
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC HDMI (High definition multimedia interface)  HDTV receiver decoder	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E07 P12-E04 P12-E09A P12-E06 P12-E06 P12-E02 X25-F05 P35-A03C T01-J12 W01-A06F  W03-G05C3 W03-A11 W03-A11D	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction feedback reduction by gain control frequency domain manipulation gain control housing	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01A1 W04-Y01A1 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y05A n W04-Y01A1 W04-Y03G7 SI W04-Y03G1 W04-Y03G1 W04-Y03A1A W04-Y03A1 W04-Y01A1
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC HDMI (High definition multimedia interface)  HDTV receiver decoder error detection / correction	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09B P12-E06 P12-E02 X25-F05 P35-A03C T01-J12 W01-A06F  W03-G05C3 W03-A11 W03-A11D	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction feedback reduction by gain control frequency domain manipulation gain control housing hygiene aspects	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y03E W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01A W04-Y01A1 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y05A n W04-Y01A1 W04-Y03G7 bl W04-Y03G1 W04-Y03G1 W04-Y03A1 W04-Y03A1 W04-Y01A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC HDMI (High definition multimedia interface)  HDTV receiver decoder error detection / correction novel standard recognition circuit	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09A P12-E09B P12-E06 P12-E02 X25-F05 P35-A03C T01-J12 W01-A06F  W03-G05C3 W03-A11 W03-A11D W03-A11D1 W03-A11D1	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction feedback reduction by gain control frequency domain manipulation gain control housing	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01A W04-Y01A1 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y05A n W04-Y01A1 W04-Y03G7 bl W04-Y03G7 bl W04-Y03G1 W04-Y03G1 W04-Y03A1 W04-Y03A1 W04-Y01A W04-Y01A
machinery/instruments taps & collectors tobacco type of crop harvested cereals & grasses fibre plants flowers fruits & nuts latex & rubbers lawn & turf mushrooms/fungi oil seeds/oil fruits rubber & latex syrups tea, coffee & herbs vegetables & pulse crops  Hauling equipment  Hazmat suit HCI HDLC HDMI (High definition multimedia interface)  HDTV receiver decoder error detection / correction	X25-N01A P12-A P12-T15 P15-L01 P12-E P12-E03 P12-E05 P12-E08 P12-E01 P12-E09 P12-E03 P12-E07 P12-E04 P12-E09B P12-E06 P12-E02 X25-F05 P35-A03C T01-J12 W01-A06F  W03-G05C3 W03-A11 W03-A11D	transducer  Health care administration  Hearing aid  audio amplifier battery behind-the-ear type carried outside auditory meatus carried within auditory meatus casing cerumen accumulation prevention circuitry combined with other apparatus constructional details coupling reduction digital signal processing earphone transducer  external type feedback reduction by construction feedback reduction by gain control frequency domain manipulation gain control housing hygiene aspects	V06-V01 S05-G02G2 W04-Y W04-Y03A W04-Y05A3 W04-Y05A3 W04-Y05A1 W04-Y01A W04-Y01A W04-Y01A W04-Y01A1 W04-Y01A1 W04-Y03G V06-V04A4 W04-Y05A5 M04-Y05A5 M04-Y05A1 W04-Y05A1 W04-Y05A1 W04-Y05A1 W04-Y05A1 W04-Y01A1 W04-Y03G7

inductive loop transmission syste	m	Heat exchange (application)	
,	W02-C02B	chemical engineering	Q78-U25
	W02-C02G3A	food industry	Q78-U07
	W04-Y03C5	heating/cooling	Q78-U41
interfacing	W04-Y03C	hydraulic engineering	Q78-U17
interfacing, remote control	W04-Y03C1C	industrial	Q78-U40
interfacing, remote control	W04-Y03C1A	power generation/plant	Q78-U16
internal details	W04-Y01B	refinery	Q78-U25
	V06-V04A2	1	Q78-U41A
microphone transducer		refrigeration/HVAC	
	W04-Y02	sewerage	Q78-U17
power supply	W04-Y03E	vehicle	Q78-U03
programming	W04-Y03P	water management/treatment	Q78-U17
self-testing and diagnostic system		Heat pump system	X27-F02B
	W04-Y03D	Heat sink	
set-up by technician	W04-Y03P	electronic apparatus (general)	V04-T03A
special localisation	W04-Y03G3	for semiconductor packages, exte	
spectacles type	W04-Y05A5	detachable	U11-D02B2
	X27-A02D	for semiconductor packages, on	OTT DOZDZ
telephone coupling	W01-C01X	chip/within package arrangeme	nte
	W04-Y03C5	chip/within package arrangeme	U11-D02B1
tone and bandwidth control	W04-Y03A3		
transcutaneous signal transfer	W04-Y03C1A	Heat pump system	X27-F02B
	W04-Y05C1	Heat therapy	S05-A05B
transducers	W04-Y02	Heating	
using digital speech processing	W04-Y03G5	<del>_</del>	X25-B04
Hearing test	S05-D01D2	automatic switching	
<del>-</del>	303 00102	battery	X16-K
Heart		carpet, electrical control	X27-E01A3
cardiac massage	S05-A05A	carpet, electrically-heated	X27-E01A3
defibrillator	S05-A01B	circulating warm air system	X27-E01A1
pacemaker	S05-A01A	circulating warm air system, contro	
pump	S05-F04		X27-E01A1
rate measurement	S05-D01B5	circulating water system	X27-E01A1
Heat		circulating water system, control	X27-E01A1
exchanger	X25-L07	control	T06-B13
pipe	X25-L07	control (unspecified domestic syst	
pump	X27-F02B		X27-E01A
sensor	S03-A03	cushion	X27-E09
therapy	S05-A05B	electric blanket	X27-E02
• •		electric fan	X27-E01A2
Heat exchange	Q78	electric field	X25-B02X
casing	Q78-T03	electric radiant bar	X27-E01A2
constructional details	Q78-T	electromagnetic	X25-B02
control	Q78-T20	electron beam	X25-B02X
header box	Q78-T03	foot warmer	X27-E09
heat/flow reflector	Q78-T03	incinerators	X25-W01
maintenance	Q78-G	magnetic field	X25-B02
manufacture	Q78-M	nuclear (waste heat to heat e.g. bu	uildings)
recycling	Q78-R		X14-C99
repair	Q78-G	oil-filled radiator, electric	X27-E01A2
safety	Q78-T20	pipe frost-damage prevention	X27-E09
sealing arrangement	Q78-T04	resistance - see Electric resistanc	
tubular elements, pipes	Q78-T01		X25-B01
types of heat exchangers	Q78-A	roof, snow melting	X27-E09
combination of contact and inc	lirect contact	semiconductor devices	U11-D02
	Q78-A05	solar	X27-E01A5
counter-current	Q78-A02C	solid state	X25-B02F
cross-flow	Q78-A02B	space heating	Q74-A02
indirect contact	Q78-A04	space neating	X27-E01
multi-pass arrangements	Q78-A02D	storago	X16-L01
parallel flow	Q78-A02A	storage	X16-L01 X27-E01A4
steam or vapor condenser	Q78-A01	storage control	
F		storage, control	X16-L01 X27-E01A4
		ı	^∠/-EU1A4

	074.404	10 - 11 - 1 - 11 - 1 - 1	W00 C00C4K
stoves and ranges system	Q74-A01 X27-E01A	Hierarchical cellular radio	W02-C03C1K
thermoelectric	X25-B02F	Hierarchical Interconnection	
thermostat	V03-C06B	Technology	V04-Q02B1A
	X27-E01A		V04-T02
toilet seat	X27-L X27-E09	High definition multimedia interfa	
underfloor, electrical control	X27-E09 X27-E01A3	(HDMI)	W03-G05C3
underfloor, electrically-heated	X27-E01A3	applications of HDMI	W03-G05C3C
water - see Water heating	X27-E03	novel aspects of HDMI	W03-G05C3A
water, electric	X27-E03A	High density interconnect (multich	<b>ip)</b> U14-H03
water, non-electric	Q74-A02A	High density wiring, IC	U11-D03C2
Hedge clipper	X27-A01A	High Efficiency Video Coding (HEV	/C)
Height, measuring	S02-B02		W04-P01A4
Helical antenna	W02-B01C3	High electron mobility transistor -	
quadrifilar helix (QFH) helical array	W02-B01C3A W02-B05B6	effect transistor, with heterostru	
Helical scan recording	VV02 D03D0		U12-D02D2
brushes for rotary head signal cou	pling	High frequency amplifier	LIDA CO1DE
, , , , , , , , , , , , , , , , , , , ,	T03-A05D3G	power small signal	U24-G01B5 U24-G01D
dynamic head position adjuster	T03-A05A1A	High frequency connector	V04-M01
	T03-N02 W04-B03B1A	High frequency package, for	V 0 - 1V10 1
grounding of rotary head drum	T03-A05D	semiconductor device	U11-D03A4
head positioning, audio/video	W04-E01A	High frequency terminals, for	
head-tape spacing adjustment	T03-A05C1	semiconductor device	U11-D03A6
	T03-A05D	High pin count packages, for	
magnetic tape per se optical signal coupling for heads	T03-A01C3A T03-A05D3C	semiconductor device	U11-D01A5
recording and recorders (general		High power (electric) connector - s	ee Cable
RF rotary head signal coupling	T03-A05D3E	High power converter - see Conve	rter
rotary head drum per se	T03-A05D5	High power supply	X12-H01C
rotary head transformer signal co	upling T03-A05D3A	High power system - see Electric p	ower
signal coupling to heads	T03-A05D3A	distribution/transmission system	
specific head positioning details	T03-A05D	High power/voltage/current regula	ation- see
Help documentation	T01-J11C2	X12-H and X12-J codes	
HEMT - see Field effect transistor, v	vith	High pressure discharge lamp	X26-A01D
heterostructure	U12-D02D2	construction details - see  Discharge lamp	X26-A02
Herbicides- analysis	S03-E14M	control	X26-C01B4
Heterojunction bipolar transistor - s		electronic ballast	X26-C01B2
Transistors, bipolar, heterojuncti			X26-C01B4
	U12-D01A2	inductive ballast	X26-C01B1A X26-C01B4
Heterojunction, semiconductor deposition	U11-C01J6	operating circuit	X26-C01B4 X26-C01B4
doping	U11-C02J2	starting circuit	X26-C01B4
structures per se	U12-E01B1	High temperature sodium-sulphur	cell
Heterostructure MISFET - see Field	effect		X16-B01C1
transistor	U12-D02A5	High temperature superconductor	- see
Heuristics	T01-J16C6	Superconducting material, oxide	
HEVC (High Efficiency Video Coding	g)		X12-D06B2
	W04-P01A4	High voltage networks, testing	S01-H02
HF choke	V02-F01	Highlight, colour - printing	S06-K01B
HF coil	V02-F01G2	Hilbert transform	T01-J04B1
HF connector - see Connector		computer processing for	T01-J04B1
HF inductor	V02-F01G2	Hiring article using coin or card	T05-H05A
HF transformer	V02-F02	HIT	V04-Q02B1A
			V04-T02

Hitless switching		Horn (sound generator)	P86-E01C5
data network	W01-A06A1A	Horn antenna	W02-B02B
digital telephone exchange	W01-C02A1C		V06-V02G
line communication	W02-C01D3A	Horn loudspeaker	V06-V02G V06-V04A1
radio communication	W02-G08A	Horse racing and riding	P36-A03
HLR (home location register)	W01-E01C1	-	W04-X01K3E
Hob	X27-C	Horticulture, agriculture cultivation room	P13-A P13-A01
electric	X27-C02	forestry	P13-A03
gas	X27-C05	greenhouses	P13-A01
Hockey (sport)	P36-A01 W04-X01K1N	new plants and processes plant receptacles	P13-B P13-A02
Hoist	X25-F05	tools and equipment	P13-A04
control	T06-D08E	types of crops cultivated	P13-E
Holder		cereals & grasses	P13-E03
CRT	V04-K09	fibre plants flowers	P13-E05 P13-E08
	V05-D08C5	fruits & nuts	P13-E01
for semiconductor device	U11-F02A4	latex, resin, sap & syrups	P13-E09
transport fuse	V04-K03	lawn & turf	P13-E03
luse	X13-D01B	mushrooms/fungi	P13-E07
lamp	V04-K01	oil seeds/oil fruits	P13-E04
·	X26-F	tea, coffee & herbs	P13-E06
semiconductor device for PCB-m		vegetables & pulse crops	P13-E02
	U11-D01Q	watering/irrigation <b>Hose, fire fighting</b>	P13-A06 P35-C03
	V04-K02		
	V04-M05	Hospital administration system	S05-G02 S05-G02G
Hologram	V07-F02C	asset management	S05-G02G
computer memory for memories	T01-H01B2 U14-A02B1	bathroom equipment	S05-G02X
manufacture	V07-F02C	bed, nursing equipment	S05-G02B
Holographic		building aspects	Q46-B05B
recording heads	T03-B12	clothing (hospital clothing)	S05-G02X
recording methods	T03-B12	gynaecological lamp inventory	S05-G02X S05-G02G
Holographic recording	T03-B12	life support systems	S05-G02B3
Holography	V07-M	mobile phone inhibiting system	W01-C08F5
Home brewing kit	X27-B	nurse call systems	S05-G02D
Home bus system		operating theatre equipment, for radiation diagnosis	S05-D02A6
AV equipment interconnection	W03-G05C1	operating theatre equipment, not	for
data bus and LAN aspects	W01-A06B1 W01-A06B5A	radiation diagnosis	S05-B
home automation system	W05-D07A	and and brails	S05-G02C
networked media storage	W03-G05C1A	patient beds patient monitoring	S05-G02B1 S05-G02B2
Home furniture	P25	patient monitoring patient's medical records	S05-G02G1
Home location register (HLR)	W01-E01C1	portable patient monitor	S05-G02B2B
<del>-</del>		remote monitoring of patients	S05-G02B2A
Home theater equipment	W03-G03H	respiratory assistance/ventilators	S05-G02E
Homodyne receiver	M(02 D01 A /	simulation system	S05-P
broadcast radio receiver communications receiver	W03-B01A6 W02-G03A8	training wearable device (electrical aspect	S05-P
TV receiver	W03-A01B6	wearable device (electrical aspect	s) S05-G02X
Homojunction lasers see Semicond	uctor lasers	Hot electron bipolar transistor - see	
<b>,</b>	U12-A01B1	Transistor, bipolar, hot electron	U12-D01A3
Honing	X25-A03C2	Hot electron transistor, unipolar	U12-D02J
control	T06-D07A	Hot standby systems	
	X25-A03C2	data network	W01-A06A1A
	X25-A03F	general	W02-G08A
Hook, cable installations	X12-G04A2	line transmission systems	W02-C01D3A
		telephone exchange	W01-C02A1C

Hourglass timer	S04-A09 S04-C09	Hunting (sport/leisure)	P36-A07 W04-X01K7C
Housing		HV network, testing	S01-H02
A/V equipment (general)	W03-G01A5	HVAC system	Q74
broadcast radio receiver	W03-B05A	HVAC system	X27-E
communications radio receiver	W02-G03H	air circulation	Q74-T01
computer	T01-L02B	air cleaning/filtering	Q74-A02F
EM shielding in computers	T01-L02D	air conditioning system	Q74-A02B
measuring equipment	S01-J01	air curtains	Q74-A02G
mobile phone	W01-C01A3	air humidifying	Q74-A02C
	W01-C01D3C	air de-humidifying	Q74-A02C
multiple capacitors	V01-B01B7D	burner	Q74-T07
PCB mounting in computer	T01-L02C	casing	Q74-T03
radio communications receiver	W02-G03H	compressor	Q74-T08
radio transceiver	W02-G02H	control	Q74-T20
radio transmitter	W02-G01H T03-L01A		X27-E01C
record carrier protective case	W04-L01A	cover	Q74-T03
recording equipment	T03-L05A	door	Q74-T03
recording equipment	W04-L05A	evaporator	Q74-T08
semiconductor devices	U11-D01	filter	Q74-T09
telephone set	W01-C01A3	firebox	Q74-T04
TV receiver	W03-A09A1	fire grate/irons fixed unit	Q74-T04 Q74-A02J
video camera	W04-M01G1A	fluid heating	Q74-A023 Q74-A02A
Housings for fixed capacitor		fuel used	Q74-A02A Q74-A25
electrolytic capacitor	V01-B01B7	biomass fuel	Q74-A25D
low power capacitor	V01-B03D3	electrical power	Q74-A25E
Housings, recording	T03-L	gaseous fuel	Q74-A25C
Housings, recording	W04-L	liquid fuel	Q74-A25B
constructional details of apparatu		solar power	Q74-A25F
constructional actums of apparata	W04-L05B	solid fuel	Q74-A25A
containers for carriers	T03-L01A	hearth	Q74-T04
	W04-L01A	insulation	Q74-T16
containers for disks	T03-L01A1	maintenance	Q74-G
	W04-L01A1	noise suppression	Q74-T15
containers for tapes	T03-L01A3	pipe	Q74-T02
	W04-L01A3	portable unit	Q74-A02H
equipment housings	T03-L05A	protection	Q74-T20 Q74-T10
	W04-L05A	radiator recycling	Q74-110 Q74-R
storage racks, boxes, cases	W04-L01C	repair	Q74-K Q74-G
storage racks/boxes for disks	T03-L01C1	safety	Q74-T20
	T03-N01	stoves and ranges	Q74-A01
storage racks/boxes for tapes	W04-L01C1 T03-L01C3	space heating and ventilating	Q74-A02
storage racks/boxes for tapes	W04-L01C3	ventilation system	Q74-A02E
	VV04-L01C3	vibration suppression	Q74-T15
HUD	WO / DO4D2	water heating	Q74-A02A
aircraft	W06-B01B3 W04-Q01K	water tank	Q74-T11
projection display aspects vehicle	X22-E07	HVAC (applications)	
		commercial	Q74-U02
Hulling grain	P41-A07A	cooking and baking	Q74-U10
Human feature recognition	S05-D01C5A	domestic	Q74-U01
	T04-D07X		X27-E
entry or exit control	T05-D01B	food industry	Q74-U07
Humidity		industrial	Q74-U40
control	T06-B07	manufacturing plant	Q74-U06
measurement, general	S03-F09	school and university	Q74-U02
measurement, nuclear radiation a		vehicle	Q74-U03
	S03-E06A	HVDC system	X12-H01D
measurement, using microwaves	S03-E05	converter station	X12-H01D
switch	V03-C06X		X12-J

inverter	X12-H01D
rectifier	X12-J05 X12-H01D
Hybrid cell	X12-J04 X16-A01B
electrode	X16-D X16-E03
metal-air	X16-E06C
	X16-A01B X16-D01
metal-halogen	X16-D02
Hybrid circuit	U14-H03
	V04-Q03
array	U14-H03
assembling	U14-H04B
attaching leads	U14-H04B
demounting defective component	
heta hardana Santa kana arawa	U14-H04B
high density interconnect	U14-H03
holders, sockets	U14-H05
manufacture	U14-H04B
mounting components on substra	
1	U14-H04B
packages	U14-H05
packaging, sealing	U14-H04B
	U14-H05
screen printing, thick film processi	•
Lance Let	U14-H04B
substrates, multilayer	U14-H03F
terminals	U14-H05
testing/measuring	U11-F01F
	U14-H04B
trimming of thin/thick film compor	
	U14-H04A4
Hybrid electronic/optical board	
arrangements	V04-T04
Hybrid coding scheme, digital trans	mission
	W01-A01B4
Hybrid diversity (radio systems)	W02-C03A5
algorithms and software	W02-C03A5 W02-C03A5S
massive MIMO	W02-C03A55
precoding	W02-C03A5A W02-C03A5P
1 9	W02-C03A31
Hybrid energy converters	1140 40040
thermophotovoltaic	U12-A02A9
wind-photovoltaic	U12-A02A9
Hybrid modulation, digital	U23-P01E
	W01-A09C
Hybrid power plant	
fossil fuels	
control, monitoring & operation	X11-C03
repair	
repair testing	X11-C10
repair testing non-fossil fuels	X11-C10 X11-C10
testing	X11-C10 X11-C10 X11-C10
testing non-fossil fuels constructional details	X11-C10 X11-C10 X11-C10 X15-J
testing non-fossil fuels constructional details control, monitoring & testing	X11-C10 X11-C10 X11-C10 X15-J X15-W X15-V
testing non-fossil fuels constructional details control, monitoring & testing  Hybrid printed circuit board manufa	X11-C10 X11-C10 X11-C10 X15-J X15-W X15-V ecture (see also
testing non-fossil fuels constructional details control, monitoring & testing	X11-C10 X11-C10 X11-C10 X15-J X15-W X15-V acture (see also U14-H04
testing non-fossil fuels constructional details control, monitoring & testing  Hybrid printed circuit board manufa PCB manufacture)	X11-C10 X11-C10 X11-C10 X15-J X15-W X15-V <b>acture (see also</b> U14-H04 V04-R05G
testing non-fossil fuels constructional details control, monitoring & testing  Hybrid printed circuit board manufa	X11-C10 X11-C10 X11-C10 X15-J X15-W X15-V acture (see also U14-H04

Hybrid signal connector - see Connector			
Hybrid synchronous machine	V06-M01C X11-D05		
Hybrid vehicle  hybrid electric hybrid mechanical parallel hybrid	Q19-Q X21-A01D X22-P04 Q19-Q01 Q19-Q05 X21-A01D1 X22-P04		
series hybrid	X21-A01D3		
Hybrids, telephone circuit	W01-C08B		
Hydraulic engineering canals dams dredging irrigation prevention of soil erosion soil shifting	Q42-A Q42-A01 Q42-A02B Q42-A10 Q42-A05 Q42-A11 Q42-A10		
Hydrodynamic testing	S02-J07		
Hydroelectric (hydel) power plant control micro hydro plant mini hydro plant monitoring operation Pelton wheels pumped storage plant testing turbines water wheels	X11-B X11-B10 X11-B05 X11-B05 X11-B10 X11-B10 X11-B01 X11-B06 X11-B10 X11-B01 X11-B01		
Hydrogen storage alloy	X15-E05C		
Hydrometers	S03-F09		
Hydrophone  circuits  manufacture	\$03-C01C1 V06-V04 W02-C07C V06-V02S V06-V04 V06-V03A		
testing	V06-V04 V06-V03B		
transducer types - see <b>Acoustoele transducer</b>	V06-V04		
Hygiene, personal - see Personal hy	giene		
	X27-A02A		
Hygrometer	S03-F09A		
Hypertext	T01-J11C1		

_		fuel injection control	V22 A02A1
I		fuel injection control fuel injection quantity control	X22-A03A1 X22-A03A1C
i-mode telephone	W01-C01G6E	fuel injection timing control	X22-A03A1A
IC - see Integrated circuit		fuel pressure regulator	X22-A02R
IC card - see Smart card	T04-K	fuel pressure regulation	X22-A03A5
To cara See Smart cara	V04-Q02A3	fuel pump	Q51-H01C
IC engine	Q51		X22-A02D
ic engine	Q17-E	fuel pump control	X22-A03A3
active noise control/suppression (		fuel purging	X22-A02E
W04-V codes)	X22-A12	fuel purging control fuel supply control	X22-A03A4 X22-A03A
air driven engine	X22-A20G	fuel system	Q51-H01
air filter	Q51-H05F	ider system	X22-A02
	X22-A06	fuel system carburettor	X22-A02C
air flow sensor	X22-A05D	fuel system filter	Q51-H01F
air-fuel ratio control	X22-A03A2A	,	X22-A02B
alcohol fuel type	X22-A20E	fuel system heater	X22-A02B
ambient pressure measurement	X22-A05A1 Q18-A	fuel treatment	X22-A02
braking	X22-A09	fuel vapour recovery system	Q51-H02
Brown's gas fuel type	X22-A07 X22-A20X	f la sia a a starl	X22-A02E
carburettor	Q51-H01A	fuzzy logic control	T01-J16B X22-A03K
	X22-A02C	gas flow sensor - see also <b>Flowme</b>	
catalytic converter	Q51-J02B	gas now sensor - see also riowine	X22-A05D
	X22-A07	gas sensor - see also <b>Gas sensor</b>	S03-E03
catalytic converter heater	X22-A07	9	S03-E02
complete management	X22-A03F		S03-E03
compressed air type	X22-A20G		S03-E14P
control cooling	X22-A03 Q51-G		X22-A05B
cooling	X22-A10	heating/warming	Q51-L
cooling fan	X22-A10		X22-A13
cooling pump	X22-A10	idling speed control	X22-A15 X22-A03B3
crankshaft angle/position sensor	X22-A05C	ignition	Q51-I
cylinder	Q51-A03A	igitaon	X22-A01
diesel fuel type	Q51-D03	ignition advancing, using knock de	
	X22-A20C	3, 3,	X22-A01B1
diesel particulate filter	Q51-J02A	ignition cable	X22-A01A
distributor EGR valve	X22-A01C1 Q51-J02E	ignition circuit breaker	X22-A01C2
LGR valve	X22-A07	ignition circuit maker	X22-A01C2
electrics	X22-A	ignition coil	V02-G01
exhaust braking	Q51-J07	ignition coil/spark plug combination	X22-A01A
, and the second	X22-A09	ignition con/spark plug combination	X22-A01E1G
exhaust braking control	X22-A03B5	ignition connector	V04-M30C
exhaust gas cleaning	Q51-J02	- Ig	X22-A01A
	X22-A07		X22-X01A
exhaust gas recirculation control	X22-A03A2C	ignition glow plug	X22-A01E
exhaust heat recovery	Q51-J02F X22-A17	ignition glow plug connector	V04-M30C
exhaust temperature sensor	X22-A17 X22-A05F1		X22-A01E
exhaust valve	Q51-E01		X22-X01A
	X22-A11	ignition noise reduction/spark plug	g X22-A01E1J
external heating for starting	X22-A13	ignition pick-up device	X22-A01C3
for aircraft propulsion	Q25-C02A	ignition plasma plug	X22-A01E
for ship propulsion	Q24-E02A	ignition plasma plug connector	V04-M30C
for train propulsion	Q21-C01C		X22-A01E
fanoshiala	X23-A01A2	ignition retarding, using knock det	
for vehicle	Q17-E		X22-A01B1
fuel flow sensor	X22-A X22-A05D	ignition switch (see also V03-C coo	
fuel injection apparatus	Q51-H01B	ignition system	X22-A01A
.aci injection apparatus	X22-A02A		
		ı	

IC engine (continued)	1	pressure sensor	S02-F04
<del>-</del>	CO2 104 A	pressure sensor	X22-A05A4
ignition testing	S02-J01A	reciprocating	Q51-A
	X22-A01D	remote starting (see also W0	
ignition timing control	X22-A01B	remote starting (see also vvo	X22-A08A
ignition timing testing	S02-J01A	rotany	Q51-B
	X22-A01D	rotary	S02-G01
ignition, advancing	X22-A01B2	rotation sensor	
ignition, automatic disablement	X22-A01A5		X22-A05C
ignition, cable	X12-D03	rpm counter	S02-G01
ignition, noise reduction circuit	X22-A01A9		X22-A05C
ignition, retarding	X22-A01B3		X22-E05
ignition, RF suppression	X22-A01A9	rpm/speed control for cruisir	
ignition, safety	X22-A01A7	rpm/speed control for cruisir	
ignition, using capacitive energy s	storage	throttle control	X22-A03B1A
3 , 3 1 37	X22-A01A9	rpm/speed control using driv	∕e-by-wire
ignition, using dynamo-electric ge	enerator	system	X22-A03B2
5 - , 5 - ,	X22-A01A1	rpm/speed control using ele	ctronic throttle
ignition, using glow plug heating			X22-A03B2
ignition, using inductive energy st		rpm/speed control using ser	vomotor
iginalon, doing madelite energy of	X22-A01A2		X22-A03B2
ignition, using magneto-electric g		secondary air control	X22-A03L
ightion, using magneto electric g	X22-A01A1	sensor	X22-A05
ignition, without energy storage	X22-A01A1	silencing	Q51-J01
immobiliser	X22-A01A1 X22-A08C	spark plug	X22-A01E1
implosion engine	X22-A00C X22-A20X	spark plug electrode	X22-A01E1A
inlet valve	Q51-E01	spark plug insulator	X22-A01E1C
inlet valve		spark plug manufacture	X22-A01E1E
:- -+/	X22-A11	spark plug/coil combination	X22-A01E1G
inlet/outlet valves' control	X22-A03G	spark plug/noise reduction c	
intake air heater	X22-A15	spank plag/holse reduction e	X22-A01E1J
integrated engine/transmission co		speed control	X22-A03B
	X22-A03F	speed control using exhaust	
	X22-G01	speed control using exhaust	X22-A05C
knock detector	S02-F04D3A	starter	X22-A03C X22-A08
	X22-A05A		X22-A08
lambda probe	S03-E03	starter gear	Q51-K
	X22-A05B	starting starting motor	X22-A04
lubricating	Q51-F	starting motor starting relay (see also V03-D	
	X22-A09	starting relay (see also vos-b	X22-A08
management by fuzzy control	X22-A03K	-tti	
manufacture	Q51-M	starting solenoid (see also VC	
measurements	X22-A05	at a section to a section I	X22-A08
multi-fuel proportion measuring	X22-A05H	stop-start control	X22-A03E
	X22-A20A	supercharger	Q51-H05A
multi-fuel type	X22-A20A		X22-A14
negative pressure measurement	S02-F04	supercharging control	X22-A03C
	X22-A05A4	swirl control	Q51-H05E
noise reduction/damping	Q51-N	a	X22-A03I
	X22-A03X	TDC position sensor	X22-A05C
	X22-A12	temperature control	X22-A03H
oil filter	Q51-F05	temperature sensor	S03-B01
oxyhydrogen dual fuel	X22-A20A		X22-A05F3
piston	Q51-A03B	testing	S02-J01A
pollution control	X22-A03J		X22-A05
power plant	X11-C02	thermostat (see also V03-C06	•
power plant, control	X11-C10	throttle position sensor	X22-A05E
power plant, repair	X11-C10	throttle valve	Q51-H05C
power/torque control	X22-A03D	torque sensor	S02-F02
power/torque control by cutting of			X22-A05G
cylinders	X22-A03D	turbocharger	Q51-H05A
power/torque control for vehicle t			X22-A14
regulation	X22-A03D1	turbocharging control	X22-A03C
rogalation		5 5	

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IC engine (continued)	054 404 1	IF amplifier	14/02 D00DE
two-stroke	Q51-A01J X22-A20T	broadcast radio receiver	W03-B02B5
vacuum concor	S02-F04D1	communications receiver	W02-G03C5 W02-G03D5
vacuum sensor	X22-A05A3	comms receiver, IF AGC television receiver	W02-G03D3 W03-A03B5
variable compression ratio	Q51-A01G		WU3-AU3D3
variable compression ratio	X22-A03A2B	IF filter	14/02 D00D4
vibration control	X22-A03X	broadcast radio receiver	W03-B02B1
vibration sensor	S02-E	communications receiver TV receiver	W02-G03C1 W03-A03B1
	X22-A05A		
IC engine, electric power generation	n	IF shift system (interference reduction	
To the grand, and the property of the property	X11-C02		W02-G03B2C
carbon footprint reduction	X11-C02 X11-C08		W02-G03C
catalytic converter	X11-C08	IFF system(RF)	W06-A04B1
environmental protection	X11-C08	IGBT - see Transistors, bipolar, MOS	gated
monitoring, operation and contro	I X11-C10	•	U12-D01A1
IC engine generator, application	X11-U01D	IGFET - see Field effect transistor	U12-D02A
IC engine ignition	X22-A01		
coil	V02-G01	lgniter <sub>,</sub>	X27-G01
	X22-A01A	piezoelectric	V06-V01B V06-V04X
connector	V04-M30C		
	X22-X01A	Illumination	X26
glow plug connector	V04-M30C	aircraft	W06-B01C
	X22-X01A	ala ali animatah manahaninal	X26-U09
testing	S02-J01A	clock or watch, mechanical commercial	S04-A02X X26-U05A
At anti- and a setting as	X22-A01D	display	W05-E05
timing testing for aircraft	S02-J01A S02-J01A1	aispidy	X26-U04A
		marine vessel	W06-C01C
IC/chip microprocessor	U13-C05		X26-U08
Ice detection	S03-D02B	optical fibres-based	V07-N03
for aircraft	W06-B01B5		X26-G
for non meteorological application		signs	W05-E05
Ice production, storage and distrib	ution	al an al	X26-U04B
	Q75-E	street telephone keyboard	X26-U06 W01-C01B8G
Ice tray	X27-F01	vehicle, land	X21-F
Icons		vernere, iuria	X22-B
program management, computer	s T01-J12D		X26-U07
IDC	V04-A03	lmage	
	V04-M07	acquisition, in facsimile	S06-K07A4
Identification		acquisition, in pattern recognition	T04-D02
fingerprint	S05-D01C5A	archiving	T01-J05B2A
9	T04-D	converter tubes	V05-D03
individual vehicle information	T07-A03	filing	T01-J05B2A
of items, using pattern recognitio	n T04-D07C	intensifier tubes	V05-D03
semiconductor wafer	U11-C15A	output, in facsimile	S06-K04A4C
Identity verification for access cont	rol	pick-up element, video camera	U13-A01
computer network passwords	T01-N02B1B	pick-up tubes	W04-M01B5 V05-D01
monitoring physical access of		pick-up tubes pick-up, in pattern recognition	T04-D02
personnel to e.g. building	T05-D01	preprocessing, in pattern recognit	
network access ID check	W01-A06E1C	11 3/ ···   1 300 g/ ···	T04-D03
secret data communication	W01-A05B	recognition per se, in pattern reco	gnition
IEEE 802.11 radio link	W01-A06C4E		T04-D04
IEEE 802.15 radio link	W01-A06C4A	screens for tubes	V05-M01
IEEE 802.16 radio link	W01-A06C4G	storage, computer processing	T01-J10E
IEEE 1394 network	W01-A06B5A	transfer, in electrophotography	S06-E05
107-110tWork	W03-G05C1	Image converter	
IEEE 1451 (transducers)	V06-V01Q	complete novel tube	V05-D03A
1701 (0.0113000013)	, 50 vo i Q	power supplies	V05-D03H
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March non-light input	Image converter tube		still picture	S06-K07A4
Image generation   3-D image   101-1101	-	V05-D03B1		
Image generation   3-D image   T01-J10C4   composite image formation   T01-J10C5   computer processing   T01-J10C5   computer processing   T01-J10C2   font generation   T01-J10C2   font generation   T01-J10C2   font generation   T01-J10C2   shapes   T01-J10C3   face   T04-D07-1   fac				
3-D image composite image formation T01-J10C4 composite image formation T01-J10C5 Computer processing T01-J10C3 computer processing T01-J10C3 fort generation T01-J10C4 television W04-N05C1 feet generation T01-J10C4 generation T01-J10C4 for generation T01-J10C5 for	·			W03-A11
computer processing 101-J10C computer through the processing 101-J10C2 font generation 101-J10C2 in lines 101-J10C3 in		T01-110C4	ultrasonic	S05-D03E
Computer processing T01-J10B3 romputer processing pattern recognition T04-D03 wideo signal W04-P processing pattern recognition T04-D03 romputer, colour processing pattern recognition T04-D03 romputer, colour processing pattern recognition T04-D03 romputer, colour processing computer, colour system conversion T01-J10B3 computer, printer colope for film parameter measurement, semiconductor mage analysis T01-J10B1 mage analysis T01-J10B1 mage analysis T01-J10B1 mage portectivel mage optic transport to the manage object reduction T01-J10B2 mage goiget analgement T01-J10B2 mage goiget analgement T01-J10B2 mage gobject reduction T01-J10B3 image object reforement T01-J10B3 image object processing T01-J10B3 image object reforement T01-J10B3 image object reduction T01-J10B3 image object reforement T01-J10B3 image object reforemen			video camera	W04-M01D6
computer processing T01-J10C8 computer tomography T01-J10C8 curves T01-J10C2 font generation T01-J10C2 font generation T01-J10C2 fines T01-J10C2 shapes T01-J10C2 shapes T01-J10C2 shapes T01-J10C2 face T04-D07F fa			X-ray, medical	S05-D02A5E
curves 101-J10C28 tont generation 101-J10C2 tont generation 101-J10C2 tont generation 101-J10C2 total generation 101-J10C2 total generation 101-J10C2 total generation 101-J10C3 total generation 101-J10C3 total generation 101-J10C3 total generation 101-J10C3 total generation 101-J10C4 total generation 101-J10C3 total generation 101-J10C4 total generation 101-J10C4 total generation 101-J10C3 total generation 101-J10C4 total generation 101-J10C3 total generation 101-J10C4 total generation 101-J10C3 total generation 101-J10C4 total generation 101-J10C5 total			Image recognition	T04-D04
curves font generation T01-J10C2 for font generation T01-J10C2 illnes T01-J10C2 shapes T01-J10C3 rext generation T01-J10C3 ring interesting T01-J10C3 ring interesting T01-J10C3 ring interesting T01-J10C3 radio communication receiver T02-J03-J03-A02C5-J1-J02-J02-J02-J02-J02-J02-J02-J02-J02-J02				
flont generation T01-J10C2 shapes T01-J10C3 yvirtual reality T01-J10C3 yvirtual				
shapes T01-J10C2 shapes T01-J10C2 television W04-N0SC1 text generation W04-N0SC1 text generation T01-J10C3 virtual reality T01-J10C3A virtual reality T01-J10C4A T05-L02B television equipment applications W07-C power supply W05-D03H tube, per se W05-D03H tube, per se W05-D03BS Image manipulation computer processing T01-J10B3 television W04-N0SC3 Image pick-up tube W05-D02A complete novel tube w05-D02A complete novel tube w05-D02B tube details W05-D02B tube details W05-D02B pattern recognition T04-D03 video signal W04-P w04-P system conversion computer, colour system conversion Computer, peneral T01-J10B3B computer, colour system conversion T01-J10B3B computer, peneral T01-J10B3B computer potential T01-J10B3B computer peneral T01-J10B3B computer processing T01-J10B3B peneral T01-J	font generation	T01-J10C3	face	T04-D07F1
shapes T01-J10C2 television W04-N0SC1 text generation T01-J10C3 virtual reality T01-J10C4A T01-J10C3 virtual reality T01-J10C4 T01		T01-J10C2	fingerprint	T04-D07F2
television W04-N0SC1 text generation T01-J10C3 virtual reality T01-J10C4A  Image intensifier  CRT V05-L05D3 night vision equipment applications W07-G power supply U24-D W05-D03H tube, per se V05-D03B5  Image manipulation computer processing T01-J10B3 television W04-N0SC3 complete novel tube V05-D02A complete novel tube V05-D02A complete novel tube v05-D02B tube details V05-D02B pattern recognition T04-D03 video signal W04-P processing pattern recognition T04-D13 scomputer, colour processing computer, colour system conversion T01-J10B3B computer, colour system conversion T01-J10B computer, general T01-J10 computer, general T01-J10 computer, image generation T01-J10 computer, pinter S06-K99B cropping W04-N0SC3G digitisation T01-J10B3 digitisation T01-J10B3 enable computer, pinter S06-K99B cropping W04-N0SC3G digitisation T01-J10B3 image acquisition T01-J10B3 image acquisition T01-J10B3 image coding T01-J10B3 image compression T01-J10B3 image compression T01-J10B3 image compression T01-J10B3 image compression T01-J10D image adata compression T01-J10D image adata compression T01-J10D image adata compression T01-J10D image enderition T01-J10B3A image object relation T01-J10B3A NMR, medical S05-D02B2 bieze foreocessing T01-J10B3A NMR, medical S05-D02B2 bieze foreocessing T01-J10B3 NMR, medical S05-D02B2 bieze foreocessing T01-J10B3 NMR, medical S05-D02B2 bieze foreocessing T01-J10B3 T01-J10B3 TV set remote control W02-A02A5A W02-C03B4A television receiver w03-A01E5A television receiver w03-B01BA television receiver w03-A01E5A television receiver w03-A01E5A TMBC set remote control w02-A02CA TMBC set remote control w02-A02CA TMBC set remote control w02-A02CA TMBC radio communication receiver w03-B01BA Tobs-A01E5A Television receiver w03-A01E5A Television receiver w03-A01E5A Television receiver w03-B01BA Television receiver w03-A02CA Tmage set canding radio receiver w03-L02E Tmage rejection dictor source and savial ratio receiver w03-L02E Tmage rejection dictor source and savial ratio receiver w03-L02E Tmage rejection d	shapes	T01-J10C2		U11-F01B3
Image intensifier  CRT V05-L05D3 night vision equipment applications W07-G power supply U24-D power supply V05-D03B5  Image manipulation computer processing T01-J10B3 television W04-N05C3  Image pick-up tube V05-D02 complete novel tube w105-D02 complete novel tube w205-D02B  Image processing pattern recognition T04-D03 video signal W04-P Image processing computer, colour system conversion T01-J10B3B computer, epeneral computer, peneral computer, peneral ro1-J10C computer, general T01-J10C computer, general T01-J10C computer, image generation T01-J10C computer, image generation T01-J10B1 facsimile S06-K99B cropping W04-N05C3G digitisation T01-J10B1 facsimile S06-K99B rofilm parameter measurement, semiconductor U11-F01B3 image analysis T01-J10B2 image add ac compression T01-J10D image add ac compression T01-J10D image add ac compression T01-J10D image object relargement T01-J10B3A image object rolation T01-J10B3A image object rolation T01-J10B3A NMR, medical S05-D02B2  Image intensifier V05-L05D3 television receiver w03-A01B4A brozacast radio receiver w03-A05Ab brozacast radio receiver w03-A01B4A brozacast radio receiver w03-A05Ab brozacast radio receiver w03-B05Ab brozacast radio receiver w03-A05Ab brozacast radio receiver w05-L02E brozacaning/comparing intruder alam w05-B01Ab brozacast radio receiver w05-L02E cardio radio re	television	W04-N05C1	TV set remote control	W03-A02C5J
mage intensifier  CRT V05-L05D3 night vision equipment applications W07-G power supply U24-D tube, per se V05-D03B5  Image manipulation computer processing television W04-N05C3 Image pick-up tube V05-D02 complete novel tube V05-D02 complete novel tube V05-D02B tube details V05-D02B tube details V05-D02B mage processing pattern recognition T04-D03 video signal W04-P processing computer, colour processing computer, colour processing computer, colour system conversion T01-J10B3B computer, paplications T01-J10B computer, paplications T01-J10B computer, paper S06-K99B computer, printer S06-K99C copier S06-K99C copier S06-K99B for film parameter measurement, semiconductor unage analysis inage coding T01-J10B3 image coding T01-J10B3 image coding T01-J10B3 image compression T01-J10B3 image coding T01-J10B3 image compression T01-J10B3 image compression T01-J10B3 image compression T01-J10B3A image object reduction T01-J10B3A image object reduction T01-J10B3A image object reduction T01-J10B3A NMR, medical S05-D02B2 by set vision receiver w03-A01B5A television receiver w03-A01B5A thelevision receiver w03-A01B5A thelevision receiver w03-A01B5A thelevision receiver w03-A01B5A broadcast radio receiver w03-B01AS lamage scanning/comparing intruder alarm w05-L02B devision receiver w03-B01AS latelvision receiver w03-A01B5A television receiver w03-B01AS latelvision receiver w03-B01AS latelvision receiver w03-A01B5A broadcast radio receiver w03-B01AS latelvision receiver w03-L02B limage scanning/comparing intruder alarm w05-L02B devision receiver w03-B01AS limage scanning/comparing intruder alarm w05-L02B development electrical coating processes v05-L02C coating processes v05-L02E development electrical coating eg.b electrophoresis v05-L02EA development electrical coating eg.b	text generation	T01-J10C3	Image rejection mixer	U23-J01
Image processing computer, colour processing computer, colour system conversion computer, general for film parameter measurement, semiconductor image acquisition image acquisition image analysis image coding image compression 101-J1082 image object reduction 101-J1082 image object reduction 101-J1083 image objec	virtual reality	T01-J10C4A	<b>-</b>	
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Image preprocessing	tube details			
pattern recognition video signal W04-P  Exposure apparatus  Exposure process  V05-L02E5  V05-L02H1  Internal surface metallisation V05-L02F  light source for exposure apparatus V05-L02E5  L02E5C  L02E5C  L02E5C  L02E5C  L02E5C  L02E5  L02E5C  L02E6C		V00 D02D	electrical coating e.g. by electrop	
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image coding T01-J10D hybrid circuits U14-H03G image compression T01-J10D lens manufacture U11-C18D U13-A01F image memory management T01-J10A2 U13-A02X image object enlargement T01-J10B3A linear U14-H01B image object reduction T01-J10B3A optical filter U11-C18D U13-A01F U13-A01F U13-A01F U13-A01F U13-A01F Object processing T01-J10B3 packaging aspects U13-A01D	image acquisition	T01-J10A	focal plane array	U13-A01X
image compression T01-J10D lens manufacture U11-C18D U13-A01F U13-A01F U13-A02X U13-A02X U13-A02X U13-A02X U14-H01B U13-A01F U14-H01B U13-A02X U13-A02X U13-A02X U13-A02X U13-A01F U13-A01F U13-A01F U13-A01F U13-A01F U13-A01F U13-A01F U13-A02X U13-A02X U13-A02X U13-A02X U13-A01D				S06-D05
image data compression T01-J10D U13-A01F image memory management T01-J10A2 U13-A02X image object enlargement T01-J10B3A linear U14-H01B image object reduction T01-J10B3A optical filter U11-C18D image object rotation T01-J10B3A U13-A01F NMR, medical S05-D02B2 object processing T01-J10B3 packaging aspects U13-A01D				
image memory management T01-J10A2 U13-A02X image object enlargement T01-J10B3A linear U14-H01B image object reduction T01-J10B3A optical filter U11-C18D image object rotation T01-J10B3A U13-A01F NMR, medical S05-D02B2 Object processing T01-J10B3 packaging aspects U13-A01D			lens manufacture	
image object enlargement T01-J10B3A linear U14-H01B image object reduction T01-J10B3A optical filter U11-C18D image object rotation T01-J10B3A U13-A01F NMR, medical S05-D02B2 object processing T01-J10B3 packaging aspects U13-A01D				
image object reduction T01-J10B3A optical filter U11-C18D unage object rotation T01-J10B3A U13-A01F U13-A02X object processing T01-J10B3 packaging aspects U13-A01D				
image object rotation T01-J10B3A U13-A01F NMR, medical S05-D02B2 U13-A02X object processing T01-J10B3 packaging aspects U13-A01D				
NMR, medical S05-D02B2 U13-A02X object processing T01-J10B3 packaging aspects U13-A01D			optical filter	
object processing T01-J10B3 packaging aspects U13-A01D				
			manus de la compani	
recognition rui-JiubzA   pnotodiode/pnotoconductor U13-AU1A				
	recognition	IUI-JIUDZA	photodiode/photoconductor	UIS-AUIA

phototransistor	U13-A01B	Imprint lithography, for semicond	uctor
reading circuitry, for facsimile	S06-D05A	manufacture	U11-C04J
static induction transistor	U13-A01B1	process methods, control	U11-C04J2
video camera application	W04-M01B5	stamp design and manufacture	U11-C04J1
window structures for package	U11-D01C1	Impurity detection - see contamina	ation
IR imager	W04-M01E1	In vitro blood analysis	S05-C01
Image sensor movement in came	ra	_	
for cleaning	W04-M01B8C	In vivo blood composition measur	
for enhanced resolution	W04-M01B8A		S05-D01G
for focusing	W04-M01B8B	Incandescent lamp	X26-B
Image signal suppression (superh	et receiver)	connection	X26-B02A2
	W02-G03B4A	construction	X26-B02
•		control	X26-C02
Imagers - see Image sensors	U13-A	dimmer	X26-C02C
lmaging		end cap	X26-B02A1
acoustic	S03-E08E	envelope	X26-B02A1
nuclear	S03-E06B	filament	X26-B02A3
	W04-M01F3	filament manufacture	X26-B03A
optical, for physical/chemical	CO2 FO4V	filament mounting	X26-B02A2
property investigation terahertz, microwave	S03-E04X S03-E05E	filling filter	X26-B02X X26-B02A1
ultrasonic	S03-E08E	getter	X26-B02X
	303-L00L	halogen	X26-B01A
Imaging systems	\	halogen, control	X26-C02A
analysing tubes	V05-F04J	heating	X25-B01H
Immersion lithography, for semic	onductor	Treating	X26-B01B
manufacture		heating, control	X25-B01H
	U11-C04K	3, 11	X25-B04
Immunoassay	S03-E09F		X26-C02B
radioactive techniques	S03-G02B9	holder	V04-K01
Impact crusher	P41-A01J		X26-F
<del>-</del>	S06-F	internal and integral reflector	X26-B02B
Impact printer, computer dot matrix	S06-F S06-F01	lead wire	X26-B02A2
hammer, daisy wheel	S06-F02	lead-in conductor	X26-B02A2
ribbon	S06-F03	manufacture	X26-B03
	V03-C06C	packaging seal	X26-B03 X26-B02A1
Impact switch		testing	X26-B03
IMPATT diodes	U12-C01E	vessel manufacture	X26-B03B
Impedance	1105.0	Incinerators	
converter	U25-C	domestic scale	X27-K
human body investigation (base	S05-D01D1	electrical details	X25-W01A
measuring	S01-D05	non-electrical incinerators	Q73-A05
measuring for materials investig		Inclination measurement	S02-B03
3	S03-E02D	Inclination switch	V03-C06C
Impedance matching		Inclinometer	S02-B03
aerial	W02-B08E1	Incontinence preventer	S05-F02
audio transducer	W04-T01	Incubators for animals	
general (lumped constant) circu		incubators for animals	P14-A01A
line communication system	W02-C01F5		P14-A05
line driver (logic)	U21-C02E	Incubators for infants	S05-G02B3A
microwave (distributed constant		Indexing	
transmitter output	W02-A02C W02-G01E	information retrieval, data proces	ssing
transmitter output waveguide (RF)	W02-G01E W02-A02C		T01-J05B1
_		recording - see <b>Recording inde</b>	
Impedance protection	X13-C01X		T03-J
Implantation, ion, for semiconduc		Indexing recordings	T03-J01
	U11-C02B		W04-H01

	1		
Indicating		power supply	V02-G
audible	S02-K04A	testing	S01-G12E
date	S04-A02B		V02-H08
date, on clock or watch	S04-A02B		X12-C01D3
direction of movement	S02-H	testing, transformers	S01-G12E1
electrical sensor output conversio	n (see		V02-H08
also <b>Transducers</b> )	S02-K03A		X12-C01D3
function of variable	S02-K01	transducers	S02-K03A2C
general (for instrumentation S01-S	503)	Inductive connectors	V02
	S02-K	hf	V02-F01P
haptic	S02-K04D	power supply type	V02-G01D
machine working	T05-G02		
magnetic sensor output conversion	on (see	Inductive loop transmission system educational	
also <b>Transducers</b> )	S02-K03A		W02-C02G3
measured values	S02-K04	entertainment	W02-C02G3
remote (see also <b>Telemetry</b> )	S02-K08A	hearing aids	W02-C02G3A
threshold	S02-K04G	selective calling system application	
time	S04-A02		W02-C02G5
time of events	T05-G03	Inductive output tube	V05-C01E
transferring/converting sensor ou		Inductive probe/sensor	V02-G01E
	S02-K03	Inductive telephone selection syste	ems
vehicle working	T05-G01	muucuve telephone selection syste	
visible (e.g. LED/LCD display)	S02-K04C		W01-B05B
weight	S02-D03	Inductive systems	W01-B05B
Indicating apparatus		Inductor	
calibration	S02-K07	casing	V02-G02A3
component parts	S02-K06	casing, hf	V02-F03A3
noise reduction	S02-K02D	chip	V02-F01L
optical transducers (see also <b>Tran</b>	sducers)	coil connection, hf	V02-F03B
,	S02-K03B	coil connection, power supply	V02-G02B
protection	S02-K02C	coil/winding insulator, hf	V02-F03B1
recording elements for	S02-K06B	coil/winding insulator, power sup	
testing	S02-K07	3, , , , , , , , , , , , , , , , , ,	V02-G02B1
using magnetic effects	S02-K03A5	coil/winding manufacture, hf	V02-H01A
Indicia, for recording/indicating ap	paratus	coil/winding manufacture, power	supply
maicia, for recording, maicating ap		9	V02-H01A
	S02-K06A	coil/winding, hf	V02-F03B
Indium phosphide - see AIII-BV com	pounds	coil/winding, power supply	V02-G02B
Inductance		constructional details, hf	V02-F03
measuring	S01-D05A1	constructional details, power sup	oly
Induction			V02-G02
cooker	X27-C06	control	V02-F03C
furnace	X25-C05		V02-G02C
heating	X25-B02A	control using current collector	V02-G02C
heating inductor, high power	X12-C01H	control using current collector, hf	
meaning madeter, mgm perior	X25-B02A1	control using movable coil/windir	
heating inductor, low power	V02-G01F		V02-G02C2
measier, ien perier	X25-B02A1	control using movable coil/windir	
relay	V03-D05E		V02-F03C2
•		control using movable core	V02-G02C2
Induction machine (asynchronous)	V06-M02B	control using movable core, hf	V02-F03C2
Confirmation and and an	X11-E	control using movable shield	V02-G02C2
induction generator	X11-E05	control using movable shield, hf	V02-F03C2
non-linear induction machines	X11-E	control using tappings on coil/wir	
linear induction machines	X11-H02A		V02-G02C1
Induction pump, electrodynamic	X11-H03B	control using tappings on coil/wir	
Inductive component		cooling	V02-F03C1
communication-type	V02-F	cooling	V02-G02A1
constructional details, hf	V02-F03	cooling, hf	V02-F03A1
constructional details, power supp		core	V02-G02A2 V02-F03A2
	V02-G02	core, hf core manufacture	V02-F03A2 V02-H03E
hf-type	V02-F	COLE MANUIACIALE	VUZ-NUJE

flat	V02-F01N	detector light measuring/consing	CO2 AO1D
heating, high power	X12-C01H	detector, light measuring/sensing heating, cooking	X25-B01H1
fleating, flight power	X25-B02A1	neating, cooking	X27-C02A
heating, low power	V02-G01F	heating, industrial	X25-B01H3
neuting, low power	X25-B02A1	image sensor	W04-M01E1A
hf, coil	V02-F01G2	infrared laser	V08-A04F
induction heating	X25-B02A1	infrared lighting	X26-Q01
manufacture	V02-H	medical therapy	S05-A03A1
manufacture, case	V02-H07	personal calling arrangements	W05-A05B
manufacture, coil/winding	V02-H01A	sensors, semiconductor	U12-A02B
manufacture, core	V02-H03E	signalling arrangements	W05-A05B
manufacture, semiconductor dev	ices	spectrometry	S03-E04A5B
	U11-C05G1C	temperature measurement	S03-A03
manufacture, testing	V02-H08	video camera	W04-M01E1
manufacture, terminal	V02-H06	Infrared communications systems a	nd
mounting	V02-G02A	equipment	W02-C04
mounting, hf	V02-F03A	data interface, optical fibre	W01-A07E
power supply, coil/winding	V02-G02B	·	W01-A07H1
screen	V02-G02D	data interface, free-space	W01-A07H3
screen, hf	V02-F03D	dispersion compensation	W02-C04A7J
semiconductor device	U12-C03B	distortion reduction	W02-C04A7E
shield	V02-G02D	diversity control	W02-C04A7G
shield, hf terminal	V02-F03D V02-G02X	equalising	W02-C04A7A
terminal terminal, hf	V02-G02X V02-F03X	free space (general)	W02-C04B2
variable, hf	V02-F01D	IrDA interface	W01-A07H3
variable, fill variable, power supply	V02-F01D V02-G01C1	IrDA LAN	W01-A06B5A
		and the form of the	W01-A06C3
Industrial process control, compute		mobile (general)	W02-C04B3
	T01-J07	networks, free-space	W01-A06C3
automobile control, multiplexer	X22-K	networks, optical fibre noise reduction	W01-A06C1 W02-C04A7C
automobile control, transmission		optical fibre (general)	W02-C04A7C W02-C04B1
data collection/acquisition	T01-J07A	polarisation control	W02-C04B1
manufacture control	T01-J07B	receiver	W02-C04A3
multiple sensor data acquisition	T01-J07A3	repeater	W02-C04A5
portable data acquisition devices	T01-J07A1 T01-J07B1	transceiver	W02-C04A4
process and quality control		transmitter	W02-C04A1
Industrial robot	X25-A03E	Infusion, medical	S05-J
assembly	X25-A03E2	for fluids	S05-J01
welding	X25-A03E1	Injection locking - see Lasers	V08-A07A
Industry 4.0	T01-J07B	· ·	V00-A07A
<b>fac</b> tory automation aspects	W05-D07B	Ink	607.607
Inertial navigation	S02-B08	chamber	S06-G06
	W06-A07	ink-jet printer	S06-G
Inertia switch	V03-C06C	thermal transfer printer	S06-H02A
Information network	T01-J05B4	Ink transfer elements (for measured	values)
	T01-J05B4M		S02-K06B2
Information retrieval	T01-J05B	Ink-jet printer	S06-G
Information retrieval, data processi	ina	3D technology	S06-G10
mormation retrieval, data process	•		X25-A08C2
content analysis	T01-J05B T01-J05B1	application	S06-G10
•	T01-J05B1 T01-J05B4M	drop deflection, continuous	S06-G02
Database Management indexing	T01-J05B4M T01-J05B1	drop-on-demand	S06-G01
searching	T01-J05B1	Inorganic insulator layer formation	U11-C05B
software	T01-J05B4	Inorganic photoconductive layer	S06-E01A2
storage	T01-J05B2		
systems	T01-J05B4	Input, computer	T01-C
Infrared	, , <del>, , , , , , , , , , , , , , , , , </del>	input/output bus, access	T01-H05B2
communication - see <b>Infrared</b>		Insecticide dispenser	X27-X
communication systems		Insect net	P27-C
detector, fire alarm	W05-B02B1	attached to e.g. bed	P26-F
,		ı	

Inspection		cement	X12-E01B
semiconductor	U11-F01	ceramics	X12-E01A
using pattern recognition	T04-D	fibrous material, organic	X12-E02X
Installation		gas, inorganic	X12-E01B
electric cable, communications	W01-D03	gas, organic	X12-E02X
electric cable, power	X12-G04	glass	X12-E01X
light guide	V07-H03	inorganic	X12-E01
light guide, fittings	V07-H02	inorganic, nanomaterial	X12-E01D
Instant picture camera control	S06-B08	inorganic, within organic veh	
Instruction execution, program co		inorganic, for semiconductor	manufacture U11-A08A2
modulation execution, program co	T01-F03	liquid, organic	X12-E02A
Instructions	T01-F03	metallic oxide	X12-E01B
		mica	X12-E01B
Instrument transformer	S01-D01D1A V02-G01B	natural rubber	X12-E02A
	X12-C01G	organic	X12-E02
	X12-001G	organic, nanomaterial	X12-E02D
Instrumentation	14/07 0040	organic within inorganic vehi	
aircraft	W06-B01B	organic, for semiconductor m	U11-A08A1
cables / wiring manufacture of -	S01-J05 S01-J03	naner	X12-E02X
manutacture of - power supply for -	S01-J03 S01-J04	paper pitch	X12-E02A X12-E02A
ship	W06-C01B	printed circuit board	V04-R07L
vehicle	X22-E	printed circuit board	X12-E
	722 L	resin	X12-E02B
Instrument	501 100	synthetic polymer	X12-E02B
brackets calibrating	S01-J09 S01-H01	wax	X12-E02B
details	S01-1101	Insulator	X12-E03
fault detection	S01-H01	buried layer, semiconductor	
fraudulent use detection	S01-H01		U11-C05B9C
housing	S01-J01	bushing	X12-E03C
insulation	S01-J09	calcium fluoride, for semicon	ductor manufacture
monitoring	S01-H01		U11-C05B7
musical	W04-U	composite	X12-E03X
power supply	S01-J04	inorganic, materials	U11-A08A2
supports	S01-J09		X12-E01
testing, electrical vibration dampening	S01-H01 S01-J09	inorganic, thin film for semico	nductor manufacture U11-C05B
Insulated conductor - see Cable	X12-D03	inorganic, thin film, with nitro	
		- 3, , -	U11-C05B5
Insulated gate bipolar transistor - Transistors, bipolar, MOS gated		inorganic, thin film, without n	
		content	U11-C05B7
Insulated gate FET - see Field effe		layer formation on All-BVI sub	U11-C05B8B
	U12-D02A	layer formation on AIII-BV sub	
Insulating body	X12-E03C	layer formation on 7 till 2 v sak	U11-C05B8A
bead	X12-E03C	layer formation on AIV eleme	
bobbin bushin	X12-E03C	compounds substrate	U11-C05B8C
bushing	X12-E03C	layer formation, semiconduct	
grommet nanostructure	X12-E03C3 X12-E03D	-	U11-C05
sleeve	X12-E03D X12-E03C1	lead-in	X12-E03A
tube	X12-E03C1 X12-E03C1	lead-through	X12-E03A
Insulation		manufacture	X12-E04
bearings	V06-M09	organic, materials	U11-A08A1
rotor	V06-M07B	organia this file for some	X12-E02
stator	V06-M07A	organic, thin film for semicon	ductor manufacture U11-C05A
Insulation material	X12-E	passivation layer, semicondu	
asbestos	X12-E01B	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	U11-C05B9A
		nin	X12-E03A
asphalt	X12-E02A	pin	
	X12-E02A X12-E02A	sidewall spacer, semiconduct	

	<b>.</b>	T esa es		٠.
silcon nitride, for semiconductor		digital - see digit	tal integrated circu	
silicon dioxide, for semiconducto	U11-C05B5	high donaity noo		U13-C U11-D01A6
silicon dioxide, for semiconducto	U11-C05B7	high density pac high frequency	5	U14-H03H
smoothing layer, semiconductor		high frequency p		U11-D01A4
smoothing layer, semiconductor	U11-C05B9A	input/output circ		U13-E03
supporting	X12-E03A		nents (see <b>Isolatio</b>	
suspension	X12-E03A X12-E03A	IC componen		U11-C08
testing	S01-G13	logic - see Logic		U21-C03A
testing	X12-E04	mountings		U11-D01Q
voltage distribution improvemen		opto-electronic		U13-D04A
	t //12-L03/	opto-electronic l		U12-A01A3
Integrated circuit		opto-electronic,		U12-A01B1J
automated component / intercor		opto electronie,	•	V08-A04A
layout design	U11-G02			V08-A07
circuit simulation/fault finding ted		opto-electronic,		U11-C18B4
	U11-G03	package inspect		U11-F01E
clocking/ synchronisation circuits	U11-G01		omagnetic shieldir	
computer aided design for	T01-J15A	p. 1. 3, 1, 1 1		Ŭ11-D01C5
		packages, resin e	encapsulated	U11-D01A1
Integrated circuit structures	U13-D		circuit prevention	U11-D01C9
biochip	U13-D04B	packages, surfac		U11-D01A3
bipolar	U13-D01		pecial shape termi	nal pins
bipolar and FET	U13-D03B		•	U11-D03A3
bipolar and FET, characterised by		packaging		U11-D01A
manufacture	U13-D03B2	packaging, asser	mbling	U11-E
bipolar and FET, characterised by		packaging, attac		U11-E01
structure	U13-D03B1	packaging, carrie	er tapes	U11-D03A1B
bipolar, with diodes, passive con		packaging, die b	onding	U11-E02A3
2040	U13-D01B	packaging, enca	psulation	U11-E02A
CMOS FET	U13-D02A U13-D02	packaging, flip c	hip	U11-E01C
FET with diodes, and/or capacito		packaging, gang		U11-E01B
and/or resistors	U13-D03A	packaging, lead		U11-D03A1A
including Hall device	U13-D03A	packaging, resin		U11-E02A1
including Nati device	U13-D04	packaging, tape	automated bondir	ng
opto-electronic	U13-D04			U11-E01B
single devices	U12-Q	packaging, wire		U11-E01A
sperical	U13-D06	pin grid array pa		U11-D01A5
tri-dimensional integration	U13-D05	power supply		U13-E02
wafer-scale	U13-D05	protection (thern		U13-E01
with semiconductor on insulator		radiation harden		U13-D08
structure	U13-D07	radiation sensors		U13-A01
Integrated circuits		scan testing		U13-C07
amplifier	U24-G04A		is, random pattern	1144 504505
analogue - see <b>Analogue integr</b>		generation		U11-F01D2B
analogue - see Analogue integr	U13-B	amall autlina nas		U13-C07
analogue-digital on same chip	U13-D08	small outline pac	rkages ntegrated circuit	U11-D01A3
application specific - see <b>ASIC</b>	U13-C04D	structures		U13-D
bare chip mountings	U11-D01A9	substrate biasing		U13-E02
biochip	U13-D04B	TAB packages	•	U11-D01A1
built-in self test	U11-F01D2	TAD packages		U11-D01A3
bant in son test	U13-C07	testing die packa		U11-F01C3
card type packages	U11-D01A7		or die or packaged	
ceramic packages (CERDIP, CER		devices		U11-F01C1
55.5 p. 55 95 / OEII.	U11-D01A1		or wafer level testir	
charge transfer devices - see <b>CCI</b>		costing probes, in		U11-F01D1
chip in tape packages	U11-D01A1	testing, at wafer		U11-F01D
1 11-11-1-19	U11-D01A3		ectron microscope	
circuit repair	U11-C19A		e, plug type packag	
CMOS	U13-D02A	and the second second		U11-D01A9
computer aided design for	T01-J15A2	trimming		U11-C19A
	U11-G	9		U13-C06
		•		

wafer scale packages	U11-D01A8	virtual reality	W02-F10G
wiring details	U11-D03C		W04-W07E
wiring details, grounding	U11-D03C1A	Interactive compact disk system	W04-C10A
Integrated optical waveguides manufacture	V07-F01A5 V07-F01A5A	Interchangeable lens, digital/video	14/04 1404 045
		camera	W04-M01C1D
Integration/differentiation, analogu		Intercom	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
	T02-A04B2	entryphone general intercom	W01-C04A1 W01-C04A
Intelligent power supply	U24-D12	medical	S05-G02D
Intellectual property	T01-J05A2G	mine shaft intercom	W01-C04A
	T01-N01A2G	telephone subscriber equipment	W01-C01G1
Intelligent highway system	T07-H	video entryphone	W01-C04A1
Intelligent relay	V03-D20		W02-F01A1
Intelligent sensor	V06-V01Q	Interconnection of utility and other	V40 1104 B
	V06-V04G	local generator	X12-H01B
Intelligent transducer	V06-V01Q	Interconnection of utility and solar p	
Intelligent transducer	V06-V01Q	distributed generators	X12-H01B1
Interactive broadcast and entertain	ment	Interconnection of utility and other distributed generators	X12-H01B1
system	W02-F10	_	
access control	W02-F10N3	Interconnection of utility and wind distributed generators	power X12-H01B1
archival storage of content		_	
primarily submitted by user	W02-F10F	Interconnection, electronic - see Co and Direct connection	nnector
billing billing based on user-determined	W02-F10N5	Interconnection, networks	W01-A06G3
level of commercial message pi	ovision	_	
	W02-F10N5A	Interconnections for semiconductor conductive layer formation	devices U11-C05C
content recommendation system	W02-F10Q3	contact hole manufacture	U11-C05D3
different-view transmission		contact note manaracture	U11-C05D4
(interactive TV)	W02-F10A1G	inductive, capacitive arrangement	sU11-D03C3B
file server financial network access	W02-F10K W02-F10J	interchip (in hybrid circuits, multic	
full video-on-demand	W02-F103	modules)	U14-H03G
game playing	W02-F10G	interchip (in hybrid circuits, multic	
3 1 7 3	W04-X02	modules) using ceramic dielect	ric U14-H03F1
impulse-buy signalling system	W02-F10N7	interchip (in hybrid circuits, multic	
information system access	W02-F10E	modules) using polymer dielect	
interactive internet broadcasting	W02-F10E3		U14-H03F2
internet access facility IPTV	W02-F10E1 W02-F10A	lateral/vertical	U11-C05D3
11 1 V	W02-F10E3	metallurgical aspects	U11-D03B2
karaoke	W02-F10G	multilayer, manufacture	U11-C05D2 U11-D03C3B
	W04-X03A3	optical inter-chip connections opto-electronic	U11-D03C3B
learning aspects, user profiling	W02-F10Q1A	smoothing interlayer insulating filr	
monetary transaction	W02-F10J		U11-C05D1
multimedia systems access near video-on-demand	W02-F10H W02-F10A1C	thin film circuit multilayer, metallu	
pay-per-play audio system	W02-F10C	aspects	U11-D03B9
profiling user	W02-F10Q1	three dimensional to semiconductor device electrod	U11-D03C3B
programme guide system	W02-F10E5	to semiconductor device electrod	u11-C05D4
scrambling aspects	W02-F10N1	wafer scale, multilayer	U11-D03B9
selective insertion of commercials		Interface	
storage system subscriber equipment	W02-F10K W03-A16C5	asynchronous/synchronous, digita	al
suggester system	W02-F10Q3	computer	T01-C07A
TV broadcasting with	VVUZ-1 10 QJ	backplanes, digital computers	T01-C07C
interactive aspects	W02-F10A5	Bluetooth™ data transmission	W01-A07H2A
upstream transmission	W02-F10N7	chip carriers, digital computers	T01-C07C
user profiling	W02-F10Q1	computer printer	S06-K99C
video-on-demand	W02-F10A1	converters, position CRT, digital computer output to	T01-C02B T01-C04A
video-on-request	W02-F10A1E	Civi, digital computer output to	.01 007/

data transmission over free space	optical	Interfacing	
interface .	W01-A07H3	audio tape recorder	W04-B12C
data transmission over radio inter	face	audio/video recording equipment	W04-K
	W01-A07H2	video tape recorder	W04-B10C
data transmission over wired inter	face	video camera	W04-M01D8
	W01-A07H1	Interference absorption circuit (IAC)	W02-G03B5
data transmission, characterised b	,	Interference and noise suppression	
Marshar and and Saturdaya	W01-A07H	in radio receivers	W02-G03B
display output interface	T01-C04	baseband bandwidth control	W02-G03B8
display panel, digital computers	T01-C04B	cross-modulation reduction	W02-G03B4E
fibre-optic, digital computers	T01-C07B W01-A07H3	IF passband variation	W02-G03B2A
free-space optical data session impulse radio	W01-A07H3 W01-A07H2K	IF shift	W02-G03B2C
joystick	T01-C02B1B	image signal suppression	W02-G03B4A
keyboard	T01-C02B1B	intermodulation reduction	W02-G03B4E
keyboard, cursor, icons, menu	T01-C02A	multipath reception compensation	W02-G03B6
keyboard, cursor, icons, menu keyboard, virtual	T01-C02A1	muting	W02-G03B1
LAN, digital computers	T01-C02B1D	noise blanker	W02-G03B5
LED display interface	T01-C03A	offset reduction (DC RX)	W02-G03B4G
light pen, digital computers	T01-C04C	spurious signal reduction	W02-G03B4C
logic circuit details - see	101-0020111	squelch	W02-G03B1
Motherboard, digital computers	T01 C07C	thermal noise reduction	W02-G03B3
mouse	T01-C07C	Interference suppression or avoidan	ce
near field digital transmission	W01-A07H2N	at source	W02-H
network, digital computers	T01-C03A	avoidance at radio network plannii	
optical fibre data transmission	W01-A07E	avoidance at radio network planim	W02-H01J1
optical libre data transmission	W01-A07L W01-A07H4	avoidance based on radio channel	
plotter output, digital computers	T01-C05B	avoluance based on radio channel	W02-C03E7
position digital converters for fing			W02-H01J5
shaped or hand input	T01-C02B1J	avoidance based on energy disper	
printer interface	T01-C05	3, 1, 1	W02-H01G3
printer output, digital computers	T01-C05A	avoidance based on frequency allo	
radio data transmission	W01-A07H2	and network operation	W02-H01J5
scanning, digital computer	T01-C06	avoidance based on operating free	
smart card reader, digital comput		selection in equipment	W02-H01G5
emare sara reader, argitar sempar	T01-C07C1	communications equipment applic	cation
telephone, digital	W01-C01R		W02-H01C
telephone, line	W01-C01L	non-communications equipment	
telephone, subscriber line	W01-C01L	application	W02-H01A
interface circuit (SLIC)	W01-C02D1	suppression based on circuitry	
three-dimensional computer input	t T01-C02B1E	or operation	W02-H01G
topology, digital computer	T01-C07D	suppression based on construction	nal
touch pen input, digital computer	T01-C02B1H	features	W02-H01E
tracker ball	T01-C02B1G	suppression on supply line,	
TransferJet™ data transmission	W01-A07H2N	e.g. mains filter	W02-H03
UWB radio	W01-A07H2K	Interference, optical for materials in	vestigation
WAN, digital computers	T01-C03A		S03-E04B5
wired data transmission	W01-A07H1	_	
near field digital transmission	W01-A07H2N	Interferometers	S02-A03A
ZigBee digital interface	W01-A07H2A	using optical fibres	V07-N01
terface logic circuits	U21-C02	interleaved memories	T01-H03C
differential transmission	U21-C02D1	Interior permanent	
drive circuits - display, relay, etc.	U21-C02B	magnet motor	V06-M01A1
IC termination	U21-C02E		X11-G01
inter-family	U21-C02A1	Interleaved memories	T01-H03C
logic level shifting	U21-C02A5	Interleaving, data error detection/co	
parallel bus	U21-C02C		
serial line transmission	U21-C02D	data transmission aspects general aspects	W01-A01B5 U21-A06E
tristate	U21-C02C		
		Interleaving error detection/correcti	ion
			U21-A06E
			W01-A01B5

Interlock for coin freed apparatus	T05-H01	Interpolation, extrapolation, analog	lue
Interlocking switch	V03-B06A		T02-A04B5
	X13-A03C	Interrogation system	W02-G05B
Intermediate layer, photoconductor	r S06-E01B	Interrupt programming	T01-F02
Intermodulation measurement	S01-D08	Intranet	W01-A06B7
Intermodulation reduction		architecture	T01-M02A1C
amplifier	U24-G03D5C	Intravenous fluid delivery monitorin	na
radio receiver	W02-G03B4E	minuteness nata sentery members	S05-J01A
Internal combustion engine - see IC	engine	Intruder alarms	
Internal ribs manufacture, discharge	e tubes	CCTV	W05-B01 W02-F01A5
_	V05-L03A1	CCTV	W05-B01C5C
International roaming,		electric/magnetic field disturbance	е
(cellular / wireless)	W01-E01A5	actuation	W05-B01A1
·	T01-N	false alarm prevention	W05-B01
Internet architecture	T01-N T01-M02A1C	:	W05-C02C5
novel data transmission aspects	W01-A06B7A	image scanning/comparing mechanical actuation of	W05-B01C5A W05-B01B1
Internet applications	T01-N	motion detection	W05-B01C5A
access via telephone network	W01-C05B4E	optical actuation	W05-B01C2A
alarm signal transmission	W05-B05B5	passive intrusion detection	W05-B01E
chat	T01-N01B2	ultrasonic actuation	W05-B01C1A
data transfer	T01-N01D	Inventory management	X25-F09
e-mail	T01-N01C	Inverter - see Converter, DC-AC	
entertainment financial	T01-N01B2 T01-NO1A	Inverters (logic)	U21-C03A3
information retrieval	T01-N01A T01-N03A2	lon	
interactive broadcasting	W02-F10E3	microscope	V05-F01A2
internet-of-things (IoT) remote		pump	V05-K
monitoring or control	W05-D06E1	Ion beam deposition	
internet radio	W02-D05C5	Ion beam lithography, for semicond	luctor
internet radio receiver	W03-B06C	manufacture	
measurement or control signal transmission	W05-D06E		U11-C04G
messaging	T01-N03A1C	masks, semiconductor manufactur	
telephony (VoIP)	W01-C05B4C		U11-C04G2
user applications	T01-N03A	method, apparatus	U11-C04G1
Virtual private network (VPN)	W01-A06B7G	Ion beam tube	
Internet, control	T01-N02B	general/high power	V05-E05
content management/control	T01-N03A1A	specimen analysing - see <b>Analysis</b>	<b>tu</b> be V05-F01
monitoring security/password	T01-N02B2 T01-N02B	workpiece processing - see <b>Proce</b>	
web site management	T01-N03B5	workpiece processing - see Floce	V05-F05A7C
Internet, hardware	T01-N02A3	Ion diffraction tube - see Analysing	tube
servers	T01-N02A3	ion annucion tabe see Analysing	V05-F01A2
set top box	T01-N02A3A	tan asahan sa	
Internet/ network communications	T01-N02A	Ion exchange	S03-E09B
communication protocol	T01-N02A1	Ion exchange chromatography	S03-E09C5
network communication	T01-N02A2	Ion implantation equipment	V05-F05A7C
Internet of things (IoT)		charge-up prevention	V05-F08D3 V05-F04X
cellular IoT	W05-D06E1C	charge-up prevention	V05-F04X V05-F05E3
computing aspects	T01-N01F	cleaning	V05-F05E9
general signal transfer	W05-D06E1	control	V05-F05E5A
narrow band IoT wireless network signal transfer	W05-D06E1C W05-D06E1A	cooling of workpiece or apparatus	
			V05-F05E3
Internet protocol (IP)	W01-A06F2A	flood effect beam	V05-F05A5
Internet portal	T01-N02B1H	focussed beam ion source	V05-F05A1 V05-F04A5
Internet Gateway	T04 N100D40	IOII SOUICE	V UJ-1 U4AJ
	T01-N02B1G		
	101-N02B1G		V05-F05E3

	\\05 F0 4 O 7	1 10 101	605 4004
ion-optics for species selection	V05-F04C7 V05-F05E3	medical therapy	S05-A03A S05-B01
maintenance	V05-F05E9	surgery	
metallurgical treatment application		IR reflow soldering	X24-A02E
monitoring	V05-F05E5A	IR video camera	W04-M01E1
power supplies	V05-F05E5	pick-up device	W04-M01E1A
semiconductor device manufactu		IrDA (Infrared data association)	\A/O1 A O7112
application	U11-C02B1	IrDA interface IrDA LAN	W01-A07H3 W01-A06B5A
testing vacuum lock	V05-F05E5A V05-F04D3	IIDA LAIV	W01-A06C3
vacuum ioek	V05-F05E3	Iron - see Metallurgy	
vessel	V05-F04D1	Iron, electric	X27-D03
	V05-F05E3	domestic clothes iron	X27-D03 X27-D03
workpiece holder	V05-F04G	trouser press	X27-D09
	V05-F05E3	wallpaper stripping iron	X27-X
workpiece introduction system	V05-F04D3A V05-F05E3	Ironing board	
lan in alandakan fan armiran dan da		electrical ironing board	X27-D09
Ion implantation for semiconducto manufacture	ur device U11-C02B	mechanical ironing board	P28-C05
apparatus for doping	U11-C02B1	ISDN	W01-C05B7
ROM programming	U14-A06B5	architecture	W01-C05B7C
techniques for doping	U11-C02B2	broadband (B-ISDN)	W01-C05B7E
Ion sensor FET - see Field effect tra	nsistor	control	W01-C05B7D
	U12-D02A	data network connection aspects exchange	W01-A06B5C W01-C05B7B
lon source, microscope with gas su		facsimile interface	S06-K07C2C
ion source, inicroscope with gas st		POTS / ISDN splitter	W01-C01L5
	V05-F04A5A	signalling	W01-C05B7C
Ion-optical arrangements	VOE FO4C	subscriber equipment	W01-C05B7A
analysing/processing tubes discharge tubes (general)	V05-F04C V05-M04	subscriber equipment interface	W01-C01L1
mass spectrometer	V05-J01G		W01-C05B7A
energy spectrometer	V05-J01G	ISFETs	S03-E03C
Ionisation chambers	S03-G02B2C		U12-D02A
materials investigation	S03-E10	Isolation of IC components	U11-C08
smoke detector	W05-B02A3	dielectric isolation dielectric trench	U11-C08A4 U11-C08A3
loniser	X12-F03	LOCOS method	U11-C08A2
	X27-E01B2	non-silicon semiconductor	U11-C08B
Ionospheric scatter radio communi	ication	on All-BVI compound substrate	U11-C08B2
	W02-C03X	on AIII-BV compound substrate	U11-C08B1
lonospheric sounding	S03-D09	on AIV compound substrate	U11-C08B3
Iontophoresis	S05-A04A	polysilicon trench proton bombardment, method	U11-C08A3 U11-C08A5
iontophioresis	S05-J02	recrystallisation	U11-C03J1
Infrared	S05-A03A1	,	U11-C08C
ultraviolet	S05-A03A3	sacrificial substrate	U11-C08A4
IoT (internet of things)		SOI	U11-C08A6
cellular IoT	W05-D06E1C	three-dimensional structures	U11-C08C
computing aspects	T01-N01F	trench isolation	U11-C08A3
general signal transfer narrow band IoT	W05-D06E1 W05-D06E1C	Isolator	X13-B01
wireless network signal transfer	W05-D06E1C	Isolator for microwave signals	W02-A04E
IP-based telephony	W01-C05B4C	Issuing ticket and receipt	T05-C01
IPTV .		IT (Instrument transformer)	V02-G01B
broadcast system	W02-F10A		X12-C01G
•	W02-F10E3		
receiver	W03-16C5A		
		1	
	W03-A16C5K		
IR and UV (see also Infrared or Ultr	aviolet)		

J	
J-leads	U11-D03A3
Jacuzzi TM	X27-A02A4
	X27-E03A1
Jam clearing in photocopier document/paper feed path	S06-K02B
Jamming	
communications	W02-L01A
GPS signals jamming signal insertion for	W06-A03A5M
subscription TV	W02-F05A1A
mobile phone inhibiting in sensitiv	ve area
	W01-C08F5
radar systems	W06-A04E1A
Javelin throwing (sport)	P36-A03 W04-X01K3A
Jaw crusher	P41-A01A
JET	X14-A03
Jet mill	P41-A03X
Jewels	CO2 FO4F2
optical examination personal articles, electrical details	S03-E04F3
personal articles, non-electrical de	
Jewellery	P23-C
badges	P23-C01
bracelets	P23-C02
brooches	P23-C01
earrings gem settings	P23-C03 P23-C20
manufacture	P23-M
materials	P23-C50
medals	P23-C01
necklaces safety arrangements	P23-C02
rings	P23-C03
JFET - see Field effect transistor	U12-D02B
Jigs, semiconductor wafer handling	
processing apparatus	U11-F02A2
Jog wheel for VTR	W04-B10A
_	W04-B10C
	W04-J05
Josephson junction	
manufacture pulse generator	U11-C18B9 U22-A02X
1 9	
Josephson junction - see Supercond devices	U14-F02B
Joystick for computer input	T04-F02B3
electromechanical switch aspects interface	V03-C03A T01-C02B1B
JPEG image coding	W04-P01A3
	WU4-FUTA3
Juke box CD system	W04-C10A5
entertainment system	W04-X03A1
Jumper cable for vehicle battery cha	
	X16-F05
	X22-F01A1

## Junction box

ceiling rose	V04-B05
_	V04-M02
high power	X12-G04B
- '	X13-E02
low power	V04-B09
low power, communication-type	W01-D03

K	
Kalman filter	U22-G01A1B
Karaoke centralised distribution system	W04-X03A3 W02-F10G W04-X03A3
in television transducer details	W03-A16C5G V06-V04R
Karmann flowmeters	S02-C01A9
KBE, control system	T01-J16C T06-A05A
Kettle, electric	X27-B01
Key switch	V03-C05
Key telephone set	W01-C01G3
Key telephone system	W01-C02G5C
Keyboard	
circuitry, computer input type construction, computer input type external, telephone interface key coding key scanning membrane type switches musical instruments switches telephone telephone telephone, external typewriter keyboard virtual, interface  Keypad see Keyboard	T04-F01A T04-F01B W01-C01B8N T01-C02A T04-F01A5 T04-F01A1 V03-C01A2A W04-U04A V03-C01A2 W01-C01B8 W01-C01B8N S06-K07A1 T01-C02B1D T04-F01
Keystone correction, image	W04 N05C3E
video projector-based	W04-N05C3E W04-M01D6 W04-N05C3E W04-N05C3E W04-Q01J
Kiln - see Furnaces	Q77
Kitchen appliance coffee cookware cooker - see Cooker cooker hood drinks cooler drinks heater electric fryer electric griddle electric grill food/beverages preparation food mixer/processor food serving trolley food thermometer food warmer intelligent refrigerator juicer kettle, electric kitchen storage knife knife sharpener other kitchen appliances	X27-B X27-B01 P28-A02 X27-C X27-B05 X27-B09 X27-C03A X27-C03C X27-C03B P28-A01 X27-B03 X27-B09 X27-C09 X27-B09 X27-B09 X27-B09 X27-B01 P28-A03 X27-B04 X27-B04 X27-B04 X27-B04 X27-B04 X27-B04

oven - see <b>Oven</b> oven toaster ovenware sandwich maker steak griddle tea machine tin opener toaster, pop-up with secondary built-in function	X27-C X27-C03B P28-A02 X27-C03C X27-C03C X27-B01 X27-B04 X27-B02 X27-X03
Kite (toy)	P36-E07 W04-X03E2
Klaxon	P86-E01C3
<b>Klystron</b> amplifiers using manufacture tube details	V05-C01C U24-G04D V05-L05C V05-C01C1
Knife sharpener	X27-B04
Knitting machine control	X25-T04B2 T06-D03C X25-T04B2
Knob switch	V03-C02A X13-A04C1
Knock detector vehicle engine	S02-F04D3A X22-A05A2
Knowledge processing	T01-J16C
Knowledge-base control system	T06-A05A

L		LED	U12-A01A
_			X26-H
Label		LED, P-N junctions details	X26-H01
electric cable presence warning	X12-G09	LED, semiconductor structures	X26-H01
general	P85-E05	· · · · · · · · · · · · · · · · · · ·	X26-H02
price tag record carriers	P85-E01L T03-H02A1A	,	X26-H03C
	103-H02A1A	•	X26-H03A
Labelling			U12-A01A5
record carrier using IC	T03-H02A3	•	X26-Q01
semiconductor wafer	U11-C15A		X26-H
goods labelling	X25-F03A8	. 9	U14-J X26-J
goods tagging	X25-F03A8		X26-A01B
Lab-on-chip	S03-H01		X26-A01B1
Ladder filter	U25-B	· · · · · · · · · · · · · · · · ·	X26-A01A
Ladders	Q46-A03A		X26-E02D
Language, Scripting	T01-N03B3		X26-Q
Lambda Probe	S03-E03B1	5, 5	X26-C03E
Laminated object manufacturing	X25-A08C4	1 3 3	X26-A03
	723-A00C4		X26-B03
Laminating,		· ·	X26-A01B1 X26-A03
magnetic record carrier manufactu		1 1 2	X26-A03 X26-X
for conjurator	T03-A02B9 S06-K05	1	X26-C03C
for copier/printer	300-103		X26-P
Lamp	V0/ A04 A		X26-A01B
arc	X26-A01A	supporting/suspending arrangeme	ent
control activated by body detector			X26-R
current/voltage control, general dentistry	X26-C03A1 S05-E02	socket	V04-K01
dielectric barrier discharge	X26-A01C		X26-F
discharge	X26-A01A	table lamp	X26-E02A
discharge, construction - see	X26-A02	S	X26-A03
Discharge lamp	71207102		X26-B03
discharge, high pressure	X26-A01D		X26-B01A
discharge, low pressure	X26-A01E		X26-Q03
electrodeless	X26-A01B		X26-Q03
electrodeless, operating circuit	X26-C01B3		X22-B01
electrodeless, starter	X26-C01B3		X26-U07
electroluminescent	U14-J	· ·	X26-A01A
	X26-J	Lamp ballast	
electron-stream	X26-A01A		V02-G01C
electrophotography	S06-D03		X26-C01B1C
	S06-E03B	_	X26-C01B2
emergency lighting	X26-E02C		V02-G01A X26-C01B1C
external-electrode	X26-A01A		
fitting/fixture - see <b>Light</b> floor lamp	X26-D X26-E02B	•	V04-K01
fluorescent	X26-E02B X26-A01E1		X26-F
gobo (goes before optics)	X26-D01D	Lamp starter switch	X26-C01B1
holder	V04-K01	Lanyard	P23-A06
	X26-F	LAN	T01-N02A2A
incandescent	X26-B		W01-A06B5A
incandescent, construction - see	X26-B02	intra-vehicle	X22-K03
Incandescent lamp		Langmuir Blodgett, semiconductor la	ever
infrared	X26-Q01	·	U11-C01F
intensity control, discharge	X26-C01C	•	U21-A05D1
intensity control, general	X26-C03A5		
intensity control, incandescent	X26-C02	3 3 , .	T01-J14
IR laser	X26-Q01 V08-A		S04-C03C2
iasei	X26-N		T05-G03
	//ZU-IN		W04-X01C1A
		Laparoscope	S05-D04

Lamping	V2E V03C3	oscillator for clock/watch	S04-B02X
<b>Lapping</b> control	X25-A03C2 T06-D07A	phase control	V08-A03
CONTROL		·	
	X25-A03C2	power control	V08-A03A
and the state of t	X25-A03F	power meter	S03-A01B
semiconductor wafers	U11-C06A1A	preparing active medium	V08-A01D1
Laptop computer	T01-M06A1	printer	S06-E
Large scale data networks (e.g. V	VAN)	protection equipment	V08-A10
_u.ge state data nettro.ns (e.g		pumping - see <b>Laser pumping</b>	V08-A02
	T01-N02A2B	Q-switching	V08-A03D
	W01-A06B5B	radiation protection	V08-A10
Large scale integration - see also	integrated	Raman	V08-A04X
circuits	U13-C06	reflow soldering	X24-A02E
Laser			X24-D03
active medium material	V08-A01D	ring-type	V08-A01A1
amplitude stabilisation	V08-A03A1	ruby	V08-A04C
arrays	V08-A07	scattering effects	V08-A04X
assembly	V08-A07	semiconductor - see <b>Semicondu</b>	ctor lasers
beam intensity control	V08-A03A		U12-A01B
chemical	V08-A03A V08-A04B	solid state	V08-A04C
connections, optical fibre	U12-A01C	solid state, diode pumped	V08-A04C1
connections, optical libre	V07-G10C	surgery	S05-B01
	V07-G10C V08-A01	testing	V08-A06
construction/shape details		types	V08-A04
construction/shape of optical r		X-ray	V08-B02
	U12-A01B1	Laser beam	
	V08-A01A	cutting - see Welding, laser bea	m X24 D03
control -see Laser control	V08-A03	parameter correction outside res	
cooling	V08-A05	parameter correction outside res	V08-A08
cutting	X24-D03	welding - see Welding, laser be	
diode, pumped - see <b>Laser pu</b>		weiding - see Weiding, laser be	X24-D03
	V08-A02B		
diodes - see <b>Semiconductor la</b>		Laser control	V08-A03
	V08-A04A	beam intensity	V08-A03A
doped insulator	V08-A04C	frequency	V08-A03C
dye	V08-A04D	frequency multiplying	V08-A03C1
electrodes	V08-A01B	frequency stabilisation	V08-A03C2
excimer	V08-A04B	measurements for feedback cont	
fibre-optic	V08-A04C2		V08-A06A
free electron	V08-A04E	mode	V08-A03B
gas	V08-A04B	mode locking	V08-A03B
gas management system	V08-A01C	phase	V08-A03
Infrared lasers and UV lasers, n		Q-switching	V08-A03D
sources	V08-A04F	Laser pointer	T04-F02A1
injection locking	V08-A07A		
lighting	V08-A		T04-F02B1
	X26-N	Laser printer	S06-E
liquid type	V08-A04D	lens, mirror, optics	S06-E03B
Master Oscillator Power Amplit	fier (MOPA)	light source	S06-E03A
	V08-A07A	optical system drive	S06-E03C
measurements	V08-A06	photosensitive paper	S06-E01
measurements for feedback co	ontrol V08-A06A	printhead	S06-E03A
medical therapy	S05-A03A2	Laser marking	X25-X10
metal vapour	V08-A04B		
mode locking	V08-A03B	Laser pumping	V08-A02
Nd:YAG	V08-A04C	chemical	V08-A02
optical cavity	V08-A01A	for gas laser	V08-A02C
optical fibre	V08-A04C2	optical	V08-A02B
optical resonator	V08-A01A	optical, using flash lamps	V08-A02B
optical resonator, external	V08-A01A3	semiconductor laser bias	V08-A02A
optical resonators, with nonline	ear element	thermal	V08-A02
	V08-A01A2	using electron beam	V08-A02
optical resonators, with passive		Laser radar - see Optical radar	W06-A06
components (diffraction grat		1	
i i ja amatu (amatu an grad	5,	'	

Laser treatment	1	circuits, drivers	U14-K01A3
for semiconductor manufacture	U11-C03D	clock or watch	S04-B04
for semiconductor manufacture ap		control aspects	T04-H03C2
	U11-C09G	control, TV receiver	W03-A08B3
laser therapy	S05-A03A2		T04-H03C2
semiconductor laser testing	U11-F01C5	electrodes	U14-K01A1B
Lateral/vertical collector bipolar train	nsistors	filters	U14-K01A1C
Edicial, Vertical concetor bipolar trai		glass substrate	U14-K01A5
	U12-D01A9	integral with photoconducting laye	er
Lathe	X25-A03A		U14-K01A2D
control	T06-D07C	manufacture (for thin film driving	
	X25-A03A	semiconductor circuitry see	
	X25-A03F	U14-K01A2)	U14-K01A1J
for metal working	T06-D05A	manufacturing apparatus	U14-K01A1K
non-electric control	P54-T20	module details	U14-K01A4A
constructional details	P54-T01	mountings/connectors	U14-K01A4B
cooling/lubrication arrangement	P54-T25	optical components	U14-K01A1C
tool holder	P54-T03	plasma-addressed display	U14-K01A2C
workpiece feeding/guiding arrang	P54-T25	polarisers	U14-K01A1C
		projection TV	W04-Q01B
Laundry drier	X27-D02	repair	U11-C19A U14-K01A1J
component parts	X27-D02B	an a core	U14-K01A15
air moving systems	X27-D02B4	spacers television receiver	W03-A08B
casings	X27-D02B5	testing	S02-J04A3A
dispensing systems	X27-D02B6	testing	U14-K01A8
drive arrangements	X27-D02B2 X27-D02B3	testing, matrix array	U11-F01F
heating systems lint management systems	X27-D02B3 X27-D02B8	testing, matrix array	U14-K01
providing mechanical energy	X27-D02B0 X27-D02B1	thin film arrays	U14-H01A
vibration damping systems	X27-D02B1 X27-D02B7	thin film transparent conductive lay	
control systems	X27-D02C	,	U14-K01A1B
types of laundry driers	X27 B020	transparent conductive layers	U14-K01A1B
clothes line	X27-D02L	•	X12-D02A1
combined washer-drier	X27-D01C	video projector	W04-Q01B
condensing tumble	X27-D02A4	with dynamic scattering	U14-K01A1G
electric vented tumble	X27-D02A1	with guest-host effect	U14-K01A1G
gas vented tumble	X27-D02A2	with MIM switching elements	U14-K01A2A
heat pump tumble	X27-D02A3	with thin film transistor switching e	
industrial laundry equipment	X25-T05		U14-K01A2B
microwave tumble	X27-D02A5	Lead acid accumulator	X16-B01B
non-tumble	X27-D02A6	Lead frames for semiconductor pack	ages
Lawn mower	X27-A01A	<b>,</b>	U11-D03A1A
Layer arrangements		connections to chip terminals	U11-D03A1A
magnetic record carriers	T03-A01F	materials	U11-A08B
magneto-optical record carriers	T03-D01A	That shalls	U11-D03B
multilayer capacitors	V01-B03C3A	mounting chip onto (die bonding)	
optical record carriers	T03-B01	transport	U11-D03A1A
Layered products	P73	•	U11-F02A
application	P73-U	Lead-in conductor	
characterised by shape	P73-A01	cathode ray tube	V05-D07B1
characterised by structure	P73-A02	discharge lamp	X26-A02A1
method, apparatus for producing	P73-N	incandescent lamp	X26-B02A2
relationship between layers	P73-A03	manufacture, discharge tubes	V05-L03A5
types of layer materials	P73-V	transit-time tubes	V05-C02B3
LC resonant circuit (single)	U25-E05B1	Lead manufacture,	
LCD	U14-K01	electrolytic capacitors	V01-B01G5
alignment layers	U14-K01A1A	Leader for magnetic tape	T03-A01H
back-lighting	T04-H03D	Leadless capacitors - see Capacitor	
	U14-K01A4C		
	X26-U04A1	Leadless mounting, semiconductor p	_
cells	U14-K01A		U11-D01A3

Leadless resistor - see Resistor	V01-A02D	manufacture	U11-C18B4
Leads for semiconductor devices	U11-E	organic/ polymeric	U12-A01A1X
attaching	U11-E01		U14-J
cutting	U11-E02B1		X26-J
deburring, cleaning	U11-E02B1	package	U12-A01A4
gang bonding	U11-E01B	package for white light LED	U12-A01A4A
high frequency package	U11-D03A6	printhead	S06-E03A
high power diode/transistor/thyr		silicon	U12-A01A1D
mgn power aloae, transisten tryf	U11-D03A5	structure	U12-A01A1
hybrid circuit package	U14-H05	structure, with AII-BIV compounds	U12-A01A1B
hybrid circuit, lead attaching	U14-H05	structure, with AIII-BV compounds	
.,	U14-H04B	structure, with AIV elements and t	heir
inspection	U11-F01E	compounds	U12-A01A1C
low/medium power		Legal and Regulatory	
diode/transistor/thyristor	U11-D03A4	data processing	T01-J05A2L
metal/alloy composition	U11-A08B	on-line systems	T01-N01A2L
shape, J-lead, gull-wing	U11-D03A3	Leisure activities	P36-A
shaping, forming	U11-E02B1	Leisule activities	W04-X01K
wire bonding	U11-E01A	air sports	P36-A03
Leakage detection	S02-J06	an sports	W04-X01K3N
acoustic/ultrasonic	S02-J06A3	American football	P36-A01
detecting leakage fluid	S02-J06A	, unemounte of built	W04-X01K1R
electrically detecting leakage flui		angling	P36-A07
immersion testing	S02-J06A9		W04-X01K7A
measuring fluid loss/gain rate	S02-J06B	athletics	P36-A03
optically detecting leakage fluid	S02-J06A7		W04-X01K3A
using pressure drop	S02-J06B	archery	P36-A05
using tracer to detect leakage flu	id S02-J06A5	-	W04-X01K5A
Leakage testing, electrical	S01-G04A5	ball-based play	P36-A01
with preset threshold	S01-G04A5A		W04-X01K1
Leather		badminton	P36-A01
analysis of material	S03-E14D7		W04-X01K1P
footwear, manufacture	X27-A02B1B	baseball	P36-A01
working/ cutting	X25-X07		W04-X01K1A
	7,20 7,07	basketball	P36-A01
LED	U12-A01A5B	h a a ah a a Haa ha H	W04-X01K1C
arrays, drive circuitry arrays, hybrid or monolithic	U12-A01A3B	beach volleyball	P36-A01 W04-X01K1V
circuit, for lighting	X26-H03A	billiards	P36-A01
connection to optical fibre	U12-A01C	Dilliards	W04-X01K1E
oomoonon to opinaa more	V07-G10C	boxing	P36-A04
control, for lighting	X26-H03C	Boxing	W04-X01K4A
display, clock or watch	S04-B04	clay pigeon shooting	P36-A05
display, control of	T04-H03C1	and programming	W04-X01K5E
display, drive circuitry	T04-H03C1A	combat-based sports	P36-A04
doping for	U11-C02J7	11 11 11 11	W04-X01K4
	U12-A01A2	cricket	P36-A01
drive circuitry	U12-A01A5		W04-X01K1G
drive circuitry for individual LED	U12-A01A5A	curling	P36-A01
germanium	U12-A01A1D		W04-X01K1
illumination	X26-H		W04-X01K3P
illumination, constructional detai		cycling	P36-A03
illumination, details of P-N junction			W04-X01K3C
illumination circuit	X26-H03A	darts	P36-A05
illumination control	X26-H03C		W04-X01K5C
indirect bandgap semiconductor		fencing	P36-A04
lighting	X26-H	6.1.	W04-X01K4C
lighting, details of P-N junctions	X26-H01	fishing	P36-A07
lighting circuit	X26-H03A	16	W04-X01K7A
lighting, constructional details	X26-H02	golf	P36-A01
lighting control manufacture	X26-H03C U12-A01A2		W04-X01K1L
manuraciure	UIZ-AUIAZ	I	

gliding	P36-A03	Length measurement	S02-A10B
hang gliding	W04-X01K3N P36-A03	using electrical/magnetic method	S02-A02 S02-A10B
	W04-X01K3N	using mechanical method	S02-A01
hockey	P36-A01		S02-A10B
	W04-X01K1N	using optical measurement	S02-A03
horse racing and riding	P36-A03		S02-A10B
hunting	W04-X01K3E P36-A07	using sound or ultrasound	S02-A05B S02-A10B
	W04-X01K7C	Lens	
ice hockey	P36-A01	antenna (RF)	W02-B03A
	W04-X01K1N	copier, exposure	S06-D03
jogging	P36-A03	copier, positioning for magnificati	
lacer simulated sheeting	W04-X01K3A P36-A04	changes	S06-D10A
laser-simulated shooting	W04-X01K4E	detachable lens, digital/video	
martial arts	P36-A04	camera	W04-M01C1D
martial arts	W04-X01K4A	electron/ion, (general)	V05-M04
motor racing	P36-A03	electron/ion, lens manufacture	V05-L01B4
g	W04-X01K3G	integral with image sensor, digital/video camera	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
paintball	P36-A04	interchangeable lens, digital/video	W04-M01C1G
•	W04-X01K4E	camera	W04-M01C1D
parachuting	P36-A03	ion-optical for mass/energy specti	
	W04-X01K3N	Ton optical for mass energy specia	V05-J01G
parascending	P36-A03	laser printer	S06-E03B
	W04-X01K3N	liquid crystal (variable), camera	W04-M01C1E
pool (indoor game)	P36-A01	manufacture, for semiconductor d	levice,
	W04-X01K1E	LCD	U11-C18D
power boat racing	P36-A03	manufacture, optical	P81-A01
	W04-X01K3L		P81-M
racquet sports	P36-A01 W04-X01K1P	multiple optical lens (novel)	P81-A01C
rugby	P36-A01	optical lens (novel)	P81-A01
rugby	W04-X01K1R	and the standard back and the same	V07-F02A
running	P36-A03	positioning, in photographic came positioning, video camera	era S06-B01B1 W04-M01C1
3	W04-X01K3A	single optical lens (novel)	P81-A01A
sailing	P36-A03	television/video camera	W04-M01C1A
-	W04-X01K3L	testing	S02-J04A5
snooker	P36-A01	variable power, general optical	P81-A01V
	W04-X01K1E	variable power, individual lens	P81-A01V1
shooting	P36-A05	variable power, lens group	P81-A01V5
1 1	W04-X01K5E	variable power, video camera	W04-M01C1E
shuttlecock-based play	P36-A01	Leveling	
surfing	W04-X01K1P P36-A03	control	T06-B05
surfing	W04-X01K3L	inclination measuring	S02-B03
swimming	P36-A03	spirit	S02-B03
	W04-X01K3J	surveyors	S02-B02
table tennis	P36-A01	switch	V03-C06X
	W04-X01K1T	Level indicating	S02-C06
tennis	P36-A01	by measuring pressure/weight	S02-C06B
	W04-X01K1P	electrical sensor	S02-C06C
volleyball	P36-A01	electrical, capacitive system	S02-C06C3
	W04-X01K1V	electrical, resistive system	S02-C06C1
water skiing	P36-A03	electrical, resistive system combin	
	W04-X01K3L	heater	S02-C06C1A S02-C06A5
wind surfing	P36-A03	float, non-electric system float, operating switch	S02-C06A5 S02-C06A1A
	W04-X01K3L	float, operating switch float, operating transducer	S02-C06A1A S02-C06A1B
uraatlina	D24 A04		
wrestling	P36-A04		
3	W04-X01K4G	other electrical e.g. inductive	S02-C06C9
wrestling enard tube			

	using optical frequencies (em)	S02-C06D1	cooling	Q71-T9
		W06-A06D1		X26-D02
	using other wave propagation eff		circuits, PCBs	V04-Q30U
		S02-C06D9	decorative	W04-X03C
	using radio frequencies (em)	S02-C06D5		X26-M
		W06-A04A1	deflection control	V07-K05
	using sonic/ultrasonic radiation	S02-C06D3	deuterium arc lamp	X26-A01E
		W06-A05D1	electroluminescent lighting device	
	using wave propagation effects	S02-C06D		U14-J
L	ever switch.	V03-C02B	emergency lighting	X26-E02C
ı	ibrary automation	T01-J05B9	fitting/fixture	X26-D
	ibrary recording/reproducing syst		fixture, cooling	X26-D02
•	control system	T03-Q07B	fixture, diffuser	X26-D01E
	disk	T03-Q07B	fitting/fixture diffuser for display	Q71-T03 X26-D01E1
	loading mechanism and drive	T03-Q07A	fitting/fixture, diffuser for display fitting/fixture, filter	X26-D01E1
	magnetic disk	T03-Q07A	ntting/lixture, litter	Q71-T03
	magneto-optical disk	T03-Q05E	fitting/fixture, guide	X26-D01F
	optical disk	T03-Q05C	intilig/lixture, guide	Q71-T03
	tape	T03-Q01	fitting/fixture, guide for display	X26-D01F
	•	W06-A06	fitting/fixture, housing	X26-D03
	idar - see Optical radar		fitting/fixture, lens	X26-D03
L	ife saving, general	P35-A	fitting/fixture, polariser	X26-D01G
	chutes	P35-A01E	Training, instance, peranteer	Q71-T03
	cushioning devices	P35-A01G	fitting/fixture, reflector	X26-D01A
	hoists	P35-A01A	9	Q71-T02
	lifting equipment	P35-A01A	fitting/fixture, refractor	X26-D01B
	slides	P35-A01E		Q71-T02
	soft-landing equipment	P35-A01G	fitting/fixture, screen	X26-D01D
L	ife saving in water	Q24-X01		Q71-T03
L	ife test, for integrated circuits	U11-F01C3	flashlight	X26-E01A
		U11-F01G	floor lamp	X26-E02B
ı	:fab	Q24-X01A	fluorescent lamp - see Fluoresce	nt lamp
	ITEDUOV	()/4-A() A		
	ifebuoy :4			X26-A01E1
L	ift	X25-F04	frequency control	X26-A01E1 V07-K04
l	<del>-</del>	X25-F04 T06-D08D	globe	X26-A01E1 V07-K04 Q71-T01
L	<b>.ift</b> control	X25-F04 T06-D08D X25-F04A	globe gobo (goes before optics)	X26-A01E1 V07-K04 Q71-T01 X26-D01D
ı	ift	X25-F04 T06-D08D X25-F04A X25-F04	globe gobo (goes before optics) ignition of combustible	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06
ı	control door	X25-F04 T06-D08D X25-F04A X25-F04 X25-U01	globe gobo (goes before optics) ignition of combustible incandescent lighting	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A
ı	control door goods lift	X25-F04 T06-D08D X25-F04A X25-F04 X25-U01 X25-F04	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01
ı	control door goods lift mining	X25-F04 T06-D08D X25-F04A X25-F04 X25-U01	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b>	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01
	control door goods lift mining ski lift	X25-F04 T06-D08D X25-F04A X25-F04 X25-U01 X25-F04 X25-D02A	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07
	control door goods lift mining ski lift switch, floor-levelling	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-D02A X25-F05 V03-B01A	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01
ı	control door goods lift mining ski lift switch, floor-levelling cift-off masking, semiconductor	X25-F04 T06-D08D X25-F04A X25-F04 X25-U01 X25-F04 X25-D02A X25-F05 V03-B01A U11-C04D1	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A
ı	control door goods lift mining ski lift switch, floor-levelling cift-off masking, semiconductor cifting equipment	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source LED	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H
ı	control door goods lift mining ski lift switch, floor-levelling cift-off masking, semiconductor cifting equipment boat hoist	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source LED LED, circuits	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H
ı	control  door  goods lift mining ski lift switch, floor-levelling  cift-off masking, semiconductor  cifting equipment boat hoist for aircraft cargo	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source LED LED, circuits LED, control	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H X26-H03A X26-H03C
ı	control  door  goods lift mining ski lift switch, floor-levelling  cift-off masking, semiconductor cifting equipment boat hoist for aircraft cargo for ship cargo	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source LED LED, circuits LED, control LED, constructional details	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H03A X26-H03C X26-H02
l l	control door goods lift mining ski lift switch, floor-levelling cift-off masking, semiconductor cifting equipment boat hoist for aircraft cargo for ship cargo for train cargo	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H03A X26-H03C X26-H02 X26-H01
l l	control  door  goods lift mining ski lift switch, floor-levelling  cift-off masking, semiconductor  cifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  cight(ing)	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-D02A X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q21-J06	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H03A X26-H03C X26-H02 X26-H01 X26-H01
l l	ift control  door  goods lift mining ski lift switch, floor-levelling ift-off masking, semiconductor ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo ight(ing) amplifier - see Optical amplifier	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-D02A X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q21-J06 V07-K01C	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H03A X26-H03C X26-H02 X26-H01 X26-H01 W06-C07C
l l	control  door  goods lift mining ski lift switch, floor-levelling  cift-off masking, semiconductor  cifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  cight(ing)	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q21-J06 V07-K01C utters	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical</b> modulation)  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship luminescent lighting	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H03A X26-H03C X26-H02 X26-H01 X26-H01
l l	door goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh	X25-F04 T06-D08D X25-F04 X25-F04 X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H03A X26-H03C X26-H02 X26-H01 X26-H01 W06-C07C Q71-A02B
l l	door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q21-J06 V07-K01C utters	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship luminescent lighting maintenance	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 X26-H01 W06-C07C Q71-A02B Q71-G
l l	door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used	X25-F04 T06-D08D X25-F04 X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 W06-C07C Q71-A02B Q71-G Q71-M
l l	door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used gas	X25-F04 T06-D08D X25-F04 X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture measuring	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H X26-H03A X26-H03C X26-H02 X26-H01 W06-C07C Q71-A02B Q71-G Q71-M S03-A
l l	control  door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used gas kerosene	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08 Q71-A50B Q71-A50B	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture measuring	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 X26-H01 W06-C07C Q71-A02B Q71-G Q71-M S03-A S05-A03A
l l	door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used gas kerosene oil	X25-F04 T06-D08D X25-F04 X25-F04 X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08 Q71-A50B Q71-A50B Q71-A50C Q71-A50A	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture measuring medical therapy	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 X26-H01 W06-C07C Q71-A02B Q71-G Q71-M S03-A S05-A03A S05-A03A S06-B02A
l l	door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used gas kerosene oil wax	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08 Q71-A50B Q71-A50B Q71-A50A Q71-A50A	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, semiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture measuring medical therapy  meter, in photography	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 X26-H01 W06-C07C Q71-A02B Q71-G Q71-M S03-A S05-A03A S05-A03A S06-B02A
l l	control  door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used gas kerosene oil wax container for combustible materia	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08 Q71-A50B Q71-A50B Q71-A50C Q71-A50A Q71-A50X al Q71-T04	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, pemiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture measuring medical therapy  meter, in photography modulation - see <b>Optical modula</b> night light	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 W06-C07C Q71-A02B Q71-G Q71-M S03-A S05-A03A S05-A03A9 S06-B02A
l l	door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used gas kerosene oil wax	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08 Q71-A50B Q71-A50B Q71-A50C Q71-A50A Q71-A50X al Q71-T04	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, pemiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture measuring medical therapy  meter, in photography modulation - see <b>Optical modula</b>	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 X26
l l	control  door  goods lift mining ski lift switch, floor-levelling  ift-off masking, semiconductor  ifting equipment boat hoist for aircraft cargo for ship cargo for train cargo  ight(ing) amplifier - see Optical amplifier amplitude modulation using sh  barriers combustible used gas kerosene oil wax container for combustible materia	X25-F04 T06-D08D X25-F04A X25-F04 X25-F04 X25-F04 X25-F05 V03-B01A U11-C04D1 X25-F05 Q24-R02 Q25-B02C Q24-B02C Q21-J06 V07-K01C utters V07-K01B S03-C08 Q71-A50B Q71-A50B Q71-A50C Q71-A50A Q71-A50X al Q71-T04	globe gobo (goes before optics) ignition of combustible incandescent lighting infrared lighting intensity control (see also <b>Optical modulation</b> )  laser source LED LED, circuits LED, control LED, constructional details LED, P-N junctions details LED, pemiconductor structures Lighthouse/lightship luminescent lighting maintenance manufacture measuring medical therapy  meter, in photography modulation - see <b>Optical modula</b> night light	X26-A01E1 V07-K04 Q71-T01 X26-D01D Q71-T06 Q71-A02A X26-Q01 T06-B07 V07-K01 W02-C04B1A X26-H03A X26-H03C X26-H02 X26-H01 X26-H01 X26-H01 W06-C07C Q71-A02B Q71-G Q71-M S03-A S05-A03A S05-A03A S05-A03A S05-B02A Attion V07-K X26-E02D

optical-fibre based	V07-N03	general lighting	X26-U05
op waa nord bacca	X26-G	general lighting for	X26-U05A
ornamental	W04-X03C	commercial use	
	X26-M	general lighting for	X26-U05B
phase control	V07-K02	domestic use	
polarisation control	V07-K03	greenhouse	X26-U12
portable	X26-E	handbag/rugsack	X26-U99
portable, battery-powered	X26-E01	3 3	X27-A02B
portable, flashlight	X26-E01A	heating/curing/sterilisation	X26-U03
portable, floor lamp	X26-E02B	indoors, general lighting	Q71-U45C
portable, key ring-mounted	X26-E01D	insect repellent lighting	Q71-U37
portable, lantern	X26-E01B	keys	X26-U99
portable, mains-powered	X26-E02	lamppost	X26-U06
portable, mains-powered emerge	ency X26-E02C	lanterns	Q71-U33
portable, mains-powered night lig		lighters	Q71-U34
portable, penlight	X26-E01C	marine vessels	W06-C01C
portable, solar-powered	X26-E01E		X26-U08
portable, table lamp	X26-E02A	medical	X26-U02
portable, torch	X26-E01A		S05-A03A
portable, torch using LEDs	X26-E01A1		Q71-U13
portable, wearable	X26-E01F	outdoors, general lighting	Q71-U45A
printed circuits	V04-Q30U	parasol	X26-U99
protection	Q71-T07	1	X27-A01B
recycling of lighting components		plant growth	X26-U12
repair	Q71-G	refrigerator	X26-U05B
safety	Q71-T07	5.0	X27-F02C2
shade	X26-P	reptile house	X26-U99
	Q71-T01	•	X27-H01
simulation (teaching equipment)	X26-U99	road marking	X26-U06
solar lights	X26-S	road sign	X26-U06
special effects	W04-X03C	scented lighting	Q71-U37
•	X26-M	screwdriver	X26-U99
stage	X26-K	sewing machine	X26-U99
sulphur lamp	X26-A01B	J 11	X25-T04C
supporting/suspending arrangem		signs	X26-U04B
table lamp	X26-E02A	space craft	W06-B03X
theatre	X26-K	.,	X26-U09
transmission systems	W02-C04	stage	X26-K
transmitter, receiver, semiconduc	tor U12-A02C3	sterilisation/heating/curing	X26-U03
Tungsten lamp	X26-B01A	street lights	X26-U06
ultraviolet lighting	X26-Q03	table lamp	Q71-U35
Xenon lamp	X26-A01A	therapeutic lighting	Q71-U37
Light(ing), applications		toothbrush	X26-U99
application	X26-U		X27-A02A3A
aquarium	X26-U99	torches/flares	Q71-U32
aquanum	X27-H01	traffic lights	X26-U06
aircraft	W06-B01C2	umbrella	X26-U99
anciait	W06-B01C5		X27-A02
	X26-U09	underwater lighting	Q71-U45E
camera	X26-U11	vehicle	X22-B
camera - digital	X26-U11A		X26-U07
camera - film-based	X26-U11B		Q71-U03
clothes	X26-U99	vase	X26-U99
cionies	X27-A02B1	vivarium	X26-U99
cosmetic	X26-U01		X27-H01
curing/heating/sterilisation	X26-U03	wearable	Q71-U36
displays	X26-U04A	Light activated thyristor - see Pho	tothyristor
back-lighting	X26-U04A1	Eight activated thyristor - see Filo	=
edge-lighting	X26-U04A1 X26-U04A2		U12-A02B2C
floor lamp	Q71-U35	Light Barriers	S03-C08
garden lighting	X26-U05B	circuitry	S03-C08C
garaciriightiiig	X27-A01	constructional details	S03-C08A

		1	
Light control	1/07//	equalising	W02-C01B2
electro-optical	V07-K	hot standby	W02-C01D3A
general optical	P81-A50J	hybrids and transformers impedance matching	W02-C01F1 W02-C01F5
Light emitting diodes - see LED	U12-A01A	impedance matching	U25-D05
for lighting	X26-H		W02-A02C
Light guides	V07-F01	interference reduction	W02-A02C
thin film	V07-F01A5	line amplifier	W02-C01E5
Light pen for computer input	T04-F02A1	monitoring	W02-C01D
interface	T01-C02B1H	power line	W02-C01A3
Light source		repeater	W02-C01E
electrophotographic exposure	S06-D02	repeater circuits	W02-C01E
laser printer	S06-E03A	testing	W02-C01D
optical heads, recording	T03-B02B1	transmission control	W02-C01B1
Lighthouse for CRT screen exposu	re V05-L02F5	waveguide	W02-C01A1
	V05-L05D1B	Line connector	V04-N
Lighting		flexible	V04-N
aircraft	W06-B01C5	turnable	V04-N
ballast	X26-C01B1	Line hybrid	
cooling	X26-D02	general	W02-C01F1
electroluminescent device	U14-J	telephone	W01-C08B
	X26-J	Linear accelerator	X14-G01
installation	X26-X		V02-E02A3
LED	X26-H	Linear actuator, solenoid-type	
optical fibres-based	V07-N03	Linear image sensor - see Image s	sensor,
	X26-G	linear	
PCB	X26-C03	Linear motor	V06-M06B
ship	W06-C01C5		X11-H02
lightship	W06-C07C	asynchronous	V06-M06B1
stage	X26-K		X11-H02A
theatre	X26-K	direct current	V06-M06B3
vehicle - see <b>Vehicle</b>	X22-B	ala desarta Ca	X11-H02C
wiring	X26-C03	electrostatic	V06-M06B8
Lightly doped drain FET - see Field		electrostrictive magnetostrictive	V06-M06B7 V06-M06B9
transistors	U12-D02A3	piezoelectric	V06-M06B7
Lightning		synchronous	V06-M06B2
arrester, metal oxide	X13-C03A2	synchronous	X11-H02B
arrester, SF6	X13-C03A3	Linear particle accelerator	X14-G01
arrester, silicon carbide	X13-C03A1	Linear particle accelerator	
arrester, spark gap type	X12-F01A	Linear predictive coding (LPC) for	r speech
	X13-C03A		W04-V05G3
arrester, varistor type	X12-A	Linear power supply regulator	U24-E02B2D
and duster	X13-C03A	Linear speed measurement	S02-G01
conductor detection	X12-G01F S03-D09	electrically/magnetically	S02-G01 S02-G01B2
rod	X25-S	optical	S02-G01A
rod, cable installation	X12-G01F	'	
•		Linearising transducer	S02-K02A
Limb prostheses	S05-F03	Linearity improvement	
Limit switch	V03-B01A	amplifier	U24-G03D5
Limiter, amplitude	U24-C02A	CRT display (TV set)	W03-A08A1D
DC limiting, level clamping	U24-C02A5	radio receiver	W02-G03B4E
soft	U24-C02A1	Lineman safety harness	P35-A03A
LINAC	X14-G01		X12-G01D
Line	· •	Lipreading	
communication - see <b>Line</b>		teaching/writing	P85-A01C
communication system	W02-C01	Liquefaction of gases by pressure	and cold
intensity measurement, optical	S03-A02A	treatment	Q75-F
Line communications system	W02-C01	constructional details	Q75-T
cross-talk reduction	W02-C01 W02-C01C2	Liquid chromatography	S03-E09C5
CLOSS-FRIK LEGUCTION	W02-C01C2	=-qaia amamatagiapii,	300 20703

W02-C01C1

echo reduction

Liquid crizet switch  Liquid crystal display- see LCD  Liquid crystal materials  U11-A03A  additives  U11-A03A  Liquid electrolyte for capacitor  Liquid plaser  Liquid plaser  Liquid plaser  Liquid plaser  Liquid plase epitaxy, semiconductor  U11-C01H  Liquid plase epitaxy, semiconductor  U11-C04H  Liquid plase epitaxy, semicond		1	,	
Liquid cortact switch	Liquid circuit breaker	V42 B00	pattern transfer	U11-C04D
Liquid contact switch				
Liquid crystal display - see LCD  Liquid crystal materials  U11-A03A  additives  U11-A03A  additives  U11-A03A  testing - for use in LCD  U14-K01A8 testing - for use in LCD  U14-C04A1  Liquid electrolyte for capacitor  U11-C04A2  uibrarian control  U11-C04C3  wibration control  U11-C04C3  wibration control  U11-C04C3  wibration control  U11-C04C8  Lithography, using beam tubes (see also  Processing tube)  U55-F08C1  Litestock  Litestock  U25-N02  Litestock  Litestock, see Agriculture, litestock  Litestock, see Agriculture, litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock, see Agriculture, litestock  Litestock, see Agriculture, litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock, see Agriculture, litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litestock  Litesto	•		9	
Liquid crystal materials V07-K10A additives U11-A03A vesting - for use in LCD U14-K01A8 testing - for use in LCD U14-C04A12 tilt control U11-C04A12 tilt control U11-C04A13 tilt control U11-C04A13 tilt control U11-C04A14 tilt control	Liquid contact switch	V03-C09		
Liquid crystal materials	Liquid crystal display - see LCD			
additives U11-A03A testing - for use in LCD U14-K01A8 testing - for use in LCD U14-C04A1 tilt control U11-C04A1 tilt control U11-C04A2 vibration control U11-C04A3	Liquid crystal materials	U11-A03A	5	
seditives U11-A03A testing - for use in LCD U14-K0148 testing - for use in LCD U11-C043 sold testing - for use in LCD U11-C045 S02-J04A3 tilt control U11-C04C5 U11-C0	Inquita di yotai materiaio			
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testing S02-J04A3 vibration control U11-C04C5 Liquid electrolyte for capacitor V01-801B5 Liquid lasers V08-A04D Liquid phase epitaxy, semiconductor U11-C01H Liquid sampling, materials investigation dippers S03-E13B1 ejector devices S03-E13B1 ejector devices S03-E13B1 pippette S03-E13B2 pippette S03-E13B2 suction devices S03-E13B1 pippette S03-E13B2 suction devices S03-E13B1 pippette S03-E13B2 suction devices S03-E13B1 lithium in cell X16-B01F1 Lithium primary cell, non-aqueous electrolyte X16-B01F1 Lithium secondary cell, non-aqueous electrolyte X16-B01F1 Lithium secondary cell, non-aqueous liquid electrolyte X16-B01F1 Lithium secondary cell, non-aqueous solid electrolyte S03-E13B1 lignment, unappetito S04-B01F1 Lithium secondary cell, non-aqueous solid electrolyte S04-B01F1 Lith			3 1 7	
Liquid lasers V08-A04D (11-C04Hz) Liquid lasers V08-A04D (11-C01Hz) Liquid lasers S03-E13B1 of degers S03-E13B1 ejector devices S03-E13B1 ejector devices S03-E13B2 splitting levels S03-E13B2 suction devices S03-E13B1 remote control/monitoring W05-D07N weighing S02-D02C wilking work of the work of the work of the weighing S02-D02C wilking work of the weighing S02-D02C wilking work of the weighing S02-D02C wilking work of the weighing S02-D02C wilking some of the work of the weighing S02-D02C wilking some of the work of the weighing S02-D02C wilking some of the weighing S02-D02C wilking S02-D02C wilking some of the weighing S02-D02C wilking S02		S02-J04A3		
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Processing tube   V05-F08C1			-	
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ejector devices   S03-E1381   animal food manufacture   X25-N02A   pippette   S03-E1382   splitting levels   S03-E1382   splitting levels   S03-E1381   x16-B01F1			Livestock	X25-N02
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Lithium primary cell, non-aqueous electrolyte X16-A02A		S03-E13B1		
Lithium secondary cell, non-aqueous electrolyte X16-B01F1	Lithium ion cell	X16-B01F1		S02-D02C
Lithium secondary cell, non-aqueous electrolyte X16-B01F1  Lithium secondary cell, non-aqueous liquid electrolyte X16-B01F1A  Lithium secondary cell, non-aqueous Siquid electrolyte X16-B01F1A  Lithium secondary cell, non-aqueous Siquid electrolyte X16-B01F1A  Lithium secondary cell, non-aqueous Solid electrolyte X16-B01F1A  Load/unload ramp for hard disk drive T03-A05G T03-P01 T03-F01 T03-F01 T03-F01 T03-F01 T03-P01 To3-N05 Carsette drive (computer) T03-A08E To3-P01 To3-	Lithium primary cell, non-aqueous	electrolyte		14/04 40/541
Lithium secondary cell, non-aqueous liquid electrolyte X16-B01F1A  Lithium secondary cell, non-aqueous solid electrolyte X16-B01F1A  Lithium secondary cell, non-aqueous solid electrolyte X16-B01F1C  Lithium secondary cell, non-aqueous disk drive  X16-B01F1A  Load/unload ramp for hard disk drive  T03-A05G T03-A05G T03-A08A1C  Loading mechanism for record carriers card drive  T03-F01 T03-N01 T03-N01 T03-N03 T03-B01 T03-N03 T03-B01 T03-N03 T03-N03 T03-N03 T03-N03 T03-N01 T03-N03 T03-N03 T03-B01 T03-N03 T03-N01			data networks	W01-A06E1L
Lithium secondary cell, non-aqueous liquid electrolyte X16-B01F1A  Lithium secondary cell, non-aqueous solid electrolyte X16-B01F1C  Lithographic plate manufacture, electrophotographic S06-E01X  Lithography, semiconductor U11-C04B alignment, lamp/light source U11-C04B alignment, vertical U11-C04B1 alignment, vertical U11-C04A1A beam modulation U11-C04A1A control of exposure apparatus beam U11-C04A1A control of exposure apparatus beam U11-C04A1C drying imprint process methods and control u11-C04A1E u11-F01B ion beam exposure U11-C04B1 lift-off masking U11-C04B1 lift-off masking U11-C04B2 mark mask alignment detection u11-C04B2 masking techniques u11-C04B1 local time indicator, clock or watch S04-A02B local time indicator, clock or watch S04-A02B local mark mask alignment detection u11-C04B2 pinsulating layer formation u11-C05B3 local deterioral-slide u25-M02 electron-based telephone service u11-C04F1A electrical-slide u25-M02	Lithium secondary cell non-aqueo	us electrolyte	Load engaging equipment	X25-D01
Lithium secondary cell, non-aqueous liquid electrolyte X16-B01F1A  Lithium secondary cell, non-aqueous solid electrolyte X16-B01F1C  Lithographic plate manufacture, electrophotographic S06-E01X  Lithography, semiconductor U11-C04B alignment, lamp/light source U11-C04B1 alignment, vertical alignment, vertical u11-C04A1A beam modulation U11-C04A1A developing U11-C04A1A electron beam exposure u111-C04A1C drying U11-C04A1A electron beam exposure U11-C04A2 imprint process methods and control u11-C04A1 imprint process methods and control lift-off masking U11-C04A1E inspection of masks U11-C04B1 in print process methods and control lift-off masking U11-C04A1 in print process methods and control u11-C04B2 inspection of masks U11-C04B2 inspection of masks U11-C04B2 mark mask alignment detection modulation, beam u111-C04B2 modulation u111-C04B3 modulation u111-C04B4 modulation u111-C04B4 modulation u111-C04B4 modulation u111-C04	Elimani Secondary cen, non aqueo		control	
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Solid electrolyte X16-B01F1C  Lithographic plate manufacture, electrophotographic S06-E01X  Lithography, semiconductor U11-C04B alignment, lamp/light source U11-C04B3 alignment, wertical U11-C04B1 alignment, vertical U11-C04A1B beam modulation U11-C04A1A cleaning U11-C04A1A electron beam exposure U11-C04A1B electron beam exposure U11-C04A1B ion beam exposure U11-C04A1E inspection of masks U11-C04B2 masking techniques U11-C04B2 masking techniques U11-C04B2 modulation, beam U11-C04E1A inspection of masks U11-C04A6 electrical-slide electromagnetic X25-M02 electrical-slide electromagnetic X25-M02	iiquiu electiolyte	ATO-DOTT TA	dick drive	
Lithographic plate manufacture, electrophotographic S06-E01X  Lithography, semiconductor U11-C044 alignment U11-C04B3 alignment, lamp/light source U11-C04B1 alignment, retrical U11-C04B1 alignment, vertical U11-C04A1H baking U11-C04A1H baking U11-C04A1A cleaning U11-C04A1A cleaning U11-C04A1A electron beam exposure U11-C04A1A electron beam exposure U11-C04A1A imprint lithography U11-C04A1E inspection of masks U11-C04A1E lincology U11-C04A1A lincology U11-C04A1A library			uisk uiive	
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Lithography, semiconductor  alignment   U11-C044   alignment, lamp/light source   U11-C04B3   alignment mark production   U11-C04B1   alignment, vertical   U11-C04A1H   baking   U11-C04A1A   cleaning   U11-C04A1A   control of exposure apparatus beam   U11-C04A1A   developing   U11-C04A1A   electron beam exposure   U11-C04A1A   imprint lithography   U11-C04A   imprint process methods and control   imprint process methods and control   lift-off masking   U11-C04A1E	solid electrolyte		disk dilve	
alignment alignment, lamp/light source U11-C04B3 alignment mark production U11-C04B1 alignment, vertical U11-C04B1 alignment, vertical U11-C04C3 anti-reflection layers U11-C04A1H beam modulation U11-C04A1A cleaning U11-C04A1A control of exposure apparatus beam U11-C04A1A electron beam exposure U11-C04A1A electron beam exposure U11-C04C2 immersion lithography U11-C04C2 imprint lithography U11-C04C2 imprint process methods and control U11-C04A1E inspection of masks U11-C04A1E lift-off masking U11-C04B2 masking techniques U11-C04D masking techniques U11-C04D poptical elements U11-C04E1A  alignment mark production U11-C04B1 tape drive (computer) T03-N01 To3-N01 tape drive (computer) T03-N01 To3-N01 tape drive (computer) T03-N01 To3-N01 To	solid electrolyte Lithographic plate manufacture,	X16-B01F1C		T03-A08A1C
alignment, lamp/light source alignment mark production alignment mark production U11-C04B1 alignment, vertical U11-C04C3 anti-reflection layers U11-C04A1H baking U11-C04A1A beam modulation U11-C04A6 cleaning U11-C04A1A control of exposure apparatus beam U11-C04A6 developing U11-C04A1C drying U11-C04A1A electron beam exposure I11-C04A1A electron beam exposure I11-C04C2 immersion lithography U11-C04A1 imprint lithography U11-C04A1 imprint process methods and control U11-C04A1E inspection of masks U11-C04A1E lift-off masking U11-C04A1E lift-off masking U11-C04B1 mark mask alignment detection modulation, beam U11-C04A6 U11-C04B2 modulation, beam U11-C04A6 optical elements U11-C04A1A library Loading mechanism, disk drive Local area networks (LAN, see also Networks) Local area networks (Local see also networks) Local area networks (Local see also networks) Local area ne	solid electrolyte Lithographic plate manufacture,	X16-B01F1C	Loading mechanism for record carri	T03-A08A1C
alignment mark production alignment, vertical alignment, vertical u11-C04C3 anti-reflection layers U11-C04A1A beam modulation U11-C04A6 cleaning U11-C04A1A control of exposure apparatus beam U11-C04A1C drying U11-C04A1A electron beam exposure U11-C04C2 immersion lithography U11-C04C2 imprint lithography U11-C04A1E U11-F01B ion beam exposure Iift-off masking Iift-off masking Iin beam wasking techniques modulation, beam U11-C04A6  u11-C04A1 U11-C04A1 U11-C04B1  wasking techniques modulation, beam U11-C04A6 U11-C04A1 U11-C04A1 U11-C04A1 U11-C04B1 U11-C04B1  wasking techniques modulation, beam U11-C04A1A U11-C04A1A U11-C04A1A Local area networks (LAN, see also Networks)  W01-A06B5A  Local oscillator broadcast radio receiver w03-B01A7 Voreceiver tuner W03-A01B7  Local time indicator, clock or watch CVD insulating layer formation U11-C05B3  Location-based telephone service Lock Applications, general electrical-slide y25-M02 electromagnetic X25-M02	solid electrolyte Lithographic plate manufacture, electrophotographic	X16-B01F1C S06-E01X	Loading mechanism for record carri	T03-A08A1C iers T03-F01
alignment, vertical anti-reflection layers baking U11-C04A1H beam modulation Cleaning U11-C04A6 cleaning U11-C04A1A control of exposure apparatus beam U11-C04A1A developing U11-C04A1A electron beam exposure I11-C04A1A electron beam exposure I11-C04C2 immersion lithography U11-C04A1 imprint lithography U11-C04J imprint process methods and control U11-C04A1E U11-F01B ion beam exposure I11-C04A1E U11-F01B ion beam exposure I11-C04A1E U11-C04B2 masking techniques modulation, beam U11-C04A6  optical elements U11-C04A1A  tape drive (computer) T03-N01 To3-A08E T03-E01  Loading mechanism, disk drive T03-F01A  Local area networks (LAN, see also Networks) W01-A06B5A  Local oscillator broadcast radio receiver broadcast radio receiver W02-G03A7 TV receiver tuner CVD insulating layer formation U11-C04B1 insulating layer formation U11-C05B3  Location-based telephone service Lock applications, general electrical-slide X25-M02 electromagnetic X25-M02	solid electrolyte Lithographic plate manufacture, electrophotographic Lithography, semiconductor	X16-B01F1C S06-E01X U11-C04	Loading mechanism for record carri	T03-A08A1C ers T03-F01 T03-N05
anti-reflection layers  baking  U11-C04A1A beam modulation  cleaning  U11-C04A6 cleaning  U11-C04A1A control of exposure apparatus beam  U11-C04A1C drying  U11-C04A1C drying  U11-C04A1C immersion lithography  U11-C04C2 imprint lithography  U11-C04J2 inspection of masks  U11-C04A1E  U11-F01B  ion beam exposure  lift-off masking  mark mask alignment detection  mark mask alignment detection  modulation, beam  U11-C04A6  U11-C04A1A  Local area networks (LAN, see also Networks)  W01-A06B5A  Local oscillator  broadcast radio receiver  broadcast radio receiver  w02-G03A7  TV receiver tuner  W03-B01A7  V02-G03A7  TV receiver tuner  CVD  insulating layer formation  U11-C04B2  modulation, beam  U11-C04A6  Local ised semiconductor treatment  CVD  insulating layer formation  U11-C05B3  Location-based telephone service  W01-C02B7L  Local ised semiconductor treatment  CVD  insulating layer formation  U11-C05B3  Location-based telephone service  W01-C02B7L  Lock  X25-M  applications, general electrical-slide electromagnetic  X25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor alignment alignment, lamp/light source	X16-B01F1C S06-E01X U11-C04 U11-C04B	Loading mechanism for record carri card drive cassette drive	T03-A08A1C iers T03-F01 T03-N05 T03-E01 T03-N03
baking U11-C04A1A beam modulation U11-C04A6 cleaning U11-C04A1A control of exposure apparatus beam U11-C04A6 developing U11-C04A1C drying U11-C04A1A electron beam exposure U11-C04F focussing U11-C04C2 immersion lithography U11-C04J imprint lithography U11-C04J imprint process methods and control  U11-C04J2 inspection of masks U11-C04A1E	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor alignment alignment, lamp/light source alignment mark production	X16-B01F1C S06-E01X U11-C04 U11-C04B U11-C04B3 U11-C04B1	Loading mechanism for record carri card drive cassette drive	T03-A08A1C iers T03-F01 T03-N05 T03-E01 T03-N03 T03-F01
beam modulation U11-C04A6 cleaning U11-C04A1A control of exposure apparatus beam U11-C04A6 developing U11-C04A1C drying U11-C04A1A electron beam exposure U11-C04F focussing U11-C04C2 immersion lithography U11-C04X imprint process methods and control inspection of masks U11-C04A1E U11-F01B ion beam exposure U11-C04B2 lift-off masking U11-C04AD1 mark mask alignment detection U11-C04B2 masking techniques U11-C04A6 optical elements U11-C04A6 celeaning U11-C04A6 developing U11-C04A1C U11-C04A1A Local area networks (LAN, see also Networks)  Local oscillator broadcast radio receiver W03-B01A7 communications receiver W02-G03A7 TV receiver tuner W03-A01B7  Local time indicator, clock or watch CVD U11-C01B1 insulating layer formation U11-C05B3  Location-based telephone service Lock X25-M applications, general Q47-U electrical-slide X25-M02 electromagnetic X25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor alignment alignment, lamp/light source alignment mark production alignment, vertical	X16-B01F1C S06-E01X U11-C04 U11-C04B U11-C04B3 U11-C04B1 U11-C04C3	Loading mechanism for record carri card drive cassette drive disk drive	T03-A08A1C iers T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01
cleaning	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor     alignment     alignment, lamp/light source     alignment mark production     alignment, vertical     anti-reflection layers	X16-B01F1C S06-E01X U11-C04 U11-C04B U11-C04B3 U11-C04B1 U11-C04C3 U11-C04C3	Loading mechanism for record carri card drive cassette drive disk drive	T03-A08A1C iers T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E
control of exposure apparatus beam U11-C04A6 developing U11-C04A1C drying U11-C04A1A electron beam exposure U11-C04F focussing U11-C04C2 immersion lithography U11-C04K imprint lithography U11-C04J imprint process methods and control U11-C04J2 inspection of masks U11-C04A1E ion beam exposure U11-C04G lift-off masking U11-C04D1 mark mask alignment detection U11-C04D2 modulation, beam U11-C04D4 modulation, beam U11-C04A6 optical elements U11-C04E1A  Local area networks (LAN, see also Networks) W01-A06B5A Local oscillator broadcast radio receiver W02-G03A7 TV receiver tuner W03-A01B7 Local time indicator, clock or watch CVD insulating layer formation U11-C05B3 Location-based telephone service W01-C02B7L Lock X25-M applications, general electrical-slide X25-M02 electronagnetic X25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor alignment alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking	X16-B01F1C S06-E01X U11-C04 U11-C04B U11-C04B3 U11-C04B1 U11-C04C3 U11-C04C3 U11-C04A1H U11-C04A1A	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)	T03-A08A1C iers T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01
developing drying U11-C04A1C drying U11-C04A1A electron beam exposure U11-C04F focussing U11-C04C2 immersion lithography U11-C04K imprint lithography U11-C04J imprint process methods and control U11-C04J2 inspection of masks U11-C04J2 in beam exposure U11-C04A1E U11-F01B ion beam exposure lift-off masking U11-C04D1 mark mask alignment detection U11-C04D2 modulation, beam U11-C04D4 modulation, beam U11-C04A6 optical elements U11-C04E1A    Cocal area networks (LAN, see also Networks)	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor alignment alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation	X16-B01F1C S06-E01X U11-C04 U11-C04B U11-C04B3 U11-C04B1 U11-C04C3 U11-C04C3 U11-C04A1H U11-C04A1A U11-C04A6	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)	T03-A08A1C iers T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01
drying U11-C04A1A electron beam exposure U11-C04F focussing U11-C04C2 immersion lithography U11-C04K imprint lithography U11-C04J imspection of masks U11-C04J2 inspection of masks U11-F01B ion beam exposure lift-off masking U11-C04D1 mark mask alignment detection U11-C04D2 modulation, beam U11-C04D4 modulation, beam U11-C04D6 optical elements U11-C04E1A    VIII-C04A1E	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor alignment alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B3  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1A	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)	T03-A08A1C  lers  T03-F01  T03-N05  T03-E01  T03-N03  T03-F01  T03-N01  T03-A08E  T03-E01  T03-Q07A
electron beam exposure focussing U11-C04C2 immersion lithography U11-C04K imprint lithography U11-C04J imprint process methods and control U11-C04J2 inspection of masks U11-C04A1E U11-F01B ion beam exposure lift-off masking U11-C04D1 mark mask alignment detection masking techniques modulation, beam u11-C04E1A  Local stime indicator, clock or watch U11-C01B1 insulating layer formation U11-C05B3  Location-based telephone service Lock applications, general electrical-slide v03-B01A7 v02-G03A7 TV receiver tuner W03-A01B7  Local time indicator, clock or watch S04-A02B  Localised semiconductor treatment CVD insulating layer formation U11-C05B3  Location-based telephone service Lock applications, general electrical-slide v25-M02 electromagnetic	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A6  U11-C04A1A	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive	T03-A08A1C  lers  T03-F01  T03-N05  T03-E01  T03-N03  T03-F01  T03-N01  T03-A08E  T03-E01  T03-Q07A
focussing U11-C04C2 broadcast radio receiver W03-B01A7 communications receiver W02-G03A7 TV receiver tuner W03-A01B7 TV receiver tuner W03-A01B7 U11-C04J2 inspection of masks U11-C04J2 inspection of masks U11-C04A1E U11-F01B ion beam exposure U11-C04G lift-off masking U11-C04D1 mark mask alignment detection U11-C04B2 modulation, beam U11-C04A6 optical elements U11-C04E1A broadcast radio receiver W03-B01A7 TV receiver tuner W03-A01B7 TV receiver t	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor     alignment alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A6  U11-C04A1A  eam U11-C04A6  U11-C04A1C	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also	T03-A08A1C  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A
immersion lithography U11-C04Z imprint lithography U11-C04J imprint process methods and control	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor     alignment alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A6  U11-C04A1C  U11-C04A1A	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)	T03-A08A1C  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A
imprint lithography U11-C04J imprint process methods and control U11-C04J2 inspection of masks U11-C04A1E U11-F01B ion beam exposure U11-C04D1 mark mask alignment detection U11-C04B2 modulation, beam U11-C04D modulation, beam U11-C04E1A  Imprint lithography U11-C04J2 TV receiver tuner W03-A01B7 S04-A02B  Local time indicator, clock or watch S04-A02B  L	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor     alignment alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A6  U11-C04A1C  U11-C04A1A  U11-C04A1C  U11-C04A1A	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A
imprint process methods and control  U11-C04J2 inspection of masks U11-C04A1E U11-F01B ion beam exposure U11-C04G lift-off masking U11-C04D1 mark mask alignment detection masking techniques modulation, beam U11-C04B2 modulation, beam U11-C04B2 very control  U11-C04B2 very control  U11-C04B2 very control  U11-C04B2 very control  Local time indicator, clock or watch S04-A02B  Localised semiconductor treatment CVD insulating layer formation U11-C05B3  Location-based telephone service V01-C02B7L  Lock A25-M Applications, general electrical-slide optical elements V25-M02 electromagnetic V25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor     alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A6  U11-C04A1C  U11-C04A1A  U11-C04A1C  U11-C04F  U11-C04C2	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7
inspection of masks  U11-C04J2 U11-C04A1E U11-F01B ion beam exposure U11-C04G lift-off masking mark mask alignment detection masking techniques modulation, beam optical elements  U11-C04J2 U11-C04A1E CVD insulating layer formation U11-C05B3 Location-based telephone service Lock applications, general electrical-slide v25-M02 electromagnetic v25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1C  U11-C04A1A  U11-C04A1A  U11-C04A1C  U11-C04F  U11-C04C2  U11-C04K	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7 W02-G03A7
inspection of masks  U11-C04A1E U11-F01B ion beam exposure U11-C04G lift-off masking U11-C04D1 mark mask alignment detection masking techniques modulation, beam u11-C04B2 modulation, beam u11-C04B2 modulation, beam u11-C04A6 optical elements  U11-C04A1E CVD insulating layer formation U11-C05B3 Location-based telephone service Lock applications, general electrical-slide v25-M02 electromagnetic v25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor     alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1A  U11-C04A1C  U11-C04A1A  U11-C04A1C  U11-C04F  U11-C04C2  U11-C04K  U11-C04J	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver TV receiver tuner	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7 W02-G03A7 W03-A01B7
U11-F01B ion beam exposure lift-off masking mark mask alignment detection masking techniques modulation, beam optical elements  U11-F01B insulating layer formation U11-C05B3 Location-based telephone service Lock  x25-M applications, general electrical-slide v247-U electrical-slide v25-M02 v25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor     alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1A  U11-C04A1C  U11-C04A1C  U11-C04F  U11-C04C2  U11-C04J  otrol	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver  TV receiver tuner  Local time indicator, clock or watch	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B
ion beam exposure U11-C04G lift-off masking U11-C04D1 mark mask alignment detection U11-C04B2 masking techniques U11-C04D modulation, beam U11-C04A6 optical elements U11-C04E1A  Insulating layer formation U11-C05B3 Location-based telephone service W01-C02B7L Lock X25-M applications, general Q47-U electrical-slide X25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and control plate manufacture.	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1C  U11-C04A1C  U11-C04A1A  U11-C04C2  U11-C04J  Ditrol  U11-C04J2	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver  TV receiver tuner  Local time indicator, clock or watch Localised semiconductor treatment	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B
lift-off masking U11-C04D1 Location-based telephone service W01-C02B/L mark mask alignment detection masking techniques U11-C04D applications, general modulation, beam U11-C04A6 electrical-slide x25-M02 optical elements U11-C04E1A corrections working techniques working techniques working techniques applications, general electrical-slide x25-M02 electromagnetic x25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and control plate manufacture.	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1C  U11-C04A1C  U11-C04A1A  U11-C04C2  U11-C04C2  U11-C04J  Introl  U11-C04J2  U11-C04A1E	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver  TV receiver tuner  Local time indicator, clock or watch  Localised semiconductor treatment  CVD	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B  U11-C01B1
mark mask alignment detection U11-C04B2 Lock X25-M masking techniques U11-C04D applications, general Q47-U modulation, beam U11-C04A6 electrical-slide X25-M02 optical elements U11-C04E1A electromagnetic X25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and coninspection of masks	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1A  U11-C04A1C  U11-C04A1C  U11-C04F  U11-C04C2  U11-C04K  U11-C04J2  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04J2  U11-C04A1E  U11-F01B	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver TV receiver tuner  Local time indicator, clock or watch  Localised semiconductor treatment CVD insulating layer formation	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B  U11-C01B1
masking techniquesU11-C04Dapplications, generalQ47-Umodulation, beamU11-C04A6electrical-slideX25-M02optical elementsU11-C04E1AelectromagneticX25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and con inspection of masks	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1A  U11-C04A1C  U11-C04A1A  U11-C04A1C  U11-C04C2  U11-C04C2  U11-C04J  Introl  U11-C04J2  U11-C04G	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver TV receiver tuner  Local time indicator, clock or watch  Localised semiconductor treatment CVD insulating layer formation	T03-A08A1C  iers  T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A  W01-A06B5A  W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B  U11-C01B1 U11-C05B3
modulation, beam U11-C04A6 electrical-slide X25-M02 optical elements U11-C04E1A electromagnetic X25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and con inspection of masks  ion beam exposure lift-off masking	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1A  U11-C04A1C  U11-C04A1A  U11-C04C2  U11-C04C2  U11-C04J  Introl  U11-C04J  U11-C04J  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04J  U11-C04J  U11-C04J  U11-C04J  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04G  U11-C04G	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver TV receiver tuner  Local time indicator, clock or watch  Localised semiconductor treatment CVD  insulating layer formation  Location-based telephone service	T03-A08A1C iers
optical elements U11-C04E1A electromagnetic X25-M02	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and con inspection of masks  ion beam exposure lift-off masking mark mask alignment detection	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1C  U11-C04A1C  U11-C04C2  U11-C04C2  U11-C04C2  U11-C04J  otrol  U11-C04A1E  U11-C04A1E  U11-C04A1E  U11-C04B2  U11-C04B2	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver TV receiver tuner  Local time indicator, clock or watch  Localised semiconductor treatment CVD  insulating layer formation  Location-based telephone service  Lock	T03-A08A1C fers T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A W01-A06B5A W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B U11-C01B1 U11-C05B3 W01-C02B7L X25-M
	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and con inspection of masks  ion beam exposure lift-off masking mark mask alignment detection masking techniques	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1C  U11-C04A1C  U11-C04A1A  U11-C04C2  U11-C04C2  U11-C04J  Ottol  U11-C04J  U11-C04J  U11-C04G  U11-C04G  U11-C04G  U11-C04D1  U11-C04B2  U11-C04D	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver TV receiver tuner  Local time indicator, clock or watch  Localised semiconductor treatment CVD  insulating layer formation  Location-based telephone service  Lock  applications, general	T03-A08A1C fers T03-F01 T03-N05 T03-E01 T03-N03 T03-F01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A W01-A06B5A W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B U11-C01B1 U11-C05B3 W01-C02B7L X25-M Q47-U
	solid electrolyte  Lithographic plate manufacture, electrophotographic  Lithography, semiconductor  alignment, lamp/light source alignment mark production alignment, vertical anti-reflection layers baking beam modulation cleaning control of exposure apparatus be developing drying electron beam exposure focussing immersion lithography imprint lithography imprint process methods and con inspection of masks  ion beam exposure lift-off masking mark mask alignment detection masking techniques modulation, beam	X16-B01F1C  S06-E01X  U11-C04  U11-C04B  U11-C04B1  U11-C04C3  U11-C04A1H  U11-C04A1A  U11-C04A1A  U11-C04A1C  U11-C04A1C  U11-C04C2  U11-C04C2  U11-C04C2  U11-C04J  Ditrol  U11-C04J  U11-C04G  U11-C04G  U11-C04G  U11-C04D  U11-C04D  U11-C04D	Loading mechanism for record carricard drive  cassette drive  disk drive  tape drive (computer)  library  Loading mechanism, disk drive  Local area networks (LAN, see also Networks)  Local oscillator  broadcast radio receiver communications receiver TV receiver tuner  Local time indicator, clock or watch  Localised semiconductor treatment CVD  insulating layer formation  Location-based telephone service  Lock  applications, general electrical-slide	T03-A08A1C fers T03-F01 T03-N05 T03-E01 T03-N01 T03-N01 T03-A08E T03-E01 T03-Q07A T03-F01A W01-A06B5A W03-B01A7 W02-G03A7 W03-A01B7 S04-A02B U11-C01B1 U11-C05B3 W01-C02B7L X25-M Q47-U X25-M02

mechanical details	Q47-A	programmable arrays (see also <b>Lo</b>	•
solenoid	X25-M02	<b>arrays</b> ) programmable logic controller	U21-C01E U21-C03B3
Lockable switch	V03-C05 X13-A04D	reconfigurable	U21-C01E
1. 12. 1. 6. 1. 1		reducing circuit size	U21-C03A5
Locking bar for clock or watch	S04-A03	serial line transmission	U21-C02D
LOCOS	U11-C08A2	short circuit protection	U21-C03A1
for field oxide manufacture	U11-C08A2	simulators	U21-C03D
for IC component icolation	U11-C08B9 U11-C08A2	superconducting	U21-C01F
for IC component isolation	011-C00A2	testing threshold logic	U21-C03D1 U21-C03A3
Logging	CO2 CO0	transistor-transistor logic	U21-C01A3
non-prospecting, optical well	S03-C09 S03-C01C	tri-state	U21-C02C
well	X25-E02	with tunnel effect devices	U21-C01R
well, electromagnetic	S03-C02	Logic gates	U21-C03B
well, nuclear	S03-C03	arithmetic	U21-C03B2
well, seismic	S03-C01C5	for pulse generation	U22-A02D
timber industry	X25-X01	fuzzy	U21-C03B1B
Logic analyser, testing	S01-G01A5	multilevel	U21-C03B1A
	U21-C03D1	tri-state	U21-C03B1A
Logic arrays, integrated circuit	U13-C04C	Logic simulation	T01-G06A
	U21-C01E		U21-C03D
field programmable, matrix layou		compiled code	T01-G06A
programmable array logic, matrix		hardware accelerators	T01-G06C T01-G06B
	U13-C04C	table driven	
programmable logic arrays, matri layout	x U13-C04C	Logic switching	U21-B05D
uncommitted	U13-C04D	Logic, fuzzy - see Fuzzy logic	
	U21-C	Long term evolution (LTE)	W02-C03C1H
<b>Logic circuits</b> Bi-FET, BIMOS	U21-C01C	Loop	
bipolar	U21-C01A	antenna	W02-B01A
CAD for wiring layout	U21-C03D	data network	W01-A06B2
chalcogenide materials-based	U21-C01P	subscriber, testing	W01-C02A5
characterised by function	U21-C03	wireless local (WLL)	W01-B05A1G
CPU design	T01-J15A1	Loss, dielectric, measuring	S01-D05A5
current-mode logic	U21-C01A2	Lottery apparatus	T05-F
diode diode/resistor-transistor	U21-C01A U21-C01A1		W04-X02G
drivers for displays, relays, etc.	U21-C02B	Loudspeaker	V06-V04A1
dynamic MOSFET	U21-C01B5	cabinet	V06-V02F
emitter coupled logic (ECL)	U21-C01A2	circuit	V06-V02S
fail-safe	U21-C03C		W04-T
fan-in, fan-out improvement detai		cone connector, lead	V06-V02A V06-V02H
FET	U21-C01B	connector, read	W04-S01C
fuzzy	U21-C03B1B	crossover network	V06-V02S
galvano-magnetic/Hall effect IC termination	U21-C01X U21-C02E		W04-T05
implemented with circuit blocks	U21-C01D	diaphragm	V06-V02A
increased speed	U21-C03A1	enclosure	V06-V02F
integrated injection logic	U21-C01A4	<b>.</b>	W04-S01E
interface	U21-C02	manufacture motional feedback	V06-V03A W04-T03
interface, inter-family	U21-C02A	mounting	V04-103 V06-V02F
inverters	U21-C03A3	mounting	W04-S01E1
logic element-based	U21-C01D	testing	V06-V03B
merged transistor logic MESFET	U21-C01A4 U21-C01B1	transducer - see <b>Acoustoelectric</b>	
modifications to reduce power	U21-C03A2A	transducer	V06-V01
MOSFET	U21-C01B3	Low frequency amplifier	
nano-tubes	U21-C01T	power	U24-G01B1
noise suppression	U21-C03A2B	small signal	U24-G01C
opto-electronic	U21-C01G		
phase-change materials-based	U21-C01P		

Low power (electronic) connector - Connector	see
Low power converter - see Converte	er
Low power system	U24-H
control	U24-H
distribution	U24-H
Low pressure discharge lamp	X26-A01E
construction details - see	X26-A02
Discharge lamp	
control	X26-C01B5
electrodeless	X26-A01B
electronic ballast	X26-C01B2
	X26-C01B5
electronic ballast, fluorescent	X26-C01B2
ri . I	X26-C01B5A
fluorescent lamp	X26-A01E1
inductive ballast	X26-C01B1A
an arating aircuit	X26-C01B5 X26-C01B5
operating circuit	X26-C01B5
starting circuit	
Low profile semiconductor package	•
	U11-D01A7
Low temperature sodium-sulphur co	ell
	X16-B01C2
LSI - see Integrated circuits	
<u>-</u>	W00 C00C111
LTE (long term evolution)	W02-C03C1H
Lubrication	
disk drive component	T03-F02C
distributed in the discount of the control of	T03-N01
disk drive lubricant dispenser for of surface	
зипасе	T03-F02X T03-N01
lavere for cables	X12-D03G
layers for cables layers for magnetic record carrier	
layers for magnetic record carrier	carrier
layers for magneto-optical record	T03-D01A7A
lubricating systems (electrical)	X25-X09
lubricating systems (general non-e	
labricating systems (general nem	Q68-L
switch contact	V03-A09
	X13-A02
testing of lubricating oil	S03-E14F
vehicle engine	Q17-E03
· ·	Q51-F
	X22-A09
dry sump	Q51-F01A
welding (non-electrical welding)	P55-T20
Luggage	P24-B
Luminaire	X26-D
Luminance/chrominance separation	
TV receiver	W03-A05B
TV receiver, adaptive	W03-A05B7
TV receiver, comb/digital filter	W03-A05B1
video signal (general)	W04-P01L
video signal (recording)	W04-F01LD1
Luminescent screens	
CRT display tubes	V05-D05B
general	V05-M01
S	

Lung measurement S05-D01C1 S02-K03A2C LVDT, transducers

conversion of sensor output

S02-K03A5

M		cooling	X27-F02A1
		diagnosis, medical	S05-D01D
MAC (media access control)	W01-A06E1	digital marking	T04-A02A
	W01-A06G3	digital position encoders	U21-A03J2
MAC TV system		digital reading	T04-A03A
receiver details	W03-A11	digital recording	T03-A06C
	W03-A16A	disk	T03-A01C1
transmission system aspects	W02-F06C1	disk drive - see Magnetic disk dri	ive T03-A08A
Mach-Zehnder interferometer, usin	a a	disk manufacture	T03-A02E1
optical fibre	V07-K02	field direction measuring	S01-E01
	V07-N02	field heating	X25-B02
	V 07 1 V 02	field measuring - see Magnetic fi	eld
Machine parts testing (see also	502 102	measurement	S01-E01
Testing)	S02-J03	flux density measuring	S01-E01
using audio signal analysis	S02-J03	head - see Magnetic recording a	
	W04-V04A7	reproducing head	T03-A03
Machine tool	X25-A03	image forming	S06-E07
	P56	material - see Magnetic material	
abrading	X25-A03C2	medical therapy	S05-A03E1
boring	X25-A03B	reading, digitally marked carrier	T04-A03A
broaching	X25-A03C1	record carrier	T03-A01
burnishing	X25-A03C3	recording and reproducing head	- see
connector	V04-M30R	Magnetic recording and	
constructional details	P56-T	reproducing head	T03-A03
copying	P56-C	recording and reproduction	T03-A
cutting	X25-A03B2	recording and reproduction, audi	
drilling	X25-A03B1	screening/shielding	V04-U
grinding	X25-A03C2	screening/shielding, casing	V04-S
hand-held	X25-A03D	and a star table little and land and	V04-U03
honing	X25-A03C2 X25-A03C2	screening/shielding, elements	V04-U04
lapping lathe	X25-A03C2 X25-A03A	screening/shielding, Faraday cage	
maintenance/repair	P56-G	screening/shielding, gaskets screening/shielding, material	V04-U04 V02-A02
manipulator	X25-A03E	screening/shleiding, material	V04-U01
milling	X25-A03C1	screening/shielding, panels	V04-U04
polishing	X25-A03C1 X25-A03C3	screening/shielding, superconduc	
robot	X25-A03E	screening/smerang, superconduc	V04-U01A
robot, assembly	X25-A03E2	material	VO-1 00 174
robot, welding	X25-A03E1	material	X12-D06B
turning	X25-A03A	seal	X25-L06
Machine working, registering and i		separation	P41-E07
Machine working, registering and i	=		X25-H01
	T05-G02	shift stores	U14-A01A
Machine, electric - see Electric mac	hine	switch with contacts	V03-C06A
Magazine advertising	P85-E01J	tape	T03-A01C3
		tape driving in recording equipme	ent T03-E07
Magnet manufacture, large	X12-C01D	variables measurement using SQL	JID S01-E01A
manufacture, small		Magnetic card	
permanent, large	X12-C06	card per se	T03-A01C5
permanent, small	V02-E01	5 p 5 55	T04-C01
·	V 02 20 1	manufacture	T03-A02E5
Magnetic	T03-A01A1A	vending machine actuation	T05-H02C5A
alloy recording medium material		Magnetic circuit	
bearing card record carrier	X25-L06 T03-A01C5	electric machine, high power	X11-J01
card record carrier	T04-C01	electric machine, low power	V06-M07
carrier re-recording	T03-A07B	inductor, hf	V02-F03A2
carrier re-recording	W04-B01C3	inductor, nower supply	V02-G02A2
coil (general)	V04-B01C3 V02-D	reactor, hf	V02-F03A2
compass	S02-B06	reactor, high power	X12-C01A
computer	T02-A04	reactor, power supply	V02-G02A2
control, for transit-time tubes	V05-C02A7		
conversion of sensor output	S02-K03A5		

Magnetic levitation, electric train

X23-A01A4

transformer, distribution/transmis	sion I	Magnetic material	V02-A
•	X12-C01A	binder	V02-A V02-A09
type	X12-C01A X12-C01E	composition, hard alloy/metal	V02-A07 V02-A01A8
transformer, hf	V02-F03A2	composition, hard anoymetal composition, hard non-metallic	V02-A01A0
	V02-F03A2 V02-G02A2	composition, soft alloy/metal	V02-A01B0
transformer, power supply		composition, soft non-metallic	V02-A02A0
Magnetic drive	T03-A08	ferrofluid	V02-A02B6 V02-A04
card drive	T03-A08C		V02-A04 V02-A05
card-type disk drive	T03-A08A1E	galvano-magnetic	
floppy disk drive	T03-A08A1A	hard	V02-A01
hard disk drive	T03-A08A1C	hard, alloy/metal	V02-A01A
	T03-A08A5	hard, alloy/metal for permanent n	
multiple head type drive	T03-A08M	1 1 11 7 . 16 19	V02-A01A1
PCMCIA	T03-A08A1E	hard, alloy/metal for recording m	
RAID	T03-A08A5A	1 1	T03-A01A1A
tape dive	T03-A08E	hard, non-metallic	V02-A01B
Magnetic drum record carrier		hard, non-metallic for permanent	
drum per se	T03-A01C7		V02-A01B1
manufacture	T03-A02E7	hard, non-metallic for recording n	
		10 1	T03-A01A1C
Magnetic field measurement (using		liquid	V02-A04
DC SQUID	S01-E01A1	magnetic record carriers-applicat	
Faraday rotation	S01-E01C	manufacture, hard alloy/metal	V02-A01A9
flux-gate sensor	S01-E01X	manufacture, hard non-metallic	V02-A01B9
galvano-magnetic effect	S01-E01B	manufacture, soft alloy metal	V02-A02A9
Hall effect devices	S01-E01B	manufacture, soft non-metallic	V02-A02B9
magneto-optical effect	S01-E01C	metallic/non-metallic mixture	V02-A01C
magnetoresistive devices	S01-E01B	nanostructure	V02-A10
RF SQUID	S01-E01A3	nanostructure, manufacture	V02-A10C
SQUID (see also U14-F02B)	S01-E01A	nanostructure, novel	V02-A10A
Magnetic film		organic	V02-A03
general (applied in addition to co	des	organo-metallic	V02-A03
listed below)	V02-B	semiconductor	V02-A05
magnetic record carriers	T03-A01A	soft	V02-A02
magneto-optical record carriers	T03-D01A	soft, alloy/metal for electric mach	ne core
nanostructures	V02-B04		V02-A02A2
Magnetic film formation		soft, alloy/metal for recording hea	ad T03-
general (applied in addition to co-	des	A03J1A	
listed below)	V02-H02	soft, metal/alloy	V02-A02A
magnetic head manufacture	T03-A04A1B	soft, metallic/non-metallic mixture	· V02-A02C
magnetic record carrier manufacti		soft, non-metallic	V02-A02B
magneto-optical record carrier ma		soft, non-metallic for electric mac	nine
magneto optical record carrier me	T03-D01A8E	core	V02-A02B2
nanostructure	V02-H02G	soft, non-metallic for recording he	ead T03-
		A03J1A	
Magnetic head positioning	T03-A05		V02-A02B1
azimuth and alignment correction		Magnetic properties	
dual actuator systems	T03-A05A1E	eddy current flaw detection	S03-E11A
dynamic	T03-A05A1	magnetostrictive - see also <b>Trans</b> e	
helical scanning positioning system	m T03-A05D	magneteether eee also IIIII	S01-E02X
load/unload ramp for hard disk		materials investigation	S03-E11
drive	T03-A05G	measuring (general)	S01-E02
	T03-A08A1C	remanence	S01-E02X
maximising read signal	T03-A05A1B	specific property	S03-E11C
motor drive	T03-A05C5	susceptibility	S01-E02X
rotary head speed control	T03-A05A1D	• •	501 202/
seeking	T03-A05B1	Magnetic record carrier	
setting-up of position in equipme		additional non-magnetic material	
temp. compensation	T03-A05A3	magnetic layer	T03-A01A5
track accessing servo	T03-A05B1	additional recording area	T03-A01G
track following servo	T03-A05A1C	antibacterial and antifungal mater	ials 103-
using non-magnetic servo informa		A01B5X	<b>T00</b> 10:
	T03-A05A1G	anticorrosion layers	T03-A01B5C

antiprint-through magnetic shield	ling layer	Magnetic record carrier manufacture	e T03-A02
	T03-A01B1X	additional recording area	T03-A02G
antistatic coatings and materials	T03-A01B5D	applying backing layer	T03-A02B3
audio recording application	T03-A01C8A	applying base layers	T03-A02B1B
backing layer	T03-A01B3	applying lubricating layer	T03-A02B5
base layer	T03-A01B1B	applying protective coatings	T03-A02B5
binder materials for	T03-A01A3	back-coating layer application	T03-A02B5
card	T03-A01C5	bulk storage equipment	T03-A02D5
characterised by disk form	T03-A01C1	calendering	T03-A02B7
characterised by form	T03-A01C	card	T03-A02E5
characterised by recording applic		characterised by type of carrier	T03-A02E
, 3 11	T03-A01C8	cleaning after basic manufacture	T03-A02B7
chemical details of magnetic laye	r T03-A01A8A	disk	T03-A02E1
complete magnetic layer formula		drum	T03-A02E7
drum	T03-A01C7	equipment for manufacture	T03-A02D
exchange coupling system	T03-A01A6A	floppy disk	T03-A02E1C
floppy disk	T03-A01C1C	hard disk	T03-A02E1A
hard disk	T03-A01C1A	inspection/testing of finished carrie	
head-cleaning section	T03-A01B5X	laminating layers	T03-A02B9
nedd cledning section	T03-A01X	liquid deposition of magnetic film	
	T03-A04B3	magnetic film formation	T03-A02A1
heat-assisted record carrier	T03-A01T	multistep processes	T03-A02A
heat-sensitive layers for printing	T03-A01X	nano-imprinted	T03-A02B0
	T03-A01B7		T03-A02D5
heat transfer layers	T03-A01C3A	pancake	
helical scan recording tape		polishing substrate or base layers	T03-A02B1C
layer arrangements	T03-A01F T03-A01H	process monitoring	T03-A02C1
leader section of tape		quality control	
lubricating layer	T03-A01B5	sputter/vapour deposition of magi	
magnetic layer magnetic properti	es T03-	and heat weeks are all as a consequence of a large of	T03-A02A3
A01A8C	Assetts	substrate and non-magnetic layer	
magnetic layer physical/chemical		a batasta area Cartana	T03-A02B1
and a superior and a state	T03-A01A8A	substrate manufacture	T03-A02B1A
magnetic materials	T03-A01A1	substrate polishing	T03-A02B1C
magnetic materials properties	T03-A01A1E	substrate texturing	T03-A02B1D
magnetic shielding layer	T03-A01B1X	substrate/non-magnetic layer proc	
manufacture - see Magnetic reco		4-4-	T03-A02B
carrier manufacture	T03-A02	tape	T03-A02E3
and the III and a superior of a superior of a fee	V02-H02	tape slitting	T03-A02B7
metallic magnetic materials	T03-A01A1A	test recording	T03-A02C5B
mould inhibiting materials	T03-A01B5X	testing	T03-A02C
multilayer magnetic coatings	T03-A01A6	texturing substrate or base layer	T03-A02B1D
nano-imprinted	T03-A01G3	treatment of deposited magnetic f	ilm 103-A02A5
non-metallic magnetic materials	T03-A01A1C	Magnetic record carrier positioning	
optical track	T03-A01G5	data recording tape drive	T03-A08E
te di e e	T03-B01		T03-E
perpendicular magnetisation carr		disk drive	T03-A08A
pH control materials	T03-A01A9		T03-F
physical details of magnetic layer			T03-N01
physical details of magnetic mate	riais 103-	general	T03-A08
A01A1E	T02 404C	general tape drive	T03-E
physical recording format	T03-A01G	Magnetic recording	
print-through prevention shieldin		audio/video track layout	W04-B01A
	T03-A01B1X	computer printer image	S06-K
protective coating	T03-A01B5C	dubbing, audio/video	W04-H05A
recycling and destroying	T03-A01R	equalising	T03-A06D
soft magnetic shielding layer	T03-A01B1X	format, audio/video	W04-B01A
substrate	T03-A01B1A	head - see Magnetic recording a	
superconducting	T03-A01E	reproducing head	T03-A03
tape	T03-A01C3	heat-assisted magnetic recording	
tape for helical scan recording	T03-A01C3A	microwave-assisted recording	T03-A06N3
thermo-assisted record carrier	T03-A01T	re-recording prevention, audio/vic	
vertical magnetisation carrier	T03-A01D	re-recording, audio/video	T03-A07B
video recording application	T03-A01C8B	J, 222.2. 3, 222.2. 1.222	

thermo-assisted magnetic reco	•	digital recording	T03-A060
vertical recording	T03-A06V	digital video tape recorder (DVTR	
gnetic recording and reprodu	cing head	duplication prevention	W04-B01
	T03-A03	dynamic head position adjustmen	
alloy materials	T03-A03	grounding of helical scan head dr	
array type	T03-A03A7	and the seast feature	T03-A05D
casing	T03-A03J7A	guide post for tape	T03-E02
cleaning	T03-A04B3	head connection system	T03-A050
cleaning area on disk	T03-A01B5X	head positioning - see <b>Magnetic</b>	
3	T03-A01C1	<b>positioning</b> head slider	T03-A05
	T03-A01X		T03-A05C
cleaning cassette	T03-A04B3B	head support arm	T03-A05C
· ·	T03-N03	head support structure helical scan speed control	T03-A05A
contacting surface	T03-A03J3	helical scanning head positioning	
core composition	T03-A03J1A	nelical scanning head positioning	T03-A05E
cores, general	T03-A03J1	interfacing	T03-A03L
	V02-F03A2	long play mode switching based of	
demagnetising	T03-A04B1		T03-E04
external shielding	T03-A03J7A	remaining tape quantity	T03-E04
film-type core	T03-A03J1C	mater drive for boad positioning	T03-E03A
flux guide	T03-A03J3A	motor drive for head positioning parking, latching arrangements	T03-A050
flux sensitive	T03-A03C	reading circuitry, digital	T03-A030
gap details	T03-A03J3C	recording and reproducing metho	
general details	T03-A03J	rotary head speed control	T03-A05/
ĞMR	T03-A03C3A	rotary head transformer signal co	
Hall effect type	T03-A03C5	Totaly flead transformer signal col	T03-A05E
heating device	T03-A03J3J	setting-up of head position	T03-A054
	T03-A06N1C	skew correction	T03-A05F
inductive, general	T03-A03B	speed changing based on remain	
internal head connections	T03-A03J8	quantity	T03-E04
internal shielding	T03-A03J7C	quantity	T03-E04
lead layers	T03-A03E1	superconductive recording	T03-L03/
magnetoresistive	T03-A03C3	tape guide post	T03-A001
manufacture	T03-A04A1	temp. compensation for head pos	
metal-in-gap (MIG)	T03-A03F	temp. compensation for nead pos	T03-A05/
metal-in-gap, gap details	T03-A03F1	track accessing servo	T03-A05E
multiple gap heads	T03-A03A	track following servo	T03-A05A
optical system	T03-A06N1E	track layout	T03-A05F
perpendicular recording	T03-A03D	track layout, audio/video	W04-B01
pole pieces	T03-A03J3A	track selection	T03-A05E
positioning - see Magnetic he	ad positioning	video tape recorder (VCR/VTR)	W04-B10
	T03-A05	writing circuitry, digital	T03-A060
protective layer	T03-A03J3E		
shielding	T03-A03J7	Magnetic Resonance Imaging - see	MRI
slider	T03-A05C1A	Magnetic separation	P41-E07
spin valve	T03-A03C3A		X25-H01
substrate	T03-A03J7E	Magnetic tape	
testing	T03-A04A5	audio player/recorder	W04-B12
thin film circuit type	T03-A03E	cassette	T03-H01E
tunnel junction magnetoresisti	ve head T03-	Cusselle	T03-N03
A03C3C		cassette adaptor	T03-H01E
vertical recording	T03-A03D	cassette type equipment	T03-N03
windings, general	T03-A03J5	helical scan type equipment	T03-N02
gnetic recording equipment		input interface to computer	T01-C01
audio tape recorder	W04-B12	leader section of tape	T03-A01F
audio tape recorder audio/video	W04-B12	manufacture of tape	T03-A011
azimuth and alignment correct		output interface from computer	T03-A02L
azımatır and angılment correct	T03-A05A	positioning - see <b>Magnetic tape</b>	
hiasing	T03-A05A T03-A06G	positioning - see wagnetic tape	T03-E
biasing connections to read/write head		reel-to-reel type equipment	T03-E T03-N04
connections to read/write nead copying prevention	W04-B01C1	1	T03-N04
CONTROL DI EVELIION	VVU4-DUICI	tape per se	TUS-AUT

tape per se, for helical scan recor	dina T03-	disk player/recorder	T03-D01
A01C3A	g	3.0 p. 13) 5 1300. 320.	T03-N01
video player/recorder	W04-B10		W04-D20A
Magnetic tape positioning	T03-E	erasing methods	T03-D01E
cassette changing	T03-E01B	initialisation system interfacing recording equipment	T03-D01F3 T03-D01E5
	T03-N03	light beam modulation	T03-D01E3
guide posts	T03-E02 T03-E05A5	magnetic field modulation	T03-D01H1
leader sensing looping/threading	T03-E05A5	magnetic head	T03-D01F1
mode control	T03-E05	magnetic head positioning	T03-D01F1A
speed control	T03-E03A	optical head	T03-D01C
tension control	T03-E04	optical head focussing/positioning	
Magnetic winding		reading circuitry	T03-D01E3C
for communications or HF	V02-F03B	record carrier - see Magneto-opti record carrier	T03-D01A
for low power supplies	V02-G02B	recording format	T03-D01A
for unspecified low power use	V02-G02B	recording methods	T03-D01E
Magnetising coil	V02-D	3	W04-D
Magneto-hydro-dynamic generato	r	writing circuitry	T03-D01E3A
low power machine	V06-M06Q	writing methods	T03-D01E
medium/high power machine	X11-H03B		W04-D
Magneto-optical		Magnetodynamic relay	V03-D05E
converison of sensor output	S02-K03A5F	Magnetoelastic resonator	V06-V01D
devices for magnetic variable me			V06-V01E
magnetic measuring devices	S01-E01C S01-E01C1	Magnetoelastic transducer	
material	V07-K03	(general)	V06-V01D
recording/reproducing - see Mag		Magnetography	S06-E07
optical recording	T03-D01	exposure	S06-D09
	W04-D	Magnetometer	S01-E01
transducers	S02-K03A5F	Magnetophoretic display	U14-K09
Magneto-optical drive	T03-D01K	Magnetoresistive	
disk drive	T03-D01K1	conversion of sensor output	S02-K03A5A
card drive tape drive	T03-D01K3 T03-D01K5	magnetic heads	T03-A03C3
'		sensor for magnetic field	
Magneto-optical record carrier antireflective layer	T03-D01A T03-D01A3A	*measurement	S01-E01D
card	T03-D01A3A T03-D01A1C	transducers	S02-K03A5A
characterised by type	T03-D01A1	Magnetoresistors	U12-B01B
dielectric layer	T03-D01A3E	Magnetostatic resonator	V06-V01E3
disk	T03-D01A1A		V06-V01X
domain wall displacement system		Magnetostatic transducer	
exchange coupling magnetic layed D01A5E	ers T03-	(general)	V06-V01X
layer arrangements	T03-D01A4	Magnetostrictive	
lubricating layer	T03-D01A7A	actuators	V06-M06H
magnetic layers	T03-D01A5	conversion of sensor output	S02-K03A5C
manufacture	T03-D01A8	materials	U11-A02
overcoat layer	T03-D01A7		V06-V01D V06-V02R
recycling and destroying	T03-D01R	motors	V06-V02K V06-M06H
reflective layer spacing layers (between magneti	T03-D01A3C	properties, measuring	S01-E02X
spacing layers (between magneti	T03-D01A5G	relays	V03-D05B
substrate	T03-D01A2	resonators	V06-V01D
tape	T03-D01A1E		V06-V01E
Magneto-optical recording	T03-D01	sensors	S02-K03A5C V06-V01D
-	W04-D		V06-V01D V06-V04G
	W04-D02	transducer (audio/communication	
card record carrier	T03-D01A1A	(11111)	V06-V01D
disk carrier	T03-D01A1A		V06-V04A
	!		V06-V04B

ultrasonic motors	V06-M06H	Manipulator	P62-E
ultrasonic transducers	V06-V01D	and the l	X25-A03E
vibrators	V06-V01N V06-V01D	control	T06-D07B X25-A03E
VIDIALOIS	V06-V01D V06-V04C		X25-A03E X25-A03F
Magnetien	V00-V04C	Manometer	S02-F04A9
Magnetron manufacture of tube	V05-L05C		
microwave oven application	X25-B02B1	Manual gain control	U24-C05A
• •	X27-C01B1	Manual input for computer	T04-F
sputtering equipment	V05-F05C3A	Manufacturing	
	V05-F08D1A	actuator	V06-M11
tube	V05-C01A	aircraft	Q25-X05 W06-B08
Magnification changing	S06-D10A	assembly plant	X25-X14
Magnifier (optical)	P81-A01	AV equipment	W03-G10A
	P81-A50C	brushes	P24-B
Mahjong (game)	P36-C03	cable	X12-D07
	W04-X02B	capacitor	V01-B04
Mail		capacitor, electrolytic	V01-B01G
electronic	T01-N01C	circuit breaker circuit breaker, moulded case	X13-B08 X13-D08
franking	T05-C05	clothes, electrical details	X25-T04
sorting or delivering	P41-K05 T05-K02	clothes, mechanical details	P21-M
A. 111		coins	P23-M
Mail box	X27-X	contact	V03-A08
Mainframes, computers	T01-M06B		X13-A01
Mains electric connector - see Conn	ector	electric machine	V06-M11
Mains, communication/control via	W02-C01A3	footwear, non-electrical details	X11-J08 P22-M
	X12-H03E	fuse	X13-D01C
telemetry or telecontrol	W05-D06P	getter	V05-L06
Mainspring for clock or watch	S04-A01	hard magnetic metal(alloy) materi	ial V02-A01A9
Maintenance		hard magnetic non-metallic mater	
aircraft	W06-B08	(of) instrumentation	S01-J03
circuit breakers	X13-B08	Jewellery lamp, discharge	P23-M X26-A03
electric installation electric machines	X12-G01D V06-M11M	lamp, incandescent	X26-B03
creedite macrimes	X11-J08M	lens	P81-A01
operation cycle counter, monitori	ng T05-G02A		P81-M
ship	W06-C07A	magnetic recording head	T03-A04A1
spacecraft	W06-B08	magnetic recording medium	T03-A02
sputtering, depositing, plasma ap		mobile phone	W01-C01D3C W01-C01V
steam turbines	U11-C09F X11-A01X	moulded case circuit breaker	X13-D08
switchgear	X11-A01X X13-E08	nuclear reactor	X14-C04
transformer	X12-C01D7	nuclear reactor fuel element	X14-B04A
vehicle	Q16-A	optical recording head	T03-B02B8C
Malware prevention	T01-N02B3	radiation sensor, semiconductor	U12-A02A3
Man-in-the-middle attack prevention	on	recording equipment	T03-M08
general data transmisson	W01-A05L5	relays with contact resistor	V03-D06B V01-A04
remote control/measurement	W05-D05B5A	resonator, electromechanical	V06-V01E
			V06-V03A
remote keyless entry (RKE)	W05-D05B5A	ship	Q24-X05
	W05-D08C X22-D01A2		W06-C08
		smartphone	W01-C01G8S
Management information systems	T01-J05A2		W01-C01V
Manchester code conversion (see C		soft magnetic metal(alloy) materia soft magnetic non-metallic materi	
conversion)	U21-A05C	spacecraft	Q25-X05
Manicure equipment	P24-C03	55000.0.0	W06-B08

sports equipment	P36-A08A	for radiation treatment	U11-C03J6
sports equipment	P36-M	inspection	U11-C04A1E
	W04-X01E	op some	U11-F01B
steam turbine	X11-A01X	ion beam	U11-C04G1
subscriber telephone equipment	W01-C01V	lift-off	U11-C04D1
switch with contacts	V03-C07	optical	U11-C04E2
	X13-A04F	resist coating of wafer	U11-C04A1B
switchgear	X13-E08	techniques	U11-C04D
television	W03-A19A	X-ray	U11-C04H2
train transducer, acoustoelectric	Q21-M05 V06-V03A	Mask, shadow	V05-D05D
transducer, acoustoelectric transducer, electromechanical	V06-V03A V06-V03A	Mass	
transformer, high power	X12-C01D	flowmeter	S02-C01F
transformer, low power	V02-H	Mass spectrometer	S03-E10A
tyres	Q11-B20	•	V05-J01A1
umbrella	P24-M	control	V05-J01M
vehicle	Q16-A	detection system	V05-J01J
vehicle assembly line	Q16-D01A	double focussing	S03-E10A1A
	X25-X14	IMS	S03-E10A3
wheels	Q11-A28	inductively coupled	S03-E10A6
Manufacturing automation protoco	l (MAP)	interfacing with other equipment	
	T06-A11	ion cyclotron resonance ion mobility	S03-E10A7 S03-E10A3
	W01-A06B5A	ion optics	V05-J01G
	W01-A06F1E	ion trap	S03-E10A5
	W05-D07B	ionising arrangement	V05-J01E
	W05-D08J	MALDI (Matrix Assisted Laser	
Mark, digital	T04-C	Desorption Ionization)	S03-E10A8
detecting, sensing, reading	T04-A03	monitoring	V05-J01M
writing, printing	T04-A02	MS/MS	S03-E10A2
Mark-up languages	T01-J11C1	quadrupole	S03-E10A5
broadcast (BML)	W02-F05C	sample introduction	V05-J01C
	W02-F07M1	Secondary ion mass spectrometer	S03-E10A4
parsing	T01-J11C3	SELDI (surface Enhanced Laser Desorption Ionization)	S03-E10A8
	T01-N03B2B	tandem	S03-E10A2
Marker buoy		Time of flight	S03-E10A3
general	Q24-P18	using magnetic sectors	S03-E10A1
electrical aspects	W06-C07C	Mass storage	T01-H03C
Marking		Massage	
cable marking (theft prevention)	X12-D03C2	massaging device	S05-A05C
defective chips, after testing at wa		mussaging device	X27-A02A2
digital, electrostatic and magnetic	U11-F01D	Massive MIMO radio systems	W02-C03A5A
digital, electrostatic and magnetic digital, optical, IR, and UV	T04-A02B	-	
monitoring and verifying	T04-B	Master slice	U13-C04D
photographic film	S06-B01B2	Master-slave	604 507
semiconductor wafer, for identific	ation U11-C15A	clock system for time indication	S04-B06
Martial arts (sports)	P36-A04	flip-flop	U22-A04C
,	W04-X01K4A	Mat, pressure sensing	000 50 450
Maser	V08-B01	piezoelectric type	S02-F04B2
	V00 B01		V06-V01B V06-V04E
Mask, breathing medical	S05-G02E	switches with contacts	V03-B01D
safety/rescue equipment	P35-A03E1		V03-D01D
, ,		Material	V1/ F01
Mask programmable memories - se ROMs, mask programmable	• <b>e</b> U14-A06B5	active, battery electrode battery electrode, manufacture	X16-E01 X16-E01G
	014-W00D3	complex oxide, battery electrode	
Mask, semiconductor	U11-C04B	conductive - see <b>Conductor</b>	X12-D01
alignment conformal	U11-C04B U11-C04D1	conductive, battery electrode	X16-E01E
CVD	U11-C01B1	conductor, for semiconductor mar	
electron beam	U11-C04F2		U11-A08B
Sicoli on boain	311 30 11 2		

conductor (inorganic), for		thick film	U11-A05
semiconductor manufacture	U11-A08B2	thin film	U11-A05
conductor (organic), for		for millimetre wave	W02-A08C1
semiconductor manufacture	U11-A08B1	for waveguide	W02-A08C
contact, connector	V04-D01	Material processing	
contact, switch	V03-A01A	crushing	X25-J
	X13-A01A	drying	X25-G
crystal, semiconductor	U11-B03	handling	X25-G X25-F
dielectric, manufacture	V01-B03B3	mixing	X25-J
dimension control	T06-B03		X25-J X25-H
electrochromic	U11-A03C	separation	
electroluminescent	U11-A15	working	X25-A
electronic component (general)	V04-X01B	Materials investigation	
electrostrictive	U11-A02	absorption with light modulation	S03-E04A5A
Ciecu osu icuve	V06-V01B	adhesive properties	S03-F08
	V06-V01B V06-V02R	applying impulsive forces	S03-F02E
fuel cell electrode	X16-E06A1	atomic absorption spectrometry	S03-E04A5G
gas, for semiconductor mfr	U11-A12	automatic optical analysis	S03-E04X
		bioluminescence	S03-E04E
inorganic compound, battery	X16-E01C	breakdown voltage	S01-G03
magnetic	U11-A04		S03-E02X
magnetic - see Magnetic material		by applying steady compression/t	
magnetoelastic	V06-V01D	by applying cloudy compressions	S03-F02C
	V06-V02R	by shearing	S03-F02D
magnetostrictive	U11-A02	by steady bending	S03-F02D
	V06-V01D	by twisting	S03-F02D
	V06-V02R	capacitance measurement	S03-F02C
nano-sized, battery electrode	X16-E01H1		
nano-sized, conductive	X12-D01D	chemical indicator, general (see a	S03-E09E
nano-sized, fuel cell electrode	X16-E06A1A	S03-E04E)	
nano-sized, insulating inorganic	X12-E01D	chemical indicator, observing	S03-E04E
nano-sized, insulating organic	X12-E02D	chemical testing	S03-E09
nano-sized, magnetic	V02-A10	chemiluminescence	S03-E04E
organic compound, battery electr	ode X16-E01A	chemisorption	S03-E09A
oxide, battery electrode	X16-E01C1	coefficient of friction, measuremen	
photoresist, for semiconductor m	anufacture - see	colour/spectral properties	S03-E04A
Resist	U11-A06	concentration of suspensions	S03-F06A
photonic crystals	V07-K10C	corrosion resistance	S03-F07
piezoelectric	U11-A02	cutting ability	S03-F02B
F	V06-V01B	density measurement	S03-F01
	V06-V02R	diffusion effects, measurement	S03-F04
polymer, battery electrode	X16-E01A1	discharges	S03-E10C
precursor for deposition process		ductility measurement	S03-F02X
semiconductor manufacture	U11-A13	electro-optical detection	S03-E04A1
pyroelectric	U11-A02	electrons	S03-E06
pyroelectric	U14-E01A	flow properties	S03-F03
rocovery electronic component (		forming picture using TV camera	S03-E04X
recovery, electronic component (	V04-X01C	gamma rays	S03-E06
resist, PCB	V04-X01C V04-R01A1	gas sampling	S03-E13C
	V04-R01A1 V04-U01	gas volume/pressure measureme	nt S03-E12
screening, electric		gravimetric analysis	S03-E12A
screening, magnetic	V04-U01	hardness measurement, magnetic	: S03-E11C
semiconductor - see <b>Semicondu</b>		hardness measurement, mechanic	
materials	U11-A	impedance measurement	S03-E02D
structure, for battery electrode	X16-E01H	ionisation/discharges	S03-E10
superconducting (see also		light resistance	S03-F07
Superconducting material)	U14-F01	light transmission	S03-E04B1A
	X12-D06B	liquid sampling	S03-E13B
superconducting, metal alloy	X12-D06B1	machinability	S03-F02B
superconducting, metal alloy mar		magnetic properties	S03-F02B
	X12-D06B1A	mechanical strength	S03-F02
superconducting, oxide	X12-D06B2	neutron diffraction	S03-F06C
superconducting, oxide manufact		neutrons	S03-E06
	X12-D06B2A	optical diffraction	S03-E04B5
thermoelectric	U14-E05B	Optical diffraction	303-L04D3

and all and and	CO2 FO4D	•	CO2 E14D
optical excitation	S03-E04D	ice	S03-E14B
optical fluorescence	S03-E04D	industrial waste	S03-E14W
optical interference	S03-E04B5	inks	S03-E14F
optical polarisation	S03-E04B5	leather	S03-E14D7
optical refraction	S03-E04B5	medicines	S03-E14A1
optical, with electrical excitation	S03-E04D	metallic electrodes	S03-E14C1
optical, with mechanical excitation		metals	S03-E14C
optical, with thermal excitation	S03-E04D	minerals	S03-E14Q7
phosphorescence	S03-E04D	nucleic acids	S03-E14H3
photo-acoustic absorption spectro		oils, e.g. lubricating	S03-E14F
	S03-E04A5A	other alloys	S03-E14C3X
precipitation, chemical	S03-E09A	paints	S03-E14F
Raman scattering	S03-E04D1	paper	S03-E14G
Raman spectrometry	S03-E04D1	pesticides	S03-E14M
resistance to heat/wear	S03-F02B	pharmaceuticals	S03-E14A1
scattering/diffuse reflection	S03-E04C	plants	S03-E14J
solid sampling	S03-E13A	plastics	S03-E14D7
sonic/ultrasonic vibrations	S03-E08	proteins	S03-E14H5
specimen preparation	S03-E13D	refractories	S03-E14D4
specular reflectivity	S03-E04B1B	resins	S03-E14D7
stimulable phosphor sheet imagir		rock	S03-E14E7
triboluminescence	S03-E04D	rubber	S03-E14D7
using dual-beam optical spectrom		saliva/phlegm	S03-E14H2
	S03-E04A4	seeds	S03-E14J
using electrostatics	S03-E02X	semen	S03-E14H2
using tunnelling effects	S03-E02F	SF6	S03-E14P9
viscosity	S03-F03	soil	S03-E14E7
weather resistance	S03-F07	steam	S03-E14B
X-ray diffraction	S03-E06C	steel	S03-E14C3A
X-ray fluorescence	S03-E06D	textiles	S03-E14G
X-ray photography	S03-E06B5	tissue samples	S03-E14H6
X-rays	S03-E06	tobacco urine	S03-E14A2
aterials investigation characterise	ed by		S03-E14H9
material		viscous liquids waster (industrial waste)	S03-E14F S03-E14W
air quality - see also <b>Pollution</b>	S03-E14N	waster (industrial waste) water	S03-E14B
alloys	S03-E14C3	wood	S03-E14D7
biological material	S03-E14H		
blood - see also <b>Blood</b>	S03-E14H1	Mathematical modelling	T01-J04E
bone	S03-E14H9	Matrix computation	T01-J04C
breath	S03-E14H9	Matrix display control	T04-H03B
carbon fibre	S03-E14D7		U13-C04
ceramics	S03-E14D4	Matrix layout, digital ICs	
chemical reaction products	S03-E14P3	Matteucci effect conversion of sens	or output
chemical warfare agents	S03-E14L		S02-K03A5X
combustion products	S03-E14P1	Mattress	P26-C
	S03-E14R	manufacture	P26-M
concrete	S03-E14D1	flexible heating element	X25-B01C3C
contaminants (air)	S03-E14N		
cosmetics	S03-E14A3	MaxMin. thermometer	S03-B01D
crops	S03-E14J	MCFC	X16-C02
drinks	S03-E14A2	мсм	U11-D01A
drugs	S03-E14A1		U14-H03
dust	S03-E14X S03-E14H5		V04-Q02A2
enzymes	S03-E14F3	MDDT (Mode Dependent Direction	al
explosives			
fibre glass flame/combustion	S03-E14D7 S03-E14R	Transformation), video coding	W04-P01A4E
flame/combustion foods		Measuring	
fuels	S03-E14A2	acceleration, linear and angular	S02-G03
	S03-E14E1 S03-E14P	active semiconductor material pro	perties
gas	S03-E14P S03-E14D4	•	U11-F01A
glass herbicides	S03-E14D4 S03-E14M	air temperature (see also <b>Thermo</b>	meters)
noi biciues	303-L I TIVI		S03-D04

alignment	S02-A10D2		S01-G06
using magnetic/electric method	S02-A02		X16-H03
	S02-A10D2	blood composition in vivo	S05-D01G
using mechanical method	S02-A01	blood flow	S05-D01B1B
	S02-A10D2	blood oxygen content	S03-E04A4
using magnetic/electric method	S02-A02	blood oxygen content in vivo	S05-D01G
	S02-A10D2	blood pressure	S05-D01B1A
using optical method	S03-A03		S02-F04C2
	S02-A10D2	blood pressure or flow	S05-D01B1
using atomic or nuclear radiatio		body shape or movement, medica	
	S02-A10D2	body temperature (see also <b>Therr</b>	
using microwaves	S02-A05A1		S05-D01E
	S02-A10D2	bone content	S05-D01J
using sound or ultrasound	S02-A05B	capacitance 	S01-D05A3
- Ich I -	S02-A10D2	cardiac output	S05-D01B1B
altitude	S02-B05	coating thickness, electrically/mag	
amplitude-frequency characteristi angle, surveying	cs S01-D05C S02-B05	coefficient of thermal expansion	S02-A10B1 S03-E01A
angles	S02-A10D1	coiling properties, materials	S03-F02X
using mechanical method	S02-A10D1	contour	S02-A10C
using mechanical method	S02-A01 S02-A10D1	using mechanical method	S02-A10C
using magnetic/electric method		daing meenamear method	S02-A10C
damy magnetic decare method	S02-A10D1	using magnetic/electric method	
using optical method	S03-A03	doing magnetic, creative method	S02-A10C
asing option memora	S02-A10D1	using optical method	S03-A03
using atomic or nuclear radiatio		doing option motion	S02-A10C
9	S02-A10D1	using atomic or nuclear radiatio	
using microwaves	S02-A05A1	S	S02-A10C
C .	S02-A10D1	using microwaves	S02-A05A1
using sound or ultrasound	S02-A05B		S02-A10C
	S02-A10D1	using sound or ultrasound	S02-A05B
angular speed	S02-G01		S02-A10C
antenna radiation pattern	S01-D07B1	coordinates	S02-A10G1
area	S02-A10C		S02-B01A
using mechanical method	S02-A01	using mechanical method	S02-A01
	S02-A10C		S02-A10G1
using magnetic/electric method		using magnetic/electric method	
	S02-A10C		S02-A10G1
using optical method	S03-A03	using optical method	S03-A03
	S02-A10C		S02-A10G1
using atomic or nuclear radiatio		cosmic ray muon radiography	S03-C02M
using microwaves	S02-A10C S02-A05A1	creep cross-modulation	S03-F02X S01-D08
using microwaves	S02-A03A1 S02-A10C	cross-modulation cross-section	S02-A
using sound or ultrasound	S02-A10C S02-A05B	current, by DC/AC conversion	S01-D01C1A
using sound or dicrasound	S02-A00D	current, digitally	S01-D01C1A
atmospheric pressure (see also SC		current/voltage,	301 001010
atmospherie pressure (see also se	S03-D03	by AC/DC conversion	S01-D01C5
attenuation (electrical)	S01-D05C	current/voltage, in voltaic cell	S03-E03B
attitude	S02-B05A	data network QoS	W01-A06
audience for radio broadcast	W02-D08	deformation	S02-A10F
audience for TV broadcast	W02-F04B	using mechanical method	S02-A01
axial thrust in shaft	S02-F03B	S	S02-A10F
azimuth	S02-B05	using magnetic/electric method	S02-A02
battery current	S01-D01		S02-A10F
	S01-G06	using optical method	S03-A03
	X16-H03		S02-A10F
battery charge level	S01-G06A	using atomic or nuclear radiatio	n
	X16-H01		S02-A05A3
battery electrolyte level	X16-H02		S02-A10F
battery electrolyte specific gravity		using microwaves	S02-A05A1
battery parameters	X16-H		S02-A10F
battery voltage	S01-D01		

easuring (continued)		electric train/tram	X23-A05
using sound or ultrasound	S02-A05B	electric variables	S01-D
	S02-A10F	electrical, medical	S05-D01D
degree of coherence	S03-A09	electrochemical properties	S03-E03
depth	S02-A10B	electromagnetic fields	S01-D07B
using mechanical method	S02-A01	electrostatic fields	S01-D07A
	S02-A10B	electrostatic fields, optically	S01-D07A1
using magnetic/electric method		elevation, surveying	S02-B05
	S02-A10B	engine energy or work indicators	
using optical method	S03-A03	fluid pressure	S02-F04
	S02-A10B	fluid speed, by measuring fluid for	
using atomic or nuclear radiatio		pressure difference	S02-G02B
using microwaya	S02-A10B S02-A05A1	fluid speed, electrically fluid speed, thermally	S02-G02A S02-G02A
using microwaves	S02-A03A1 S02-A10B		S02-G02A S02-G02X
using sound or ultrasound	S02-A10B S02-A05B	fluid speed, ultrasonically fluid speed, using Doppler effect	
using sound or ditrasound	S02-A03B S02-A10B	force (see also <b>Force measureme</b> )	
diameter	S02-A10A	Torce (see also <b>Force measuremen</b>	S02-F01
using mechanical method	S02-A10A	four-terminal network characteristi	
using meenamear method	S02-A10A	functions of currents	S01-D01A
using magnetic/electric method		gain (amplification)	S01-D05C
using magnetic/creene method	S02-A10A	gap	S02-A10B
using optical method	S03-A03	using mechanical method	S02-A01
using optical method	S02-A10A	using meenamearmearea	S02-A10B
using atomic or nuclear radiatio		using magnetic/electric method	
asing atomic of macical radiatio	S02-A10A	doming magnetic electric method	S02-A10B
using microwaves	S02-A05A1	using optical method	S03-A03
3 3 3 3 3 3	S02-A10A	3 1	S02-A10B
using sound or ultrasound	S02-A05B	using atomic or nuclear radiation	n S02-A05A3
3	S02-A10A	3	S02-A10B
dichroism	S03-E04B5	using microwaves	S02-A05A1
dimensions			S02-A10B
using mechanical method	S02-A01	using sound or ultrasound	S02-A05B
using magnetic/electric methoc	I S02-A02	_	S02-A10B
using optical method	S03-A03	gauges	S02-A01B
using atomic or nuclear radiatio	n S02-A05A3	harmonics, electrical	S01-D03C
using microwaves	S02-A05A1	heart rate	S05-D01B5
using sound or ultrasound	S02-A05B	human body impedance	S05-D01D1
using calibrated CCTV system	W02-F01D	human body mineral content	S05-D01J
using fluids	S02-A04	inclination	S02-B03
using radiation	S02-A05A	inflation pressures	S02-F04C1A
displacement	S02-A10B	integrated circuit parameters (wafe	
for non-vehicle use	S02-B12B		U11-F01D
for vehicle	S02-B12A	intermodulation	S01-D08
	X22-X06F	laser parameters	V08-A06
using mechanical method	S02-A01	length	S02-A10B
	S02-A10B	using mechanical method	S02-A01
using magnetic/electric method			S02-A10B
· · · · · · · · · · · · · · · · · · ·	S02-A10B	using magnetic/electric method	
using optical method	S03-A03		S02-A10B
	S02-A10B	using optical method	S03-A03
using optical method, in line of			S02-A10B
using atomic or nuclear radiatio	S02-A05A3	using atomic or nuclear radiation	n S02-A05A3 S02-A10B
using microwaya		using microwove	
using microwaves	S02-A05A1 S02-A10B	using microwaves	S02-A05A1 S02-A10B
using sound or ultrasound	S02-A10B S02-A05B	using sound or ultrasound	S02-A10B
using sound or ultrasound	S02-A03B S02-A10B	using sound or ultrasound	S02-A03B S02-A10B
with distance recording	S02-A10B S02-B12	lenses and lens systems	S02-A10B S02-J04A5
		<del>-</del>	S03-A
	SN2-RN2		
for surveying/navigation	S02-B02 S03-F02X	light linear speed	
for surveying/navigation ductility	S03-F02X	linear speed	S02-G01
for surveying/navigation			

Measuring (continued)		power, mechanical (see also	
magnetic variables	S01-E	Dynamometers)	S02-F02
magnetic, medical	S05-D01D	pressure differences	S02-F04C1
magnetostrictive properties	S01-E02X	pressure differences pressure, mechanically	S02-F04A
mass flow	S02-C	propagation velocity of mechanical	
mechanical efficiency	S02-F02	propagation velocity of mechanica	S02-E01
-	S02-F02 S03-F02A		S05-D01X
mechanical hardness		psychotechnics	
mechanical stress	S02-F01	rainfall (see also <b>Moisture measu</b> i	•
mechanical vibration	S02-E		S03-D02A
mechanical vibration, by detecting		rapid changes in pressure	S02-F04D3
capacitance change	S02-E02	reflection coefficient	S01-D05B5
mechanical vibration, by detecti	9	reflex and reaction, medical	S05-D01F
reluctance change	S02-E02	refractive index	S03-E04B5
mechanical vibration, by		resistance, electrical	S01-D05B1
radiation-sensitive detector	S02-E02	resonant frequency, mechanical	S02-E01
mechanical vibration, using dete		reverberation time	S02-E01
fluid	S02-E02	RMS current/voltage	S01-D01A1
micrometers	S02-A01A	roughness	S02-A10E
modulation and noise	S01-D08	using mechanical method	S02-A01
modulation depth	S01-D08A		S02-A10E
modulation index	S01-D08A	using magnetic/electric method	S02-A02
moment of a force	S02-F02		S02-A10E
MRI	S01-E02A2	using optical method	S03-A03
	S03-E07A		S02-A10E
MRI, for medical purposes	S05-D02B2	using atomic or nuclear radiatio	n S02-A05A3
muongraphy/muon imaging	S03-C02M		S02-A10E
neurological, nerve stimulation	S05-D01A	using microwaves	S02-A05A1
neutron radiation	S03-G01C		S02-A10E
NMR	S01-E02A1	using sound or ultrasound	S02-A05B
NMR, for medical purposes	S05-D02B2		S02-A10E
noise figure	S01-D08B	scattering parameters	S01-D05B5A
noise power	S01-D08B	semiconductor bandgap	U11-F01A9
nuclear radiation	S03-G	semiconductor device multilayer o	
nuclear radiation intensity	S03-G02B	boards	S01-G02B
optical element parameters	S02-J04A	semiconductor film parameters	U11-F01B
optical ciement parameters	V07-J	semiconductor, chemical analysis	
optical phase difference	S03-A09	several components of force	S02-F03B
optical radiation	S03-A	several pressures	S02-F04C3
optical wavelength	S03-A09	sheet thickness	S02-A10B1
orientation, for surveying naviga		using mechanical method	S02-A10B1
pain threshold	S05-D01X	using mechanical method	S02-A01
partial pressures	S02-F04C3A	using magnetic/electric method	
phase angle	S01-D04	using magnetic/electric method	S02-A02 S02-A10B1
phase-frequency characteristics	S01-D04	using optical method	S03-A03
physical/chemical properties	S03-E	using optical method	S02-A03
		shock	
pollution position	S03-D06 S02-A10G2	signal-to-noise ratio	S02-G03 S01-D08B
•		signal-to-noise ratio	
large scale using mechanical method	S02-B01A	sound waves	W02-G03J5
using mechanical method	S02-A01		S02-E
	S02-A10G2	spacing	S02-A10B
using magnetic/electric metho		using mechanical method	S02-A01
	S02-A10G2		S02-A10B
using optical method	S03-A03	using magnetic/electric method	
	S02-A10G2		S02-A10B
using atomic or nuclear radiat		using optical method	S03-A03
	S02-A10G2		S02-A10B
using microwaves	S02-A05A1	using atomic or nuclear radiatio	n
	S02-A10G2	and an indicate radiation	
using sound or ultrasound	S02-A05B		S02-A05A3
	S02-A10G2		S02-A10B
power, electrical	S01-D02	using microwaves	S02-A05A1
•	X12-H04		S02-A10B

Measuring (continued)		volume	S02-C
using sound or ultrasound	S02-A05B	volume flow	S02-C
using sound or unfuseund	S02-A10B	VSWR	S01-D05B5
specific heat	S03-E01C	well drilling conditions, acoustical	
speed	S02-G01	well drilling conditions,	iy 505-C01C5
speed of bodies relative to fluid	S02-G01	electromagnetically mechanically	CU3 CU3
speed of bodies relative to fluid speed of fluid	S02-G02	well drilling conditions, mechanical	
•			
speed of sound	S02-E01	wheels, mechanical	S02-A01A
speed, doppler methods	S02-G01D	width	S02-A10B
speed, electrically/magnetically	S02-G01B	using mechanical method	S02-A01
speed, mechanically	S02-G01X		S02-A10B
system, medical	S05-D01	using magnetic/electric method	
tape travel in recording equipme			S02-A10B
tapers	S02-A10D1	using optical method	S03-A03
optical measurement	S02-A03		S02-A10B
thermal conductivity	S03-E01A	using atomic or nuclear radiation	on S02-A05A3
thermal properties	S03-E01		S02-A10B
thickness	S02-A10B	using microwaves	S02-A05A1
using mechanical method	S02-A01	_	S02-A10B
	S02-A10B	using sound or ultrasound	S02-A05B
using magnetic/electric method	d S02-A02		S02-A10B
gg	S02-A10B	work- mechanical	S02-F02
using optical method	S03-A03	X-radiation	S03-G
using optical method	S02-A10B		000 0
using atomic or nuclear radiation		Mechanical	
using atomic of nacieal radiation	S02-A03A3	dimension measurement - see als	
using microwaves	S02-A10B	Measuring	S02-A10
using inicrowaves	S02-A03A1	oscillation control	T06-B12
		power control	T06-B12
using sound or ultrasound	S02-A05B	recording methods	W04-A
	S02-A10B	separation	X25-H06
thickness of sheet or coating	S02-A10B	surgery	S05-B03
using mechanical method	S02-A01	treatment, semiconductor wafers	U11-C06A
	S02-A10B	video scanning	W04-M01E5
using magnetic/electric metho		Mechanical control system	T06-C
	S02-A10B	automatic movement-using device	
using optical method	S03-A03	controlled member	T06-C01
	S02-A10B	controlling member	T06-C01
using atomic or nuclear radiation		limiting movement-type	T06-C02
	S02-A05A3	manually-operated mechanism-ty	
	S02-A10B	multi- or several- controlled	pe 100-C03
using microwaves	S02-A05A1		T06-C03B
	S02-A10B	members-type	
using sound or ultrasound	S02-A05B	single controlled member-type	T06-C03A
	S02-A10B	Mechanical power	
torque	S02-F02	measurement of	S02-F02
torque on nut	S02-F03B	special purpose measurement of	S02-F03B
total harmonic distortion (THD)	S01-D03C5	Mechanical strength tests	
trajectory	S02-H	applying impulsive forces	S03-F02E
tube for	V05-F08B	applying impulsive forces applying steady tension or compr	
turbidity, using optical transmission		applying steady tension or compr	S03-F02C
also Nephelometer	S03-E04B1A	horata a do la cardia a decistia a carda de	
twisting properties, materials	S03-F02X	by steady bending, twisting or she	
	S01-D05C		S03-F02D
two-port network characteristics		creep measurement	S03-F02X
tyre pressure	S02-F04C1A	hardness	S03-F02A
vacuum	S02-F04D1	other (includes ductility, twisting a	
vehicle, engine paramaters	X22-A05	coiling properties)	S03-F02C
vehicle, non-engine parameters	X22-X06	resistance to wear/ heat, machinal	bility/
vehicle power	S02-F03B	cutting ability	S03-F02B
velocity of light	S03-A09	Mechanically varied capacitor - see	
vibration	S02-E	Variable capacitor	V01-B02A
voltage	S01-D	•	
voltage, by DC/AC conversion	S01-D01C1A	Media player	T01-J30C
voltage, digitally	S01-D01C1B		W04-E30A1

Medical	1	general image processing	505 D084
	P33-A20	general image processing	S05-D08A S05-A02
acupuncture	S05-A05	general electrode arrangements	
		glucose monitoring	S05-D01G
administering drugs through skin	P33-A	hair removal	S05-B09
aids		heart pacemaker	S05-A01A
aids for handicapped people	S05-K	heart pump	S05-F04
air filter	S05-A09	heart rate measurement	S05-D01B5
alarm based on equipment failure		hospital administration	S05-G02G
alarm based on patient status	W05-B07G5A	hospital bed	S05-G02B1
ambulance equipment	S05-G02B2B	hospital database	S05-G02G1
anaesthesia	S05-L	hospital equipment	S05-G02
anaesthetic gas delivery	S05-L01	hospital intercoms	S05-G02D
analysis	S05-C	hospital records	S05-G02G
applying currents as treatment	S05-A04	human body impedance measure	
artificial aids for eyesight	S05-F05		S05-D01D1
audio relaxation	S05-A09	implantable devices	S05-Y03
audiometery	S05-D01D	implanted hearing aid	S05-F01
blood analysis in vitro	S05-C01	incontinence preventer	S05-F02
blood analysis in vivo	S05-D01G	information system	T01-J06A1
blood flow measurement	S05-D01B1B	infusion	S05-J
blood pressure measurement	S05-D01B1A	ingestible devices	S05-Y04
blood pumping	S05-H02	insomnia treatment	S05-A09
breathalyser	S05-C09	intramuscular anaesthesia systems	s S05-L02
cardiac massage	S05-A05A	intravenous anaesthesia systems	S05-L02
cardiac output measurement	S05-D01B1B	intravenous fluid delivery	S05-J01A
clinical waste	P34-W	iontophoresis	S05-A04A
communicating with internal devi	ces	IT systems	S05-G02G
	S05-Y05	laser, IR, UV surgery	S05-B01
connector	V04-M30M	life support systems	S05-G02B3
	S05-A02	limb prosthesis	S05-F03
controlling internal devices	S05-Y05	manufacture of equipment	S05-Y07
controlling medical endoscope	S05-D04A	measurement, electrical or + mag	netic
defibrillator	S05-A01B		S05-D01D
diagnostic displays	S05-D07	measuring and recording	S05-D01
diagnostic information systems	S05-D06	measuring bioelectric current	S05-D01A
dialysis	S05-H	medical waste management	S05-W
dialysis and blood treatment	S05-H01	medicine/drug storage	S05-M03
digital health systems	S05-G02	monitor built into telephone	S05-D01
drug management and administra	ation S05-M01	·	W01-C01P8
drug storage and dosing	S05-M	monitoring internal devices	S05-Y05
drug taking monitoring	S05-M02	nerve stimulation	S05-A04
electrical diagnosis	S05-D	nano/micro scale devices	S05-Y02
electrocardiograph	S05-D01A1	nuclear radiation diagnosis	S05-D02C
electrodes for bioelectric currents	S05-D01A2A	operating theatre equipment	S05-G02C
electrodes for ECG measurement	s S05-D01A1A	ovulation and conception detection	on S05-D09
electrotherapy	S05-A04	pacemakers and defibrillators	S05-A01
encephalograph	S05-D01A	pain threshold sensing	S05-D01X
endoscope (diagnostic)	S05-D04	patient beds	S05-G02B1
1 . 3 .	W02-F01M	patient monitoring	S05-G02B2
endosopes, imaging aspects	S05-D04B	patient positioning for therapy	S05-A10
equipment failure alarm	W05-B07G5C	patient table for radiation diagnos	sis
equipment manufacture	S05-Y07	1	S05-D02E
expert systems	S05-D06	pharmacovigilance	S05-G02G5
eye exercise	S05-A07	physical therapy	S05-A05
eye testing	S05-D05	portable monitoring equipment	S05-G02B2B
eye treatment	P32-A50	prosthesis	P32-A40
feeding devices	P33-A50	p. com con	S05-F
filtering	S05-H	psychotechnics	S05-D01X
fluid analysis in vitro	S05-C02	pulse measurement	S05-D01X
fluid analysis in vivo	S05-C02 S05-D01L	pumping	S05-H
for endoscopic/keyhole surgery	S05-B05	radiation diagnosis	S05-D02
gas delivery of medication	S05-M04	reflex measurement	S05-D02
gas delivery of medication general diagnostic processing	S05-D08	remote monitoring of patients	S05-G02B2A
general diagnostic processing	303-200	remote monitoring or patients	JUJ-UUZDZA

Medical (continued)	İ	bit line control	U14-A07
respiration measurement	S05-D01C1	bubble, magnetic	U14-A01A1
respiratory assistance using gas	S05-G02E	clock/synchronisation circuit	U14-A07C
respiratory massage	S05-A05A	combined FET and bipolar	U14-A03B5
sex determination	S05-D09	computer interface for	T01-C01C
simulation and education systems		data refreshing	U14-A03B4A
sleep monitoring	S05-D01C7	dynamic	U13-C04B1A
		,	
speech therapy	S05-A09	ferro-electric, computer interface	for 101-C01C
sterilising	S05-G01	FET and capacitor - see <b>RAMs</b> ,	114.4.4.000.4
stethoscope	S05-D01H	dynamic, with capacitor store	
stimulable phosphor sheet	S05-D02A5C	fixed-program - see <b>ROMs, fixed</b>	
stretcher	P33-A01	program	U14-A06B
surgery, laser, IR, UV	S05-B01	flip-flop - see RAMs, static, wit	
surgery, mechanical and electrica		bistable FET cells	U14-A03B1
surgery, ultrasonic	S05-B02	initialisation circuitry	U14-A07
teaching	S05-X	interconnection layout	U14-C01
telediagnosis	S05-D06A	manufacture	U11-C18B5
temperature measurement	S05-D01E	mask-programmable - see ROMs,	
testing of drugs	S05-C05	programmable	U13-C04A
testing and monitoring of medica			U14-A06B5
apparatus	S05-Y01	multilevel	U14-B01
therapy or treatment	P33-A20	multiport	U14-A08B1
	S05-A	neutral models	U14-B02
tomography, X-ray	S05-D02A1	non-reprogrammable - see <b>ROMs</b>	5,
transplanting	S05-X	non-reprogrammable	U14-A06B
treatment planning systems	S05-G02G4	non-reprogrammable, using diod	es - see
treatment using optical, UV, or IR	radiation	ROMs, non-reprogrammable,	using
	S05-A03A	diodes	U13-C04A
trolley for patients	P33-A01		U14-A06B1
•	S05-G02A	non-reprogrammable, using fuses	s - see
ultrasonic and sonic diagnosis	S05-D03	ROMs, non-reprogrammable,	
ultrasonic medical equipment	S05-D03B	fuses	U13-C04A
ultrasonic transducer arrangemer	ts		U14-A06B1
3	S05-D03A2	non-volatile, ultraviolet erasable -	see
ultrasonic transducer details	S05-D03A1	ROMs, ultraviolet erasable	U13-C04A
waste disposal	P34-W	·	U14-A06C
waste management and recycling	S05-W	one-time programmable	U14-A06B
wheelchair	P33-A01	packages	U14-A10
	S05-G02A	power supply	U14-A09
X-ray detector positioning	S05-D02A6B	precharge and equalisation circuit	
X-ray diagnosis	S05-D02A5	programming/erasing	U14-A07B
X-ray generation, for diagnosis	S05-D02A3	reading/writing	U14-A07
X-ray recording, diagnostic image		ROM, electrically programmable	U13-C04A1
X-ray source positioning	S05-D02A6A	ROM/RAM combined	U14-A03B9
X-ray, protection from	S05-D02A3	sensing circuitry	U14-A07A
	300 2027 10	smart card	T04-K01
Medicine	COE NACA	software error prevention	U14-A11
administration and management		static RAM	U13-C04B1B
analysis	S03-E14A1	testing, using built-in circuits	U14-D01
	S05-C05	testing, using error correction coc	
computer systems	T01-J06A	thin film arrays	U14-H01A
dosing and storage	S05-M	thin magnetic film	U14-A04A
gas delivery	S05-M04	using bipolar transistors	U14-A03A1
monitoring patient compliance	S05-M02	using diodes/bipolar	014-A03A1
Meeting co-ordination	T01-N03A3	transistors/thyristors	U14-A03A
Membrane switch	V03-C01A2A	with adjustable threshold FET cell	
		with electro-optical element	U14-A02A
Memory		with electro-optical element with electrochemical cell	
address selection	U14-A08A	with ferroelectric elements	U14-A03X
addressing circuitry	U14-A08		U14-A03F
analogue	LITA D	with FETs	U14-A03B
	U14-B		1114 A02D1
bistable FET cells - see <b>RAMs, sta</b>	tic,	with hologram storage	U14-A02B1
bistable FET cells - see RAMs, sta with bistable FET cells			U14-A02B1 U14-A02A U14-A02B

with random access - see <b>RAMs</b>	U14-A03	Mercury sulphide - see All-BVI comp	ounds
with redundant circuits	U14-D01A	Mercury telluride - see All-BVI comp	ounds
51 126 ·	U14-D01B	Mercury thermometer	S03-B01D
with shift stores - see <b>Shift stores</b> with superconductive elements	U14-A01 U14-A03G	MESFET - see Field effect transistor	1112-D02B
with superconductive elements	U14-F02B		
with variable resistance organic fil	-	Message Queueing Telemetry Trans	=
word line control	U14-A08	(MQTT)	W01-A06F3
Memory bus access control	T01-H05B1	Metadata	T01-J05B2C
Memory storage in facsimile	S06-K07A4	Metadyne	X11-H09
Memory storage in telephone	W01-C01Q2	control	X13-H01C9
internal	W01-C01Q2 W01-C01Q2A	Metal base transistor - see Hot elect	
external	W01-C01Q2C	transistor	U12-D02J
	T01-H01B3A	Metal casting	P53-B
Memory storage in TV receiver	W03-A11M	control	P53-T20
Memory systems, computer	T01-H01B	electrical details	T06-D05B X25-A01
associative	T01-H03B	lubrication details	P53-T05
by type	T01-H03	maintenance	P53-G
cache	T01-H03A	post-casting treatment	P53-B05
content addressable	T01-H03B	pre-casting treatment	P53-B04
dual port	T01-H03D	recycling of components	P53-R
hardware details	T01-H01A	repair	P53-G
illegal access	T01-H01C2	safety	P53-T20
interleaved	T01-H03C	types of metal casting	
multiprocessor memory managen	nent	continuous casting	P53-B01A
	T01-H08	die casting	P53-B01C2
non-volatile	T01-H01B3D	expandable mould casting	P53-B01B
other memory components	T01-H01X	non-expandable mould casting	P53-B01C
other memory types	T01-H03X	permanent mould casting	P53-B01C1
preventing memory corruption/lo		sand casting	P53-B01B1
protection of contents	T01-H01C	Metal casting (applications)	
refresh	T01-H01C3	industrial	P53-U40
sequential access	T01-H03D	vehicle	P53-U03
shared	T01-H03D	Metal casting (materials processed)	
smart card, fraud prevention	T01-H01C1	cobalt (alloys)	P53-V08
stacks	T01-H01D	coinage metals	P53-V04
static	T01-H01B3 T01-H01B	composites with non-metallic inorg	
storage components virtual	T01-H01B		P53-V10
		composite with organic componer	
MEMS	U12-B03F1		P53-V11
MEMS actuator	V06-M06G	ferrous metals	P53-V02
MEMS display	U12-B03F1A T04-H03C8	group 11 elements	P53-V04
MEMS display MEMS generator	V06-M06G8	light metals	P53-V03
MEMS motor	V06-M06G	nickel (alloys)	P53-V07
MEMS oscillator	U23-A01A2	rare earth metals	P53-V09
MEMS relay	V03-D10	refractory metals	P53-V05
MEMS resonator	V06-V01E	soft metals	P53-V06
	V06-V01K1	Metal insulator-silicon oxide-silicon	
MEMS sensor	V06-V01K1	structures - see MIOS	
	V06-V04G	Metal vapour laser - see Lasers	V08-A04B
MEMS switch	V03-C10	Metal-air hybrid cell	X16-A01B
MEMS switch, manufacture	V03-C07A	Metal-air nybrid teli	X16-A01B X16-D01
MEMS system	U12-B03F1B	electrode	X16-E03
MEMS transducer(audio)	V06-V01K1	electrode	X16-E06C1
	V06-V04A		
MEMS tuning in resonant circuits	U25-G01	Metal-air primary cell	X16-A01B
Menu-driven telephone	W01-C01G8A	Metal-air secondary cell	X16-D01
Menu interface, keyboard	T01-C02A1	Metal-halogen cell	X16-B01D
		<del>-</del>	X16-D02
Mercury selenide - see AII-BVI comp	oounds	electrode	X16-E06C2

Metal-hydrogen cell	X16-B01A3	gear/tooth racks making	P54-E
electrode	X16-E05C	hammering	P52-C
Metal-in-gap magnetic head	T03-A03F	milling	P54-C
gap-filling material	T03-A03F1	planing	P54-D01
Metal-Insulator-Metal - see MIM		polishing	P54-D06
		punching	P52-B
Metal working		rasping	P54-D05
construction, milling and machining		refining, electrolysis	X25-R02
chuck	P54-T03	riveting	P52-C
cooling system	P54-T22		T06-D06A
drives/gears	P54-T02		X25-A03R
frame/casing	P54-T05	rolling	P51-A
lathes	P54-T01	sawing	P54-D04
lubrication	P54-T22	shaping	X25-A02
mandrel	P54-T03	shearing	P54-D02
tools/tool holders	P54-T03	slotting	P54-D01
construction, punching, working a	ind forging	spinning	P52-D04
systems	DEO TOO	stamping	P52-D03
anvil	P52-T03	straightening/stretching	P52-D01
blank holder	P52-T04	thread cutting	P54-F
bolster plate	P52-T01	turning	P54-A
burr prevention/removal	P52-T10	twisting	P52-D02
cooling and lubrication die/die cushion	P52-T22	wire working	P52-D06
	P52-T02	Metal working (applications)	
hammer	P52-T03	building/construction	P54-U17
mandrel	P52-T08	cutlery	P52-U99
ram storage of finished items	P52-T03 P52-T99	industrial	P52-U40
workpiece feeding/guiding	P52-T25		P54-U40
control and safety	1 32-123	haberdashery	P52-U50B
casting, control	T06-D05B	jewellery	P52-U50A
detector	S03-C02B		P54-U50A
forging/punching/hammering	P52-T20	personal	P52-U50
foundry moulding	P53-A		P54-U50
milling, control	P54-T22	vehicle	P52-U03
shaping, control	T06-D05A		P54-U03
working, control	T06-D05A	weapons	P54-U31
flanging, edge/metal -	X25-A02F	Metallurgical connections, semicor	nductor
maintenance	P52-G	devices	U11-D03B
aec	P54-G	bonding pads	U11-D03B1
phase segregation, semiconducto		bump terminals	U11-D03B1
p	U11-C04D2	fuse	U12-C04
preliminary treatment	P52-A	HF monolithic signal transmission	n lines
recycling of components	P52-R		U11-D03B9
, 5	P54-R	metal-ceramics bonding	U11-D03B3
repair	P52-G	solder	U11-D03B3
1	P54-G	to substrate	U11-D03B3
small-scale/handheld	P54-H	Metallurgy	X25-Q
straightening/stretching	X25-A02F	cold working	X25-Q02
types of metal working		heat treatment	X25-Q02
bending	P52-D02	iron or steel manufacture	X25-Q01
boring/drilling	P54-B	process	X25-Q
broaching	P54-D03	process control	T06-D09
burnishing	P54-D06	·	X25-Q
casting - see Metal Casting	X25-A01	tensile testing - see also <b>Mechan</b>	ical
	P53	strength tests	S03-F02
coiling	P52-D02	testing alloys	S03-E14C3
corrugating	P52-D02	testing brass	S03-E14C3X
drawing	P51-B	testing bronze	S03-E14C3X
deep-drawing	P52-D05	testing metallic electrodes - see a	lso
extruding	P51-C	Electrodes	S03-E14C1
filing	P54-D05	testing metals	S03-E14C
forging	P52-C		

testing solder - see also under so		Microarrays for instrumentation	S03-H01A
	S03-E14C3X	Microcapsule type copier	S06-B04A1
testing steel	S03-E14C3A	Microcomputer	T01-M06A
Metals analysis	S03-E14C	Microelectromechanical device/sys	tem
Metamaterial antenna	W02-B08Q1	actuators, electrostatic excitation	
Meteorology	S03-D	actuators, magnetic excitation	V06-M06G2
air temperature (see also <b>Therm</b> e		control, actuators	V06-N22
	S03-D04	control, motors	V06-N22
atmospheric pressure measurem	ents S03-D03	manufacture, resonator	V06-V01E V06-V03A7
bulletin reception in broadcast	303-203	microgenerators	V06-V03A7 V06-M06G8
receiver	W03-B08C4	motors, electrostatic excitation	V06-M06G1
ice detection	S03-D02B	motors, magnetic excitation	V06-M06G2
pollution/fall-out measurements	S03-D06	nanogenerators	V06-M06G8A
rain detection	S03-D02B	resonators	V06-V01E
snow detection	S03-D02B		V06-V01K1
weather prediction system	S03-D05 W06-A06H2	semiconductor device	U12-B03F1A
weather lidar weather radar	W06-A06H2	semiconductor structures semiconductor structures, manuf	U12-B03F1 acture U11-
Meter	VV00-A04112	C18C	
digital electrical meters	S01-B03	semiconductor system	U12-B03F1B
electrical power	S01-D02	sensors	V06-V01K1
electricity consumption	S01-B	transducers (audio/	V06-V04G
ala akas as a ka ataul taka asasta a	T05-H06 S01-B	communication type)	V06-V01K1
electromechanical integration electronic integration	S01-B S01-B	gonina neadon sypo,	V06-V04A
frequency	S01-D03		V06-V04B
gas consumption	T05-H06	Microfabricated cold cathode devi	<b>ce</b> V05-B05
gas consumption- remote readin		anode electrodes	V05-B05B5B
integrating current/power	S01-B	array implementation	V05-B05A3B
monitoring	S01-B01	characterised by cold cathode en	
parking	T05-G03A	element	V05-B05A5C
phase	S01-D04	characterised by configuration	V05-B05A3
power system, remote monitorin reading, remote indication, elect		characterised by dielectric mater substrate	v05-B05A8X
reading, remote indication, elect		characterised by emitting elemer	
remote indication, electric power		characterised by film emitting ele	
distribution/transmission syste			V05-B05A5B
taxi	T05-G01	characterised by II-VI element sub	ostrate
Watt-hour	S01-B		V05-B05A8C
Watt-hour, remote reading	S01-B01	characterised by III-V element sub	
\\/	X12-H04A	ah aya ata yiga al bu yayyah ay af alaa	V05-B05A8A
Watt-hour, tamper protection	S01-B05	characterised by number of elec	V05-B05A1
Metronome	S04-A09	characterised by pn junction emi	
music toaching	S04-C09 P85-A01J	element	V05-B05A5A
music teaching		characterised by semiconductor	
Metropolitan area networks (MAN Networks)	<b>, see</b> W01-A06B5B		V05-B05A8
•		characterised by silicon substrate	
MF tone generator for telephone d	_	characterised by substrate	V05-B05A8
	W01-C01B2C	characterised by substrate type	V05-B05A8
MFB (motional feedback) for audio	transducer	cold cathode electrode collector electrode	V05-B05B3 V05-B05B5B
	W04-T03	combined with other vacuum	400-000DD
MHD generator	X11-H03B1	conduction devices	V05-B05A3E
MICR	T04-D01	complete novel device	V05-B05B8
		control electrodes	V05-B05B5A
Micro-analysis	S03-E09D	device details	V05-B05B
Micro-control parallel operation	T01-F01A	dielectric substrate (novel)	V05-B05A8X
			VAL DALD1
Microactuator	V06-M06G	diode type device	V05-B05B1 V05-B05A1A

		1	
driving circuitry	V05-B05B7D	ion	V05-F01A2
emitting element (novel)	V05-B05B3	optical	S02-J04B1
encapsulation	V05-B05B7A	optical elements for	P81-A50C
grid/control electrodes	V05-B05B5A	positron	V05-F01A9
housing	V05-B05B7A	Raman	S03-E04D1
II-VI element substrate (novel)	V05-B05A8C	scanning electron	S03-E06B1
, ,	V05-B05B1	transmission electron	S03-E06B1
III-V element substrate (novel)	V05-B05A8A	tunnelling - see also <b>Atomic Force</b>	
v element capetrate (nevel)	V05-B05B1	Scanning Tunnelling Microsco	
integral circuitry	V05-B05B7D	ultrasonic	S03-E08G
integrated with solid state	V03-D03D7D	X-ray	S03-E06B1
semiconductor device	V05-B05A3C	X-1 dy	V05-F01A3
			VU3-FUTA3
interconnections	V05-B05B7B	Microscopy	
manufacture	U11-C18B9	confocal	S03-E04R1
	V05-L05B5	electron	S03-E06B1
silicon substrate (novel)	V05-B05A8E	optical	S03-E04R
	V05-B05B1	Microsensor	S03-H02A
single device implementation	V05-B05A3A	WICIOSEIISOI	V06-V01K1
substrate (novel)	V05-B05B1		
triode device	V05-B05A1B		V06-V04G
Microfilm		Microstrip	
reader	S06-B06C	aerial	W02-B02A
	S06-B04A	circuit, general	U23-Q
reader-printer	S06-B04A S06-B06C	electromagnetic waveguide filter	W02-A05A2
		line per se	W02-A01A3
Microfluidic instrumentation	S03-H01B	manufacture	W02-A07A
Micromachine	V06-M06G	microwave hybrid/IC application	U14-H03H
	700000	more wave my smarre approaction	W02-A01A3
Micromechanical device - see		testing	W02-A07C
Microelectromechanical device		waveguide (RF)	W02-A01A3
Micrometer	S02-A01A	waveguide (NT) waveguide circulator	W02-A01A3
Microminiature valves, semicondu	ctor		W02-A04F1
	CLOI	waveguide resonator	VVUZ-AUSA4
		=	
,	U12-B03F	Microswitch	V03-C10
Micromotor	U12-B03F V06-M06G	Microswitch manufacture	V03-C10 V03-C07A
Micromotor	V06-M06G	manufacture	
Micromotor Microphone	V06-M06G V06-V04A2	manufacture <b>Microtransducer</b>	V03-C07A
Micromotor Microphone circuits	V06-M06G V06-V04A2 V06-V02S	manufacture  Microtransducer acoustoelectric type	V03-C07A V06-V01K1
Micromotor Microphone circuits manufacture	V06-M06G V06-V04A2 V06-V02S V06-V03A	manufacture  Microtransducer acoustoelectric type microactuators	V03-C07A V06-V01K1 V06-M06G
Micromotor Microphone circuits manufacture sanitary devices	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J	manufacture  Microtransducer acoustoelectric type microactuators micromotors	V03-C07A V06-V01K1 V06-M06G V06-M06G
Micromotor Microphone circuits manufacture	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1	manufacture  Microtransducer acoustoelectric type microactuators	V03-C07A V06-V01K1 V06-M06G V06-M06G V06-V01E
Micromotor Microphone circuits manufacture sanitary devices telephone handset	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator	V03-C07A V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1
Micromotor Microphone circuits manufacture sanitary devices telephone handset testing	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B	manufacture  Microtransducer acoustoelectric type microactuators micromotors	V03-C07A V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1
Micromotor Microphone circuits manufacture sanitary devices telephone handset testing throat-mountings	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator	V03-C07A V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator	V03-C07A V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1
Micromotor  Microphone  circuits  manufacture  sanitary devices  telephone handset  testing  throat-mountings  transducer - see also Acoustoele  transducer	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor	V03-C07A V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G
Micromotor  Microphone  circuits  manufacture  sanitary devices  telephone handset  testing  throat-mountings  transducer - see also Acoustoele  transducer	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator microsensor  Microturbine plant environmental protection	V03-C07A V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Pectric V06-V01 V06-V02J	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator microsensor  Microturbine plant environmental protection monitoring, operation and contro	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele     transducer     waterproof filter  Micro power generator	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F ectric V06-V01	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele     transducer     waterproof filter  Micro power generator  Microprocessing	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Pectric V06-V01 V06-V02J V06-P01	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application Microwave	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele     transducer     waterproof filter  Micro power generator	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Pectric V06-V01 V06-V02J	manufacture  Microtransducer     acoustoelectric type     microactuators     microresonator     microsensor  Microturbine plant     environmental protection     monitoring, operation and contro     microturbine generator, application  Microwave     analysis	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele     transducer     waterproof filter  Micro power generator  Microprocessing     speed enhancement	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Pectric V06-V01 V06-V02J V06-P01	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele     transducer     waterproof filter  Micro power generator  Microprocessing	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Petric V06-V01 V06-P01 T01-F01A T01-F01	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele     transducer     waterproof filter  Micro power generator  Microprocessing     speed enhancement  Microprogramming     address formation	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Petric V06-V01 V06-V01 T01-F01A T01-F01 T01-F01C	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele     transducer     waterproof filter  Micro power generator  Microprocessing     speed enhancement  Microprogramming	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Petric V06-V01 V06-V01 T01-F01A T01-F01A T01-F01C T01-F01B	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter  Micro power generator Microprocessing speed enhancement  Microprogramming address formation loading	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F ectric V06-V01 V06-V01 T01-F01A T01-F01A T01-F01C T01-F01B T01-F01B1	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter  Micro power generator Microprocessing speed enhancement  Microprogramming address formation loading  Microrelay	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Pectric V06-V01 V06-V01 T01-F01A T01-F01A T01-F01C T01-F01B T01-F01B1 V03-D10	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter  Micro power generator Microprocessing speed enhancement  Microprogramming address formation loading	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F ectric V06-V01 V06-V01 T01-F01A T01-F01A T01-F01C T01-F01B T01-F01B1	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  microsensor  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter  Micro power generator Microprocessing speed enhancement  Microprogramming address formation loading  Microrelay	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V03B V06-V02F Pectric V06-V01 V06-V01 T01-F01A T01-F01A T01-F01C T01-F01B T01-F01B1 V03-D10	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating hybrid circuit industrial heating	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B U14-H03G
Micromotor  Microphone     circuits     manufacture     sanitary devices     telephone handset  testing     throat-mountings     transducer - see also Acoustoele         transducer     waterproof filter  Micro power generator  Microprocessing     speed enhancement  Microprogramming     address formation     loading  Microrelay     manufacture	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F Pectric V06-V01 V06-V02J V06-P01  T01-F01A T01-F01C T01-F01B T01-F01B T01-F01B1 V03-D10 V03-D06B1 V06-V01E	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating hybrid circuit industrial heating medical therapy	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B U14-H03G X25-B02B3
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter  Micro power generator Microprocessing speed enhancement  Microprogramming address formation loading  Microrelay manufacture  Microresonator	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F Pectric V06-V01 V06-V02J V06-P01  T01-F01A T01-F01A T01-F01C T01-F01B T01-F01B T01-F01B1 V03-D10 V03-D06B1	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating hybrid circuit industrial heating medical therapy microstrip	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B U14-H03G X25-B02B3 S05-A03D W02-A01A3
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter Micro power generator Microprocessing speed enhancement Microprogramming address formation loading  Microrelay manufacture Microresonator  Microscope	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F Petric V06-V01 V06-V02J V06-P01  T01-F01A T01-F01A T01-F01B T01-F01B T01-F01B1 V03-D10 V03-D06B1 V06-V01E V06-V01K1	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating hybrid circuit industrial heating medical therapy microstrip moisture detection	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B U14-H03G X25-B02B3 S05-A03D W02-A01A3 S03-E05A
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter Micro power generator Microprocessing speed enhancement Microprogramming address formation loading  Microrelay manufacture Microscope acoustic	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F Pectric V06-V01 V06-V02J V06-P01  T01-F01A T01-F01A T01-F01B T01-F01B T01-F01B T01-F01B1 V03-D10 V03-D06B1 V06-V01E V06-V01K1	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating hybrid circuit industrial heating medical therapy microstrip	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B U14-H03G X25-B02B3 S05-A03D W02-A01A3 S03-E05A X25-B02B1
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter Micro power generator Microprocessing speed enhancement Microprogramming address formation loading  Microrelay manufacture Microresonator  Microscope	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F Pectric V06-V01 V06-V02J V06-P01  T01-F01A T01-F01A T01-F01B T01-F01B T01-F01B T01-F01B V03-D10 V03-D06B1 V06-V01E V06-V01K1  S03-E08G S03-E06B1	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating hybrid circuit industrial heating medical therapy microstrip moisture detection oven	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G  X11-C15 X11-C08 I X11-C10 DD X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B U14-H03G X25-B02B3 S05-A03D W02-A01A3 S03-E05A X25-B02B1 X27-C01
Micromotor Microphone circuits manufacture sanitary devices telephone handset  testing throat-mountings transducer - see also Acoustoele transducer waterproof filter Micro power generator Microprocessing speed enhancement Microprogramming address formation loading  Microrelay manufacture Microscope acoustic	V06-M06G V06-V04A2 V06-V02S V06-V03A V06-V02J V06-V04B1 W01-C01M V06-V02F Pectric V06-V01 V06-V02J V06-P01  T01-F01A T01-F01A T01-F01B T01-F01B T01-F01B T01-F01B1 V03-D10 V03-D06B1 V06-V01E V06-V01K1	manufacture  Microtransducer acoustoelectric type microactuators micromotors microresonator  Microturbine plant environmental protection monitoring, operation and contro microturbine generator, application  Microwave analysis circuit, general distribution for CATV drying flaw detection heating hybrid circuit industrial heating medical therapy microstrip moisture detection	V03-C07A  V06-V01K1 V06-M06G V06-M06G V06-V01E V06-V01K1 V06-V01K1 V06-V04G X11-C15 X11-C08 I X11-C10 on X11-U01M  S03-E05 U23-Q W02-F03A7 X25-B02B3 S03-E05C X25-B02B U14-H03G X25-B02B3 S05-A03D W02-A01A3 S03-E05A X25-B02B1

semiconductor circuit, general	U14-H03G	laser weapons	W07-E07
Microwave-assisted magnetic		launching systems	Q24-M01A
recording	T03-A06N3	munitions	W07-E05 W07-E06
Microwave lamp	X26-A01B	non-lethal weapons	W07-E08
construction - see Discharge lam			W07-F05C
manufacture - see <b>Discharge lam</b>	<b>p</b> X26-A03	ship-mounted	Q24-M
Microwave oven	X25-B02B1	stun gun	W07-E08
	X27-C01	Milking	
construction construction, cavity	X27-C01A X27-C01A	livestock, milking monitoring & cor	
construction, door	X27-C01A X27-C01A	milk processing	X25-N02B X25-P01C
construction, interlock	X27-C01A	Mill	P41-A03
construction, seal	X27-C01A		
control	X27-C01B3	ball mill disk mill	P41-A03E P41-A03C
magnetron	V05-C01A	drum mill	P41-A03U
mode stirrer	X27-C01B1 X27-C01B1	hammer mill	P41-A03G
power supply	X27-C01B1 X27-C01B3	jet mill	P41-A03X
programmer	X27-C01B3	roller mill	P41-A03A
timer	X27-C01B3	stamp mill	P41-A03L
turntable	X27-C01B1	tumbler mill	P41-A03E
waveguide	W02-A	Milling (metal working)	X25-A03C1
	X27-C01B1	control	T06-D07A X25-A03C1
MIDI systems	W04-U05	Milling, food	X25-P01X
MIG magnetic head gap-filling material	T03-A03F T03-A03F1	5.	U12-C02C
MIG welding	X24-B06	MIM diode	U12-C02C
<del>-</del>	A24-B00		W02-C01L
Military  battlefield communications	W07-X03		
bomb detection/defusing	W07-F05A	Mimic diagram, switchgear	X13-E01
early warning systems	W07-F04	MIMIM tunnel transistor	U12-D02J2
mine sweeping	W07-F05A	Mine sweeping	W07-F05
reconnaissance	W07-F04	Minicomputer	T01-M06A
weapon detection	W02-F01 W07-F05C	Minimum shift keying	U23-P01A5
Military equipment testing/inspect			W01-A09B
Military equipment, electrical	W07-J	Mining	T01 10FA4
constructional details	W07-J05	business model control	T01-J05A4 T06-D11
clothing	W07-F01B		X25-D02A
electrical installations, cables, cor	nnectors	equipment - electrical	X25-D02
	W07-J01	equipment - mechanical	Q49-A
manufacture	W07-J07	extraction tools and machines	Q49-A01
power generation and distributio robotic 'mule'	W07-X07	9	X25-D02A
soldier aids	W07-X07	lift maintenance equipment	X25-D02A Q49-H
tracking of	W07-X05	material being mined or quarried	
Military training equipment	W07-D	methods	Q49-B
simulation systems	W07-D05	1 1- 1- 7 1- 1-	X25-D02C
target practice systems	W07-D01	safety devices	Q49-C05
Military vehicle	Q19-D	support structures	X25-D02 Q49-A01H
	W07-X01	tools	X25-D02B
aircraft	X22-P06	ventilation	Q49-C01
aliciali	Q25-P13 W06-B15E	MIOS transistor	U12-D02A2
ship	Q24-P13	Mirror, polygonal (printer)	S06-D01B
	W06-C15E	Mirror	P27-B01
Military weapons		MIS capacitor	U12-C02A
ala atria fici e c	W07-E	Missile guidance	W07-A01
electric firing	W07-E01	missing Baradille	, , , , , ,

altitude/attitude control	T06-B01B W07-A01	cordless call point, system (e.g. C7	Γ2) W01-B05A1B
antenna	W02-B08F6		W02-C03C3A
haran dalah	W07-A03A	fifth generation telephone system	
beam rider	W07-A01E1 W07-A01E3		W02-C03C1A W02-C03C1L
by electric cable or optical fibre by non-wire links	W07-A01E3 W07-A01E1	fourth generation telephone syste	
computers for	T01-J06B	B05A1A	111 4401-
Gempatere ie.	W07-A01	200,, .	W02-C03C1A
heat-seeking	W07-A01C		W02-C03C1H
laser pointing	W07-A01C1	handoff, cellular	W02-C03C1D
laser targeting	W07-A01C1	handoff, general	W02-C03C3D
navigational aspects	W07-A01A	location determination, cellular	W02-C03C1E
optical sensors and elements	W07-A03B	location determination, general microcellular	W02-C03C3F
propulsion control radome, protective enclosure	W07-A01G W02-B07C1	subscriber roaming	W02-C03C1 W01-E01A
radome, protective enclosure	W07-A03D	trunked radio system	W02-C03C3G
remotely guided	W07-A01E	third generation telephone system	
stability/ flight control	W07-A01H	3 ,	W02-C03C1A
sensing systems, details	W07-A03		W02-C03C1G
target designation	W07-A01C1	Mobile radio telephone	W01-C01D
target-seeking	W07-A01C	3G, 4G or 5G telephone	W01-C01D3G
Mitola (cognitive) radio systems	W02-C03G5	Bluetooth® interface	W01-A07H2A
Mixed reality (MR)	T01-J40D		W01-C01R
Mixed signal connector - see Conne	ctor	car telephone	W01-C01D3B
Mixed-FDM-TDM system	W02-K07A	cellular subscriber set	W01-C01D3 W02-C03C1C
Mixing, audio	W04-G05	cordless call point, set (e.g. CT2)	W02-C03C1C W01-C01D1E
Mixing machine	X25-J	cordiess can point, ser (e.g. C12)	W02-C03C3C
control	T06-D04	digital short range radio system	W01-C01D2
	X25-J	digital interface	W01-C01R
Mixing, sound	W04-G05	direct mode communication	W04 C04D0
Mixing, video	W04-N05B1	apparatus hand-held	W01-C01D2 W01-C01D3C
Mixer (frequency changing)	U23-J01	hands-free	W01-C01G2
balanced	U23-J01C5	i-mode handset	W01-C01D3C
bipolar transistor implementation			W01-C01G6E
diode implementation	U23-J01A1	motorcycle telephone	W01-C01D3B
double-balanced doubly double-balanced	U23-J01C5C U23-J01C5G	multi-band	W01-C01D3J
FET implementation	U23-J01A5A	multi-SIM card	W01-C01D3K
Film circuit implementation	U23-J01E	near field interface	W01-A07H2N W01-C01R
Integrated implementation	U23-J01E	PHS handset	W01-C01R W01-C01D1E
ring	U23-J01C5E		
single-balanced	U23-J01C5A	portable power management	W01-C01D3C W01-C01D3C
single-ended	U23-J01C1	power management	W01-C01E5B
triple-balanced	U23-J01C5G		W01-C01Q7
MMIC		satellite telephone	W01-C01D3E
back-side metallisation	U11-D03B9	security	W01-C01D3D
semiconductor circuit, general	U14-H03H	TransferJet™ interface	W01-A07H2N
MNOS transistor	U12-D02A2	UMTS telephone	W01-C01R W01-C01D3G
Mobile advertising	W05-E03M	ZigBee interface	W01-A07H2A
Mobile radio systems	W02-C03C	2.g200oa00	W01-C01R
broadcasting	W01-B05A1M	Mode Dependent Directional	
cellular base station	W01-B05A1A W02-C03C1B	Transformation (MDDT), video co	dina W04-
cellular system	W02-C03C1B W02-C03C1A	P01A4E	vv04-
cordless call point, base station (e		Mode selector/converter	
, , , , , , , , , , , , , , , , , , , ,	W01-B05A1B	optical waveguide	V07-F03
	W02-C03C3B	waveguide (RF)	W02-A06A
		Model kits	P36-E03
	ļ		. 30 =00

Model vehicles	P36-E01	copier/printer	S06-K07B
electrical	W04-X03E1	computing processors	T01-G05C
Modelling networks	W01-A06D	control system, general	T06-A08
Modelling radio systems	W02-C03E5	data exchanges	W01-A06A
= -	W02 000E0	during surgery	S05-B04
Modem	W01-C05B3A	during surgery, of patient	S05-B04B
connected to telephone system facsimile-modem connected to	WUI-CUSB3A	electric machines	V06-M11M
telephone system	W01-C05B3H	l e e e e e e e e e e e e e e e e e e e	X11-J08M
integrated with telephone appara		electric power distribution system electric vehicle	
modem interface with computer	T01-C03B		X21-A05 T01-G11B
modulation and demodulation as		environment monitoring fuses	X13-D01C
modulation and demodulation as	W01-A09E	hardware, computing	T01-G
voice over data transmission	W01-A09E3	line transmission systems	W02-C01D
	W01-C05B3G	measuring non-processing	T01-G11
MODFET - see Field effect transistor		moulded case circuit breakers	X13-D08
heterostructure	U12-D02D2	nuclear reactor	X14-C02
	012-00202	numerical controller	T06-A04A6
Modulation	1102 DOE	pattern recognition process	T04-D05
AM/FM combined	U23-P05 U23-G	personal calling	W05-C
amplitude	U23-G U23-P02	power monitoring	T01-G11A
analogue (general) details	U23-PU2 U23-H	power transformer	X12-C02B
angle digital modulation/demodulation		processors, computer	T01-G05C
electromagnetic wave	U23-X	program, computing	T01-G05
frequency	U23-H	pulse	U22-D03
measurement	S01-D08	radar systems operation	W06-A04E3A
PAM	U22-E01E	recording/reproduction	T03-K09
PFM	U22-E01G		W04-J
phase	U23-H	recording/statistical evaluation	T01-G05C1
phase-locked loop, using	U23-D01C	relays with contacts	V03-D06B
PPM	U22-E01C	resonators, electromechanical	V06-V01E
pulse	U22-E	and the sections	V06-V03B
PWM	U22-E01A	security systems	W04-J01 W05-C
Modulation depth/index measuring	S01-D08A	signalling systems steam turbines	X11-A01X
Modulator		stress monitoring	T01-G11C
data transmission	W01-A09E1	surgical instrument location	S05-B04A
optical transmitter	W02-C04A1A	switchgear	X13-E08
radio transmitter	W02-G01D	telemetry systems	W05-D05
Moisture measurement		telephone exchange	W01-C02A1
capacitive	S03-E02C1	television station output	W02-F04C
gamma ray	S03-E06A3	television studio equipment	W02-F04A5A
general	S03-E00AS	theft alarms	W04-J01
microwave	S03-E05A	theft alarms	W05-B01
precipitation detection	S03-D02		W05-C
rain presence	S03-D02B	time division multiplex systems	W02-K02B5
rain presence, non-meteorologica	I S03-D02B1	transducers (general)	V06-V03B
rainfall measurement	S03-D02A	transducers, acoustoelectric	V06-V03B
thermal	S03-E01B	transmission systems	W02-C05
X-ray	S03-E06A3	using additional processors	T01-G05B
Molecular beam epitaxy		vehicle traffic video camera	T07-A01 W04-M01D2
apparatus	U11-C09D	watchdog, computing	T01-G05A
method	U11-C01A2		
Molecular excitation microscopy	S03-E04R	Monitoring, alarm signals	W05-C
Molten carbonate fuel cell	X16-C02	Monochromator - for spectrometer	
Moneybox	T05-L05B	Monolithic microwave integrated ci	
	103-2030	(MMIC)	U14-H03H
Monitoring	\/O4 NA11NA	filter	W02-A05A2
actuators adverse weather condition traffic	V06-M11M T07-G05	microstrip circulator	W02-A04F1
alarm systems	W05-C	microstrip waveguide	W02-A01A3
circuit breakers	X13-B08	Monostable pulse generator	U22-A04B
S. I Care Di Care I I	500	1	

MOS capacitor	U12-C02A	MRI	S01-E02A2
Mosaic diagram, switchgear	X13-E01	a destate as to as all advantages	S03-E07A
<b>MOSFET - see Field effect transis</b>	tor U12-D02A4	adaptations to medical equipm for MRI compatibility	s05-D02B4
Motherboard, digital computer in	nterface	coils and waveguides	S01-E02A8A
	T01-C07C		V02-F01G
Motion (shake) compensation in	cameras	contrast media	S03-E09X
photographic (film) camera	S06-B02E	contrast media for medical pur	
video camera	W04-M01D7	Fourier Transform image enhancement	S01-E02A8C S01-E02A2A
Motion compensation in video co	oding	magnet	S01-E02A2A S01-E02A8E
hybrid coding	W04-P01A4C		X12-C06
MPEG coding	W04-P01A4C	magnet, superconducting-type	
predictive coding	W04-P01A5C	measurements for medical purp	
Motional feedback for audio tran	isducer W04-T03	pulse sequences and control ar	nd operation S01-E02A8P
Motor - see Electric machine		signal & image processing	S01-E02A8C
Motor racing	P36-A03	MSBVW resonator	V06-V01E3
	W04-X01K3G	MSF receiver	S04-B06
Motor vehicle - see Vehicle	X22		
Motor-generator set	X11-H09	MSFVW resonator	V06-V01E3
Motor-generator UPS	X12-H02C	MSK	U23-P01A5 W01-A09B
Motorcycle	Q19-B	BACCIA!	
	X22-P02	MSSW resonator	V06-V01E3
electric motorcycle rider assist	X21-A01G	MTI radar	W06-A04A2
rider assist	X21-R X22-R	Multi-discharge path lamp	X26-A01A
Mould inhibitor, for magnetic rec		construction - see <b>Discharge la</b>	amp X 26-AU2
Modia minibitor, for magnetic rec	T03-A01B5X	Multi-standard TV receiver decoder	W03-A11D
		novel standard recognition circ	
Moulded case circuit breaker - se breaker, moulded case	e Circuit	picture signal motion detector	W03-A11C
Mountings		scanning format based on dete	
for IC packages	U11-D01A	standard	W03-A11B1A
in-car electrical equipment	X22-X02B	standard recognition/switching	
measurement apparatus	S01-J09	Multichannel access radio system	
multilayer, for IC packages	U14-H05	Multichannel amplifier	U24-G02F2
Mouse, computer input	T04-F02B1	Multichip modules, high density	1144 B044 /
for telephone	W01-C01B8L T01-C02B1A	semiconductor device package	
interface with computer optical	T04-F02B1A	Multicolour system	S06-K01
Mouth organ	P86-A01A1	Multicopy, sheet feeding in	60 / 1/00 4
Mouthpiece	V06-V04A4	printing unit	S06-K02A
•		Multifrequency codes, carrier dat	
Movement detection system, for	=	transmission systems	W01-A09D
	W04-P01A1	Multi-frequency code techniques	
Movement of body, measuremen		Multilayer ceramic PCB manufact	ture (see also PCB V04-R05A1
for medical purposes for non-medical purposes	S05-D01C5 S05-D01C5A	manufacture)	VU4-KU3A I
• •	S01-A	Multilayer ceramic substrate manufacture	U14-H04B
Moving coil meter		manulacture	V04-R07A1
Mower, lawn	X27-A01A		V04-R07P
MPEG audio signal coding	W04-V10G1		X12-E01A
MPEG video signal coding	W/04 D01 4 4	material	U14-H03B1
coding circuit recording signal processing	W04-P01A4 W04-F01F		V04-R07A1 V04-R07P
recording signal processing	W04-P01A4	material, thick film	U11-A05B
TV receiver decoder	W03-A11D	structure	U11-D01A
			U14-H03F1
			V04-R07A1

Multilayer PCB manufacture (see also PCB -		Multiprocessors	T01-M02
manufacture)		computer networks	T01-M02A1
	V04-R05A	cooperative	T01-M02B
Multimedia		distributed	T01-M02A
computer systems	T01-J30	master-slave systems	T01-M02D
interactive broadcasting	W02-F10H	parallel/array	T01-M02C
multimedia data transfer	T01-H07C3D	Multiprocessors, digital computing	
telephone apparatus	W01-C01P1	memory management	T01-H08
telephone system	W01-C05B2	Multiprogramming	T01-F02
Multimedia messaging service (MMS)		Multistable pulse generators	U22-A04X
subscriber telephone aspects	W01-C01G6B		
telephone exchange aspects	W01-C01G0B W01-C02B7F	Multistep manufacturing processes	
· ·		capacitors	V01-B04B8A
Multimeters calibration/testing	S01-H04 S01-H01	discharge tubes	V05-L07A
digital voltage/current measurement S01-		electrolytic capacitors	V01-B01G6A
D01C1B	ent 301-	magnetic record carriers optical record carriers	T03-A02B8 T03-B01E3S
probe	S01-H03B	resistors	V01-A04G1
resistance measurement	S01-D05B1	semiconductor devices	U11-C18
			011-010
Multipath reception compensation	W02-G03B6	Multitasking	T04 F00C
Multiple-tuner broadcast receiver		task interaction	T01-F02C
radio receiver	W03-B01D	task restoring/saving	T01-F02B
TV receiver	W03-A01D	task transfer	T01-F02A T01-F02A1
Multiplex systems			
analogue component TV system	W02-F06C1	Multivibrator	U22-A04
data transmission, FDM	W01-A03E5	Municipal solid waste (MSW) dispos	al
data transmission, TDM	W01-A03C	industrial/large scale	X25-W01
data transmission, TDMA	W01-A03C1	domestic	X27-K
data network transmission, TDMA		general	P43-E
data transmission, WDM	W01-A03E1	general, by burning	P43-E01
code division multiplex system	W02-K08	general, by burying or dumping	P43-E03
frequency division	W02-K01	general, by treating or converting	P43-E05
general	W02-K	Muography/muon mapping & imag	ing S03-C02M
hybrid	W02-K07	Muscular force measurement	S02-F03A
OFDM	W02-K07C	Musical animation, clock or watch	S04-B05A
optical communication	W02-C04B4 W02-K04	· ·	304-D03A
	W02-R04 W02-C04A6	Musical entertainment systems	MO4 MO2 4 1
orthogonal	W02-C04A0 W02-K07E	jukebox karaoke	W04-X03A1
orthogonal FDM	W02-K07C		W04-X03A3 W04-X03C
remote control	W05-D02	musical greeting cards	
spatial division multiple access (SDMA)W02-K10		Musical instrument, electrical	W04-U
statistical	W02-K02E	accompaniment	W04-U04C
telephone systems	W01-B07	automatic rhythm generator	W04-U04C
time division - see <b>Time division</b> r	nultiplex	composition system	W04-U06
	W02-K02	construction	W04-U04G W04-U05
vehicle	X22-K03	digital interface (MIDI) electric guitar	W04-U03 W04-U02A
electric vehicle	X21-K	electric guitai electromechanical sound generati	
wavelenth division (WDM), optical	W02-C04B4B	electionilechanical sound generati	W04-U02C
Multiplication/division, analogue	T02-A04B1	electronic tone generator	W04-U01A
Multiplier		quitar synthesiser	W04-U04J
electron - see Electron multiplier	V05-K01	input/output arrangements	W04-U04D
frequency - see Frequency multip		keyboards	W04-U04A
divider	U22-D05A	memory access (tone generation)	W04-U01C
		metronome	W04-U09
Multiplying, dividing, data processing T01-E02B		MIDI	W04-U05
Multipole connector - see Connector		pick-up	W04-U02A1
Multiport memories - see Memories, multiport			V06-V04A3
	U14-A08B1	pick-up mounting	V06-V02F
	T01-H03D		V06-V04A3
	101-11000		W04-U02A

reverberation	W04-U03E	N	
sampling	W04-U01C1	N-path filter - see Electric filter	U25-A01
sequencer sound-to-light conversion	W04-U06		
special effects	W04-U08 W04-U03E	Nanoelectromechanical device/s	system V06-M06G9
synthesiser	W04-U03C	control, actuators	V06-N00G9
tone combination/generation		electronic switching	U21-B01T
training	W04-U07	generators	V06-M06G8A
transcription system	W04-U06	logic circuit	U21-C01T
		relays	V03-D10A
Musical instrument, general accessories	P86-A	resonators	V06-V01E
	P86-A30	resonators	V06-V01E
air-reed type	P86-A01A5 P86-A30	semiconductor device	U12-B03F2A
carrying case castanets	P86-A05	semiconductor structure	U12-B03F2
cello	P86-A03C	semiconductor structure, man	
clarinet	P86-A01A1		U12-C18C
cleaning	P86-A	semiconductor system	U12-B03F2B
cleaning	P86-G	sensors	S03-H02B
cow bell	P86-A05	06/166/16	V06-V01K2
drum	P86-A05		V06-V04G
flute	P86-A01A5	switches	V03-C10A
guitar	P86-A03E	transducers(audio)	V06-V01K2
harp	P86-A03E		V06-V04A
keyboard construction	P86-T01C	Nano-imprinted magnetic record	d carrier
lip vibration type	P86-A01A3	, , , , , , , , , , , , , , , , , , , ,	T03-A01G3
manufacture	P86-A	Nano-materials	
manadeare	P86-M	battery electrode	X16-E01H1
metronome	P86-A30	conductive	X10-201111 X12-D01D
music stand	P86-A30	fuel cell electrode	X16-E06A1A
neck, string instruments	P86-T01E	general use	V04-X01B1
ocarina	P86-A01A5	insulating, inorganic	X12-E01D
packaging	Q34-T	insulating, morganic	X12-E01D
pedal	P86-T01C	magnetic	V02-A10
piano	P86-A03A1	magnetic, manufacture	V02-A10 V02-A10C
recorder	P86-A01A5	magnetic, novel	V02-A10A
reed	P86-T01A	_	
repairing	P86-A	Nanorelays	U12-B03F2A
1 3	P86-G	manufacture	V03-D10A
saxaphone	P86-A01A1		V03-D06B1
soundbox	P86-T01E	Nano-structures	U12-B03F2
string instruments	P86-A03	magnetic film	V02-B04
string-tensioning device	P86-T01C	Nano-structures - See	
tambourine	P86-A05	Nanoelectromechanical device	e/system
trumpet	P86-A01A3	Nanosensors	U12-B03F2A
tuning fork	P86-A30	114110001100110	S03-H02B
violin	P86-A03C		V06-V01K2
xylophone	P86-A05		V06-V04G
Muting		Nanoswitches	U12-B03F2A
audio amplifier	U24-C05C	Ivalioswitches	V03-C10A
gated amplifier	U24-G02F1	manufacture	V03-C10A V03-C07A
radio receiver	W02-G03B1		
		Nano-wires	V06-V01K2
		Nappy	P32-A60
		embedded in underwear	P21-E
		Nappy wetting alarm	X27-X01
		Narrow band internet of things (	
		Natural disasters	
		prediction & short term measu	
			S03-C05
		warning systems / alarms	W05-B08

Navigation	S02-B08	smart card data transfer	W02-C02G7
_	W06-A	TransferJet™ data interface	W01-A07H2N
aids, aircraft	W06-B01B1	tunnel communication	W02-C02G1
aids, ship	W06-B01C1	Needle disposing box/bin	P34-W
aids, spacecraft	W06-B03F	Needle disposing box/bill	
	X22-E06		Q35-A01
beacon systems	W06-A01	Needle impact printer, computer	S06-F01
buoy	W06-C07C	Negative feedback for amplifiers	U24-G03A
dead reckoning systems	S02-B08X	=	
for motor vehicle	X22-E06A	Negative resistance devices	U12-B02
display aspects	S02-B08E	Negative resistance FET - see Field	effect
electric vehicle application	X21-C20	transistor	U12-D02J1
equipment, calibrating, testing	S02-B10	NEMS	U12-B03F2
GPS (Global Positioning System)	S02-B08C	NEMS actuator	V06-M06G9
- See <b>GPS</b>	W06-A03A5	NEMS actuator	U12-B03F2A
for motor vehicle	X22-E06B		
	W06-A01	NEMS generator	V06-M06G8A
hyperbolic systems inertial navigation system	W06-A07	NEMS motor	V06-M06G9
inertial navigation system		NEMS relay	V03-D10A
instrument combinations	S02-B08X	NEMS resonator	V06-V01E
	S02-B11	NEMC	V06-V01K2
missile application	W07-A01A	NEMS sensor	V06-V01K2
position fixing	W06-A03		V06-V04G
radar systems	W06-A04	NEMS switch	V03-C10A
receiver integrated with telephone		NEMS system	U12-B03F2B
roadside beacons-type, vehicle	T07-A05C	NEMS transducer(audio)	V06-V01K2
	W06-A01A		V06-V04A
	X22-E06C	Nephelometer	S02-F05
satellite based, e.g. GPS	W06-A03A	-	S02-F06
sonar systems	W06-A05	for measuring contamination	S03-E04F1
space vehicle application	W06-B03F	light scattering	S03-E04C
systems using non-radio	W06-A06	optical fluorescence type	S03-E04D
EM wave reflection		optical transmission type	S03-E04B1A
techniques	S02-B08	specular reflection type	S03-E04B1B
using computer/processor	S02-B08G	Nerve stimulation	S05-A04
	T01-J21		
using radio	S02-B08A	measurement	S05-D01A
vehicle application	X22-E06	Network (data)	W01-A06
Navigation systems		access	W01-A06E1
GPS (Global Positioning System)	W06-A03A	access control (protocol)	W01-A06F1
See <b>GPS</b>		addressing	T01-N02A1A
Gallileo	W06-A03A		W01-A06E1N
hyperbolic	W06-A01A	ad-hoc	T01-N02A1B
Loran	W06-A01A		W01-A06B8E
Omega	W06-A01A	alarm transmission	W05-B05B6
road traffic information	T07-A05C	allocation of resources	W01-A06E1L
vehicle application	X22-E06	apparatus testing	W01-A06A2A
vehicle, reception of updated info		Bluetooth TM	W01-A06B5A
verment, recopilion or apacitoc inite	X22-E06F		W01-A06C4A
NDCit (ttil-thi)		bridge	W01-A06G5C
NBC suit (protective clothing)	P35-A03C	bus configuration	W01-A06B1
NC	T06-A04A	caching	T01-N01D4
Nd:YAG laser	V08-A04C	circuit switching	W01-A06G1
		client-server network	T01-N02A2C
Near-field systems	W02-C02		W01-A06B8A
auditorium	W02-C02G3	cloud computing	T01-N01D3A
data interface	W01-A07H2N	coaxial cable	W01-A06C2A
entertainment	W02-C02G3	computer	T01-M02A1
hearing aids	W02-C02G3A	computer terminal	T01-M02A1A
inductive loop	W02-C02B	contention protocols	W01-A06F1A
leaky cable	W02-C02A	control	W01-A06E
mine communication	W02-C02G1	control, centralised	W01-A06E2A
selective calling system	W02-C02G5	control, decentralised	W01-A06E2B
	W05-A05C	cross-connect switch	W01-A06G5A

data broadcasting system	W01-A06E1A	testing	W01-A06A
data conferencing system	W01-A06E1A	testing vulnerability	T01-N92B3
equipment testing	W01-A06A2A	tree configuration	W01-A06B4
fail-safe and standby systems	W01-A06A1	twisted pair	W01-A06C2B
fault detection, isolation	W01-A06A2	usage/operation monitoring	W01-A06A3
FDDI (Fibre Distributed Data Interf	•	user privileges/password system	W01-A06E1C
	W01-A06B2		T01-N02B1B
	W01-A06C1	UWB/impulse radio link	W01-A06C4K
forensics	W01-A06A3	vehicle area networks	W01-A06B5A
gateway	W01-A06G5C		W05-D07D
graded service	W01-A06E1G		X22-K
hot-standby system	W01-A06A1A		X22-X
IEEE 802.11 radio link	W01-A06C4E	virtual private network (VPN)	W01-A06B7G
IEEE 802.15 radio link	W01-A06C4A	wide area (WAN)	W01-A06B5B
IEEE 802.16 radio link	W01-A06C4G	Network protocol	
interconnection	W01-A06G3	application layer protocol	W01-A06F3
internet	T01-N	Aloha	W01-A06F1G
internal control (ID)	W01-A06B7	contention protocol	W01-A06F1A
internet protocol (IP)	W01-A06F2A	conversion	W01-A06F7A
internet protocol telephony (VoIP)		CSMA/CD	W01-A06F1A
internetworking	T01-M02A1C	encapsulation	W01-A06F7C
internal	W01-A06G3	Ethernet TM	W01-A06F1A
intranet	T01-M02A1C	IP	W01-A06F2A
I-D A	W01-A06B7E	network layer protocol	W01-A06F2
IrDA	W01-A06B5A	novel protocol	W01-A06F5
ISDN	W01-A06C3 W01-A06B5C	polling protocol	W01-A06F1C
LAN/WAN architecture	T01-M02A1C	TCP/1P	W01-A06F2C
large scale (WAN)	W01-A06B5B	TDMA	W01-A06F1G
large scale (WAIN)	W01-A06B3B W01-A06B7E	token passing protocol	W01-A06F1E
load balancing	W01-A06E1L	tunnelling	W01-A06F7C
local area (LAN)	W01-A06B5A	Neural models for memories - see	
medium	W01-A06D3A W01-A06C	Memories, neural models	U14-B01
metering and billing aspects	W01-A06E1E	Neural network	T01-J16C1
metropolitan area (MAN)	W01-A06B5B	analogue computers	T02-A04A5
modelling	W01-A06D3B W01-A06D	configuration, data processing	T01-E05B
multicasting	T01-N01D5		
network operated computer	T01-M02A1A	Neurological stimulation, measuren	
operation and logical structure	W01-A06B8		S05-D01A
optical fibre	W01-A06C1	bioelectric currents	S05-D01A2
optical, free space	W01-A06C3	electrocardiograph	S05-D01A1
peer-to-peer network	T01-N02A2E	electrodes, for measurement	S05-D01A2A
poor so poor mornom	W01-A06B8C	electrodes, for stimulation	S05-A02B
power line data network	W01-A06C6	Electroencephalogaphy (EEG)	S05-D01A2
protocol - see Network protocol	W01-A06F	Electromyography (EMG)	S05-D01A2
radio link	W01-A06C4	SQUID	S05-D01A2
roaming between diff-standard		Neutron	
networks	W01-E01A3A	diffraction	S03-E06C
roaming between same-standard		radiation measurement	S03-G01C
networks	W01-E01A1A	shield for nuclear reactor	X14-B02
roaming between wireless networl	<s .<="" td=""><td>source</td><td>V05-E06</td></s>	source	V05-E06
and mobile phone networks	W01-E01A3E	using for materials investigation	S03-E06
repeater	W01-A06G5G	News, Internet	T01-N01B4
ring configuration	W01-A06B2	Newspaper advertising	P85-E01J
router	W01-A06G5E		
routing	W01-A06E1J	NFC interface (data transfer)	W01-A07H2N
small scale (LAN)	W01-A06B5A	Nickel-cadmium cell	X16-B01A1
software	W01-A06E	electrode	X16-E05A
star configuration	W01-A06B3	Night vision equipment	W07-G
structure	W01-A06B	goggles	W07-G01
storage area	T01-N02A2D	IR imager	W04-M01E1
switching/connection	W01-A06G	-	
TCP/IP	W01-A06F2C		

for semiconductor manufacture	nation U11-C05B1	pattern recognition radar	T04-D03A W06-A04E5
		radio receiver (see <b>Radio commu</b> i	
NMR	S01-E02A1	receiver)	W02-G03B
harana tanan dan	S03-E07C	railway train	Q21-N
baggage inspection	S03-C02F1	ship	Q24-N
airport	W06-B02A5A	speech signal (digital processing)	
railway station	X23-S01E	vehicle	Q17-N
coils	S01-E02A8A	vernere	X22-X08
	V02-F01G	engine	Q51-N
coils and waveguides	S01-E02A8A	engine	X22-A12
contraband detection	S03-C02F1	passenger compartment	X22-X12 X22-X08
drug detection	S03-C02F1	transmission	X22-X00 X22-G03N
explosives detection	S03-C02F1	video signal (general)	W04-P01F1
Fourier Transform	S01-E02A8C	video signal (general) video signal (recording)	W04-F01E
gradient coil	V02-F01G1	video signal (TV receiver)	W03-A04H
imaging - see also MRI	S03-E07A	_	VV03-A0411
magnet	S01-E02A8E	Noise suppression	
	X12-C06	IC engine spark plug	X22-A01E1J
magnet, superconducting-type	X12-C05A	mains filter	W02-H03
medical, diagnosis	S05-D02B	radio receiver	W02-G03B
medical, equipment	S05-D02B1	RFI suppression	W02-H01
medical, image processing	S05-D02B2	Noise-measuring receiver	S01-G08B3
other spin device measuring detai	ls S01-	Noise, vibration, harshness reduction	n .
E02A8X		for aircraft	Q25-N
presence detection	S03-C02F1	for IC engine	X22-A03X
pulse sequences and control & op		for railway train	Q21-N
	S01-E02A8P	for ship	Q24-N
sample handling	S01-E02A1A	for vehicle	Q17-N
signal processing	S01-E02A8C	for vehicle engine	X22-A12
spinning mechanism	S01-E02A1A	for vehicle passenger compartmen	
waveguides	S01-E02A8A	for vehicle transmission	X22-G03N
Noise blanker for radio receiver	W02-G03B5		
Noise cancelling headphones	V06-V04A4	Non-aqueous electrolyte lithium-ba primary cell	X16-A02A
	W04-V07C1	electrode	X16-A02A X16-E03A1
	VVO <del>T</del> -VO/C1		
Noise cancelling (local) for telephor			
Noise cancelling (local) for telephor	e set	Non-aqueous electrolyte lithium-ba	sed
	we set W01-C01C3C	Non-aqueous electrolyte lithium-ba secondary cell	<b>sed</b> X16-B01F1
Noise cancelling systems (acoustic)	we set W01-C01C3C W04-V07	Non-aqueous electrolyte lithium-ba secondary cell electrode	<b>sed</b> X16-B01F1 X16-E08A
Noise cancelling systems (acoustic) control	we set W01-C01C3C W04-V07 W04-V07C	Non-aqueous electrolyte lithium-ba secondary cell electrode Non-aqueous liquid electrolyte lithi	<b>sed</b> X16-B01F1 X16-E08A
Noise cancelling systems (acoustic) control installations	W01-C01C3C W04-V07 W04-V07C W04-V07A	Non-aqueous electrolyte lithium-ba secondary cell electrode	<b>sed</b> X16-B01F1 X16-E08A
Noise cancelling systems (acoustic) control installations transducer	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A	Non-aqueous electrolyte lithium-basecondary cell electrode  Non-aqueous liquid electrolyte lithicsecondary cell	x16-B01F1 X16-E08A <b>um-based</b> X16-B01F1A
Noise cancelling systems (acoustic) control installations	W01-C01C3C W04-V07 W04-V07C W04-V07A	Non-aqueous electrolyte lithium-basecondary cell electrode Non-aqueous liquid electrolyte lithic secondary cell Non-aqueous solid electrolyte lithiu	x16-B01F1 X16-E08A <b>um-based</b> X16-B01F1A
Noise cancelling systems (acoustic) control installations transducer	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A	Non-aqueous electrolyte lithium-basecondary cell electrode Non-aqueous liquid electrolyte lithic secondary cell Non-aqueous solid electrolyte lithic secondary cell	x16-B01F1 X16-E08A <b>um-based</b> X16-B01F1A <b>im-based</b> X16-B01F1C
Noise cancelling systems (acoustic) control installations transducer Noise cancelling using DSP	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A	Non-aqueous electrolyte lithium-basecondary cell electrode  Non-aqueous liquid electrolyte lithic secondary cell  Non-aqueous solid electrolyte lithic secondary cell  Non-aqueous electrolyte primary ce	x16-B01F1 X16-E08A um-based X16-B01F1A im-based X16-B01F1C
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05	Non-aqueous electrolyte lithium-basecondary cell electrode  Non-aqueous liquid electrolyte lithius econdary cell  Non-aqueous solid electrolyte lithius econdary cell  Non-aqueous electrolyte primary cell	x16-B01F1 X16-E08A um-based X16-B01F1A m-based X16-B01F1C III X16-A02 X16-E03A
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1	Non-aqueous electrolyte lithium-bar secondary cell electrode  Non-aqueous liquid electrolyte lithin secondary cell  Non-aqueous solid electrolyte lithin secondary cell  Non-aqueous electrolyte primary ce electrode  Non-aqueous electrolyte secondary	x16-B01F1 X16-E08A um-based X16-B01F1A im-based X16-B01F1C II X16-A02 X16-E03A cell X16-B01F
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1	Non-aqueous electrolyte lithium-barsecondary cell electrode  Non-aqueous liquid electrolyte lithius econdary cell  Non-aqueous solid electrolyte lithius econdary cell  Non-aqueous electrolyte primary celectrode  Non-aqueous electrolyte secondary electrode	x16-B01F1 X16-E08A um-based X16-B01F1A im-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G	Non-aqueous electrolyte lithium-bar secondary cell electrode  Non-aqueous liquid electrolyte lithiu secondary cell  Non-aqueous solid electrolyte lithiu secondary cell  Non-aqueous electrolyte primary ce electrode  Non-aqueous electrolyte secondary electrode  Non-chemical electrical energy store	x16-B01F1 x16-E08A um-based x16-B01F1A um-based x16-B01F1C viii x16-A02 x16-E03A cell x16-B01F x16-E08 age x16-L
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07	Non-aqueous electrolyte lithium-barsecondary cell electrode  Non-aqueous liquid electrolyte lithius econdary cell  Non-aqueous solid electrolyte lithius econdary cell  Non-aqueous electrolyte primary celectrode  Non-aqueous electrolyte secondary electrode	x16-B01F1 X16-E08A um-based X16-B01F1A im-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N	Non-aqueous electrolyte lithium-barsecondary cell electrode  Non-aqueous liquid electrolyte lithius secondary cell  Non-aqueous solid electrolyte lithius secondary cell  Non-aqueous electrolyte primary celectrode  Non-aqueous electrolyte secondary electrode  Non-chemical electrical energy storadouble layer capacitor	x16-B01F1 X16-E08A wm-based X16-B01F1A m-based X16-B01F1C II X16-A02 X16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general)	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1	Non-aqueous electrolyte lithium-bar secondary cell electrode  Non-aqueous liquid electrolyte lithiu secondary cell  Non-aqueous solid electrolyte lithiu secondary cell  Non-aqueous electrolyte primary ce electrode  Non-aqueous electrolyte secondary electrode  Non-chemical electrical energy store	x16-B01F1 X16-B01F1A x16-B01F1A x16-B01F1C x16-B01F1C x16-B03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general)	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03	Non-aqueous electrolyte lithium-barsecondary cell electrode  Non-aqueous liquid electrolyte lithius secondary cell  Non-aqueous solid electrolyte lithius secondary cell  Non-aqueous electrolyte primary celectrode  Non-aqueous electrolyte secondary electrode  Non-chemical electrical energy storadouble layer capacitor  flywheel-type, motor-driven	x16-B01F1 X16-B01F1A x16-B01F1A m-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog	W04-V07 W04-V07C W04-V07A W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1 Gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 Gue	Non-aqueous electrolyte lithium-barsecondary cell electrode  Non-aqueous liquid electrolyte lithius secondary cell  Non-aqueous solid electrolyte lithius secondary cell  Non-aqueous electrolyte primary celectrode  Non-aqueous electrolyte secondary electrode  Non-chemical electrical energy storadouble layer capacitor	x16-B01F1 X16-B01F1A x16-B01F1A m-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X16-L02 X16-L02 X16-L01
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G	Non-aqueous electrolyte lithium-barsecondary cell electrode Non-aqueous liquid electrolyte lithius econdary cell Non-aqueous solid electrolyte lithius econdary cell Non-aqueous electrolyte primary celectrode Non-aqueous electrolyte secondary electrode Non-chemical electrical energy storadouble layer capacitor flywheel-type, motor-driven storage heater	x16-B01F1 X16-B01F1A x16-B01F1A m-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L X16-L01 X27-E01A4
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter discrete semiconductor device	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G U11-D03C3A	Non-aqueous electrolyte lithium-barsecondary cell electrode  Non-aqueous liquid electrolyte lithius secondary cell  Non-aqueous solid electrolyte lithius secondary cell  Non-aqueous electrolyte primary celectrode  Non-aqueous electrolyte secondary electrode  Non-chemical electrical energy storadouble layer capacitor  flywheel-type, motor-driven	x16-B01F1 X16-B01F1A x16-B01F1A m-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L X16-L01 X27-E01A4 X12-C05
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G	Non-aqueous electrolyte lithium-barsecondary cell electrode Non-aqueous liquid electrolyte lithius econdary cell Non-aqueous solid electrolyte lithius econdary cell Non-aqueous electrolyte primary celectrode Non-aqueous electrolyte secondary electrode Non-chemical electrical energy storadouble layer capacitor flywheel-type, motor-driven storage heater	x16-B01F1 X16-B01F1A x16-B01F1A m-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L X16-L01 X27-E01A4
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction  A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter discrete semiconductor device DSP-based hearing aid electrical instrument	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G U11-D03C3A W04-Y03G7 S01-H01A1	Non-aqueous electrolyte lithium-barsecondary cell electrode Non-aqueous liquid electrolyte lithius secondary cell Non-aqueous solid electrolyte lithius secondary cell Non-aqueous electrolyte primary celectrode Non-aqueous electrolyte secondary electrode Non-chemical electrical energy storadouble layer capacitor flywheel-type, motor-driven storage heater superconducting coil	x16-B01F1 X16-B01F1A x16-B01F1A m-based X16-B01F1C ill X16-A02 X16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L X16-L01 X27-E01A4 X12-C05
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter discrete semiconductor device DSP-based hearing aid electrical instrument electronic switching	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G U11-D03C3A W04-Y03G7 S01-H01A1 U21-B02F	Non-aqueous electrolyte lithium-barsecondary cell electrode Non-aqueous liquid electrolyte lithius econdary cell Non-aqueous solid electrolyte lithius econdary cell Non-aqueous electrolyte primary celectrode Non-aqueous electrolyte secondary electrode Non-chemical electrical energy storadouble layer capacitor flywheel-type, motor-driven storage heater	x16-B01F1 X16-B01F1A x16-B01F1A x16-B01F1C x16-B01F1C x16-B03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L X16-L01 X27-E01A4 X12-C05 X16-L
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction  A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter discrete semiconductor device DSP-based hearing aid electrical instrument electronic switching IC engine	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G U11-D03C3A W04-Y03G7 S01-H01A1 U21-B02F Q51-N	Non-aqueous electrolyte lithium-barsecondary cell electrode Non-aqueous liquid electrolyte lithius secondary cell Non-aqueous solid electrolyte lithius secondary cell Non-aqueous electrolyte primary celectrode Non-aqueous electrolyte secondary electrode Non-chemical electrical energy storadouble layer capacitor flywheel-type, motor-driven storage heater superconducting coil	x16-B01F1 X16-B01F1A x16-B01F1A x16-B01F1C x16-B01F1C x16-B01F x16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L X16-L01 X27-E01A4 X12-C05 X16-L T01-L01D
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction  A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter discrete semiconductor device DSP-based hearing aid electrical instrument electronic switching IC engine integrated circuit	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G U11-D03C3A W04-Y03G7 S01-H01A1 U21-B02F Q51-N U11-D03C3A	Non-aqueous electrolyte lithium-barsecondary cell electrode Non-aqueous liquid electrolyte lithius secondary cell Non-aqueous solid electrolyte lithius secondary cell Non-aqueous electrolyte primary celectrode Non-aqueous electrolyte secondary electrode Non-chemical electrical energy storadouble layer capacitor flywheel-type, motor-driven storage heater superconducting coil	x16-B01F1 x16-B01F1A x16-B01F1A x16-B01F1C x16-B01F1C x16-B01F x16-E03A cell x16-B01F x16-E08 age x16-L v01-B01D x16-L02 x11-J05X x16-L x16-L01 x27-E01A4 x12-C05 x16-L T01-L01D U24-H02
Noise cancelling systems (acoustic) control installations transducer  Noise cancelling using DSP  Noise generators, electrical for radio receiver testing  Noise reduction  A-D converters - see Analogue-di converter acoustic cancellation aircraft amplifier (general) audio (general) D-A converters-see Digital-analog converter discrete semiconductor device DSP-based hearing aid electrical instrument electronic switching IC engine	W01-C01C3C W04-V07 W04-V07C W04-V07A W04-V07A U22-G03E3A U23-F05 S01-G08B1  gital U21-A03F7G W04-V07 Q25-N U24-G03D1 W04-G03 gue U21-A02B7G U11-D03C3A W04-Y03G7 S01-H01A1 U21-B02F Q51-N	Non-aqueous electrolyte lithium-basecondary cell electrode Non-aqueous liquid electrolyte lithius secondary cell Non-aqueous solid electrolyte lithius secondary cell Non-aqueous electrolyte primary celectrode Non-aqueous electrolyte secondary electrode Non-chemical electrical energy storadouble layer capacitor flywheel-type, motor-driven storage heater superconducting coil Non-contact power distribution	x16-B01F1 X16-B01F1A x16-B01F1A x16-B01F1C x16-B01F1C x16-B01F x16-E03A cell X16-B01F X16-E08 age X16-L V01-B01D X16-L02 X11-J05X X16-L X16-L01 X27-E01A4 X12-C05 X16-L T01-L01D U24-H02 X12-H01E

Milestroper   Milestrope   Mi	control, monitoring, optimization	U24-H02L	Non-visible spectrum imaging	W04-P01B
172-H01E2			Non-volatile ferrorelectric RAMs - s	ee Memories,
194	inductive coupling		with ferrorelectric elements	U13-C04B1
Iight	radio or microwaves	-	Non-volatile memories - see ROMs	U14-A03B7
	radio of finerowaves			U14-A06
Ultrasonic waves	light	U24-H02D		
Non-dedicated record carrier vending machine actuation				
Non-dedicated record carrier vending machine actuation	ultrasonic waves			
machine actuation         T05-H02C3           Non-electric telecontrol or telemetry transmission system         W05-D06M production of light - see Optical materials, organic materials, organic modulation of light - see Optical fine from the first modulation of light - see Optical fine from the first modulation of light - see Optical fine from the first modulation of light - see Optical fine from the first modulation of light - see Optical fine from the first modulation of light - see Optical fine from the first modulation of light - see Optical from filiph - see Optical fine from the first modulation of light - see Optical from filiph - see Optical from dulation of light - see Optical from dulation of light - see Optical from dulation of light - see Optical from dulation of light - see Optical from dulation of light - see Optical modulation of light - see Optical from dulation of light - see Optical from subject to the modulation of light from fertion of light - see Optical from filiph filiph filiph filiph filiph filiph filip	Non dedicated accordes missions and			
Non-electric telecontrol or telemetry		5		
transmission system hydraulic transmission W05-D06M infrared (IR) free-space link W05-D06C mechanical transmission W05-D06M1 mud pulse telemetry link W05-D06M1 optical fibre link W05-D06A3 pneumatic transmission W05-D06M1 optical fibre link W05-D06A3 pneumatic transmission W05-D06M1 ultrasonic link W05-D06A5 Non-insulated conductor X12-D02C1 high power, bus bar X12-D02C1 high power, work work work work work work work work				
hydraulic transmission w05-D06M infrared (IR) fere-space link w05-D06C mechanical transmission w05-D06C mechanical transmission w05-D06M mod pulse telementy link w05-D06C optical fibre link w05-D06C optical free-space link w05-D06AS pneumatic transmission w05-D06M ultrasonic link w05-D06AS pneumatic transmission w05-D06AS pneuma		ı y	5 1	
infrared (IR) optical fiber link mochanical transmission w05-D06C mechanical transmission w05-D06M mud pulse telemetry link w05-D06M optical fibre link w05-D06A3 pneumatic transmission w05-D06M3 pneumatic transmission w05-D06A43 pneumatic transmission w05-D06A43 pneumatic transmission w05-D06A5 p		W05-D06M		V07-K
mechanical transmission W05-D06M1 mud pulse telemetry link W05-D06C optical free-space link W05-D06A3 pneumatic transmission W05-D06A5 pneumatic transmission W05-D06A5 work wost-D06A5 will transmission W05-D06A5 work wost-D06A5 will transmission W05-D06A5 work wost-D06A5 high power X12-D02C1 high power X12-D02C1 high power X12-D02C2A low power, output in the power work wost-D06A3 low power, communication W12-D02C2A low power, communication W12-D02C2A low power, communication W12-D02C2A low power, control/instrumentation W1		W05-D06A3		
mud pulse telemetry link optical fibre link w05-D06C1 optical free-space link pneumatic transmission w05-D06A3 pneumatic transmission w05-D06A5 pneumatic transmission w05-D06A5 word-individed free-space link power word-individed word-individed word-individed low power, audio/video w12-D02C2A low power, communication w12-D02C2A low power, communication w12-D02C2A low power, communication w12-D02C2A low power, control/instrumentation w12-D02C2C low power, fibres w12-D02C2E low power, fibres w12-D02C2E low power, edicated with word-individed w				
optical fibre link optical free-space link W05-D06C optical free-space link W05-D06A3 pneumatic transmission W05-D06M ultrasonic link W05-D06A5 W05-D06A5 W12-D02C1 high power X12-D02C1 high power X12-D02C1 low power, sudio/video X12-D02C2 low power, communication X12-D02C2A low power, communication X12-D02C2A low power, control/instrumentation X12-D02C2C low power, control/instrumentation X12-D02C2E manufacture x12-D07E was with the control with the control with the control was with the control was with the control was with the control was with ferroelectric RAMs - see Memories when ferroelectric RAMs - see Memories with ferroelectric RAMs - see Memories with ferroelectric RAMs - see Memories with ferroelectric RAMs - see Memories with ferroelectric RAMs - see Memories with ferroelectric RAMs - see Memories digital wides with ferroelectric elements with fire digital distributed constant type up25-602A wischedistributed constant type up25-602A with ferroelectric elements with ferroelectric elements with ferroelectric elements with fister digital with fire vier in procession with ferroelectric elements with fire vier in procession with ferroelectric elements with fister digital with fister by with constant type up25-602A notation				
optical free-space link pneumatic transmission         W05-D06AS w05-D06AS ultrasonic link         Memories with ferroelectric elements         U14-A03F           Non-insulated conductor         X12-D02C1 digital         Motch filter         U12-A03F           high power power with power, bus bar low power, bus bar low power, control/instrumentation         X12-D02C2B with power, audio/video         Non-E008C2B with ferroelectric elements         W02-A05K4 with power digital           low power, bus bar low power, bus bar low power, control/instrumentation         X12-D02C2B with power, p	ontical fibre link			
Non-insulated conductor   X12-D02C				
Non-insulated conductor high power         X12-D02C1 high power         digital distributed constant type         U22-G01B4 distributed constant type         U22-G01B4 distributed constant type         U22-G01B4 distributed constant type         U22-G01B4 distributed constant type         W02-A05K4 bigh power, 200K2 bigh	pneumatic transmission	W05-D06M		
high power         X12-D02C1 high power, bus bar         X12-D02C1 A Value of the power big power by the power of the power big power by the power with pig power, audio/video         X12-D02C2 big power by the power big power by the power with pig power by the power with pig power big power with pig power big power with pig power with pig power big big power big power big big power big big power big big power big big power big big power big big big big big big big big big big	ultrasonic link	W05-D06A5	Notch filter	
high power, bus bar X12-D02C1A low power X12-D02C2B low power, audio/video X12-D02C2B low power, communication X12-D02C2A low power, control/instrumentation X12-D02C2A low power, fibres X12-D02C2E manufacture X12-D07C2CE low power, fibres X12-D07C2 manufacture or cable X12-D07E manufacture or cable X12-D07E manufacture or cable X12-D07E Mon-mechanically varied capacitor - see Variable capacitor V01-B02B V05-A02A bell P86-E0143 siren P86-E0143 siren P86-E01C3 whistle P86-E01C5 Non-reprogrammable U14-A06B Non-reprogrammable U14-A06B Non-superheterodyne tuner W02-G03A9 Non-superheterodyne tuner W02-G03A9 Non-visible image, pattern recognition T04-D07K Non-visible output lamp X26-Q heating X26-B01B R X12-B0X Non-visible output lamp X26-Q like in the processing X12-B0X Non-visible output lamp X26-Q like in the processing X12-B0X Non-visible was a control of the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp X26-Q like in the processing Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible output lamp Non-visible Non-visible Non-visible Non-visible Non-visible Non-visible No				
Notebook computer   T01-M06A1	5 1			
low power, audio/video X12-D02C2B low power, communication X12-D02C2A low power, communication X12-D02C2C low power, fibres X12-D07E manufacture x12-D07E manufacture for cable X12-D07E manufacture for cable X12-D07E MOR S01-E02A3 S03-E07G Wariable capacitor - see Variable capacitor				
low power, communication X12-D02C2A low power, control/instrumentation X12-D02C2C low power, fibres X12-D02C2E manufacture X12-D07E manufacture for cable X12-D07E manufacture for cable X12-D07E MCR S01-E02A3 Non-mechanically varied capacitor - see Variable capacitor V01-B02B Coils and waveguides S01-E02A8C S03-E07G S03-C02F5 coils and waveguides S01-E02A8C coils and waveguides S01-E02A8C coils and waveguides S03-C02F5 coils and waveguides S01-E02A8C coils and waveguides S03-C02F5 coils and waveguides S03-C02F5 coils and waveguides S03-C02F5 coils and waveguides S03-C02F5 coils and waveguides S03-C02F5 coils and waveguides S03-C02F5 coils and waveguides S03-C02F5 coils and waveguides S03-C02F5 explosives detection S03-C02F5 explosives detection S03-C02F5 signal processing S01-E02A8C prospecting S03-C02F5 signal processing S01-E02A8C signal processing S01-E02A8C Nuclear cell X14-E Nuclear cell X14-E Nuclear diagnosis, medical X14-E Nuclear fuel X14-B04 bundle S14-B04X core X14-B04X core X14-B04X core X14-B04X transmission W01-A08C handling X14-C03 material X14-B04A pin X14-B04A pin X14-B04A pin X14-B04X reprocessing X14-D rod, manufacture X14-B04X reprocessing X14-B04X re				
Novelites			•	
Nozzles for spraying apparatus   P42-A	low power, control/instrumentati	on X12-	Noveities	
manufacture manufacture for cable x12-D07E manufacture for cab	D02C2C			
manufacture for cableX12-D07ENQRS01-E02A3Non-mechanically varied capacitor - see Variable capacitorV01-B02BS03-E07GNon-musical sound-producing devicesP86-E alerting (electrical)baggage inspection coils and waveguides contraband detection drugs detectionS03-C02F5bellP86-E01A1 klaxonP86-E01A1 P86-E01C3 rattleP86-E01C3 prospectingS03-C02F5rattleP86-E01C1 whistleP86-E01C5Fourier Transform prospectingS03-C02F5Non-rechargeable cellX16-ANuclear cellX14-ENon-reprogrammableV14-A06BNuclear diagnosis, medicalS05-D02CNon-reprogrammableU14-A06BNuclear fuel bundleX14-B04Non-superheterodyne tunerW02-G03A9Nuclear fuel cladding coreX14-B04X x14-B04X x14-B05Non-visible image, pattern recognitionmaterial pin reprocessingX14-B04A x14-B04X rod rod rod rod, manufacture x14-B04X x14-B04X rod, manufacture x14-B04X rod, manufacture x14-B04X rod, manufacture x14-B04X x14-B04X x14-B04X x14-B04XNon-visible output lamp lack lack liR liR liR x26-B01B liR x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01BNOR x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01BNOR x26-B01B x26-B01B x26-B01B x26-B01B x26-B01B x26-B01BNOR x26-B01B x26-B01B x26-	Lancon Change	V40 D00C0F	Nozzles for spraving apparatus	$P\Delta \mathcal{I} - \Delta$
Non-mechanically varied capacitor - see Variable capacitor V01-B02B  Non-musical sound-producing devices			Nozzles for spraying apparatus	
Variable capacitorV01-B02Bbaggage inspection coils and waveguides contraband detectionS03-C02F5Non-musical sound-producing devicesP86-Edrugs detectionS03-C02F5alerting (electrical)W05-A02Aexplosives detectionS03-C02F5bellP86-E01A1Fourier TransformS01-E02A8CklaxonP86-E01C3prospectingS03-C02F5rattleP86-E01A5prospectingS03-C02F5sirenP86-E01C5P86-E01C5Nuclear cellX14-ENon-rechargeable cellX16-ANuclear diagnosis, medicalS05-D02CNon-reprogrammable stores - see Memories, non-reprogrammableU14-A06BNuclear diagnosis, medicalS05-D02CNon-silicon semiconductorNuclear fuelX14-B04Non-superheterodyne tunerW02-G03A9Nuclear fuelX14-B04XNon-synchronous, DC systems, data transmissionW01-A08ChandlingX14-B04XNon-visible image, pattern recognitionmaterialX14-B04ANon-visible output lampX26-QpinX14-B04XheatingX26-B01BrodX14-B04XIRX26-Q01spacer gridX14-B04XIR, heatingX26-B01BtubeX14-B04XX14-B04XtubeX14-B04X	manufacture	X12-D07E		P42-T01A
devices P86-E alerting (electrical) W05-A02A bell P86-E01A1 klaxon P86-E01C3 rattle P86-E01C5 whistle P86-E01C5 Non-rechargeable cell X16-A Non-reprogrammable U14-A06B Non-silicon semiconductor Non-superheterodyne tuner W02-G03A9 Non-synchronous, DC systems, data transmission W01-A08C Non-visible image, pattern recognition Non-visible output lamp Reference Account	manufacture manufacture for cable	X12-D07E X12-D07E		P42-T01A S01-E02A3
devicesP86-EContrability detection\$03-C02F5alerting (electrical)W05-A02Aexplosives detection\$03-C02F5bellP86-E01A1Fourier Transform\$01-E02A8CklaxonP86-E01C3prospecting\$03-C02F5rattleP86-E01A5signal processing\$01-E02A8CsirenP86-E01C1Nuclear cellX14-EwhistleP86-E01C5Nuclear diagnosis, medical\$05-D02CNon-rechargeable cellX16-ANuclear diagnosis, medical\$05-D02CNon-reprogrammable stores - see Memories, non-reprogrammableU14-A06BNuclear duel\$14-B04Non-silicon semiconductorNuclear fuel\$14-B04Non-superheterodyne tunerW02-G03A9cladding\$14-B04XNon-synchronous, DC systems, data transmissionelement, manufacture\$14-B04XNon-visible image, pattern recognitionmaterial\$14-B04ANon-visible output lamp\$26-Qrod\$14-B04XNeating lar lar lar lar lar lar lar 	manufacture manufacture for cable  Non-mechanically varied capacitor	X12-D07E X12-D07E	NQR baggage inspection	P42-T01A S01-E02A3 S03-E07G S03-C02F5
alerting (electrical) bell P86-E01A1 klaxon P86-E01C3 rattle P86-E01C5 siren P86-E01C5 Non-rechargeable cell X16-A Non-reprogrammable V14-A06B Non-silicon semiconductor Non-superheterodyne tuner W02-G03A9 Non-synchronous, DC systems, data transmission W01-A08C Non-visible image, pattern recognition Non-visible output lamp Residual P86-E01C3 P86-E01C5 Nuclear cell X14-E Nuclear diagnosis, medical S05-D02C Nuclear fuel X14-B04	manufacture manufacture for cable Non-mechanically varied capacitor Variable capacitor	X12-D07E X12-D07E	NQR  baggage inspection coils and waveguides	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A
Fourier Transform   S01-E02A8C   P86-E01A5   prospecting   S03-C02F5   Signal processing   S01-E02A8C   P86-E01A5   signal processing   S01-E02A8C   S03-C02F5   Signal processing   S01-E02A8C   S03-C02F5   Signal processing   S01-E02A8C   S03-C02F5   Signal processing   S01-E02A8C   S05-E02A8C   S05-E0A8C   S05-E02A8C   S05-E02A8C   S05-E02A8C   S05-E02A8C   S05-E0A8C   S05-E02A8C   S05-E02A8C   S05-E02A8C   S05-E02A8C   S05-E02	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices	X12-D07E X12-D07E <b>see</b> V01-B02B	NQR  baggage inspection coils and waveguides contraband detection	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5
rattle siren P86-E01A5 signal processing S01-E02A8C  Non-rechargeable cell X16-A  Non-reprogrammable stores - see Memories, non-reprogrammable U14-A06B  Non-silicon semiconductor  Non-superheterodyne tuner W02-G03A9  Non-synchronous, DC systems, data transmission W01-A08C  Non-visible image, pattern recognition  Non-visible output lamp A26-Q heating IR IR	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical)	X12-D07E X12-D07E *- see V01-B02B P86-E W05-A02A	NQR  baggage inspection coils and waveguides contraband detection drugs detection	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5
siren whistle P86-E01C1 whistle P86-E01C5 Nuclear cell X14-E  Non-rechargeable cell X16-A Nuclear diagnosis, medical S05-D02C  Non-reprogrammable stores - see Memories, non-reprogrammable U14-A06B Nuclear energy battery X14-E  Non-silicon semiconductor Nuclear fuel X14-B04X cladding X14-B04X core X14-B05  Non-superheterodyne tuner W02-G03A9 core X14-B05  Non-synchronous, DC systems, data transmission W01-A08C handling X14-C03  Non-visible image, pattern recognition material X14-B04X reprocessing X14-D rod X14-B04X reprocessing X14-D rod, manufacture X14-B04X spacer grid X14-B04X spacer grid X14-B04X x14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell	X12-D07E X12-D07E *- see V01-B02B P86-E W05-A02A P86-E01A1	NQR  baggage inspection coils and waveguides contraband detection drugs detection explosives detection	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S03-C02F5
Non-rechargeable cell X16-A  Non-reprogrammable stores - see Memories, non-reprogrammable U14-A06B  Non-silicon semiconductor  Non-superheterodyne tuner W02-G03A9  Non-synchronous, DC systems, data transmission W01-A08C  Non-visible image, pattern recognition  Non-visible output lamp  heating IR X26-Q01  IR, heating X26-B01B  IR, heating X26-B01B  IR, heating X26-B01B  IR, heating X26-Q01  IR X16-A  Nuclear diagnosis, medical  S05-D02C  Nuclear fuel  X14-B04  Nuclear fuel  X14-B04  Cadding X14-B04  Core Cadding X14-B04  Landing X14-B04  Nan-visible image, pattern recognition  material M14-B04A  reprocessing X14-D  rod Manufacture M14-B04A  rod, manufacture M14-B04A  spacer grid M14-B04X  tube X14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon	X12-D07E X12-D07E *- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3	NQR  baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5
Non-reprogrammable stores - see Memories, non-reprogrammable U14-A06B  Non-silicon semiconductor Non-superheterodyne tuner W02-G03A9 Non-synchronous, DC systems, data transmission W01-A08C Non-visible image, pattern recognition Non-visible output lamp    Nuclear fuel	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle	X12-D07E X12-D07E Y-see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01A5	NQR  baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5
non-reprogrammable U14-A06B  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, data transmission  Non-visible image, pattern recognition  Non-visible output lamp  heating  IR  IR  IR  IR  IR  IR  IR  IR  IR  I	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01A5 P86-E01C1	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C
Non-silicon semiconductor Non-superheterodyne tuner W02-G03A9 Non-synchronous, DC systems, data transmission W01-A08C Non-visible image, pattern recognition Non-visible output lamp Ac6-Q Ac6-B01B IR IR IR IR IR IR IR IR IR IR IR IR IR	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle	X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01A5 P86-E01C1 P86-E01C5	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E
Non-superheterodyne tuner         W02-G03A9         cladding core         X14-B04X x14-B05           Non-synchronous, DC systems, data transmission         W01-A08C         handling material         X14-B04A x14-C03           Non-visible image, pattern recognition         T04-D07K         material pin reprocessing reprocessing x14-D         X14-B04X reprocessing rod, manufacture           Non-visible output lamp heating IR         X26-Q rod spacer grid spacer grid spacer grid tube         X14-B04X x14-B04X reprocessing rod, manufacture         X14-B04X x14-B04X reprocessing rod, manufacture           IR, heating         X26-Q01 rod spacer grid tube         X14-B04X reprocessing rod, manufacture         X14-B04X reprocessing rod, manufacture         X14-B04X reprocessing rod, manufacture	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C3 P86-E01C1 P86-E01C5 X16-A	NQR  baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C
Non-superneterodyne tuner         W02-G03A9         core         X14-B05           Non-synchronous, DC systems, data transmission         element, manufacture         X14-B04A           Non-visible image, pattern recognition         material         X14-B04A           Non-visible output lamp         X26-Q         pin         X14-B04X           heating         X26-B01B         rod, manufacture         X14-B04X           IR         X26-Q01         spacer grid         X14-B04X           IR, heating         X26-B01B         tube         X14-B04X           X14-B04X         X14-B04X         X14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C3 P86-E01C1 P86-E01C5 X16-A Memories,	NQR  baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear energy battery	P42-T01A \$01-E02A3 \$03-E07G \$03-C02F5 \$01-E02A8A \$03-C02F5 \$03-C02F5 \$03-C02F5 \$01-E02A8C \$03-C02F5 \$01-E02A8C X14-E \$05-D02C X14-E
Non-synchronous, DC systems, data transmission	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see inon-reprogrammable	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C3 P86-E01C1 P86-E01C5 X16-A Memories,	NQR  baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle	P42-T01A  S01-E02A3  S03-E07G  S03-C02F5  S01-E02A8A  S03-C02F5  S03-C02F5  S01-E02A8C  S03-C02F5  S01-E02A8C  X14-E  S05-D02C  X14-E  X14-B04  X14-B04X
transmission         W01-A08C         handling         X14-C03           Non-visible image, pattern recognition         T04-D07K         material         X14-B04X           Non-visible output lamp         X26-Q         reprocessing         X14-D           heating         X26-B01B         rod, manufacture         X14-B04X           IR         X26-Q01         spacer grid         X14-B04X           IR, heating         X26-B01B         tube         X14-B04X           X14-B04X         X14-B04X         X14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see inon-reprogrammable  Non-silicon semiconductor	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01A5 P86-E01C1 P86-E01C5 X16-A Memories, U14-A06B	NQR  baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle cladding	P42-T01A  S01-E02A3  S03-E07G  S03-C02F5  S01-E02A8A  S03-C02F5  S03-C02F5  S01-E02A8C  S03-C02F5  S01-E02A8C  X14-E  S05-D02C  X14-E  X14-B04  X14-B04X  X14-B04X
Non-visible image, pattern recognition         material         X14-B04A           Non-visible output lamp         X26-Q         reprocessing         X14-D           heating         X26-B01B         rod         X14-B04X           IR         X26-Q01         spacer grid         X14-B04X           IR, heating         X26-B01B         tube         X14-B04X           X14-B04X         X14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C1 P86-E01C1 P86-E01C5 X16-A Memories, U14-A06B W02-G03A9	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle cladding core	P42-T01A  S01-E02A3  S03-E07G  S03-C02F5  S01-E02A8A  S03-C02F5  S03-C02F5  S01-E02A8C  S03-C02F5  S01-E02A8C  X14-E  S05-D02C  X14-E  X14-B04  X14-B04X  X14-B04X  X14-B05
T04-D07K   pin   X14-B04X   reprocessing   X14-D   X14-B04X   reprocessing   X14-D   X14-B04X   X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C1 P86-E01C5 X16-A Memories, U14-A06B W02-G03A9	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle cladding core element, manufacture	P42-T01A  S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B04X X14-B05 X14-B04A
Non-visible output lamp         X26-Q         reprocessing rod         X14-D           heating IR         X26-B01B         rod, manufacture         X14-B04X           IR, heating         X26-Q01         spacer grid         X14-B04X           IR, heating         X26-Q01         tube         X14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat transmission	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C1 P86-E01C5 X16-A Memories, U14-A06B W02-G03A9	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle cladding core element, manufacture handling	P42-T01A  S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B04X X14-B04X X14-B05 X14-B04A X14-C03
heating X26-B01B rod, manufacture X14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat transmission	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C5 P86-E01C5 X16-A Memories, U14-A06B W02-G03A9 W1-A08C ition	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell  Nuclear diagnosis, medical  Nuclear fuel bundle cladding core element, manufacture handling material pin	P42-T01A  S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B04X X14-B05 X14-B04A X14-C03 X14-B04A
IR X26-Q01 spacer grid X14-B04X IR, heating X26-B01B tube X14-B04X X14-B04X	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat transmission  Non-visible image, pattern recogni	X12-D07E X12-D07E X12-D07E Y- see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C1 P86-E01C5 X16-A Memories, U14-A06B W02-G03A9 Yaa W01-A08C ition T04-D07K	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle cladding core element, manufacture handling material pin reprocessing	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B05 X14-B05 X14-B04A X14-C03 X14-B04A X14-B04X X14-B04A
IR, heating X26-B01B tube X14-B04X X26-Q01	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat transmission  Non-visible image, pattern recogni	X12-D07E X12-D07E X12-D07E - see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C5 P86-E01C5 X16-A Memories, U14-A06B W02-G03A9 Ia W01-A08C ition T04-D07K X26-Q	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle cladding core element, manufacture handling material pin reprocessing	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B04X X14-B04A X14-B04A X14-B04A X14-B04X X14-B04X X14-B04A X14-B04X X14-B04X X14-B04X X14-B04X X14-B04X X14-B04X X14-B04X X14-B04X X14-B04X X14-B04X X14-B04X
X26-Q01	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat transmission  Non-visible image, pattern recognications	X12-D07E X12-D07E X12-D07E - see V01-B02B P86-E W05-A02A P86-E01A1 P86-E01C3 P86-E01C5 P86-E01C5 X16-A Memories, U14-A06B W02-G03A9 Ia W01-A08C ition T04-D07K X26-Q X26-B01B	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell Nuclear diagnosis, medical Nuclear fuel bundle cladding core element, manufacture handling material pin reprocessing rod rod, manufacture	P42-T01A S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B04X X14-B04A X14-B04A X14-B04A X14-B04X X14-B04X X14-B04A X14-B04X X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A X14-B04A
UV X26-Q03	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat transmission  Non-visible image, pattern recognically in the string IR	X12-D07E X12-D07E X12-D07E 	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell  Nuclear diagnosis, medical Nuclear fuel bundle cladding core element, manufacture handling material pin reprocessing rod rod, manufacture spacer grid	P42-T01A  S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B04X X14-B04A X14-B04X
	manufacture manufacture for cable  Non-mechanically varied capacitor Variable capacitor  Non-musical sound-producing devices alerting (electrical) bell klaxon rattle siren whistle  Non-rechargeable cell  Non-reprogrammable stores - see in non-reprogrammable  Non-silicon semiconductor  Non-superheterodyne tuner  Non-synchronous, DC systems, dat transmission  Non-visible image, pattern recognically in the store in the second in the se	X12-D07E X12-D07E X12-D07E 	baggage inspection coils and waveguides contraband detection drugs detection explosives detection Fourier Transform prospecting signal processing  Nuclear cell  Nuclear diagnosis, medical Nuclear fuel bundle cladding core element, manufacture handling material pin reprocessing rod rod, manufacture spacer grid	P42-T01A  S01-E02A3 S03-E07G S03-C02F5 S01-E02A8A S03-C02F5 S03-C02F5 S01-E02A8C S03-C02F5 S01-E02A8C X14-E S05-D02C X14-E X14-B04 X14-B04X X14-B04X X14-B04A X14-B04X

Nuclear fusion reactor	X14-A03	X-ray fluorescence	S03-E06D
cold fusion-type	X14-A03A	X-ray photography	S03-E06B5
electrolysis-type	X14-A03A	Nuclear reaction containment	X14-B01
plasma process	X14-A03	Nuclear reaction control	X14-C01
	X14-F01		
Nuclear imaging - see also under X-	ray	Nuclear reactor	X14-A
	S03-G02B3	advanced gas cooled (AGR)	X14-A02
medical	S05-D02C	boiling water (BWR)	X14-A02
video camera	W04-M01F3	control rod	X14-C01
		control material	X14-C01
Nuclear Magnetic Resonance - see N		cooling core structure	X14-B03
Nuclear power plant	X14-C05	decommission	X14-B05 X14-D
cable installation	X14-C05X	decontamination	X14-D X14-D
control	X14-C05B	decontamination dosimeter badge	X14-D X14-C05X
measurements	X14-C05C	electricity generation	X14-C05A X14-C05A
measurements, reactor in-situ	X14-C02	emergency protection	X14-C03A X14-B02
monitoring	X14-C02	fast breeder (FBR)	X14-A01
personal radiation monitor	X14-C05X	fast fission	X14-A01
safety suit	X14-C05X	fuel assembly	X14-B04X
for ship	Q24-E02E	fuel element	X14-B04
simulator	X14-C05X	fuel element manufacture	X14-B04A
Nuclear Quadrupole Resonance - se	e NQR	fuel handling	X14-C03
Nuclear radiation		fuel reprocessing	X14-D
absorption, materials investigation	S03-E06A	fuel support	X14-B05
analysis	S03-E06	fusion	X14-A03
apparatus details, materials invest	gation	fusion, cold	X14-A03A
	S03-E06H	maintenance/service/repair	X14-C06
beam measurements	S03-G02C1	manufacture	X14-C04
beam polarisation measurement		measurement	X14-C02
calibration/compensation/testing	S03-G05	measurement, in-situ	X14-C02
counting tube	S03-G02B2A	mechanical energy	X14-C05A
cross section measurement	S03-G02C1C	moderator	X14-B05
detection system, materials investi		moderator material	X14-B05
	S03-E06H5	monitoring	X14-C02
diffraction, materials investigation		neutron absorber	X14-C01
dosimeters	S03-G02A	poison rod	X14-C01
flaw detection, absorption	S03-E06A1	power plant	X14-C05
flaw detection, diffraction/scattering	0	power plant, control	X14-C05B
half-life measurement	S03-G02C5	pressure vessel	X14-B01
integrating detectors	S03-G02A	pressurised water (PWR)	X14-A02
ionisation chamber	S03-G02B2C	probe	X14-C02
measurement	S03-G05	radioactivity measurement	X14-C02
measuring	S03-G	reactivity measurement	X14-C02
microscopes neutron flux measurement	S03-E06B1	shielding	X14-B02
NMR, medical	S03-G01C S05-D02B	temperature measurement	X14-C02
picture forming, general	S03-E06B	testing	X14-C02
prospecting	S03-C03	thermal	X14-A02
protection, materials investigation		waste treatment/disposal	X14-D
radiation source, materials investigation		Nuclear reactor component	X14-B
radiation source, materials investig	S03-E06H1	cooler	X14-B03
recording/processing particle trac		core shroud	X14-B05
scattering, materials investigation		core structure	X14-B05
scintillation detectors	S03-G02B1	fuel assembly	X14-B04X
secondary emission detector	S03-G02B2E	fuel element	X14-B04
semiconductor detector	S03-G02B2G	fuel support	X14-B05
shielding, materials investigation	S03-E06H7	moderator	X14-B05
specimen positioning, materials	-	neutron shield	X14-B02
investigation	S03-E06H3	pressure vessel	X14-B01
spectrometer	S03-G02C3	Nuclear reactor process	X14-A
stimulable phosphor sheet	S03-E06B3	cold fusion	X14-A03A
tomography	S03-E06B	fast breeder	X14-A01

fast fission	X14-A01
fusion	X14-A03
thermal	X14-A02
Numerical control - see Program-co	ntrol
system	T06-A04
Nurse call system	S05-G02D
Nursing equipment	S05-G02B
hospital beds	S05-G02B1
hospital monitor	S05-G02B2
life support systems	S05-G02B3
monitoring patients at home	S05-G02B2A
portable patient monitor	S05-G02B2B
respiratory gas delivery systems	S05-G02E
trolleys	S05-G02H
Nyquist diagram	S01-D05C

0	
Object-based program control	T01-F07
Oboe	P86-A01A1
Ocean currents - power generation	from -
	X15-C
Ocean thermal energy conversion	X15-C
Oceanography	S02-B04
	S03-C01C1
<b>OCR (Optical Character Recognition</b>	T04-D04
Odometers	S02-B12A
Office automation	T01-J11D
Office furniture	P25
Offset reduction	
amplifier	U24-G03F
digital filter	U22-G01X
digital signal processing direct conversion radio receiver	U22-G09 W02-G03A8A
direct conversion radio receiver	W02-G03A6A W02-G03B4G
Ohmic heating	X25-B01
Ohmic, Schottky contact formation,	7,20 001
semiconductor manufacture	U11-C05E1
Oil circuit breaker	
with built-in arc control-type	X13-B02
with separate arc control-type	X13-B03
Oil prospecting	S03-C
Oil-filled heater, electric	X27-E01A2
OLED - see LED	U12-A01A1X
for lighting application	X26-J
One-part connector, electronic	V04-A V04-B
One-time programmable memories	
ROMs, one-time programmable	U14-A06B
Open bit line architecture - see Men	nories,
interconnection layout	U14-C01
Open loop numerical control system	T06-A04A9
Open systems interconnection (OSI)	W01-A06F
Operating system for smartphones	T01-F
	W01-C01G8S
	W01-C01Q3C
Operating theatre equipment	S05-G02C
Operation cycle counter, for mainte applications	nance T05-G02A
• •	
Operation, medical surgery	S05-B
Operational amplifier amplifier circuit implementation	U24-G04C
amplifier per se	U24-G02A5
Bi-FET '	U13-B03
	U24-G04A3
current mode operation offset compensation	U24-G02A5C U24-G03F
pulse generation (using)	U22-A02E
pulse shaping (using)	U22-D10F
	U22-D10X

Optical		waveguides - see <b>Optical waveg</b>	ıuides
alarm link, centralised signalling	W05-B05B4		V07-F01
antitheft alarms	W05-B01C2B	wavelength measurement	S03-A09
audio-video recording and repro		· ·	
addie videe recerding dia repre	W04-C	Optical amplifier	V07-K01C
burglar alarms	W05-B01C2A	repeater application	W02-C04A5A
cables - see Optical cable	V07-F01B4	semiconductor	U12-A02C3
card, digital	T04-C02		V07-K01C1
coherence tomography	S03-E04C3	testing	S02-J04A1C
	W02-C04	with optical fibre	V07-K01C2
communication systems computerised tomography	S03-E04C3	Optical apparatus, testing	S02-J04A
connectors, permanent	V07-G10B	Optical bistable	V07-K06
	S02-K03B		V07 100
conversion of sensor output		Optical cable	
coupling	V07-G10D	installing/installations - see Option	
data network, fibre	W01-A06C1	waveguides	V07-H
data network, free-space	W01-A06C3	manufacture	V07-F01B4B
data processing	T01-E05A	materials	V07-F01B4C
deflectors	V07-K05	repair	V07-H01
digital mark reading	T04-A03B	structure	V07-F01B4A
digital marking	T04-A02B	Optical card	
filters	V07-F02B	carrier per se	T03-B01D3
flaw detection	S03-E04F2	carrier per se	T04-C02
gratings	V07-F02B	vending machine actuated by	T05-H02C5B
intruder alarms	W05-B01C2A	,	
interface, free-space	W01-A07H3	Optical Character Recognition	T04-D04
interface, optical fibre	W01-A07E	Optical communications	
	W01-A07H4	anti-dispersive transmission	W02-C04B7
line intensity measurement	S03-A02A	automatic gain control (RX)	W02-C04A3C
links, free space, networks	W01-A06C3	data network, fibre	W01-A06C1
logic	V07-K06	data network, free-space	W01-A06C3
masks, semiconductor lithograph	ny U11-C04E2	data transmission (general)	W01-A07E
measurement of dimensions	S02-A03	distortion reduction	W02-C04A7E
measurement of fibre-optic para	meters	dispersion compensation	W02-C04A7J
	S02-J04A1A	diversity control	W02-C04A7G
	V07-J	equalising	W02-C04A7A
microscope	S02-J04B1	free space	W02-C04B2
microscopy	S03-E04R	IrDA interface	W01-A07H3
mode selector/converter	V07-F03	IrDA LAN	W01-A06B5A
modulation - see Optical modul		1137 (2) (1)	W01-A06C3
multiplexer	V07-K04	mobile	W0170003
non prospecting logging	S03-C09	mode multiplex systems	W02-C04B4
optrodes	V07-X	multiplexing	W02-C04B4
polarisers	V07-F02B	noise reduction	W02-C04A0
prospecting	S03-C04A	optical amplifier	W02-C04A7C
radar - see <b>Optical radar</b>	W06-A06	optical amplifier	W02-C04A3A W02-C04B1
		optical libre optical selection for telephony	
record carrier - see <b>Optical reco</b>	T03-B		W01-B05C
remote control, free-space	W05-D06A3	polarisation control	W02-C04A7G
remote control, free-space		radio-over-fiber	W02-C04B1F
and the second of the form	W05-D08C	receiver	W02-C04A3
remote monitoring, free-space	W05-D06A3	repeater	W02-C04A5
. ( )	W05-D08E	repeater optical amplifier	W02-C04A5A
resonator for laser	V08-A01A	switching	W02-C04A6
signal transmission, telemetry/te		telecontrol/telemetry, optical fibr	
free-space link	W05-D06A3		W05-D06C
signal transmission, telemetry/tel		telecontrol/telemetry, free-space	
optical fibre link	W05-D06C		W05-D06A3
smoke detection	S03-E04C1	testing	W02-C04C1
	W05-B02A1	transceiver	W02-C04A4
time domain reflectometry	S03-E04C	transmission using solitons	W02-C04B7
transducers	S02-K03B	transmitter	W02-C04A1
waveguide sensors	V07-X		

Optical computer		reflectors	P81-A03
analogue	T02-A03B	Tellectors	V07-F02A
digital	T01-M06D	refractors	P81-A01
· ·		refractors	V07-F02A
Optical couplers	V07-G		VU7-1 UZA
aligning	V07-G02	Optical fibre	
beam focussing, shaping	V07-G04	active element coupling	V07-G10C
coupling using optical elements,	9	aligning	V07-G02
	V07-G10D	applications	V07-N
detachable	V07-G10A	arrays	V07-F01A1C
evanescent	V07-G11	beam shaping, expanding	V07-G04
fixing light guide separation	V07-G03	bundles	V07-F01A1B
fused biconical taper	V07-G11	cable - see <b>Optical cable</b>	V07-F01B4
fused connectors	V07-G10B	cable television	W02-F03A3
multi-fibre with mixing rod	V07-G11	chemical sensors	V07-X
multiport	V07-G11	communications system	W02-C04B1
preparing optical fibre ends, cutt	ing,	connectors - see Optical coupler	<b>'s</b> V07-G10
polishing, stripping	V07-G01	cutting	V07-G01
rotary	V07-G12	data networks	W01-A06C1
splices	V07-G10B	dispensers	V07-H01
star coupler	V07-G11	displacement sensors	V07-X
three port	V07-G11	dust-proof	V07-F01B1A
to lasers/LEDs	U12-A01C	endoscope	S02-J04B3C
to lasers/LEDs/photodetectors	V07-G10C	'	V07-N02
to thin film waveguide	V07-G10D	ferrules	V07-G02A
two port connectors	V07-G10	fibrescope	S02-J04B3A
		graded index	V07-F01A1
Optical disk	T02 D01	gyroscopes	S02-B07B
carrier	T03-B01	3)	V07-N01
container drive	T03-H01A6B	installing, installations - see Option	
	T03-B10A	waveguides	V07-H
dual deck optical disk player/rec		interferometer	S02-A03A
and after a return than	W04-C10A1K		V07-N01
reading circuitry	T03-B06C	laser	V08-A04C2
	W04-C06	lighting application	V07-N03
recorder/player	W04-C10	ingriting application	X26-G
recording	T03-B	manufacture methods	V07-F01A3A
signal recording format	T03-B05	manufacturing equipment	V07-F01A3C
	W04-C05	material (e.g. glass, plastics)	V07-F01A3B
testing during manufacture	T03-B01E7B	material, nonlinear	V07-K10B
writing circuitry	T03-B06A	material, nonlinear, inorganic	V07-K10B1
	W04-C06	material, nonlinear, organic	V07-K10B1
Optical elements	P81	measurement of optical characte	
attenuator	V07-F02	measurement of optical character	S02-J04A1A
beam profile correction	V07-F02	measurements of fibre characteri	
condenser	P81-A13	medsarements of fibre characters	V07-J
deflectors, using diffraction grati	ng V07-F02B	networks	W01-A06C1
deflectors, using mirrors	V07-F02A	orthogonaly intersecting	V07-G10E
diffraction grating	P81-A07	packages, modules	V07-G10L V07-G13
	V07-F02B	polarisation independent	V07-G13 V07-F01A6
diffraction grating, for semicond	uctor	polarisation maintaining	V07-F01A0
lithography	P81-A07	polishing	V07-F01A1A V07-G01
	U11-C04D2	preform	V07-G01 V07-F01A2
filters	P81-A05	preparing ends of	V07-F01A2 V07-G01
	V07-F02B	protective coating	V07-G01 V07-F01B1
gratings	P81-A07	repair, maintenance	V07-F01B1
lenses	P81-A01	sensors	V07-F01B1A
	V07-F02A	Selisors	
mirrors	P81-A03	single made	V07-N01
	V07-F02A	single mode	V07-F01A1A V07-G10B
polarizers	P81-A15	splices	V07-G10B V07-F01A1A
•	V07-F02B	step index	V07-F01A1A V07-H04
prisms	P81-A11	storrage	V07-H04 V07-G01
•	V07-F02A	stripping protective coating	VU/-GUI

ctructuro	V07-F01A1	Sagnac effect	V07-K02
structure tapes	V07-F01A1D	scanning	V07-K02 V07-K05
terminations	V07-G10	spatial	V07-K01
Optical filter	107 010	opana.	V07-K01A2
CCD imager	U13-A02X		V07-K05
display (general)	W05-E05A	Optical mouse	T04-F02B1A
image sensor with	W03-L03A		
photodiode/photoconductor/		Optical multiplex system	W02-K04
phototransistor	U13-A01F	Optical phase difference measurem	ent S03-A09
optical filter	V07-F02B	Optical printing	S06-E
light diffusion film	V07-F02B	testing	S03-E04
retardation film	V07-F02B	Optical pumping - see Laser pumpir	na ontical
manufacture, for semiconductor of		Optical painiping See Laser painipin	
LCD	U11-C18D		V08-A02B
TV receiver display	W03-A08E1	Optical radar	
video camera	W04-M01C3	applications	W06-A06H
Optical heads, recording	T03-B02B	calibrating	W06-A06C3
beam splitter	T03-B02B7A	determining target position	W06-A06D1
diffraction gratings	T03-B02B7G	display	W06-A06C3
focusing	T03-B02A1C	for air, land and sea vehicles	W06-A06H1
harmonic generator	T03-B02B7E	for aircraft	W06-A06H1B W06-A06H1K
head cleaning	T03-B02B8A	for anti-collision purposes	W06-A06H8
head manufacturing	T03-B02B8C	for industrial applications for land vehicles	W06-A06H1A
head positioning	T03-B02A	for meteorological applications	W06-A06H2
head testing	T03-B02B8E	for object identification	W06-A06B5
lens	T03-B02B5	for ships	W06-A06H1C
light source	T03-B02B1	for tracking, target seeking	W06-A06H5
optical system	T03-B02B	for vehicle/aircraft identification	W06-A06B1
photodetector	T03-B02B3	jamming/anti-jamming	W06-A06C8
polariser	T03-B02B7C	mapping/imaging	W06-A06H3
positioning	T03-B02A	monitoring	W06-A06C5
super-resolution optical aspects tilt correction	T03-B02B6 T03-B02A4	primary	W06-A06D
till Correction		receiver circuit	W06-A06C2
		receiver circuit	VV00-A00C2
Optical microscopy	S03-E04R	security/coding aspects	W06-A06B3
<b>Optical microscopy</b> molecular exciton microscopy	S03-E04R S03-E04R	security/coding aspects testing	W06-A06B3 W06-A06C5
Optical microscopy molecular exciton microscopy Optical modulation	S03-E04R S03-E04R V07-K	security/coding aspects testing transmitter circuit	W06-A06B3 W06-A06C5 W06-A06C1
Optical microscopy molecular exciton microscopy Optical modulation amplification	S03-E04R S03-E04R V07-K V07-K01C	security/coding aspects testing transmitter circuit using different response medium	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control	S03-E04R S03-E04R V07-K V07-K01C V07-K01	security/coding aspects testing transmitter circuit using different response medium using relative movement	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control	S03-E04R S03-E04R V07-K V07-K01C V07-K01 V07-K04	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection	S03-E04R S03-E04R V07-K V07-K01C V07-K01 V07-K04 V07-K05	security/coding aspects testing transmitter circuit using different response medium using relative movement	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam	S03-E04R S03-E04R V07-K V07-K01C V07-K01 V07-K04	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B7
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator,	S03-E04R S03-E04R V07-K V07-K01C V07-K01 V07-K04 V07-K05 V07-K01A1	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B7 S03-A01B3
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam	S03-E04R S03-E04R V07-K V07-K01C V07-K01 V07-K04 V07-K05 V07-K01A1	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B7 S03-A01B3 S03-A01B3
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor	S03-E04R S03-E04R V07-K V07-K01C V07-K01 V07-K04 V07-K05 V07-K01A1 U12-A02C3 V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B7 S03-A01B3 S03-A01B3
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B1
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K03 \$V07-K04	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B3 T03-B01C
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K03 \$V07-K04 \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B5 S03-A01B5
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using sho	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K03 \$V07-K04 \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B7 S03-A01B3 S03-A01B3 S03-A01B3 T03-B01C T03-B01D3 T03-B01D1
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K05 \$V07-K05 \$V07-K01A1 \$U12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K03 \$V07-K04 \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B7 S03-A01B3 S03-A01B3 S03-A01B3 T03-B01C T03-B01D3 T03-B01D1 T03-B01D7A
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using sho	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K05 \$V07-K05 \$V07-K01A1 \$U12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K03 \$V07-K04 \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proces	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B7 S03-A01B3 S03-A01B3 S03-A01B5 S03-A01B1 T03-B01C T03-B01D3 T03-B01D1 T03-B01D7A ess T03-B01B5
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K03 \$V07-K04 \$V07-K01B \$V07-K01B	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B7 S03-A01B3 S03-A01B3 S03-A01B5 S03-A01B1 T03-B01C T03-B01D3 T03-B01D1 T03-B01D7A ess T03-B01B5
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electro-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light intensity control, using shuttlight valves	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K03 \$V07-K04 \$V07-K01B \$V07-K01B	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B7 S03-A01B3 S03-A01B3 S03-A01B5 S03-A01B1 T03-B01C T03-B01D3 T03-B01D1 T03-B01D7A ess T03-B01B5
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electro-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light intensity control, using shutter	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K04 \$V07-K01A \$V07-K01B \$V07-K01B	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A characterised by combination of	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B7 S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B1 T03-B01C T03-B01D3 T03-B01D1 T03-B01D1 T03-B01D7A ess T03-B01B5 eg T03-
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electro-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light intensity control, using shutt light valves magneto-optic control parametric oscillation	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$V12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01A \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A characterised by combination of recording methods	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B7 S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B1 T03-B01C T03-B01D3 T03-B01D1 T03-B01D7A ess T03-B01B5 eg T03-
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electro-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light intensity control, using shutt light valves magneto-optic control parametric oscillation phase control	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K05 \$V07-K01A1 \$U12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01B	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A characterised by combination of	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B3 T03-B01C T03-B01D3 T03-B01D1 T03-B01D1 T03-B01D7A ess T03-B01B5 r03-B01B5 r03-B01B5J
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light valves magneto-optic control parametric oscillation phase control phase shift	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$U12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01B \$V07-K01A2 \$V07-K03 \$V07-K04 \$V07-K02 \$V07-K02	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A characterised by combination of recording methods characterised by deformation record	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B1 T03-B01C T03-B01D3 T03-B01D1 T03-B01D7A ess T03-B01B5 og T03-
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light intensity control, using shuttlight valves magneto-optic control parametric oscillation phase control phase shift Pockels effect	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$U12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01A2 \$V07-K03 \$V07-K03 \$V07-K04 \$V07-K04 \$V07-K02 \$V07-K02 \$V07-K02 \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A characterised by combination of recording methods	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B3 T03-B01D3 T03-B01D3 T03-B01D1 T03-B01D7A ess T03-B01B5 rog T03-
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light intensity control, using shuttlight valves magneto-optic control parametric oscillation phase control phase shift Pockels effect polarisation control	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$U12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01A \$V07-K01B \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A characterised by combination of recording methods characterised by deformation record characterised by interaction record	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B5 S03-B01D1 T03-B01D7 T03-B01D7 T03-B01D7A ess T03-B01B5 eg T03-B01B5J ording T03-B01B5C ding T03-B01B5E
Optical microscopy molecular exciton microscopy  Optical modulation amplification amplitude control colour control deflection electo-optical for single beam electro-optic modulator, semiconductor  electro-optical effect Faraday effect frequency control Kerr effect light amplitude control, using shulight intensity control light intensity control, using electro-optical devices light intensity control, using shuttlight valves magneto-optic control parametric oscillation phase control phase shift Pockels effect	\$03-E04R \$03-E04R \$V07-K \$V07-K01C \$V07-K01 \$V07-K04 \$V07-K05 \$V07-K01A1 \$U12-A02C3 \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01A \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01B \$V07-K01A2 \$V07-K03 \$V07-K03 \$V07-K04 \$V07-K04 \$V07-K02 \$V07-K02 \$V07-K02 \$V07-K01A	security/coding aspects testing transmitter circuit using different response medium using relative movement weather lidar  Optical radiation detector array capacitive ferroelectric photoresistive photovoltaic  Optical record carrier antireflective layers card carrier CD-ROM  characterised by (recording) proce characterised by ablation recordin B01B5A characterised by combination of recording methods characterised by deformation record	W06-A06B3 W06-A06C5 W06-A06C1 W06-A06C1 W06-A06B7 W06-A06D2 W06-A06H2 S03-A01B S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B3 S03-A01B1 T03-B01C T03-B01D3 T03-B01D7A ess T03-B01B5 eg T03-

characterised by orientation char	nge I	carrier positioning	T03-B03
recording process	T03-B01B5X	compensation system for head po	
characterised by phase transition		compensation by stom for model po	T03-B02A5
7 1	T03-B01B5G	determining format/type of carrie	r T03-B05K
characterised by reversible reco	ding	disk player/recorder	T03-B10A
process	T03-B01B5L		W04-C10A
characterised by type of carrier	T03-B01D	diffraction gratings	T03-B02B7G
disk carrier	T03-B01D1	focus drive motor	T03-B02A1A
double substrate	T03-B01A5A	focus servo	T03-B02A1C
DRAW	T03-B01D7A	focussing	T03-B02A1
DVD	T03-B01D1	format	T03-B05F
	T03-B01D6	harmonic generators (optical)	T03-B02B7E
erasable	T03-B01D8	head	T03-B02B
groove details	T03-B01F5	head cleaning	T03-B02B8A
labelling layers	T03-B01C8	head manufacture	T03-B02B8C
layer arrangements	T03-B01H T03-B01B	head positioning	T03-B02A T03-B02A3B
light-sensitive layers manufacture - see <b>Optical recor</b>		head positioning mounting rails head testing	T03-B02A3B
manufacture	T03-B01E	lens	T03-B02B6L
multilayer	T03-B01D6	light guide	T03-B02B7
multiple light-sensitive layers	T03-B01B5N	ngin galac	V07-F01
multiple wavelength-sensitive lay		light source	T03-B02B1
	T03-B01B5P	light source control	T03-B02A7
non-erasable	T03-B01D7	multilayer disk drive	T03-B10A1
physical recording format	T03-B01F	multiple head drive	T03-B10M
pit details	T03-B01F5	multiple head systems	T03-B02A8
protective layers	T03-B01C	multiple optical path	T03-B02B7M
read-only	T03-B01D7A	optical drive	T03-B10
recycling and destroying	T03-B01R	optics	T03-B02B5
reflective layers	T03-B01C		T03-B02B6
substrate	T03-B01A		T03-B02B7
super resolution carrier	T03-B01D4	optimisation methods	T03-B05A1
tape carrier	T03-B01D5	photodetector	T03-B02B3
•	T02 D01D7C	in a landata an anada a	TAR DARDEC
WORM	T03-B01D7C	polarising optics	T03-B02B7C
WORM  Optical record carrier manufacture	T03-B01E	polarising optics reading/writing	T03-B06
WORM  Optical record carrier manufacture cleaning	T03-B01E T03-B01E3L	reading/writing	T03-B06 W04-C06
WORM  Optical record carrier manufacture cleaning coating application	T03-B01E T03-B01E3L T03-B01E3J		T03-B06 W04-C06 T03-B05A
WORM  Optical record carrier manufacture cleaning coating application coating equipment	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B	reading/writing recording methods	T03-B06 W04-C06 T03-B05A W04-C05
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M	reading/writing recording methods re-recording	T03-B06 W04-C06 T03-B05A
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A	reading/writing recording methods	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C	reading/writing recording methods re-recording	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S	reading/writing recording methods re-recording signal recording format	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P	reading/writing recording methods re-recording signal recording format super-resolution optics	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S	reading/writing recording methods re-recording signal recording format super-resolution optics	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B10E
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder track access servo track following servo	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B10E W04-C10B T03-B02A3C T03-B02A3D
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3G	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder track access servo track following servo track selection/following drive mo	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B10E W04-C10B T03-B02A3C T03-B02A3D
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder track access servo track following servo track selection/following drive mo	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B10E W04-C10B T03-B02A3C T03-B02A3D tor T03-
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P T03-B01E3L T03-B01E3P T03-B01E3B T03-B01E3B	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B10E W04-C10B T03-B02A3C T03-B02A3D
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate)	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P T03-B01E3L T03-B01E3P T03-B01E3B T03-B01E3B	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B10E W04-C10B T03-B02A3C T03-B02A3D otor T03-
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P T03-B01E3B T03-B01E3B T03-B01E3B T03-B01E3B T03-B01E3L T03-B01E3L	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic)	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B10E W04-C10B T03-B02A3C T03-B02A3D tor T03- W04-C10A3 V07-G15 U21-B02C3
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate)	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P T03-B01E3L T03-B01E3P T03-B01E3B T03-B01E3B	reading/writing  recording methods  re-recording signal recording format  super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B10E W04-C10B T03-B02A3C T03-B02A3C T03-B02A3D stor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X testing  Optical recording	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3C T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3D T03-B01E3L T03-B01E3L	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B10E W04-C10B T03-B02A3C T03-B02A3D tor T03- W04-C10A3 V07-G15 U21-B02C3
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X testing	T03-B01E T03-B01E3L T03-B01E3B T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3C T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3C T03-B01E3C T03-B01E3C T03-B01E3C	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters  Optical testing	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B10E W04-C10B T03-B02A3C T03-B02A3D dtor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X testing  Optical recording	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3C T03-B01E3P T03-B01E3L T03-B01E3G T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3D T03-B01E3L T03-B01E3L	reading/writing  recording methods  re-recording signal recording format  super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters  Optical testing absorption with light modulation	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B10E W04-C10B T03-B02A3C T03-B02A3C T03-B02A3D stor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A V07-K01B
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X testing  Optical recording record carrier - see Optical record.	T03-B01E T03-B01E3L T03-B01E3L T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3D T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E1A T03-B01E3L T03-B01E3L T03-B01E3C T03-B01E3C T03-B01E3C T03-B01E3C	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters  Optical testing	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B10E W04-C10B T03-B02A3C T03-B02A3C T03-B02A3D stor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A V07-K01B  S03-E04A5A ag apparatus)
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X testing  Optical recording record carrier - see Optical recording equipment audio disk player/recorder	T03-B01E T03-B01E3L T03-B01E3B T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3C T03-B01E3P T03-B01E3L T03-B01E3B T03-B01E3B T03-B01E3P T03-B01E3P T03-B01E1A T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L	reading/writing recording methods re-recording signal recording format super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters  Optical testing absorption with light modulation apparatus (see also Optical testing	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B10E W04-C10B T03-B02A3C T03-B02A3C T03-B02A3D otor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A V07-K01B  S03-E04A5A ag apparatus) S03-A
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X testing  Optical recording record carrier - see Optical record carrier - see Optical record udio/video	T03-B01E T03-B01E3L T03-B01E3L T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3L T03-B01E3P T03-B01E3P T03-B01E1A T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L	reading/writing recording methods re-recording signal recording format  super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters  Optical testing absorption with light modulation apparatus (see also Optical testing atomic absorption spectrometry	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B02B6 T03-B02A3C T03-B02A3C T03-B02A3D stor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A V07-K01B  S03-E04A5A ag apparatus) S03-A S03-E04A5G
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate adhesion (multi-substrate testing)  Optical recording record carrier - see Optical record carrier - see Optical record audio/video beam splitter	T03-B01E T03-B01E3L T03-B01E3L T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3P T03-B01E1A T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L	reading/writing recording methods re-recording signal recording format  super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters  Optical testing absorption with light modulation apparatus (see also Optical testin atomic absorption spectrometry attenuated total reflection	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B02B6 T03-B02A3C T03-B02A3C T03-B02A3D stor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A V07-K01B  S03-E04A5A gapparatus) S03-A S03-E04A5G S03-E04A5S
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate B01E3X testing  Optical recording record carrier - see Optical record carrier - see Optical record udio/video	T03-B01E T03-B01E3L T03-B01E3J T03-B01E1B T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3C T03-B01E3F T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3P T03-B01E3D T03-B01E3D T03-B01E3D T03-B01E3D T03-B01E3D T03-B01E3D T03-B01E3D	reading/writing  recording methods  re-recording signal recording format  super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive model and the selection of the selection of the selection of the selection of the selection of the selection of the selection of the selection of the selection of the selection of the selection optical of the selection optical optical optical optical optical optical optical optical testing absorption with light modulation apparatus (see also Optical testing atomic absorption spectrometry attenuated total reflection bioluminescence	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B10E W04-C10B T03-B02A3C T03-B02A3D ttor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A V07-K01B  S03-E04A5A T03-E04A5A T03-E04A5G S03-E04A5S S03-E04E
WORM  Optical record carrier manufacture cleaning coating application coating equipment mastering equipment master production metal master/mother production multistep process packing manufactured carriers polishing pressing shipment stamper stamper cleaning/polishing stamper production substrate adhesion (multi-substrate adhesion (multi-substrate testing)  Optical recording record carrier - see Optical record carrier - see Optical record audio/video beam splitter	T03-B01E T03-B01E3L T03-B01E3L T03-B01E1B T03-B01E1M T03-B01E3A T03-B01E3C T03-B01E3S T03-B01E3P T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3P T03-B01E1A T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L T03-B01E3L	reading/writing recording methods re-recording signal recording format  super-resolution optics tape player/recorder  track access servo track following servo track selection/following drive mo B02A3A video disk player/recorder  Optical switching proximity (electronic) using electro-optical devices using shutters  Optical testing absorption with light modulation apparatus (see also Optical testin atomic absorption spectrometry attenuated total reflection	T03-B06 W04-C06 T03-B05A W04-C05 T03-B07 T03-B05 W04-C05 T03-B02B6 T03-B02B6 T03-B02A3C T03-B02A3C T03-B02A3D stor T03- W04-C10A3 V07-G15 U21-B02C3 V07-K01A V07-K01B  S03-E04A5A gapparatus) S03-A S03-E04A5G S03-E04A5S

chemiluminescence	S03-E04E	feedthroughs	V07-H03
colour/ spectral properties	S03-E04A	ferrules	V07-G02A
compensation	S03-E04P	fibres - see <b>Optical fibre</b>	V07-F01A1
contamination detection	S03-E04F1	fittings	V07-H02
cuvettes	S03-E04X	installations	V07-H03
dichroism	S03-E04B5	installing, excess management	V07-H04
diffraction	S03-E04B5	installing, method/equipment	V07-H01
electroluminescence	S03-E04D	integrated sensors	V07-F01A5S
electrooptical detection	S03-E04A1	manufacture methods	V07-F01A3A
ellipsometry	S03-E04B5	manufacturing equipment	V07-F01A3C
examination of jewels	S03-E04F3	measurements of guide characteri	
flaw detection	S03-E04F2		V07-J
fluorescence	S03-E04D	mode selector/converter	V07-F03
granular solids	S03-E04H	packages, modules	V07-G13
impurity detection	S03-E04F1	planar	V07-F01A4
interference	S03-E04B5	polarisation independent	V07-F01A6
lenses and lens systems	S02-J04A5	reels	V07-H04
light guide structures	S02-J04A1	repair, maintenance	V07-F01B2
light transmission	S03-E04B1A	rod slab	V07-F01A V07-F01A4
materials, using radiation at two	S03-E04A4		V07-F01A4 V07-H02
wavelengths microscopy	S03-E04A4 S03-E04R	splice cases splicing - see <b>Optical couplers</b>	V07-H02 V07-G10B
	S03-E04K S03-E04G		V07-G10B V07-H01
monitoring of moving sheets moving fluids	S03-E04H	splicing equipment structures	V07-F01A
optical fibre	S02-J04A1A	thin film	V07-F01A5
optical fibre/ guide structures	V07-J		
photoelectric effect	S03-E06D	Optics (printer)	S06-D03
polarisation	S03-E04B5		S06-E03B
properties of materials	S03-E04	Optimum control system	T06-A05
Raleigh scattering	S03-E04C	using algorithms	T06-A05C
Raman scattering	S03-E04D1	Opto-electronic devices	U12-A
Raman spectrometry	S03-E04D1	Opto-electronic integrated circuit	U13-D04A
refraction	S03-E04B5	_	010 00 17 (
refractive index	S03-E04B5	Opto-electronic integrated circuit manufacture	1111 C10D4
scattering in flowing fluid	S03-E04C1		U11-C18B4
scattering in material in container	S03-E04C2	Opto-electronic logic circuit	U21-C01G
scattering/ diffuse reflection	S03-E04C	Opto-receiver amplifier	U24-G01A5
specular reflectivity	S03-E04B1B	Optocouplers	U12-A02C1
surface plasmon resonance	S03-E04B5		U12-A02C1
testing equipment	S03-E04P	Optoisolators	
turbidity	S03-E04B1A	Order telegraph	W05-A04C
Tyndall scattering	S03-E04C	Organ, musical instrument	
wavelength dependent absorption	nS03-E04A5	electronic	W04-U01
Optical testing apparatus	S02-J04B	pipe	P86-A01C1
colorimeter	S03-A02C	reed	P86-A01C3
endoscope	S02-J04B3C	Organic photoconductive layer	S06-E01A1
endoscope, for medical purposes	S05-D04	Organic semiconductor devices	U12-B03C
fibrescope	S02-J04B3A	film deposition	U11-C01J5
microscope	S02-J04B1	light emitting diodes with organic	
polarimeter	S03-A02C	ngm emitting diodes with organic	U12-A01A1E
spectrometer	S03-A02	0	
spectrophotometer see also <b>Opti</b>	-	Organiser	T01-J11F
	S03-A02		T01-N03A3
<b>Optical Time Domain Reflectometry</b>	S03-E04C	Orientation	
optical fibre testing	S02-J04A1A	measurement for surveying	
	V07-J	and navigation	S02-B05A
Optical waveguides	V07-F01	Orientation detection using pattern	
clamps	V07-H02	recognition	T04-D07D5
conduits	V07-H03	Orientation flat, semiconductor wafe	er
dispensers (for installing)	V07-H01	positioning	U11-F02B
distribution boxes	V07-H02		
ducting	V07-H03		

Orientation switch	V03-C06C
Orthogonal multiplex systems	W02-K07E
Orthogonal Time Frequency Multipl	exing (OTFM) W02-K07E
Oscillator	
atomic	U23-A06
clock or watch timing source	S04-B02
crystal	U23-A01A
dielectric resonator LCR	U23-A01B2 U23-A01B
LCR distributed constant elements	
LCR lumped constant elements	U23-A01B1
MEMs	U23-A01A2
microwave	U23-Q
negative resistance type	U23-A02
output control	U23-E01
quartz crystal	U23-A01A
receiver local oscillator SAW type	W02-G03A7 U23-A01A1
spin torque (STO)	U23-A01A1
sinusoidal	U23-A
temperature compensation	U23-E05
transit time	U23-A02
transmitter	W02-G01A1
tunnel diode	U23-A02
Oscilloscope	S01-C01
probe	S01-H03B
OSD for recording apparatus	W04-J03C
OSD for TV receiver	W03-A13G
channel number display	W03-A01C
	W03-A13G
OSI layer protocol	W01-A06F
Osmosis measurement	S03-F04
Osmotic power generation	X11-B09
	X15-C
OTDR - See Optical Time Domain Reflectometry	
Output control, X-ray apparatus	
incorporating protection features	V05-E02C5
limiting output level	V05-E02C5C
for flash operation	V05-E02C1
Oven	V07 C07
combination	X27-C07
electric electric, using halogen lamp	X27-C02 X27-C02A
fan-assisted electric oven	X27-C02A
industrial cooking / baking equipm	
3 3 1 1	X25-P01A
furnace, see <b>Furnaces</b>	
microwave - see Microwave oven	
toaster, grill	X27-C03B
Oven control, oscillators	U23-E05
Overcurrent protection	X13-C01A
Overhead distribution / power line railway	X12-G05 X23-A03A
Overhead transmission line	
connector/fitting - see Cable	

Overload protection	
electric power system	X13-C01A
	X13-C04A
electronic circuits	U24-F
telephone circuits	W01-C08A
transducers, general	S02-K02C
transducers, pressure measurem	
	S02-F04E
Overmodulation avoidance (TX)	W02-G04B1
Oversampling	
AD conversion	U21-A03F6B
AD converter architecture	U21-A03A
Overspeed protection for motor	X13-C02
	X13-C04C
Overstress indicator, PCB, manufa	cture V04-R20
Overvoltage protection	X13-C01C
Ovshinsky-effect devices	U12-B02
Oxidation, insulating thin film forn	nation
for semiconductor manufacture	U11-C05B1
Ozone	
manufacture	X25-X04
removal, in printer	S06-K06B
Ozoniser	X12-F03
air conditioning	X27-E01B2

P		phototransistor, photodiode or	
D.N. iverstion IC commons to a letie	- U11 C00 A 1	photoresistor	U12-A02B3
P-N junction, IC component isolation	n U11-C08A1	pin insertion type	U11-D01A1
PA systems	W04-S05	power supply	U11-D03C1A
	V06-V04A5	protection against electrostatic di	
amplifiers	W04-S05A		U11-D01C3
microphones	W04-S05C	protection against radiation	U11-D01C2
mixing desk	W04-S05A	protection from inspection, revers	
stands	W04-S05C	engineering	U11-D01C3
wireless microphones	W04-S05C1	protection fuses inside packages	
Pacemaker, heart	S05-A01A	resin encapsulation	U11-E02A1
control aspects	S05-A01A5	sealants	U11-A07
demand type	S05-A01A1	short circuit prevention	U11-D01C9
electrode	S05-A02A	solar cell	U12-A02A1
power supplies	S05-A01C	substrates	U11-D01A
remote programming	S05-A01A5A	substrates, multilayer	U14-H03F
		TAB packages	U11-D01A1
Packages for semiconductor device		to a continue to different and	U11-D01A3
assembling	U11-E	tape automated bonding	U11-E01B
assembly	U11-E02A2	terminals, pins with special shape	
attaching covers, sealing device	U11-E02A2	testing (air tightness, encapsulation	
attaching leads	U11-E01	moisture resistance)	U11-F01E
bare chip mountings	U11-D01A9	thermal protection	U11-D01C6
card type	U11-D01A7	thin film	U14-H01D
carrier tapes	U11-D03A1B	transport, carrier lines	U11-F02A4
ceramic type	U11-D01A1	wafer scale	U11-D01A8
chip on board (COB)	U11-D01A3A	window structures for ROMs, imag	
chip/substrate connection, hybrid			U11-D01C1
circuits, multichip package	U14-H05	wire bonding	U11-E01A
die bonding	U11-E02A3	zigzag in line (ZIP)	U11-D01A1
discrete device	U11-D01B	Packaging	Q31-Q34
dual-in-line (DIP)	U11-D01A1 U11-D01C5		X25-F03A
electromagnetic shielding encapsulants	U11-A07	aerosol containers	Q32-A05B
encapsulated	U11-D01A1	apparatus (packaging apparatus)	Q31
encapsulation	U11-E02A		X25-F03
encapsulation encapsulation for hybrid, multichi		barriers (gas, oxygen, moisture ba	arriers)
packages	U14-H05		Q32-D01C
packages	U14-H04B	bottling	Q31-A01A
flip chip	U11-E01C		X25-F03A
forming lens on package	U11-E02A9	caps - see L <b>ids</b>	Q32-C
gang bonding	U11-E01B	container, types of -	Q32-A
glob top	U11-D01A3A	ampoules	Q32-A02
high density	U11-D01A6	bags	Q32-A15
high frequency package	U11-D01A4	barrels	Q32-A05C
holders	U11-D01Q	baskets	Q32-A10
hollow type	U11-D01A1	blister packaging	Q32-A17
hybrid circuits	U14-H05	bottles	Q32-A01
input/output pad layout	U11-D03C1A	boxes	Q32-A08
lasers	U12-A01B3	buckets	Q32-A99
	V08-A04A	cable ties	Q32-T01B
lead frame type	U11-D01A1	cans	Q32-A05
lead frames	U11-D03A1A	cargo containers	Q32-A30
light emitting diodes	U12-A01A4	cartons	Q32-A08
light emitting diodes (white light)		casks	Q32-A05C
marking	U11-E02B3	collapsible tubes	Q32-A16
memories	U14-A10	crates	Q32-A08
metallic type	U11-D01A1	cups	Q32-A20
moisture barrier package adaptat	-	drawer-and-shell	Q32-A09
	U11-D01C9	drums	Q32-A05B
multichip modules	U11-D01A6	envelopes	Q32-A15
		films, wrapping -	Q32-A18
		jars	Q32-A04

juice boxes	Q32-A03	recyclable packaging	Q33-J03
large containers (tanks)	Q32-A03	renewable sources	Q33-J02
milk cartons	Q32-A30	thermocol	Q33-302 Q33-B
pouches	Q32-A05	wood	Q33-E
resealable packaging	Q32-A15A	method (packaging method)	Q31
sacks	Q32-A15A	modified atmosphere packaging (	
shipping containers	Q32-A13	modified authosphere packaging (	Q32-D01A
shrink packaging	Q32-A30 Q32-A18A	refilling (prevention of)	Q32-D01A Q32-D07
silo	Q32-A10A Q32-A30	safety features	Q32-D07 Q32-D03
skin packaging	Q32-A30 Q32-A17	self-cooling	Q32-D03 Q32-D02
tanks	Q32-A17 Q32-A05B	self-heating	Q32-D02 Q32-D02
tanktainers	Q32-A03B Q32-A30	special environment	Q32-D02 Q32-D01
	Q32-A30 Q32-A09	television	W03-A19G
trays constructional details	Q32-A07	tamper evident	Q32-D03A
collapsible	Q32-B05	tamper evident tamper resistant	Q32-D03A Q32-D03B
foldable	Q32-B04	trackable/traceable packaging	Q32-D03B Q32-D03A
handles	Q32-B04 Q32-B06		Q32-D03A Q32-T
inspection windows	Q32-B06 Q32-B99	transit packaging air pouches	Q32-T02
label holder	Q32-B99	bubble wrap ®	Q32-T02 Q32-T02
	Q32-B99	cable ties	Q32-T02 Q32-T01B
lining	Q32-B99	encapsulated air plastic sheetin	
partitions/dividers reinforcements	Q32-B03	external packaging	g Q32-T02 Q32-T01
walls			
	Q32-B01	flexible elongated elements	Q32-T01B
decorative features (e.g. wax seals		internal packaging	Q32-T02
foils)	Q32-D11	pallets / palletizing equipment	Q32-T01D
dispensing features	Q32-D06	plugs	Q32-T01A
electrical equipment	X25-F03A1	straps	Q32-T01B
electrical package	X25-F03A3	wrappers	Q32-T01C
electronic device (general)	V04-X01A	Packaging (types of goods package	
lids / caps	Q32-C	antibacterial hand gel	Q34-J03
bungs	Q32-C01G	antibacterial wipes/sprays	Q34-J04
corks deformable	Q32-C01G	AV equipment	W03-G10G
	Q32-C01D	bio-hazards	Q34-H03
films	Q32-C01H	building materials	Q34-G
gable tops	Q32-C02	chemicals	Q34-H01
non-removable	Q32-C02	coffee (pods/capsules)	Q32-A06
removable	Q32-C01	constructional materials	Q34-G
screw cap	Q32-C01A	cosmetic products	Q34-J03
seals	Q32-C01H	display	Q34-M02
secondary covers	Q32-D12	domestic items	Q34-N
snap action	Q32-C01B	electronic goods	Q34-M02
threaded	Q32-C01A	fertilizers	Q34-H01
general	V04-X01A	food (for human consumption)	Q34-C
goods being packaged	Q34	alcoholic drinks	Q34-C07C
materials	Q33	baby food	Q34-C08B
biodegradable	Q33-J01	bakery/confectionery	Q34-C05
cardboard	Q33-C	cereals	Q34-C03
ceramic	Q33-F	cheese	Q34-C04C
cloth	Q33-H	dairy products	Q34-C04
compostable	Q33-J01	eggs	Q34-C04B
earthenware	Q33-F	fruits	Q34-C02B
edible materials	Q33-J04	meat/fish	Q34-C01
energy efficient materials	Q33-J06	milk/yoghurt	Q34-C04A
fabric	Q33-H	nuts/seeds	Q34-C02C
fiberglass	Q33-B	oils/vinegars	Q34-C06C
glass	Q33-A	parenteral/enteral feeding	Q34-C08D
green packaging	Q33-J	pasta	Q34-C05
metal	Q33-D	prepared meals	Q34-C08A
microwaveable packaging	Q33-G	sauces/soups/pastes	Q34-C06B
paper	Q33-C	spices/herbs	Q34-C06A
plastic	Q33-B	sugar/sweeteners	Q34-C06D
polymer	Q33-B		004 0075
polystyrene	Q33-B	teas/coffees	Q34-C07B

vegetables	Q34-C02A	Packing/Unpacking	X25-F03A1
vitamins/food supplements	Q34-C08C	control	T06-D15
water/soft drinks	Q34-C07A		X25-F03A
food (for animal consumption)	Q34-D	food packing/canning	X25-P01X
animal food	Q34-D01	Pad grid array, semiconductor pack	age
animal supplements/health pro	Q34-D02		U11-D01A3
fuels	Q34-D02 Q34-H02		U11-D01A5
game console	Q34-M02	Pad, semiconductor terminal	U11-D03A2
gar materials	Q34-N02 Q34-B	PAFC	X16-C04
hazardous materials	Q34-H		
household items	Q34-N	Pagers	W05-A05C1A
household waste/garbage	Q34-H05	receiver details	W02-G03
hospital waste	Q34-H03	transceiver (answer-back)	W02-G02A3
human organs	Q34-J02	Paging centre	W05-A05C1E
kitchen appliances	Q34-M01	Paging system	W05-A05C2
lightbulbs	Q34-M99	radio system aspects	W02-C03C3
liquids/semi-liquids	Q34-B	selective call (radio) aspects	W01-B05A5
machine parts/tools	Q34-K02	telephone exchange aspects	W01-C02B7A
make-up	Q34-J03	telephone network aspects	W01-C05A
medical	024 100	Pain threshold sensing	S05-D01X
bandages	Q34-J02	Paint hanger for spraying or other	
human organs	Q34-J02 Q32-D01	liquid application	P42-T05E
instruments	Q34-J02	ilquid application	142-103L
tablets/medicines	Q34-J02 Q34-J01	Paint spray booth	P42-T20
musical instruments	Q34-301 Q34-T	Tunic spray bootin	P42-U14H1
nuclear waste	Q34-H04	Do int atvisor ov	X25-X
oils (industrial)	Q34-H02	Paint stripper	X25-X X27-X
papers/magazines	Q34-F	5 1 d H ( ) (1 )	
pharmaceuticals	Q34-J01	Paintball (sport/leisure)	P36-A04
photovoltaic panels/cells	Q34-M99		W04-X01K4E
powders	Q34-A	PAL - see Logic arrays, integrated ci	
radioactive waste	Q34-H04	programmable logic arrays	U13-C04C
skincare products	Q34-J03	Palm recognition	T04-D07F2
smart meters	Q34-M99	Pancake, for magnetic record carrie	er storage
solar panels/cells	Q34-M99		T03-A02D5
solids	Q34-A	Daniel was disabassas disabass	
sport items textiles	Q34-T Q34-E	Panel, gas discharge display	V05-A01
tobacco products	P15-T04	Panoramic receiver	S01-D03C1
tobacco products	Q34-L	Paper	
toiletries	Q34-L Q34-J03	analysis	S03-E14G
tools	Q34-K02	book binding	X25-T
toys	Q34-T	cardboard manufacture	X25-T09B
vehicle parts/tyres	Q34-K01	decurling, in electrophotographic	
white goods	Q34-M01		S06-K02E
acket data transmission	W01-A03B	dielectric, treatment and manufac	
assembler/disassembler (PAD)	W01-A03B	ala atronia	S06-E01X
GPRS mobile phone aspects	W01-C01D3	electronic	W05-E10
	W01-C01G6G	for computer ink jet printer heat sensitive for computer printe	S06-G05
GPRS system aspects	W01-B05A1A	jam clearing, in copier	S06-k02B
,	W01-C05B3J	manufacture	X25-T09
	W02-C03C1A	other paper industry aspects	X25-T09G
Push to talk over packet network,		paper and envelope handling	X25-F02A
mobile phone aspects	W01-C01D3C	paper manufacture	X25-T09A
	W01-C01G6H	paper manufacture, control	T06-D03A
store and forward switching	W01-A06G2	paper shredding / cutting	X25-T09C
acket switching, general		photosensitive, for computer prin	
and audio/video	W02-K03	press	X25-A02A
		recycling	S06-K04A
		recycling processes / systems	X25-W04

shredding	P41-A04 P41-V12	Particle accelerator cyclic	X14-G X14-G02
	T04-X	linear	X14-G01
	X25-J	Particle beam treatment, semicondu	ıctor
	X27-A02C	rancie beam treatment, semicondo	
stapling, binding in copier	S06-K05A		U11-C03B
thermal, for computer printer	S06-H01		U11-C03E
Paperweights	P77-D	Particle counter	S03-F06C
Paper, feeding		Particle detector	V05-H
conveying/feeding arrangements	P74-C09	Particle separator tube	V05-J01
printer, sheet feeding	S06-K02	combination with chromatography	y apparatus
media feeding	T04-J01		V05-J01K
Paper making		control	V05-J01M
boxes	P72-B01	detection system	V05-J01J
cartons	P72-B02	interface with other equipment	V05-J01K
control	T06-D03A	ion-optical systems	V05-J01G
	X25-T09	ionising arrangements	V05-J01E
corrugated	P72-B07	monitoring	V05-J01M
cups	P72-B03	sample introduction arrangement	
electrophotography	S06-E01X	Particle size measurement	S03-F05C
envelopes	P72-B05	Particle spectrometer	
embossing/corrugating	P72-A07	combination with chromatography	y apparatus
manufacturing equipment/machi paper bags	P72-B06		V05-J01K
tubes/cylinders/cones	P72-B04	control of	V05-J01M
types of paper articles and shapes	-	detection systems	V05-J01J
types of paper working	P72-A	interface with other equipment	V05-J01K
Paper recycling	P72-A10	ion-optical systems	V05-J01G
	X25-T09G	ionising arrangements	V05-J01E
	X25-W04	monitoring	V05-J01M
printer	S06-K04A	sample introduction arrangement	
Paper shredder	P41-A04	Particle trapping in disk drives	T03-F02G1
	P41-V12	Party line selection, telephone	W01-B04
	T04-X	Party line system, telephone	W01-C04
	X25-J	Pass-fail test, production line	T05-E
5	X27-A02C	-	103 E
Paper towel dispenser	X27-X X25-F03	Passivation insulating layer, for semiconductor manufacture	U11-C05B9A
	A25-F05		011-C03B7A
PAPR (peak to average power		Passwords	W04 C04EE
ratio control)	W02-G04B1	call sceening, subscriber end	W01-C01F5
Parabolic aerial reflector	W02-B03B1A	computer system data networks	T01-N02B1B W01-A05B
Parachutes	W06-B09	data networks	W01-A05B W01-A06E1C
Parallax-based 3D video display	W03-A08E8	But the state of t	
r dranax basea ob trace display		Paste dielectric for electrolytic capa	
	W03-A12A	Pasteurization - see Milking, milk p	rocessing
Parallel bus logic interface	U21-C02C		X25-P01C
Parallel-series code conversion - se		Patient	
conversion, parallel/series	U21-A05B	monitoring during surgery	S05-B04
Parametric audio systems	W04-S05P	surgical instrument monitoring	S05-B04A
Parity error detection		table, positioning for radiation dia	gnosis
data recording	T03-P01A		S05-D02E
data transmission	W01-A01B1A	Pattern generator (video)	W04-M07
digital computer	T01-G01A1	Pattern recognition	T04-D
general	U21-A06A2	character containing code marks	T04-D01
Parking system		colour	T04-D01
control	T07-F	detecting defect in pattern	T04-D07A
meter	T05-G03A	detecting movement	T04-D07D1
Parsing	T01-J11A1	detecting position or orientation	T04-D07D5
mark up language	T01-J11C3	edge recognition	T04-D03B
·	T01-N03B2B	hand written character	T04-D07E
	·		

Payment freed apparatus  banknote operated  coin operated mechanism  coin testing or sorting  construction  control systems  T05-H03  T05-H08C  substrate, multilayer ceramic  testing - see PCB testing  three-dimensional  types  PCB manufacture	ed V04-R07E1 V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R06
image preprocessing noise reduction T04-D03A non-visible image T04-D07K recognition per se sorting objects T04-D07B system error detection vehicle licence plate T04-D07C T07-A03C5A  Pattern transfer, masking techniques Danknote operated coin operated mechanism coin testing or sorting construction control systems T05-H08C Substrate, material substrate, metal-clad substrate, metal-clad, double-si substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad substrate, metal-clad substrate, metal-clad substrate, metal-clad substrate, metal-clad, double-si substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad sub	U14-H03 V04-R07D V04-R07L X12-E V04-R07E ded V04-R07E2 ed V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R07A1
noise reduction non-visible image recognition per se sorting objects respectively recognition per se sorting objects recognition per se recognition per se recognition per se recognition per se rod-D07B system error detection rod-D05 rehicle licence plate rod-D07C T07-A03C5A  Pattern transfer, masking techniques Payment freed apparatus banknote operated roin operated mechanism roin testing or sorting construction ronstruction rounding view substrate, metal-clad substrate, metal-clad substrate, metal-clad sub	V04-R07D V04-R07L X12-E V04-R07E ded V04-R07E2 ed V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R07A1
non-visible image T04-D07K recognition per se T04-D04 sorting objects T04-D07B system error detection T04-D05 vehicle licence plate T04-D07C T07-A03C5A  Pattern transfer, masking techniques U11-C04D  Payment freed apparatus T05-H banknote operated T05-H02A coin operated mechanism T05-H01 coin testing or sorting T05-H03 construction T05-H08C substrate, metal-clad, double-si substrate, metal-clad, single-sid substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, multilayer substrate, metal-clad, single-sid substrate, metal-clad, substrate, metal-clad, substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-si	V04-R07L X12-E V04-R07E ded V04-R07E2 ed V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R06
recognition per se sorting objects T04-D04 sorting objects T04-D07B system error detection T04-D05 substrate, metal-clad, double-si substrate, metal-clad, single-sid substrate, metal-clad, substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad	X12-E V04-R07E ded V04-R07E2 ed V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R06
sorting objects system error detection vehicle licence plate  T04-D05 T07-A03C5A  Pattern transfer, masking techniques Danknote operated coin operated mechanism coin testing or sorting construction control systems  T04-D07C T07-A03C5A T07-A03C5A  Substrate, metal-clad, double-si substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, double-si substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, double-si substrate, metal-clad, single-sid	V04-R07E ded V04-R07E2 ed V04-R07E1 V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R06
system error detection vehicle licence plate  T04-D05 T07-A03C5A  Pattern transfer, masking techniques D11-C04D  Payment freed apparatus banknote operated coin operated mechanism coin testing or sorting construction control systems  T05-H08C  substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, for substrate, metal-clad, single-sid substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, double-si substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, for substrate, metal	ded V04-R07E2 ed V04-R07E1 V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R06
vehicle licence plate  T04-D07C T07-A03C5A  Pattern transfer, masking techniques  Payment freed apparatus banknote operated coin operated mechanism coin testing or sorting construction control systems  T05-H08C  substrate, metal-clad, single-sid substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, metal-clad, single-sid substrate, multilayer substrate, mul	ed V04-R07E1 V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R06
T07-A03C5A  Pattern transfer, masking techniques  Payment freed apparatus  banknote operated  coin operated mechanism  coin testing or sorting  construction  control systems  T07-A03C5A  substrate, metal-cored substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, multilayer substrate, metal-cored substrate, metal-cored substrate, metal-cored substrate, metal-cored substrate, metal-cored substrate, metal-cored substrate, metal-cored substrate, multilayer sub	V04-R07B V04-R07A U14-H03F V04-R07A1 V04-R06
Pattern transfer, masking techniques U11-C04D  Payment freed apparatus banknote operated coin operated mechanism coin testing or sorting construction control systems  U11-C04D  substrate, multilayer	V04-R07A U14-H03F V04-R07A1 V04-R06
Payment freed apparatus  banknote operated  coin operated mechanism  coin testing or sorting  construction  control systems  T05-H02A  testing - see PCB testing  three-dimensional  types  PCB manufacture	U14-H03F V04-R07A1 V04-R06
banknote operated T05-H02A coin operated mechanism T05-H01 coin testing or sorting T05-H03 construction T05-H08A control systems T05-H08C  testing - see PCB testing three-dimensional types PCB manufacture	V04-R07A1 V04-R06
banknote operated T05-H02A coin operated mechanism T05-H01 coin testing or sorting T05-H03 construction T05-H08A control systems T05-H08C  testing - see PCB testing three-dimensional types  PCB manufacture	V04-R06
coin operated mechanism coin testing or sorting construction control systems  T05-H01 three-dimensional types  PCB manufacture	
coin testing or sorting T05-H03 types construction T05-H08C T05-H08C  Control systems T05-H08C  T05-H08C  T05-H08C  T05-H08C	
construction T05-H08A control systems T05-H08C PCB manufacture	V04-R05E
control systems 103-100C	V04-R05
dispensing cooked articles T05-H04A adhering metal layer	V04-R02
dispensing cold articles T05-H04B	V04-R07
dispensing discrete articles T05-H04 adhesion aids	V04-R02G
dispensing fluid, grain, electricity T05-H06 adhesive application, SMT	V04-R04B1
entertainment T05-H05E adhesive curing, SMT	V04-R04B1
hiring articles T05-H05A adhesive drying, SMT	V04-R04B1
magnetic card operated T05-H02C5A adhesive material, SMT	V04-R04B2
optical card operated T05-H02C5B applying conductive material	V04-R02
public telephone T05-H05C applying conductive material, e	
W01-C07A plating	V04-R02A
return of payment T05-H05A1 applying conductive material	X25-R04
reverse vending T05-H02E applying conductive material, e	V04-R02E
services T05-H05C	
smart card operated T05-H02C5C applying conductive material, so	V04-R02F
PC (personal computer)  T01-M06A  applying conductive material, sp	
PCB	V04-R02D
ATE S01-G01B3 assembling components, leader	
V04-R06G3 assembling electronic compone	
component bandolier V04-R04G1 assembling electronic compone	
component magazine V04-R04G1	V04-R04D1
conductive material V04-R02P assembling electronic components	ents,cutting leads
double-sided V04-R05B	V04-R04D1
flex-rigid V04-R05H assembling electronic components	ents,shaping leads
	V04-R04D1
holder/support V04-R09	
holder/support V04-R09 hybrid U14-H03 assembling electronic compone	
holder/support V04-R09 hybrid U14-H03 assembling electronic compone V04-R05G using adhesive	ents, SMT V04-R04B1
holder/support V04-R09 hybrid U14-H03 assembling electronic compone V04-R05G using adhesive flexible V04-R05D assembling electronic compone	ents, SMT V04-R04B1
holder/support V04-R09 hybrid U14-H03 assembling electronic compone V04-R05G using adhesive flexible V04-R05D assembling electronic compone mounting in computer T01-L02C surface-mounted	ents, SMT V04-R04B1 ents, V04-R04B
holder/support V04-R09 hybrid U14-H03 assembling electronic component vousing adhesive flexible V04-R05D assembling electronic component assembling in computer T01-L02C surface-mounted would blanking	ents, SMT V04-R04B1 ents,
holder/support hybrid U14-H03 V04-R05G flexible mounting in computer multilayer multilayer, ceramic V04-R09 U14-H03 v04-R05G v04-R05D assembling electronic componer assembling electronic componer surface-mounted blanking board conveying, general	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17
holder/support hybrid U14-H03 V04-R05G flexible mounting in computer multilayer multilayer, ceramic V04-R09 hybrid U14-H03 V04-R05G using adhesive assembling electronic compone surface-mounted blanking board conveying, general	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01
holder/support hybrid U14-H03 V04-R05G flexible mounting in computer multilayer multilayer, ceramic U14-H03B v04-R05D mounting in computer multilayer, ceramic V04-R05A printed antenna V04-Q06 hybrid U14-H03 V04-R05G using adhesive assembling electronic compone surface-mounted blanking board conveying, general board handling, general	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17
holder/support hybrid U14-H03 V04-R05G flexible mounting in computer multilayer multilayer, ceramic U14-H03B V04-R05D T01-L02C T01-L02C T04-R05A T0	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages
holder/support hybrid U14-H03 V04-R05G flexible mounting in computer multilayer multilayer, ceramic U14-H03B v04-R05D mounting in computer multilayer, ceramic U14-H03B v04-R05A1 printed antenna V04-Q06 w02-B07A3A printed connection V04-M05  assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone basembling electronic compone using adhesive assembling electronic compone basembling electronic compone using adhesive assembling electronic compone basembling electronic compone using adhesive blanking board conveying, general board handling, between proce	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17
holder/support hybrid U14-H03 V04-R05G flexible mounting in computer multilayer multilayer, ceramic U14-H03B v04-R05A1 printed antenna V04-Q06 printed connection V04-R05 V04-	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2
holder/support hybrid U14-H03 V04-R05G flexible wounting in computer multilayer multilayer, ceramic  printed antenna  v04-R05D To1-L02C To4-R05A To	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11
holder/support hybrid U14-H03 V04-R05G V04-R05D mounting in computer multilayer multilayer, ceramic U14-H03B v04-R05A1 printed antenna V04-Q06 printed connection V04-M05 V04-Q01 probe card rigid V04-R05C  V04-R05A  U14-H03B V04-R05A1 board conveying, general board handling, between proces CAD of wiring layout  component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component using adhesive assembling electronic component surface-mounted blanking board conveying, general board handling, between procent calculations component surface-mounted blanking board conveying, general board handling, between procent calculations component surface-mounted blanking board conveying, general board handling, between procent calculations component surface-mounted blanking board conveying, general board handling, between procent calculations component surface-mounted blanking board conveying, general board handling, between procent calculations component surface-mounted blanking board conveying, general board handling, between procent calculations component surface-mounted blanking board conveying, general board handling, between procent calculations component surface-mounted blanking	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11 V04-R02A
holder/support hybrid U14-H03 V04-R05G flexible W04-R05D mounting in computer multilayer multilayer, ceramic U14-H03B printed antenna V04-R05A1 printed connection  probe card rigid rigid-flex V04-R05H  U14-H03B V04-R05A1 V04-Q06 W02-B07A3A V04-Q06 V04-Q01 V04-Q01 CAD of wiring layout  assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer using adhesive assembling electronic componer surface-mounted blanking board conveying, general board handling, between procer CAD of wiring layout  chemical plating circuit pattern	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11 V04-R02A V04-R02
holder/support hybrid U14-H03 V04-R05G V04-R05D mounting in computer multilayer multilayer, ceramic  printed antenna printed connection  probe card rigid rigid-flex solder mask V04-R05H V04-R05G V04-R05H V04-R0	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11 V04-R02A V04-R02 V04-R04A5C
holder/support hybrid U14-H03 V04-R05G flexible Mounting in computer Multilayer Multilayer, ceramic  printed antenna  printed connection  probe card rigid rigid-flex Solder mask Solder mask Solder mask, permanent  V04-R05G V04-R05D W04-R05D T01-L02C T01-L	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11 V04-R02A V04-R02 V04-R04A5C X24-A01A
holder/support hybrid  V04-R09 hybrid  U14-H03 V04-R05G  v04-R05D  mounting in computer multilayer multilayer, ceramic  printed antenna printed connection  v04-R05  rigid rigid v04-R05 rigid-flex solder mask solder mask solder mask, permanent  v04-R04A2 soldering  v04-R04A2  v04-R04A2 soldering  v04-R04A2 soldering  assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone variace-mounted blanking board conveying, general board handling, between proce chemical plating circuit pattern clean flux cleaning, brush	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11 V04-R02A V04-R02A V04-R02A V04-R04A5C X24-A01A V04-R03C1
holder/support hybrid U14-H03 V04-R05G V04-R05D mounting in computer multilayer multilayer, ceramic  printed antenna printed connection  probe card rigid rigid-flex solder mask solder mask soldering sufface V04-R05 V04-R05A1 V04-R05A1 V04-Q06 W02-B07A3A V04-Q06 V04-Q01 V04-Q08 V04-R05C V04-R05H soldering v04-R04A2 soldering sassembling electronic compone using adhesive assembling electronic compone surface-mounted blanking board conveying, general board handling, between proce chemical plating circuit pattern clean flux cleaning, brush cleaning, CFC-free	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11 V04-R02A V04-R02A V04-R02 V04-R04A5C X24-A01A V04-R03C1 V04-R03C9
holder/support hybrid  V04-R09 hybrid  U14-H03 V04-R05G  v04-R05D  mounting in computer multilayer multilayer, ceramic  printed antenna printed connection  v04-R05  rigid rigid v04-R05 rigid-flex solder mask solder mask solder mask, permanent  v04-R04A2 soldering  v04-R04A2  v04-R04A2 soldering  v04-R04A2 soldering  assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone using adhesive assembling electronic compone variace-mounted blanking board conveying, general board handling, between proce chemical plating circuit pattern clean flux cleaning, brush	ents, SMT V04-R04B1 ents, V04-R04B V04-R13 V04-R17 X25-F01 V04-R17 essing stages V04-R17 T01-J15A2 V04-R11 V04-R02A V04-R02A V04-R02A V04-R04A5C X24-A01A V04-R03C1

PCB manufacture (continued)		leaded component mounting	V04-R04D
cleaning, ultrasonic	V04-R03C4	manufacturing metal foil	V04-R07P2
cleaning, vapour degreasing	V04-R03C2	mask registration	V04-R10
cleaning, wave bath	V04-R03C3	masking tape, plating	V04-R02R
component bandolier handling	V04-R04G1	material recovery	V04-R15
component feeding	V04-R04G	material recovery, conductive	V04-R15B
component magazine handling	V04-R04G1	material recovery, etchant	V04-R15A
component orienting	V04-R04G	mechanical component mounting	V04-R04
component placement machine	V04-R04F	mechanical metal removal	V04-R01C5
component placement machine,		mechanical metal removal, using l	aser
pick-and-place	V04-R04F3		V04-R01C5
component placement machine, i	robotic	metal foil manufacture	V04-R07P2
	V04-R04F1	metal layer deposition	V04-R07P4
component positioning	V04-R04G	metal removal	V04-R01C
conformal coating	V04-R03E	metal removal, chemical etching	V04-R01C1
cutting	V04-R13	metallising	V04-R02
de-soldering apparatus	V04-R03J	mounting electronic components	- see
	V04-R04A	PCB manufacture, assembling	
	X24-A02	electronic components	V04-R
de-soldering method	V04-R03J	multilayer substrate laminating	V04-R07P3
	V04-R04A	multistep processes	V04-R14
	X24-A01C	overstress indicators, mfr	V04-R20
defluxing	V04-R03C	photomask	V04-R01B
depositing (patterned)		photoresist	V04-R01A
metal layer on substrate	V04-R02	phototool	V04-R01B
depositing (un-patterned)		plating resist	V04-R02R
metal layer on substrate	V04-R07P4	plating through-holes	V04-R02C
drill smear removal	V04-R03G	plating via holes	V04-R02C
drilling holes	V04-R08	polishing	V04-R03
	X25-A03B	printed track	V04-R02P
drilling vias	V04-R08	printed track, baking	V04-R02Q
	X25-A03B	protective coating	V04-R03E
drying	V04-R03L	protective coating application	V04-R03E1
electroless plating	V04-R02A	protective coating application to s	
electroplating	V04-R02B		V04-R07P1A
	X25-R04	punching	V04-R08
embedding wire on substrate	V04-R02 V04-R02	recycling	V04-R15
embedding wire, encapsulating EMI shielding (screening) tracks	VU4-KUZ	removing electronic components repairing conductive pattern faults	
manufacture	V04-R19	resist	V04-R03A
evaporation	V04-R17	resist laminating, dry	V04-R01A5A
exposure	V04-R02L V04-R12	resist material	V04-R01A3A
flux material	V04-R04A5	resist, developing	V04-R01A6
nux material	X24-A01A	resist, developing	V04-R01A5
flux/solder cream/paste application		resist, liquid	V04-R01A4
R04A5A	511 VO-1	resist, protector	V04-R01A3
110 17 107 1	X24-A09	resist, stripping	V04-R01A2
flux/solder cream/paste application		resoldering components	V04-R03J
pressure dispensing	V04-R04A5A	RFI shielding (screening) tracks	
process and among	X24-A09	manufacture	V04-R19
flux/solder cream/paste application		screen printing conductive materia	
screen printer	V04-R04A5A	screen printing solder	V04-R04A5A
	X24-A09	contain priming contain	X24-A09
flux/solder cream/paste application		secondary treatment	V04-R03
stencil printer	V04-R04A5A	secondary treatment, cleaning	V04-R03C
	X24-A09	secondary treatment, drill smear re	
fluxless soldering	V04-R04A5C	secondary treatment, drill smear re	V04-R03G
holes drilling	V04-R08	cocondany treatment drains	V04-R03G V04-R03L
noies arilling	X25-A03B	secondary treatment, drying secondary treatment, protective co	
insulating layers of multilayer PCE		secondary treatment, protective co	V04-R03E
laminating metal foil to substrate	V04-R07P1	secondary treatment, protective co	
layout design	V04-R0711	application	V04-R03E1
.ayout acoign	. 3 / 10/ /	Г	. J 1 1100L1

accorder, treatment renairing		I ATE	CO1 CO1P
secondary treatment, repairing	V04-R03A	ATE	S01-G01B V04-R06G3
conductive pattern faults secondary treatment, soldering	V04-R03A V04-R03J	bare board	S01-G01B1
shearing	V04-R033 V04-R13	bare board	V04-R06A
SMT	V04-R13 V04-R04B	bare board, conductivity	S01-G01B1
solder excess removal	V04-R04B V04-R03J	bare board, conductivity	S01-G01B1
solder mask, application	V04-R033 V04-R04A2		V04-R06A3
solder mask, temporary	V04-R04A2F	bare board, isolation	S01-G01B1
solder material	V04-R04A5	bare board, isolation	S01-G04
Solder material	X24-A01A		V04-R06A1
soldering defects correction	V04-R03J	bed-of-nails contacts	S01-G01B
soldering inspection	V04-R04A7	Sea of flame serillasis	S01-H03A
ariariigpranii	V04-R06D3		V04-B01
	X24-A09		V04-M05
soldering, reflow	V04-R04A3		V04-R06G1A
<i>3.</i>	X24-A02E	contact probe	S01-G01B
soldering, reflow using hot gas	V04-R04A3J	·	S01-H03B
	X24-A02E		V04-B01
soldering, reflow using IR	V04-R04A3A		V04-M05
	X24-A02E		V04-R06G1
soldering, reflow using iron	V04-R04A3L	correct component position	V04-R04J
	X24-A02A		V04-R06D5
soldering, reflow using laser	V04-R04A3C	electronic imaging using CCTV	V04-R06J1C
	X24-A02E		W02-F
	X24-D03B	fixture	S01-G01B
soldering, reflow using thermal			V04-R06G
conduction	V04-R04A3G	fixture, wireless	V04-R06G4
11.	X24-A02E	flying-probes	V04-R06G1B
soldering, wave	V04-R04A1	generic probes	V04-R06G1C
	X24-A02C		V04-R06G
sputtering	V04-R02D	image processing	V04-R06J1C
	X25-A04	in-circuit	V04-R06D
substrate, depositing (patterned) metal layer	V04-R02	lands' position loaded board	V04-R06M S01-G01B3
substrate, depositing (un-patterne		loaded board	V04-R06D
metal layer	V04-R07P4	loaded board, correct component	
substrate, laminating metal foil	V04-R07P1	mounting	S01-G01B3
substrate, manufacture	V04-R07P	mounting	V04-R04J
substrate, metal foil manufacture	V04-R07P2		V04-R06D5
substrate, multilayer laminating	V04-R07P3	loaded board, correct component	
substrate, protective coating appl	ication		S01-G01B3
3 11	V04-R07P1A		V04-R04J
surface mounting electronic comp	oonents		V04-R06D5
	V04-R04B	loaded board, functional	S01-G01B3
testing (see also <b>PCB testing</b> )	V04-R06		V04-R06D1
testing, correct component moun		loaded board, in-circuit	S01-G01B3
	V04-R06D5		V04-R06D1
testing, correct component prese		loaded board, soldering	S01-G01B3
	V04-R06D5		V04-R04A7
through-hole mounting	V04-R04D		V04-R06D3
through-hole plating	V04-R02C	MEMS probes	V04-R06G5
vias driling	V04-R08	non-contact probes	V04-R06G2
	X25-A03B	optical	S03-E04
vias plating	V04-R02C	and all and an area and the	V04-R06J1
waste decontamination	V04-R16	optical pattern recognition	T04-D
waste disposal	V04-R16		T04-D07A
wiring	V04-R04C	antical visual inspection	V04-R06J1C
PCB testing	S01-G01	optical, visual inspection probes, non-contact type	V04-R06J1A V04-R06G2
-	V04-R06	probes, non-contact type probes, MEMS type	V04-R06G2 V04-R06G5
artwork	V04-R06M	techniques	V04-R06J
assembled board	S01-G01B3	traces	V04-R06M
	V04-R06D	wireless fixture	V04-R06G4
		1 5.655 17.0416	

y rave	V04-R06J2	brushes	P24-E
x-rays PCR testing	S03-E09F	calorie counter	X27-A02
rck testing		clothing, electrical details	X27-A02B1
	S05-C	clothing, non-electrical details	P21
PDP - see Plasma display		clothing, footwear	P22
Peak current measuring	S01-D01A3	clothing, garments	X27-A02B1A P21
Peak detector	U24-C03A	clothing, heater	X27-A02B1
Peak to average power ratio		clothing, lighting (application)	X26-U99
control	W02-G04B1	clothing, manufacture	X27-A02B1
Peak voltage measuring	S01-D01A3	aladeta a collega a calcalata a la secta a	P21-M
Pedestrian crossing, manual switch	T07-C03	clothing with attachable electric pa A02B1F	arts XZ/-
Pedicure equipment	P24-C03	clothing with built in mobile teleph	none
Pedometer	S02-B12B		W01-C01A3G
Peer-to-peer network	T01-N02A2E	clothing with integral electric parts	
	W01-A06B8C	camping equipment connector	P24-D V04-M30P
Peltier effect devices - see Thermoe		cosmetics aids	X27-A02
devices	U14-E05 X27-F02B1	cosmetic products	P24-C04
Delter wheel	X11-B01	diary	X27-A02C
Pelton wheel		dietetic aid	X27-A02
Pen	X27-A02C	filing system footwear, manufacture	X27-A02C X27-A02B1B
Pen holder	P77-D	Tootwear, managedre	P22-M
Pen recorder	\$02-K05	glasses	X27-A02D
B	S06-K99E	glasses, anti-glare	X27-A02D
Pencil sharpener	X27-A02C	glasses, lens manufacture	X25-A05 X25-A06
Pentode, vacuum tubes	V05-B01A7		X27-A02D
Percussion-based musical instrumer	nts P86-A05 W04-U02C	glasses, manufacture	X27-A02D
B		goggles	X27-A02D
Percussion welding	X24-B09	handbag	X27-A02C P24-B
Peripheral equipment power supply	/104-L02	heating pad	X27-A02
Perishable goods time indication	S04-C07	aug paa	X27-E02
		helmet	X27-A02B1A
Permanent magnet manufacture	V02-E01 V02-H04	handara Barranal barriana	P21-F
material, hard alloy/metal	V02-A01A1	hygiene - see <b>Personal hygiene</b> jewellery	X27-A02A X27-A02B2
material, hard non-metallic	V02-A01B1	jewenery	P23-C
Permeability measurement		jewellery, brooch	X27-A02B2
magnetic	S03-E11		P23-C01
magnetic - see also <b>Magnetic pro</b>	perties S01-E02X	jewellery, eye-catching effects jewellery, necklace	X27-A02B2 X27-A02B2
of porous materials	S03-F06B	Jewellery, Hecklace	P23-C02
Permeable base transistor - see Fiel		key finder	X27-A02
transistor, with static induction	U12-D02C	life jacket	X27-A02B1A
Permittivity measuring	S01-D05A3	lunch box	X27-A02 P24-B
Perpendicular magnetic recording		manicure and pedicure equipmen	
magnetic head	T03-A03D	medication ingestion reminder	X27-A02
record carrier	T03-A01D	mirror	X27-A02
Perpetual calendar	P85-A50C	mirror (no alcot aiza)	P27-B01
Perpetual motion machine	V06-M06	mirror (pocket-size) notepad	P24-C05 X27-A02C
	X11-H09	pen	X27-A02C
Personal article	X27-A02	powder compact	X27-A02
arm/waist band badge	X27-A02B1 X27-A02B1	rucksack/backpack	X27-A02B1
badge bag	X27-A02B	shaving equipment	P24-B P24-C02
- <del>- 3</del>	X27-A02C	shoe polisher	X27-A02
briefcase	X27-A02C	shoes	X27-A02B1B

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	shoes, heater	X27-A02B1B	towel dispenser	X27-A02A
	shoes, manufacture	X27-A02B1B	washer	X27-A02A
		P22-M	weighing scale	X27-A02A
	spectacles	X27-A02D	Personal safety alarm, anti-mugging	3
	static dissipation band	X27-A02B1		W05-B01D5
	suitcase	X27-A02C		
		P24-B	Personal safety alarm	W05-B07
	umbrella	X27-A02	accidental falling into water alarm	
		P24-A02	aged persons protection	W05-B07C
	walking stick	X27-A02E	dangerous gas alarms	W05-B07L
		P24-A01	detect person in hazardous area	W05-B07K
Per	sonal calling arrangements	W05-A	driver/pilot/passenger protection	W05-B07E
	acoustic and visual signalling	W05-A04A		X22-E04A
	answer-back pager	W02-G02A3	industrial worker protection	W05-B07A
	electromagnetically-operated indi	cators	infirm persons protection	W05-B07C
		W05-A03X	person overboard alarm	W05-B07J3
	monitoring	W05-C		W06-C01B
	pagers	W05-A05C1A	swimming pool alarm	W05-B07J1
	vibration signalling	W05-A01A1	triggered by body position or attit	
	visible indication	W05-A03	triggered by lack of activity	W05-B07G3
Per	sonal calling transmission mediu	m	triggered by medical equipment failure	WOE DOZCEC
. •.	electric transmission	W05-A01C		W05-B07G5C
	EM transmission	W05-A05	triggered by patient medical	\\/\OF DO7CEA
	hydraulic transmission	W05-A01A	parameter	W05-B07G5A
	IR transmission	W05-A05B		S05-D
	mechanical transmission	W05-A01A	Personnel control, entry or exit	T05-D01
	pneumatic transmission	W05-A01A	Personnel protection (emergency	
	power line transmission	W05-A01C3	circuit protection)	X13-C09
	radio transmission	W05-A05A	Personnel Management	T01-J05A2H
	telephone line transmission	W05-A01C1	i cisoinici management	T01-N01A2H
	UV transmission	W05-A05B	Built I and I do	
		W05-A05B	Pesticides analysis	S03-E14M
Per	sonal Computer		Pesticides analysis PET	
Per	sonal Computer equipment support using	T01-J08A1	PET	S03-E14M
Per Per	sonal Computer equipment support using sonal hygiene	T01-J08A1 X27-A02A	PET Pet - see Domestic pet	S03-E14M S03-G02C3
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser	T01-J08A1 X27-A02A X27-A02A	PET Pet - see Domestic pet PET - see nuclear imaging	S03-E14M S03-G02C3 X27-H
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector	T01-J08A1 X27-A02A X27-A02A V04-M30P	PET Pet - see Domestic pet	S03-E14M S03-G02C3 X27-H P36-A01
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)	S03-E14M S03-G02C3 X27-H
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport) pH	S03-E14M S03-G02C3 X27-H P36-A01
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A S05-A04	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH control layer/material in magnetic	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1 S05-A04 X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH control layer/material in magnetic record medium	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1 S05-A04 X27-A02A3B X27-A02A1	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1 S05-A04 X27-A02A3B X27-A02A1 X27-A02A1	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1 S05-A04 X27-A02A3B X27-A02A1 X27-A02A1 X27-A02A1	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1 S05-A04 X27-A02A3B X27-A02A1 X27-A02A1 X27-A02A1 X27-A02A1	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1 S05-A04 X27-A02A3B X27-A02A1 X27-A02A1 X27-A02A1 X27-A02A X27-A02A	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric  drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler	T01-J08A1 X27-A02A X27-A02A V04-M30P X27-A02A X27-A02A1 S05-A04 X27-A02A3B X27-A02A1 X27-A02A1 X27-A02A1 X27-A02A1 X27-A02A X27-A02A3B X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric  drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A3B  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A3B  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric  drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A3B  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A  X27-A02A5	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric  drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A3B  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A  X27-A02A  X27-A02A3B  X27-A02A3B  X27-A02A  X27-A02A  X27-A02A	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device razor, electric shaver, electric	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A1  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A1  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  PH  control layer/material in magnetic record medium sensor, electrochemical sensor, non-electrochemical Pharmaceutical analysis  delivery management delivery with ventillator drugs processing drugs processing, control storage and dosing storage of medicines	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device razor, electric shaver, electric shower	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A1  X27-A02A3B  X27-A02A	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M
Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device razor, electric shaver, electric shower smoothing tongs	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A1  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  PH  control layer/material in magnetic record medium sensor, electrochemical sensor, non-electrochemical Pharmaceutical analysis  delivery management delivery with ventillator drugs processing drugs processing, control storage and dosing storage of medicines	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03
Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device razor, electric shaver, electric shower	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B  X27-A02A1  X27-A02A  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03 S05-M03 S05-M02
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric  drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device  razor, electric shaver, electric shower  smoothing tongs solarium	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A2  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03 S05-M03 S05-M02 S01-D04
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device razor, electric shaver, electric shower smoothing tongs	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03 S05-M02 S01-D04 U21-B01P
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device razor, electric shaver, electric shower smoothing tongs solarium sunbed/lamp	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A3B  X27-A02A2	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03 S05-M02 S01-D04 U21-B01P U21-C01P
Per Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric  drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device  razor, electric shaver, electric shower  smoothing tongs solarium  sunbed/lamp  toothbrush, electric	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A3B	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03 S05-M02 S01-D04 U21-B01P U21-C01P U14-A03H
Per	sonal Computer equipment support using sonal hygiene condom dispenser connector contact lens steriliser curling tongs depilator, electric drier, hair drier, hand drier, nail polish foot washer hair clipper, electric hair curler incontinence detector massaging device razor, electric shaver, electric shower smoothing tongs solarium sunbed/lamp	T01-J08A1  X27-A02A  X27-A02A  V04-M30P  X27-A02A  X27-A02A1  S05-A04  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A1  X27-A02A3B  X27-A02A2	PET Pet - see Domestic pet PET - see nuclear imaging Petanque (sport)  pH	S03-E14M S03-G02C3 X27-H P36-A01 W04-X01K1X T03-A01A9 S03-E03B2 S03-F10 S03-E14A1 S05-C09 S05-M01 S05-M04 X25-P02 T06-D02A X25-P02 S05-M S05-M03 S05-M02 S01-D04 U21-B01P U21-C01P

Phase comparator (sinusoidal signa	ıls)	Photocathodes	V05-G01
analogue implementation	U23-C01	Photoconductive semiconductor de	evice
digital implementation	U23-C02	AIV elements and their compoun	
Phase locked loop	U23-D01	A02B5D	
acquisition time reduction	U23-D01F1	amorphous, polycrystalline	
active loop control	U23-D01A2	semiconductor	U12-A02B5C
broadening capture range	U23-D01F7	with AI-BIII-CVI compounds	U12-A02B5X
charge pump	U23-D01A3C	with AII-BIV-CV compounds	U12-A02B5X
Costas loop	U23-D01C1	with All-BVI compounds	U12-A02B5A
data synchronisation using	W01-A04B1	with AIII-BV compounds	U12-A02B5B
demodulation using	U23-D01C	Photoconductor, electrophotograp	hic#
details	U23-D01A		S06-E01
digital	U23-D01A8B	belt	S06-E01A9
false lock prevention	U23-D01F3	binder	S06-E01A3
frequency synthesiser - see Frequ		carrier	S06-E01B
synthesis	U23-D01B	cover layer	S06-E01B
improving loop characteristics lock detector	U23-D01F U23-D01A5	inorganic	S06-E01A2
loop filter	U23-D01A3	intermediate layer	S06-E01B
loop filter, variable characteristic	U23-D01A7	manufacture	S06-E01D
modulation using	U23-D01C	organic	S06-E01A1
noise reduction in	U23-D01F5	sensitizer	S06-E01A3
phase detector	U23-D01A3A	Photocopier - see Electrophotograp	phy
phase error reduction	U23-D01F4	Photodetector	
testing	U23-D01E	copier, image acquisition	S06-D05
voltage controlled oscillator	U23-D01A1	cryogenic cooling	U11-D02C
Phase segregation of metals, semic	onductor	facsimile, image acquisition	S06-D05
lithography	U11-C04D2	optical communications	W02-C04A3D
Phase shift compensation, video sign	nal	optical heads, recording	T03-B02B3
,,,,,	W04-P01E7	Photodiode	
		AIV elements and their compoun	ds U12-
Phase shift keying	W01-A09B	A02B5D	
	U23-P01A3	arrays for sensing/imaging	U13-A01A
Phase shift network		circuitry	U12-A02B4
lumped constant circuits	U25-F01	manufacture	U11-C18B4
waveguide - see Waveguide pha		1	U12-A02B2A
	W02-A06C	packages structure	U12-A02B3 U12-A02B2A
Phase shifting and delay using DSP	U22-G03E3F		U I Z-AUZBZA
Phase shifting masks, semiconducte	or,	Photoelectric	1104 40014
optical lithography	U11-C04E2	digital position encoders discharge tubes	U21-A03J1 V05-G
Phase splitter, for amplifier	U24-G02C1	screens, for image tubes	V05-G V05-D05A1
Phase/frequency, automatic contro	I U23-D	secondary emission electrodes, n	
Phosphor		secondary emission electrodes, in	V05-L01A5B
CRT	V05-D05B1	Photoelectric discharge tube	V05-G
discharge lamp	X26-A02D	manufacture	V05-L05G
general	V05-M01A	Photoelectric effect	
LED package	U12-A01A4A		S03-E06D
plasma display	V05-A01B3	Photoelectric layer, electrophotogi	raphyS06-E01X
Phosphorescence, for materials inv	estigation	Photoelectric sensors	U12-A02B
•	S03-E04D	integrated circuits	U13-A
Phosphoric acid fuel cell	X16-C04	Photoelectrochemical cell	U12-A02A
•			X15-A02D
Photo booth	S06-B09		X16-A04
Photo frame, digital/electronic	W04-E30A5A	electrode	U12-A02A
Photo-acoustic absorption spectros	сору		X15-A02D
,	S03-E04A5A		X16-A04
Dhata finiah timir			X16-E09
Photo-finish timing	S04-C03C2 T05-G03	Photoelectronic composing	S06-C01
	W04-X01C1	Photoflash array	S06-B03B
			X26-B01

Photoframe, digital/electronic	W04-E30A5A	studio lighting	S06-B09
Photographic apparatus	P82	timer actuation, camera	S06-B02C5
camera	P82-A01	viewer	S06-B06B
body	P82-T05	viewfinder display, camera	S06-B01C
still	P82-A01A	anti-reflection layers	U11-C04A1H
motion picture	P82-A01C	exposure apparatus, method masks	U11-C04E1
viewfinder	P82-T03		U11-C04E2
cleaning	P82-G	Photolithography, semiconductor	
constructional details	P82-T	manufacture	U11-C04E
film handling	P82-T07	Photoluminescence quenching therr	nometry
film package	P83-B P82-A03		S03-B01G
printing projector	P82-A02	Photomasks	
using non-optical waves	P82-B08	caseholders	U11-C04E2
viewer	P82-A02		U11-F02
	P84	pellicle	U11-C04E2
Photographic processes electrographic	P84-A02	phase shifting	U11-C04E2
holography	P84-A05	reticle	U11-C04E2
погодгарну		Photometry	S03-A01
magnetographic	V07 P84-A03	by comparison with electric value	S03-A01A
magnetographic photomechanical	P84-A01	by comparison with reference light	
•		chemical	S03-A01X
Photography	S06-B S06-B02C	cooling arrangement	S03-A04
aperture control, camera aperture value calculation, camera		IR detector cooling arrangement	
camera shake	S06-B02E	photodiode	U13-A01A
cinematography	S06-B05	using electric radiation detectors	
colour	P82-B02	visual	S03-A01X
digital - see Electronic still	. 02 202	Photomultiplier, for nuclear radiatio	n S03-
picture camera	W04-M01B1	G02B2E	600 60004
exposing	P82-T01	novel scintillator for	S03-G02B1
exposure control in printing	S06-B04A5	Photomultiplier, for optical radiation	n S03-A01B
exposure control, camera	S06-B02	Photonic crystals	V07-K10C
exposure time calculation, camera		Photoresist materials - see Resist	U11-A06
film marking, camera	S06-B01B2	Photoresistor	U12-A02B1
film processing and manufacture		manufacture	U11-C18B4
film winding, camera flash, camera	S06-B08A S06-B03	manadetare	U12-A02B1
focus detection, camera	S06-B01A	Photosensitive paper	S06-E02
focusing, camera	300 D0 171	i notosensitive paper	
	S06-B01	DI	300 L02
high speed	S06-B01 P82-B06	Photosensor, imaging	
high speed		facsimile	S06-D05
	P82-B06	facsimile  Photosynthesis analysis	
high speed lens positioning, camera light metering, camera panoramic/wide screen	P82-B06 S06-B01B1	facsimile  Photosynthesis analysis  Photothyristor	S06-D05 S03-E14J U12-A02B2C
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials	P82-B06 S06-B01B1 S06-B02A P82-B05	facsimile  Photosynthesis analysis  Photothyristor  circuitry	S06-D05 S03-E14J U12-A02B2C U12-A02B4
high speed lens positioning, camera light metering, camera panoramic/wide screen	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A	facsimile  Photosynthesis analysis  Photothyristor	S06-D05 S03-E14J U12-A02B2C U12-A02B4 U11-C18B2
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A	facsimile  Photosynthesis analysis  Photothyristor  circuitry	S06-D05 S03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials image receiving materials	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C	facsimile  Photosynthesis analysis  Photothyristor     circuitry     manufacture	S06-D05 S03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials image receiving materials developers	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D	facsimile  Photosynthesis analysis  Photothyristor     circuitry     manufacture  packages	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials image receiving materials developers fixing agents	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B2B
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials image receiving materials developers fixing agents recycling	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B3 U12-A02B4
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials image receiving materials developers fixing agents recycling photographic processes	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry imagers	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B4 U13-A01B
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials image receiving materials developers fixing agents recycling	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R P83-D	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B2B U12-A02B4 U13-A01B U11-C18B4
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials image receiving materials developers fixing agents recycling photographic processes	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R P83-D P82-T15	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry imagers manufacture	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B4 U13-A01B U11-C18B4 U12-A02B2B
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials  image receiving materials developers fixing agents recycling photographic processes printing  printing control projector	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R P83-D P82-T15 S06-B04A S06-B04A5 S06-B06A	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry imagers manufacture  packages	S06-D05 S03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B2B U12-A02B4 U13-A01B U11-C18B4
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials  image receiving materials developers fixing agents recycling photographic processes printing  printing control projector rangefinder, camera	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R P83-D P82-T15 S06-B04A S06-B04A5 S06-B06A S06-B01A	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry imagers manufacture  packages  Photovoltage measurements	S06-D05 S03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B4 U13-A01B U11-C18B4 U12-A02B2B U12-A02B2B U12-A02B3
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials  image receiving materials developers fixing agents recycling photographic processes printing  printing control projector rangefinder, camera recording of medical X-ray	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R P83-D P82-T15 S06-B04A S06-B04A5 S06-B04A S06-B01A S05-D02A5A	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry imagers manufacture  packages  Photovoltage measurements materials investigation	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B4 U13-A01B U11-C18B4 U12-A02B2B U12-A02B2B U12-A02B3 S03-E02X
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials  image receiving materials developers fixing agents recycling photographic processes printing  printing control projector rangefinder, camera recording of medical X-ray remote control, camera	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R P83-D P82-T15 S06-B04A S06-B04A5 S06-B04A S06-B01A S05-D02A5A S06-B02C1	facsimile  Photosynthesis analysis  Photothyristor     circuitry     manufacture  packages  Phototransistor     circuitry     imagers     manufacture  packages  Photovoltage measurements     materials investigation     on semiconductor wafer	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B4 U13-A01B U11-C18B4 U12-A02B2B U12-A02B2B U12-A02B3 \$03-E02X \$03-E02X \$03-E02X
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials  image receiving materials developers fixing agents recycling photographic processes printing  printing control projector rangefinder, camera recording of medical X-ray remote control, camera shutter control, camera	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50E P84-T50E P84-R P83-D P82-T15 S06-B04A S06-B04A5 S06-B04A5 S06-B01A S05-D02A5A S06-B02C1	facsimile  Photosynthesis analysis  Photothyristor circuitry manufacture  packages  Phototransistor circuitry imagers manufacture  packages  Photovoltage measurements materials investigation	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B4 U13-A01B U11-C18B4 U12-A02B2B U12-A02B2B U12-A02B3 \$03-E02X \$03-G02B1 U12-A02A1
high speed lens positioning, camera light metering, camera panoramic/wide screen photographic materials photosensitive materials  image receiving materials developers fixing agents recycling photographic processes printing  printing control projector rangefinder, camera recording of medical X-ray remote control, camera	P82-B06 S06-B01B1 S06-B02A P82-B05 P83-A P84-T50A P84-T50C P84-T50D P84-T50E P84-R P83-D P82-T15 S06-B04A S06-B04A5 S06-B04A S06-B01A S05-D02A5A S06-B02C1	facsimile  Photosynthesis analysis  Photothyristor     circuitry     manufacture  packages  Phototransistor     circuitry     imagers     manufacture  packages  Photovoltage measurements     materials investigation     on semiconductor wafer	\$06-D05 \$03-E14J U12-A02B2C U12-A02B4 U11-C18B2 U11-C18B4 U12-A02B2C U12-A02B3 U12-A02B4 U13-A01B U11-C18B4 U12-A02B2B U12-A02B2B U12-A02B3 \$03-E02X \$03-E02X \$03-E02X

semiconductor manufacture	U11-C09A	delay lines	V06-V01B
Physical deposition, conductive lay		delay iiiles	V06-V04D2
rnysical deposition, conductive lay		generators	V06-M06D2
	U11-C05C2	igniters	V06-V01B
Physical deposition, insulating laye	r U11-C05B2		V06-V04X
Physical deposition, semiconductor	r layer		X27-G01
	U11-C01A	materials	U11-A02
evaporation, arc	U11-C01A1		V06-V01B
evaporation, thermal	U11-C01A1		V06-V02R
Physical therapy, medical	S05-A05E	microsensors	V06-V01B V06-V01K1
Physical/chemical properties, inves	tigating		V06-V04G
corrosion resistance	S03-F07	motors	V06-M06D
density	S03-F01	printhead (inkjet printing)	V06-M06D
emulsion concentration	S03-F06A	pressure sensors	S02-F04B3
friction coefficient	S03-F08	·	V06-V01B
hardness, mechanical	S03-F02A		V06-V04G
machinability	S03-F02B	properties, measuring	S01-D09
mechanical strength	S03-F02	pulse generators	V06-M06D2
moisture, capacitive	S03-E02C1	relays	V03-D05A
moisture, general	S03-F09	resonators	V06-V01B
moisture, nuclear radiation	S03-E06A		V06-V01E
mositure, microwave	S03-E05A	sensors	
osmotic pressure	S03-F04	(general measurement)	S02-K03X
particle counters	S03-F06C	-	V06-V01B
particle size	S03-F05C		V06-V04G
pore volume	S03-F06B	sensors (medical use)	S02-K03X
resistance to heat/wear	S03-F02B		V06-V01B
sedimentation	S03-F05A		V06-V04G
specific gravity	S03-F01		V06-V04K
surface area of porous materials	S03-F06B	switches, contactless	
surface tension	S03-F04	(see also U21-B02C)	V06-V01B
suspension concentration	S03-F06A		V06-V04E
tensile testing	S03-F02C		V03-C09
test methods/apparatus. (see spe		transducers, audio/	
codes)	S03-E	communication type	V06-V01B
viscosity	S03-F03		V06-V04A
weather resistance	S03-F07		V06-V04B
Pick-up		transducers, general	V06-V01B
gramophone	V06-V04A3	transformers	V06-V01B
	W04-A02		V06-V04F
guitar	V06-V04A3	ultrasonic motors	V06-M06D1
	W04-U02A1	ultrasonic transducers,	\/O/ \/O1D
image	U13-A	general	V06-V01B
	W04-M01B5	. :la wata wa	V06-V01N
manufacture	V06-V03A	vibrators	V06-V01B V06-V04C
	V06-V04A3		
musical instruments	W04-U02A1	Piezoresistances, pressure measur	ring
	V06-V04A3		S02-F04B1
Picocell (cellular radio)	W02-C03C1K	Piezoresistor - see Resistor	V01-A02J
Picture frame	P27-B01	Pigment sensitized solar cell	U12-A02A8
Picture-in-picture display, TV receiv	ver .	Pillars, semiconductor device	
	W03-A13B	interconnection manufacture	U11-C05G2C
Piezoelectric		Pin grid array	
actuators	V06-M06D	attaching pins to package	U11-D01A5
buzzers, communication	V06-V01B		U11-E01X
•	V06-V04B	semiconductor package	U11-D01A5
buzzers, general	V06-V01B	Pin network, test probe	S01-H03A
-	V06-V04X	· •	
conversion of sensor output	S02-K03X	Pipe organ	P86-A01C3
•			

Pipeline/vector computer	T01-M02C2	Plant receptacles, supports and ba	rriers
•	101 100202	runt receptacies, supports and sa	
Pipes, pipelines	0/7.0	fer en 1	P13-A02
accessories	Q67-C	cultivation bags	P13-A02A
brackets/clips	Q67-C	pots, tubs and trays	P13-A02A
connectors/joints	Q67-B	trellis, supports and barriers	P13-A02B
electrical details	X25-Y02	Plasma	X14-F
hose clip	Q67-C	burner	X14-F03
insulation	Q67-D		X24-D05
non-electrical details	Q67	confinement/handling/generatio	n for
pipe cleaning	Q67-A03	fusion reactor	X14-A03
pipelaying	Q67-A03		X14-F01
pipe repair	Q67-A03	display - see Plasma display	V05-A01
pipe seal	Q67-B02	IC manufacture	U11-C09C
protection	Q67-D		X14-F02
valve	X25-L01	lamp	X26-A01B1
vibration damping	Q67-D	nuclear fusion	X14-A03
water treatment	X25-H03	1146.64. 146.611	X14-F01
Pipette	S03-E13B1	plasma spray coating	X25-A09
•		processing apparatus - see <b>Proce</b>	
Pistol shooting (sport)	P36-A05	processing apparatus see From	V05-F05C
	W04-X01K5E	processing for magnetic film	V02-H02D
Pitot tube	S02-G02B	processing for magnetic min	X14-F
PLA - see Logic arrays, integrated o	ircuit	processing for IC device	U11-C07A
programmable logic arrays	U13-C04C	processing for its device	U11-C09C
			X14-F02
Planar doped barrier transistors	U12-D02J	propulsion	V05-E05A
Planar inverted-F antenna (PIFA)	W02-B01F	propulsion	X14-F04
Planarisation, semiconductor manu	ıfacture	propulsion, ordnance	W07-E05A
etching techniques	U11-C07D3	propulsion, ordinance	X14-F04
insulating layers, for metallic	011 007 20		
interconnections	U11-C05B9A	propulsion, space vehicle	V05-E05A
mercomiccions	U11-C05D1		W06-B03A
Block and Italian		to design to the	X14-F04
Planing machine	X25-A03C2	technique	X14-F
control	T06-D07A	torch	X14-F03
	X25-A03C2		X24-D05
	X25-A03F	Plasma CVD	
Plant analysis	S03-E14J	apparatus, for semiconductor ma	nufacture
Plant, electric power			U11-C09B
aircraft, (engine) control system	W06-B01C		U11-C09C
biomass	X15-E		X14-F02
cogeneration	X11-C04	method	U11-C01B
combined cycle	X11-C03	Plasma display	
diesel engine	X11-C02	anodes, electrode assemblies	V05-A01C1
gas turbine	X11-C01	address/bus electrodes	V05-A01C2
geothermal	X15-X	cell construction	V05-A01D
hydroelectric	X11-B	combined technology displays	V05-A01A7
IC engine	X11-C02	connectors	V05-A01F5
micro hydroelectric	X11-C02 X11-B05	dielectric coatings, electrodes	V05-A0113
mini hydroelectric	X11-B05 X11-B05	drive circuitry	T04-H03C4A
		drive circuitry	V05-A01G
nuclear	X14-C	drive airquita, PCP mounting	V05-A01G
pumped storage	X11-B06	drive circuitry, PCB mounting electrode assemblies	
rankine cycle plant	X11-C05	electrode assemblies electrode construction	V05-A01C
sea	X15-C05A		V05-A01C
solar	X15-A	electrode manufacture	V05-L01B6
steam turbine (coal-fired)	X11-A	electrode supports	V05-A01C5
thermoelectric	X15-D	gas filling	V05-A01B1
tidal	X15-C02	gas filling additives	V05-A01B1A
wind	X15-B	gas filling with several separate g	jases V05-
wind, off-shore	X15-B03	A01B1C	
wind, on-shore	X15-B02	heated cathode	V05-A01C3A
		housing	V05-A01F3

internal seals	V05-A01D3A	data and network aspects	T05-L01D
LCD, plasma addressed	U14-K01A2C	printer	T05-L01H
	V05-A01A7		S06
lead-in conductors	V05-A01D5	product code reader	T05-L01C
microfabricated electrodes module aspects	V05-A01C4 V05-A01F	scales	T05-L01X
module aspects multicolour display	V05-A01F V05-A01A5	Pointer, for indicating/recording m	
optical filter	V05-A01A3 V05-A01F1	values	S02-K06A
panel	V05-A01A3	Polar measurements	S02-A10G
phosphor arrangement	V05-A01B5	Polarimetry, optical	S03-A02C
phosphor composition	V05-A01B3	Polarization control	
plasma as source of electrons	V05-A01A7B	light	V07-K03
screening	V05-A01F3	RF, antenna polariser	W02-B03C
segment type spacers	V05-A01A1 V05-A01D	RF, waveguide polariser	W02-A06B
trigger electrodes	V05-A01C2	variable polarisation, antenna	W02-B06E
tube cooling	V05-A01H	Polarization filter, video camera	W04-M01C3G
TV receiver	W03-A08D	Polarization measurement, optical	S03-A02C
vessels	V05-A01D	materials investigation	S03-E04B5
	V05-A01D1	polarimeters	S03-A02C
with several separate gases	V05-A01B1C	Polarizer, aerial (RF)	W02-B03C
Plasma gun	X14-F03	Polarizer, light fitting	X26-D01G
Plasma lamp	X26-A01B1	Polarizers, optical - see Optical	504 445
Plastics		elements	P81-A15
analysis	S03-E14D7		V07-F02B
extruding injecting	X25-A06 X25-A06	Polarography	S03-E03B1
moulding	X25-A06	Police speed trap	T07-A01A1
processing	X25-A06	detection receiver (radar)	W02-G03 W06-A04E3C
processing control	T06-D13	using laser	T07-A01A1
	X25-A06	doming labor	W06-A06D2
working	X25-A06	using radar	T07-A01A1
Platinum resistance thermometers	S03-B01B		W06-A04A2
Playground equipment	P36-E07	Polishers	
	W04-X03E2	floor polisher	X27-D05
Playlist management	W04-E20P	for semiconductor manufacture	U11-C06A1A
PLC	T06-A04B1	Polishing	P61-A03
	U21-C03B3	control	X25-A03C3 T06-D07A
Pleximeter	P31-A05	CONTROL	X25-A03C3
PLL - see Phase locked loop			X25-A03F
Plotter		constructional details	P61-T
computer peripheral	S06-K99E	hard magnetic disks substrates	T03-A02B1C
to record measured values	S02-K05		T03-A01E1A
Plug connector - see Connector		materials, semiconductor manufac	cture U11-A10
Plug standard converter	V04-H		U11-C06A1A
Plush toy	P36-E05	optical record carriers during mar	
-	W04-X03E5	B01E3L	
Pockel's effect		semiconductor wafers	U11-C06A1A
for current/voltage measurement		Pollution measurement	S03-D06
optical modulation	V07-K01A	air quality	S03-E14N
Pocket calculator	T01-J01	Polycrystalline semiconductor	
Point of sale	T05-L01	film deposition	U11-C01J2
automatic packing	T05-L01X	for photodiode, phototransistor, photothyristor structure	U12-A02B5C
bar code reading	T05-L01C1 T04-A03B1	for solar cell structure	U12-A02B3C
			- · - · · · - · · · · · · · · · · · · ·
card reader, electronic funds trans		Polymerase Chain Reaction testing	- see PCP
card reader, electronic funds trans	sfer	Polymerase Chain Reaction testing testing	- see PCR
card reader, electronic funds transcash register		Polymerase Chain Reaction testing testing Polymers, doping	- see PCR U11-C02J3

Pool (game)	P36-A01 W04-X01K1E	Positron Emission Tomography - se nuclear imaging	e
Population inversion - see Laser pur	mping	Positron microscope	V05-F01A9
	V08-A02	Potential transformer	S01-D01D1
Pop-up blocking	T01-N02B1C		V02-G01B
Pore-volume measurement	S03-F06B		X12-C01G
Porous silicon	U11-A01A1	Potentiometer	V01-A03
Port equipment	OTT AUTAT	Potentiometer, pressure measurem	ent
electrical aspects	W06-C07A		S02-F04B1
general	Q24-R	Potentiometric titration	S03-E03B1
Portable and mobile transceiver answer-back pager digital architecture duplex hand-held walkie-talkie	W02-G02A W02-G02A3 W02-G02K W02-G02A5B W02-G02A1	Powder metallurgy  compacting and/or sintering powder blending powder manufacture	P53-C M22-H P53-C03 P53-C02 P53-C01
mobile radio transceiver	W02-G02A2	system maintenance	P53-G
push-to-talk selective calling voice operated switching	W02-G02A5A W02-G02A3 W02-G02A5C	Powder metallurgy (materials proc cobalt (alloys) coinage metals	P53-V08 P53-V04
Portable AV equipment	W03-G04	composites with non-metallic ino	rganic materials P53-V10
Portable computer Portable hard disk drive	T01-M06A1 T03-A08A1G	composite with organic compone	
Portable light	X26-E	ferrous metals	P53-V02
table lamp torch	X26-E02 X26-E01	group 11 elements	P53-V04
Portable telephone	W01-C01D3C	light metals nickel (alloys)	P53-V03 P53-V07
Position detection	WOT COTDOC	rare earth metals	P53-V09
using pattern recognition	T04-D07D5	refractory metals	P53-V05
using semiconductor device	U12-A02C	soft metals	P53-V06
Position encoder	U21-A03J	Powder metallurgy (applications)	DE2 1140
absolute type	U21-A03J5	industrial vehicle	P53-U40 P53-U03
capacitive magnetic or inductive	U21-A03J9 U21-A03J2	Powdered elements for electric hea	
optical	U21-A03J1	i owdered elements for electric flee	X25-B01E
rotary	U21-A03J1	Power amplifier	U24-G01B
wiping contact	U21-A03J9	audio	U24-G01B1
Position fixing, navigation using light waves using radio waves using sonic/ultrasonic waves	W06-A03 W06-A03D W06-A03B W06-A03F	HF LF radio transmitter	W03-C01C U24-G01B5 U24-G01B1 U24-G01B5
Position measurement	S02-A10G2	radio transmitter	W02-G01B3
calibration/compensation	S02-A07	RF	U24-G01B5
	S02-A10G2	Power cable	X12-D04
large scale monitoring/testing	S02-B01A S02-A07	Power cable connector/fitting - see	Cable
monitoring/testing	S02-A07 S02-A10G2	Power capacitor	X12-B
using electrical/magnetic method	S02-A02	manufacture	X12-B
	S02-A10G2	Power compensation	
using sound or ultrasound	S02-A05B S02-A10G2	reactive, by series capacitor reactive, by shunt reactor	X12-H01A2C X12-H01A2C
Position switch	V03-C06C	reactive, load side	X12-H01A2B
Positioning		reactive, transmission side static VAR	X12-H01A2A X12-H01A2D
for semiconductor processing	U11-F02B	static VAR using thyristor-	X12-H01A2D
magnetic recording head optical recording head	T03-A05 T03-B02	switched capacitor	- · · · - <b>-</b>
record carriers	T03-F	static VAR using thyristor-	X12-H01A2D
Positive feedback for amplifier	U24-G03B	switched reactor	V0= 500::
•		Power control, for discharge heatin	<b>ig</b> X25-B03X

Power control, radio		small-scale, solar	X15-A04
radio system	W02-C03E3	solar energy	X15-A09
radio transmitter	W02-G01C1	solar energy, large scale	X15-A05
Power converter - see Converter, p		solar energy, small scale	X15-A04
•	ovvei	steam turbine plant	X11-A
Power distribution	V40 C04D	tidal flow plant	X11-B09
box	X12-G04B	thermoelectric power generation	X15-D
	X13-E02	using vehicular traffic flow	X15-X
electric - see <b>Electric power</b>	* V10 II	vortex power	X15-D
distribution/transmission sys	U24-H	waste fuel combustion-type	X15-E
electronic overhead installation	X12-G05	wind	X15-B
	X12-G03	wind, off-shore	X15-B03
Power factor	V40 104C	wind, on-shore	X15-B02
correction (general)	X12-J01C X12-B	Power inductor - see Power reactor	
correction capacitor	X12-B X12-H01A2	Power line	
	X12-H01AC	arc fault protection	X13-C01F
measuring electrical	S01-D02	'	X13-C04A
regulation	U24-E02D2	break location	X12-G01C
regulation	X12-H01A2	breakage protection	X13-C02
Davier memoration (alastria)	/	clamp	X12-G02X
Power generation (electric) biomass combustion-type	X15-E	communication	W02-C01A3
cogeneration plant	X11-C04		X12-H03E
cogeneration plant	X11-C04 X15-K	crimping	X12-G01E
chip-scale	V06-P01	data network	W01-A06C6
combination plant		deicing	X12-G01D
including the use of solar pow	erX15-A10	and a constant	X12-G05
excluding the use of solar pow		earth wire fault location	X12-G01F X12-G01C
exclusive use of fossil fuel sour	ces X11-C03	ground wire	X12-G01C X12-G01F
combined cycle plant	X11-C03	installations	X12-G011 X12-G05
	X15-J	insulator cleaning	X12-G01D
diesel engine plant	X11-C02	joining	X12-G01E
gas turbine plant	X11-C01	lightning protection arrangement	
geothermal energy	X15-G	lightning strike recorder	X12-G01D
electricity generation	X15-G01	overhead, installing equipment/m	ethod
thermal power	X15-G02		X12-G01A1
human exercise hybrid plant	X15-X	overhead, installing using helicopt	
including the use of solar pow	orX15-Δ10	pylon	X12-G05
excluding the use of solar pow		safety arrangement	X12-G01F
exclusive use of fossil fuel sour		strain detector	X12-G01D
hydroelectric plant	X11-B	support	X12-G05
IČ engine plant	X11-C02	telecontrol	W05-D06P W05-D08C
MEMS-scale	V06-P01	telemetry	W05-D06C W05-D06P
micro hydro plant	X11-B05	teleffletry	W05-D08F
micro wind turbine plant	X15-B01A3		X12-H04A
microturbine plant	X11-C15	terminating	X12-G01E
mini hydro plant	X11-B05	tower	X12-G05
muscle contraction/relaxation	X15-X	vibration damper	X12-G02X
ocean currents	X15-C	·	X12-G05
ocean thermal energy conversion		Power management techniques	U24-H04
plant, chip-scale plant, MEMS-scale	V06-P01 V06-P01	-	W02-C03E3B
plant, MEM3-scale plant, small scale	V06-P02	battery saving - mobile phone	
plant, micro scale	V06-P01	communications receiver	W02-G03P5
pumped storage plant	X11-B06	mobile phone	W01-C01D3C
rankine cycle plant	X11-D00 X11-C05		W01-C01E5B
sea power	X17-C00		W01-C01Q7
sea power using thermal gradien		power saving - mobile phone	W02-C03E3B
sea power using waves	X15-C01	PSU power saving mode/operation	
Seebeck effect	X15-D		U24-K
small scale	V06-P02	system power control	W02-C03E3C
		Power measurement, electrical	S01-D02

Power meter		1	
15 - 55 - 1		induction heating	X12-C01H
digital	S01-B03		X25-B02A1
integrating type	S01-B	magnetic circuit	X12-C01A
remote, customer premises mete	er reading	magnetic screen/shield	X12-C04
	S01-B01	manufacture	X12-C01D
	X12-H04A	maintenance	X12-C01D7
RF	S01-D02	monitoring	X12-C02B
	S01-H05	mounting	X12-C03
tamper-proof	S01-B05	noise damping	X12-C03
tamper proof	X12-H04	oil-cooling	X12-C02A1
	X12-1104	oil-cooling, expansion chamber	X12-C02A1
Power plant, electric			X12-C02A1
aircraft, (engine) control system	W06-B01C	oil-cooling, oil conservator	
biomass, biofuel	X15-E	reactive compensation	X12-C01F
cogeneration			X12-H01A2
fossil fuels	X11-C04	short circuit current limiter	X12-C01F
non-fossil fuels	X15-K		X12-H01A3
combined cycle			X13-C03B
fossil fuels	X11-C03	superconducting	X12-C05
non-fossil fuels	X15-J	support	X12-C03
diesel engine	X11-C02	suspension	X12-C03
gas turbine	X11-C01	terminal	X12-C01C
geothermal	X11-C01 X15-G	terminal, manufacture	X12-C01D5
3		testing	X12-C01D3
hydroelectric	X11-B	water cooling	X12-C02A2
IC engine	X11-C02	9	
micro hydroelectric	X11-B05	Power regulator	U24-E02D
mini hydroelectric	X11-B05	Power resistor	X12-A
nuclear	X14-C	manufacture	X12-A
profiting from waste heat	X15-H	Power supply	
pumped storage	X11-B06	alarm	W05-B10E
rankine cycle plant	X11-C05		
sea	X15-C	arrangements of power buses fed	
solar	X15-A	by multiple sources	U24-H03
steam turbine (coal-fired)	X11-A	audio tape recorder	W04-B12C
thermoelectric	X15-D	audio/video equipment, general	W03-G02
tidal	X15-C02	back up	U24-J
traffic flow, power generation fro		band gap reference circuits	U24-E01C7
waste fuel combustion power ge		battery saving	U24-H04
waste fact combastion power ge	X15-E		U24-K
wava		capacitor charging circuits	U24-L
	V15 (101		U24-L
wave	X15-C01	charge pump-type	U24-L U24-D02A1
wind	X15-B	charge pump-type chopper	
wind wind, off-shore	X15-B X15-B03	chopper	U24-D02A1 U24-D02A2
wind wind, off-shore wind, on-shore	X15-B	chopper clock or watch	U24-D02A1 U24-D02A2 S04-B01A
wind wind, off-shore	X15-B X15-B03	chopper clock or watch communications receiver	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1
wind wind, off-shore wind, on-shore Power rail, electric train/tram	X15-B X15-B03 X15-B02 X23-A03	chopper clock or watch communications receiver computer	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor	X15-B X15-B03 X15-B02 X23-A03 X12-C01F	chopper clock or watch communications receiver computer computer (primary)	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01 T01-L01A
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C	chopper clock or watch communications receiver computer computer (primary) computer (secondary)	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01 T01-L01A T01-L01B
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01D6	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01 T01-L01A T01-L01B S06-K07 U24-E01C5 general)
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01D6 X12-C01B1	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (secondary)	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding connection	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01D6 X12-C01B1 X12-C01B1	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (g	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding connection coil/winding, manufacturing	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01D6 X12-C01B1 X12-C01B1 X12-C01D2	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (good degaussing system, CRT discharge heating	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding connection coil/winding, manufacturing control	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01B1 X12-C01B1 X12-C01D2 X12-C01D2	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (good degaussing system, CRT discharge heating EHT, TV receiver	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding, manufacturing control cooling by conduction through s	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01D5 X12-C01D5 X12-C03 X12-C01B1 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (good by the computer) degaussing system, CRT discharge heating EHT, TV receiver electric vehicle	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding connection coil/winding, manufacturing control	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01B1 X12-C01B1 X12-C01D2 X12-C01D2	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (good degaussing system, CRT discharge heating EHT, TV receiver	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding, manufacturing control cooling by conduction through s	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01D5 X12-C01D5 X12-C03 X12-C01B1 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (good by the computer) degaussing system, CRT discharge heating EHT, TV receiver electric vehicle	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding connection coil/winding, manufacturing control cooling by conduction through s cooling by evaporating liquids	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01B1 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A X12-C02A	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (general degaussing system, CRT discharge heating EHT, TV receiver electric vehicle electromagnetic interference (EM)	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding connection coil/winding, manufacturing control cooling by conduction through s cooling by evaporating liquids cooling by gas	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01B1 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A X12-C02A	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (general degaussing system, CRT discharge heating EHT, TV receiver electric vehicle electromagnetic interference (EM)	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding control cooling by conduction through s cooling by evaporating liquids cooling by gas core	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01C X12-C01D5 X12-C03 X12-C01B1 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A X12-C02A X12-C02A X12-C02A	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (general degaussing system, CRT discharge heating EHT, TV receiver electric vehicle electromagnetic interference (EM)	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B II) U24-D01E5 W02-H01
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding, manufacturing control cooling by conduction through s cooling by evaporating liquids cooling by gas core core, manufacture electric screen/shield	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01D5 X12-C01D5 X12-C01D6 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A X12-C02A X12-C02A X12-C02A X12-C01A X12-C01D1 X12-C01D1 X12-C04	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (or degaussing system, CRT discharge heating EHT, TV receiver electric vehicle electromagnetic interference (EM reduction	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B II) U24-D01E5 W02-H01 X12-J01E5 S06-K99D
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding, manufacturing control cooling by conduction through s cooling by evaporating liquids cooling by gas core core, manufacture electric screen/shield electric/magnetic effects reduction	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01D5 X12-C01D5 X12-C01D6 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A X12-C02A X12-C02A X12-C02A X12-C01A X12-C01D1 X12-C04 on, using	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (or degaussing system, CRT discharge heating EHT, TV receiver electric vehicle electromagnetic interference (EM reduction	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B II) U24-D01E5 W02-H01 X12-J01E5 S06-K99D X12-H01C
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding, manufacturing control cooling by conduction through s cooling by evaporating liquids cooling by gas core core, manufacture electric screen/shield electric/magnetic effects reduction auxiliary coil/core	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01D5 X12-C01D5 X12-C01D6 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A X12-C02A X12-C02A X12-C02A X12-C01A X12-C01D1 X12-C04 on, using X12-C04	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (or degaussing system, CRT discharge heating EHT, TV receiver electric vehicle electromagnetic interference (EM reduction  facsimile high level induction heater	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B II) U24-D01E5 W02-H01 X12-J01E5 S06-K99D X12-H01C X12-H01C
wind wind, off-shore wind, on-shore  Power rail, electric train/tram  Power reactor bushing bushing, manufacture casing casing, manufacture coil/winding coil/winding coil/winding connection coil/winding, manufacturing control cooling by conduction through s cooling by evaporating liquids cooling by gas core core, manufacture electric screen/shield electric/magnetic effects reduction	X15-B X15-B03 X15-B02 X23-A03 X12-C01F X12-C01D5 X12-C01D5 X12-C01D6 X12-C01B1 X12-C01B1 X12-C01D2 X12-C02B olid X12-C02A X12-C02A X12-C02A X12-C02A X12-C01A X12-C01D1 X12-C04 on, using	chopper clock or watch communications receiver computer computer (primary) computer (secondary) copier current mirror circuits data communication equipment (or degaussing system, CRT discharge heating EHT, TV receiver electric vehicle electromagnetic interference (EM reduction	U24-D02A1 U24-D02A2 S04-B01A W02-G03P1 T01-L01A T01-L01B S06-K07 U24-E01C5 general) W01-A07K V05-D08A1 X25-B03X W03-A07C X21-B II) U24-D01E5 W02-H01 X12-J01E5 S06-K99D X12-H01C

integrated circuits, wiring arrange	ements U11-D03C1A	pilot relaying, communication	X12-H03E X13-C01X
intelligent power supply	U24-D12		X13-C04A
low level	U24-D	Power system protection	
low power network control	U24-H06	A/D signal conversion, digital pro-	tection
low, regulation	U24-E	A/D signal conversion, digital pro	X13-C15N2
low, regulation with feedback	U24-E02	arc fault	
low, regulation with feedback for		arctauit	X13-C01F
low, regulation with recapack for	U24-E02A		X13-C04A
law regulation with feedback for		arrester, metal oxide	X13-C03A2
low, regulation with feedback for			X12-A
	U24-E02B	arrester, SF6	X13-C03A3
low, regulation without feedback		arrester, silicon carbide	X13-C03A1
low, regulation without feedback		arrester, spark gap	X12-F01A
AC variable	U24-E01A		X13-C03A
low, regulation without feedback		arrester, varistor	X12-A
DC variable	U24-E01C		X13-C03A
memories	U14-A09	artificial intelligence-type	X13-C15B
	U24-D	auto-reclosures	X13-C01X
mining	X25-D02C	automatic disconnection	U24-F01
non-contact power distribution	U24-H02	automatic disconnection	X13-C01
power management techniques	U24-H04	Developed and a section	
power saving mode/operation	U24-K	Buchholz relay	X13-C02
power via communication networ		circuit breakers (see also <b>Circuit b</b>	
	V05-F05E5		X13-D
processing tubes		CTs	X13-C01X
protection, low level	U24-H01	cutoffs, thermal	X13-D12
remote control/monitoring		differential	X13-C01D
equipment	W05-D08P	digital relays	X13-C15
telephone battery charging	W01-C01E5A	discharge tube, surge protection	V05-A05
	X16-G		X13-C03A
telephone charging using genera	ntor W01-	distance	X13-C01E
C01E5D		earth leakage	X13-C01B
	X16-G02C	excess current/voltage limiting	U24-F02
telephone battery saving	U24-K	expert system-type	X13-C15B1
, , ,	W01-C01E5B	fault indicators	X13-C13B1
telephone exchange	W01-C02E		X13-C01X X13-C01X
telephone set	W01-C01E	frequency-deviation	
television receiver	W03-A07	fuses, electrical - see <b>Fuse</b>	X13-D01
transit time tubes	V05-C03A	fuses, thermal	X13-D12
vehicle, auxiliary supply	X22-F03	fuzzy logic-type	X13-C15C
		gas discharge tube, surge protect	
vehicle low voltage distribution n			V05-A05
1.1	U24-H07		X13-C03A
vehicle, power supply control	X22-F04	high power equipment	X13-C
vehicle, using cigar lighter socket		impedance	X13-C01E
video camera	W04-M01P	lightning arresters	X13-C03A
voltage reference circuit with feed	dbackU24-E02B7	line-breakage	X13-C02
VTR	W04-B10C	low power equipment	U24-F
Wearable	U24-X	microprocessors	X13-C15A
welding	X12-H01C	neural networks	X13-C15B2
	X24-B02X	numeric relays-type	X13-C15
	X24-C09	overcurrent limiter	U24-F02
X-ray equipment	V05-E02A	Overcurrent infinter	X13-C03B
X-ray equipment, output control	V05-E02C	averaurrent disconnection	X13-C03B X13-C01A
		overcurrent, disconnection	
Power supply installation, electric	train/tram	overload	X13-C01A
	X23-A03	overspeed	X13-C02
Power supply protection - see Prot	ection.	overvoltage limiter	U24-F02
emergency			X13-C03A
low level	U24-H01	overvoltage, disconnection	X13-C01C
		Peterson coils, current limiting	X13-C03B
Power supply transformer	V02-G01A	power-reversal	X13-C01X
Power system		protection algorithms, digital prot	ection
communication	X12-H03E		X13-C15N3
	<del>-</del>	protectors, thermal	X13-D12
		ı	

protectors (not covered elsewher		control, by tap changing	X12-C02B1
PTs	X13-C01X		X13-H04
reactor, current limiting	X12-C01F	control, tap changer per se	X12-C02B1
	X12-H01A3	cooling by conduction through so	
short-circuit	X13-C03B	cooling by evaporating liquids	X12-C02A
	X13-C01A	cooling by gas cooling by oil - see also <b>Power</b>	X12-C02A
signal conditioning, digital protec	X13-C15N1	transformer, oil-cooling	X12-C02A
simulators	X13-C15N1 X13-C20A	_	
solid-state (analogue) relays	X13-C20A X13-C10	core core, manufacture	X12-C01A X12-C01D1
spark gaps, surge limiting	X12-F01A	electric screen/shield	X12-C01D1 X12-C04
spark gaps, surge illilling	X13-C03A	electric screen/smeid	X23-A01A5
superconducting current limiter	X13-C03A X13-C03B1	electric/magnetic effects reduction	
superconducting current inniter	X12-C05	auxiliary coil/core	X12-C04
surge arrester (see <b>Arrester</b> )	X13-C03	fault detection	X12-C02B
synchronism-loss	X13-C01X	foil winding	X12-C01B2
testing	X13-C20	magnetic circuit	X12-C01A
thermal , circuitry	X13-C02	magnetic screen/shield	X12-C04
under-voltage	X13-C01C	manufacture	X12-C01D
varistors	X12-A	maintenance	X12-C01D7
	X13-C03A	monitoring	X12-C02B
Power system protection, applicati	one	mounting	X12-C03
accumulators	X13-C04X	noise damping	X12-C03
arresters	X13-C04X X13-C04X	oil cleaner	X12-C09
batteries	X13-C04X X13-C04X	oil-cooling	X12-C02A1
bus-bars	X13-C04X X13-C04X	oil-cooling, expansion chamber	X12-C02A1
capacitors (static)	X13-C04X X13-C04X	oil-cooling, oil conservator	X12-C02A1
capacitors (synchronous)	X13-C04B	polychlorinated biphenyl disposal	X12-C01D7
converter	U24-D01B		X12-C09
Converter	U24-F		X12-E02A
	X12-J01B	pressure relief	X12-C09
	X13-C04D	structural association with built-in	
distribution-gear	X13-C04X	electric component	X12-C09
feeders	X13-C04A	superconducting coil	X12-C01B2
generators	X13-C04B		X12-C05
inverter	U24-D01B	support	X12-C03
	U24-F	suspension	X12-C03
	X12-J01B	tap changer	X12-C02B1
	X13-C04D	terminal	X12-C01C
motors	X13-C04C	terminal, manufacture	X12-C01D5
personnel	X13-C09	testing	X12-C01D3
reactors	X13-C04X	water cooling	X12-C02A2
rectifier	U24-D01B	Power transmission	
	U24-F	electric - see Electric power	
	X12-J01B	distribution/transmission system	
	X13-C04D	electronic	U24-H
sectionalised lines/cables	X13-C04A	Power transmission line - see Power	r line
static capacitors	X13-C04X	Power transmission line connector/	fittina -
synchronous capacitors	X13-C04B	see Cable	
transformers	X13-C04B	Pram	X27-X
Power train, vehicle	Q13		
	X22-G	Precipitation detection	S03-D02
Power transformer	X12-C01E	for automatic actuation of vehicle	600 00004
bushing	X12-C01C	windscreen wipers	S03-D02B1
bushing, manufacture	X12-C01D5	Precoding for hybrid diversity	W02-C03A5P
casing	X12-C03	Pregnancy diagnosis	S05-D09
casing, manufacture	X12-C01D6		
coil/winding	X12-C01B2	Preparation of data for facsimile tra	
coil/winding connection	X12-C01B2		S06-K07C3
coil/winding, manufacturing	X12-C01D2	Prepayment telephone - see Public	telephone
control	X12-C02B	-	W01-C07A
33.11.31	X13-H04		VVUI-CUIA

Presentation software         T01-J11E         semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor semiconductor to semiconductor semiconductor to semiconductor to semiconductor semiconductor semiconductor semiconductor semiconductor to sem	Preprocessing, pattern recognition	1 T04-D03	1	V06-V04G
Press   X25-A02A   application of press   P71-U   Control   T06-D05A2   T06-			semiconductor	
pricestion of press			semiconductor, manufacture	U11-C18C
Price tags and labels			Pressure switch	V03-C06D
Marterials pressed				
materials pressed   P71-V   press action   P71-B   press function   P71-A10   press function   P71-A10   press function   P71-A10   printing - see Printing press   S06-C   printing - see Printing press   S06-C   printing - see Printing press   S06-C   P71-A01   printing - see Printing pressure   S06-E06A   P71-A01   printing - see Printing	Control		-	
press action P71-B press construction P71-T press function P71-T press function P71-A10 printing rese Printing press S06-C types of press P71-A01 printing rese Printing press S06-C types of press P71-A01 printing rese Printing press S06-C types of press P71-A01 printing rese Printing press S06-C types of press P71-A01 printing rese Printing press S06-C types of press P71-A01 printing rese Printing press S06-E06A pressure gauges - see also pressure measurement bellows type S02-F04A2 flexible diaphragm S02-F04A2 flexible diaphragm S02-F04A2 flexible diaphragm S02-F04A2 flexible diaphragm S02-F04A2 flexible diaphragm S02-F04A1 calibration S02-F04A9 priston S02-F04A1 calibration S02-F04A9 priston S02-F04A1 calibration S02-F04A1 calibration S02-F04A1 calibration S02-F04A1 calibration S02-F04B2 electric/magnetic S02-F04B2 manometer S02-F04B2 manometer S02-F04B2 printing pressures S02-F04C1A ionisation gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 piezoelectric S02-F04B2 potentiometer S02-F04B1 pressure differences S02-F04B1 pressure differences S02-F04B1 pressure differences S02-F04B1 pressure sindication S02-F04B1 semiconductor transducer S02-F04B2 sewical pressure S02-F04C3 strain gauge S02-F04B2 tetmp. compensation S02-F04B2 evihicle engine pressure X25-R05A4 vehicle engine pressure X25-R05A4	materials proseed			
press construction	•			
press function press so So-C types of press Printing press So-C types of press Printing press So-C types of press Printing press So-C types of press Printing press Printing press Printing press So-C types of press Printing press Printing press Printing press Printing press Printing press Printing press Printing Pressure detection pressure measurement    bellows type	•		,	
printing - see Printing press	•			
Pressure cooker, electric   X27-C04   metal-air   metal-air   X16-A01B   non-aqueous electrolyte   X16-A02   X16-A02   X15-A02   X15-A02   X15-A02   X16-A03   X16-A				
Pressure cooker, electric X27-C04 Pressure fixing of toner in photocopier  S06-E06A  Pressure gauges - see also pressure measurement bellows type S02-F04A1 flexible diaphragm S02-F04A2 flexible diaphragm S02-F04A2 piston S02-F04A9 capacitive S02-F04B8 electric/magnetic S02-F04B8 inductive S02-F04B8 manometer S02-F04B8 manometer S02-F04B9 penning gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 penning gauge V05-K03 pressure differences S02-F04B1 proseure differences S02-F04B1 protection against overload or environment S02-F04B1 protection against overload or environment sour-P04B1 protection against overloa				
Pressure fixing of toner in photocopier				
Pressure gauges - see also pressure   measurement	Pressure fixing of toner in photoco	pier		
Pressure gauges - see also pressure		S06-E06A		
bellows type	Proceuro gaugos - coo alco proceur			
bellows type		e		
capsule type		S02-F04Δ1		
Flexible diaphragm	, i			
Flexible tube				
liquid column   S02-F04A9   Print media advertising   P85-E01J				
Prissure measurement   Print media advertising   P85-E01	liquid column	S02-F04A9	_	
Bourdon gauge S02-F04A1 calibration S02-F04B2 electric/magnetic S02-F04B2 electric/magnetic S02-F04B2 inductive S02-F04B2 coll. printed V04-Q02A6 (C engine S02-F04B2 inflation pressures S02-F04B2 coll. printed V04-Q02A6 (capacitor, printed V04-Q04A (capacitor, printed V04-Q04A (capacitor, printed V04-Q04A (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6 (capacitor, printed V04-Q02A6	piston	S02-F04A9	Print media advertising	P85-E01J
Bourdon gauge calibration S02-F04F capacitive electric/magnetic Electric/magnetic electric/magnetic s02-F04B2 electric/magnetic s02-F04B2 inflation pressures inductive s02-F04B2 inflation pressures s02-F04B2 inflation pressures s02-F04C1A ionisation gauge v05-K03 magnetic s02-F04B2 manometer s02-F04B2 manometer s02-F04B2 manometer s02-F04B2 poptical partial pressures s02-F04C3A penning gauge v05-K03 penning gauge v06-V01B v06-V01B piezoresistance potentiometer s02-F04B1 pressure differences s02-F04C1 protection against overload or environment semiconductor transducer so2-F04B3 seeveral pressures s02-F04C3 strain gauge s02-F04E semiconductor transducer so2-F04B1 using movement of magnets so2-F04C3 strain gauge s02-F04E testing using movement of magnets voel-cele engine pressure x22-E02B s02-F04C1A  Pressure sensor electromagnetic  s02-F04C1A sove-collable capacitor, printed v04-Q02A calibration so2-F04B1 capacitor, printed v04-Q02B vod-Q0ac capacitor, printed v04-Q0A capacitor, printed v04-Q0A capacitor, printed v04-Q0A capacitor, printed v04-Q0A capacitor, printed v04-Q0A capacitor, printed v04-Q0A capacitor, printed v04-Q0A capacitor, printed v04-Q0A coil, printed, v04-Q0A coil, printed v04	Pressure measurement			
calibration SQ2-F04B2 capacitive SQ2-F04B2 electric/magnetic SQ2-F04B3 IC engine SQ2-F04B3 inductive SQ2-F04B2 inflation pressures SQ2-F04C1A ionisation gauge VQ5-K03 magnetic SQ2-F04B2 manometer SQ2-F04A9 optical SQ2-F04A9 optical SQ2-F04A9 partial pressures SQ2-F04C3A penning gauge VQ5-K03 piezoelectric SQ2-F04B2 pressure differences SQ2-F04B1 pressure differences SQ2-F04B1 protection against overload or environment remote indication SQ2-F04B remote indication SQ2-F04B3 several pressures SQ2-F04B3 several pressures SQ2-F04B3 several pressures SQ2-F04B3 several pressures SQ2-F04B1 several pressures SQ2-F04B1 several pressures SQ2-F04B3 several pressures SQ2-F04B1 using movement of magnets SQ2-F04B vehicle engine pressure XZ2-R0ZB selectromagnetic SQ2-F04C1A  Pressure sensor electromagnetic sQ2-F04C1A  pressure sensor electromagnetic sQ2-F04C1A  prosures sensor electromagnetic sQ2-F04B1 capacitor, printed vQ4-Q02B4 capacitor, printed vQ4-Q02B4 capacitor, printed vQ4-Q04C capacitor, printed vQ4-Q04C capacitor, printed vQ4-Q04-Q04-Q02-H04 vQ4-R04-R04-Q04-R04 vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 vQ4-R04 vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 vQ4-R04 vQ4-R04 vQ4-R04 components association with vQ4-Q04C coil, printed, manufacture vQ4-R04 vQ4-R04 vQ4-R04 vQ4-R04 components association with vQ4-Q04C coil, printed, manufacture vQ4-R04 vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R02 vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 vQ4-R04 coil, printed, vQ4-R04 vQ4-R04 coil, printed, manufacture vQ4-R04 vQ4-R04 connector, two-part, multi-pole vQ4-R04 vQ4-R04 vQ4-R04 vQ4-R04 vQ4-	Bourdon gauge	S02-F04A1	antenna, printed	
electric/magnetic S02-F04B association with V04-Q02A6 (IC engine S02-F04B2 inflatton pressures S02-F04C1A ionisation gauge V05-K03 magnetic S02-F04B2 manometer S02-F04A9 mechanical S02-F04A9 optical S02-F04B2 partial pressures S02-F04C3A penning gauge V05-K03 piezoelectric S02-F04B2 v06-V01B v06-V04B potentiometer S02-F04B1 protection against overload or environment remote indication source source protection against overload or environment several pressures S02-F04B3 strain gauge S02-F04B1 semiconductor transducer S02-F04B1 several pressures S02-F04B2 strain gauge S02-F04B1 testing using movement of magnets source lectromagnetic S02-F04B source pressure X22-F04B2 vehicle engine pressure X22-F04B2 vehicle engine pressure X22-F04B2 vehicle engine pressure X22-F04B2 vehicle engine pressure X22-F04B1 vehicle tyre pressure S02-F04C1A		S02-F04F		
reaction against overload or environment protection against overload or environment against overload or environment several pressures so2-F04E1 semiconductor transducer so2-F04E2 semiconductor transducer so2-F04E3 strain gauge so2-F04E3 strain gauge so2-F04E3 strain gauge so2-F04E3 to some soarce so2-F04E3 strain gauge so2-F04E4 vehicle engine pressure so2-F04B2 vehicle engine pressure so2	capacitive	S02-F04B2		
inductive S02-F04B2 inflation pressures S02-F04C1A ionisation gauge V05-K03 magnetic S02-F04B2 manometer S02-F04B2 manometer S02-F04B2 optical S02-F04A optical S02-F04A optical S02-F04B2 partial pressures S02-F04C3A penning gauge V05-K03 piezoelectric S02-F04B2 V06-V01B V06-V01B V06-V04G piezoresistance S02-F04B1 pressure differences S02-F04B1 pressure differences S02-F04B1 remote indication S02-F04E semiconductor transducer S02-F04B3 several pressure S02-F04B1 testing gauge S02-F04B1 testing gauge S02-F04B1 void-T02 strain gauge S02-F04B1 testing using movement of magnets S02-F04B2 vehicle engine pressure X22-E02B s02-F04C1A  Pressure sensor electromagnetic indication, printed void-M04-V04-V04-V04-V04-V04-V04-V04-V04-V04-V		S02-F04B		
inflation pressures inflation pressures ionisation gauge	9			
ionisation gauge V05-K03 magnetic S02-F04B2 component (non-printed), association with V04-Q02A optical S02-F04A9 connector, bed of nails V04-B01 v04-M05 v04-W05-K03 pensing gauge V05-K03 peizoelectric S02-F04B2 connector, two-part, multi-pole v04-G02 v04-M05 v06-V04B cooling pressure differences S02-F04E1 protection against overload or environment remote indication S02-F04B3 several pressures S02-F04B1 temp. compensation S02-F04B testing using movement of magnets S02-F04B2 vehicle engine pressure X25-A05A4 vehicle tyre pressure electromagnetic V05-K03 sinductor, printed, manufacture V02-H01A v04-R0 v04-R0 v04-R02 connector, two-part, multi-pole component (non-printed), association with v04-R02A v04-M05 v04-M0			coil, printed	
magnetic S02-F04B2 manometer S02-F04A9 mechanical S02-F04J optical S02-F04J partial pressures S02-F04C3A penning gauge V05-K03 piezoelectric S02-F04B1 potentiometer S02-F04B1 pressure differences S02-F04E rapid changes in pressure S02-F04B3 remote indication S02-F04B several pressures S02-F04B1 several pressures S02-F04B1 temp. compensation S02-F04B testing using movement of magnets S02-F04B2 vehicle engine pressure X22-F04B2 vehicle engine pressure X22-F04B1 pressure sensor electromagnetic  manometer S02-F04A9 component (non-printed), association with V04-Q02A connector, bed of nails V04-B01 vod-M05 vod-M04B01 vod-M05 cooling v04-W062 vod-M05 cooling v04-W04-W02 vod-M05 cooling v04-W04-W04-W04-W04-W04-W04-W04-W04-W04-W			anil printed manufacture	
manometer manometer mechanical optical partial pressures penning gauge piezoelectric  S02-F04B2 V06-V01B V06-V04G piezoresistance potentiometer protection against overload or environment remote indication several pressures so2-F04C3 semiconductor transducer semiconductor transducer several pressures so2-F04B1 testing several pressure so2-F04B1 several pressure so2-F04B1 several pressure so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 several pressures so2-F04B1 testing so2-F04B2 vehicle engine pressure x25-A05A4 voh-M05  Pressure sensor electromagnetic  component (non-printed), association with V04-Q02A voh-M05 voh-M			coii, printed, mandiacture	
mechanical S02-F04A optical S02-F04J connector, bed of nails V04-Q02A optical partial pressures S02-F04C3A penning gauge V05-K03 penning gauge V05-K03 v06-V01B V06-V04G cooling v06-V04G piezoresistance S02-F04B1 potentiometer S02-F04B1 pressure differences S02-F04C1 protection against overload or environment S02-F04E rapid changes in pressure S02-F04D3 remote indication S02-F04E semiconductor transducer S02-F04B3 several pressures S02-F04C3 strain gauge S02-F04C3 strain gauge S02-F04E testing using movement of magnets S02-F04E vehicle engine pressure X22-E02B vol-M05			component (non-printed) associ	
netical survey optical		component (non-printed), associa		
partial pressures S02-F04C3A penning gauge V05-K03 piezoelectric S02-F04B2 V06-V01B V06-V01B V06-V04G piezoresistance S02-F04B1 potentiometer S02-F04B1 pressure differences S02-F04C1 protection against overload or environment semiconductor transducer S02-F04B seweral pressures S02-F04B3 several pressures S02-F04B1 semiconductor transducer S02-F04B1 semiconductor transducer S02-F04B1 strain gauge S02-F04E strain gauge S02-F04E testing S02-F04E vohicle engine pressure X25-A05A4 vehicle tyre pressure X22-E02B Pressure sensor electromagnetic S02-F04C1 point May 200-F04E point May 200-F04E point May 200-F04E potentiometer S02-F04B1 v04-M05 point May 200-F04E source connector, two-part, multi-pole v04-G02A v04-M05 V04-M05 V04-M05 EMI (non-tracks type) shields V04-Q02A5 EMI (tracks type) shields V04-Q02A5 EMI (tracks type) shields V04-Q02A5 HIT arrangement V04-Q02B1A V04-M05 V04-M			connector, bed of nails	
penning gauge V05-K03 piezoelectric S02-F04B2 V06-V01B V06-V04G  piezoresistance S02-F04B1 potentiometer S02-F04B1 pressure differences S02-F04C1 protection against overload or environment semiconductor transducer S02-F04B3 several pressures S02-F04C3 strain gauge S02-F04E testing S02-F04E test				
piezoelectric  S02-F04B2 V06-V01B V06-V04G  piezoresistance potentiometer potentiometer pressure differences protection against overload or environment remote indication sewiconductor transducer semiconductor transducer strain gauge temp. compensation testing using movement of magnets vol4-W02  Pressure sensor electromagnetic  S02-F04E1  S02-F04E3  V04-W05  IC socket  U11-D01Q  V04-W05  V04-W05  V04-W05  V04-W05  IC socket  U11-D01Q  V04-W05  V0				
V06-V01B V06-V04G piezoresistance potentiometer potentiometer pressure differences protection against overload or environment remote indication seweral pressures several pressures several pressures several guage temp. compensation so2-F04E testing using movement of magnets v06-V04G S02-F04E testing using movement of magnets v08-F04E testing using movement of magnets vehicle engine pressure vehicle tyre pressure electromagnetic  v04-M05 v04-M05 v04-Q02B1A v04-Q02			connector, two-part, multi-pole	V04-G02
piezoresistance S02-F04B1 potentiometer S02-F04B1 pressure differences S02-F04C1 protection against overload or environment remote indication S02-F04E semiconductor transducer S02-F04B1 several pressures S02-F04B1 temp. compensation S02-F04E testing using movement of magnets S02-F04B2 vehicle engine pressure X22-E02B electromagnetic S02-F04C1 solve semsor electromagnetic S02-F04C1 solve solve semsor electromagnetic S02-F04C1 solve solve sistance S02-F04B1 solve solve solve sistance S02-F04B1 solve s	prezociocarie		·	V04-M05
piezoresistance S02-F04B1 potentiometer S02-F04B1 pressure differences S02-F04C1 protection against overload or environment S02-F04E rapid changes in pressure S02-F04D3 remote indication S02-F04E semiconductor transducer S02-F04B3 several pressures S02-F04B1 temp. compensation testing using movement of magnets vehicle engine pressure X25-A05A4 vehicle tyre pressure electromagnetic successive S02-F04C1A source strain gauge source S02-F04B2 source semsor electromagnetic source source source source, two-part, multi-pole V04-G02A vod-G02A vod-M05 and source source, two-part, multi-pole v04-G02A vod-M05 source, two-part, multi-pole v04-M05 vod-M05 source, two-part, multi-pole v04-M05 vod-M05 source, two-part, multi-pole v04-M05 vod-M05 source, two-part, multi-pole v04-M05 vod-M05 source, two-part, multi-pole v04-M05 source, taken to source to v04-M05 source, taken to source to v04-M05 source, taken to v04-M05 source,			cooling	V06-U04D
potentiometer S02-F04B1 pressure differences S02-F04C1 protection against overload or environment S02-F04E rapid changes in pressure S02-F04D3 remote indication S02-F04E semiconductor transducer S02-F04B3 several pressures S02-F04B1 strain gauge S02-F04B1 temp. compensation S02-F04E testing using movement of magnets S02-F04B2 vehicle engine pressure X25-A05A4 vehicle tyre pressure X22-E02B S02-F04C1A  Pressure sensor electromagnetic  S02-F04B1 V04-Q02B1A V04-Q02B1A V04-C02B1A V04	piezoresistance		edge connector, two-part, multi-	
pressure differences 302-104C1 protection against overload or environment \$	•			
protection against overload or environment  S02-F04E rapid changes in pressure remote indication semiconductor transducer serior gauge temp. compensation testing using movement of magnets vehicle engine pressure vehicle tyre pressure sensor electromagnetic  protection against overload or environment S02-F04E S02-F04E S02-F04D3 remote indication S02-F04E S02-F04E S02-F04B3 S02-F04C3 S02-F04B1 U11-D01Q V04-Q02B1A V04	pressure differences	S02-F04C1		
rapid changes in pressure remote indication semiconductor transducer semiconductor transducer several pressures strain gauge temp. compensation using movement of magnets vehicle engine pressure vehicle tyre pressure electromagnetic  so2-F04D3 so2-F04B1 So2-F04B3 so2-F04C3 strain gauge so2-F04B1 temp. compensation so2-F04E vo4-R02 V04-Q02B1A V04-R02	protection against overload or e			
Taplet Changes in Pressure   S02-F04B3   S02-F04B3   Semiconductor transducer   S02-F04B3   Several pressures   S02-F04B3   Strain gauge   S02-F04B1   IC holder   U11-D01Q   V04-K02   V04-K03   V04-K03   V04-K03   V04-K05		S02-F04E		
Semiconductor transducer   S02-F04B3   Semiconductor transducer   S02-F04B3   Seweral pressures   S02-F04B3   So2-F04C3   Strain gauge   S02-F04B1   IC holder   U11-D01Q   S02-F04E   V04-K02   V04-K02   V04-K02   V04-K02   V04-K02   V04-M05   V04-M05   V04-K02   V04-K03   V04-K05   V04-K05   V04-K03   V04-K05   V	rapid changes in pressure	S02-F04D3	hierarchical interconnection	
Several pressures   S02-F04C3   S02-F04B1   IC holder   U11-D01Q			LUT a war a sant	
strain gauge         \$02-F04B1         IC holder         U11-D01Q           strain gauge         \$02-F04B1         V04-K02           temp. compensation         \$02-F04E         V04-B01           testing         \$02-F04F         V04-M05           using movement of magnets         \$02-F04B2         V04-M05           vehicle engine pressure         X25-A05A4         IC socket         U11-D01Q           vehicle tyre pressure         X22-E02B         V04-K02           \$02-F04C1A         V04-M05           Pressure sensor           electromagnetic         inductor, printed         V02-F01N1           V04-O04C         V04-O04C			HII arrangement	
temp. compensation			IC holder	
testing			ic noidei	
using movement of magnets				
vehicle engine pressure vehicle tyre pressure         X25-A05A4 vehicle tyre pressure         V22-E02B S02-F04C1A         IC socket         U11-D01Q V04-K02 V04-K02 V04-B01 V04-M05 V04-M05 V04-M05           Pressure sensor electromagnetic         inductor, printed         V02-F01N1 V04-O04C	5			
Vehicle engine pressure         X23-A03A4 vehicle tyre pressure         V04-K02           V04-B01 V04-B01 V04-M05         V04-M05 V02-F01N1 V04-O04C			IC socket	
Vol-B01 V04-B01 V04-M05  Pressure sensor electromagnetic  V04-B01 V04-M05 V02-F01N1 V04-O04C			TO SOCIACE	
Pressure sensor electromagnetic inductor, printed V04-M05 V04-M05 V02-F01N1 V04-O04C	venicie tyre pressure			
Pressure sensor inductor, printed V02-F01N1 v04-Q04C	_	302-F04C1A		
electromagnetic V04-Q04C			inductor, printed	
induction type V06-V01A	S .	\(\(\alpha\)\(\)\(\alpha\)	• •	
	induction type	VU6-VU1A		

manufacture - see PCB manufa	<b>cture</b> V04-R	Printed circuit board manufacture manufacture	- see PCB V04-R
mechanical components, assoc		Printer	
'	V04-Q02A4	3-D (see also <b>3D printing</b> )	X25-A08
multichip modules, association	with U11-D01A	fused deposition modelling	X25-A08C2
,	U14-H03	laminated object manufacturin	
	V04-Q02A2	selective laser sintering	X25-A08C3
printed circuits(other), associati	on with V04-Q02B	stereolithography	X25-A08C1
probe cards	V04-Q08	control	T06-D17
probe cards, horizontal	V04-Q08A	4-D (see also <b>4D printing</b> )	X25-A08
probe cards, vertical	V04-Q08B	5-D (see also <b>5D printing</b> )	X25-A08
resistor, printed	V01-A02	computer - see <b>Printer, compute</b>	
•	V04-Q04A	computer out to	T01-C05A
RFI (non-tracks type) shields	V04-Q02A5	computer out to networked p	
31 7	V04-U	computer output to networked p	T01-C05A1
RFI (tracks type) shielding	V04-Q05A	inking arrangements	P74-C08
semiconductor device, associat	ion with	machinery and equipment	P74-C00
· ·	V04-Q02A7	electrophotographic - see <b>Electr</b>	
smart card, association with		photographic	S06-B04A
(see Smart card also)	T04-K01	line printing	P74-C11
•	V04-Q02A3	print presses	P74-C02
surface connector, two-part, mu	ılti-pole	rotary printing machines	P74-C02
	V04-G02B	screen printers	P74-C04
	V04-M05	'	
switch, association with	V04-Q02A1	Printer, computer	S06-K99C
terminal block	V04-B01	authentication	S06-K07C7
	V04-M05	Braille	S06-K
terminal strip	V04-B01	colour	S06-K01
	V04-M05	confidential documents	S06-K07C7
Printed circuits, applications	V04-Q30	construction	S06-K03
alarms	V04-Q30T	continuous ink-jet	S06-G02
audio equipment	V04-Q301 V04-Q30H	control system	S06-K07A
avionics	V04-Q3011 V04-Q30A	construction	S06-K03
broadcasting	V04-Q30A V04-Q30G	daisy wheel	S06-F02
cameras	V04-Q30J	dot matrix impact	S06-F01
computers	V04-Q30C	drop deflection	S06-G02
data storage	V04-Q30E	drop-on-demand ink-jet	S06-G01
displays	V04-Q30D	electrode	S06-J
domestic appliances	V04-Q30D V04-Q30N	electroerosive	S06-J
fax machines	V04-Q30F	electrographic	S06-J
games	V04-Q30K	electrophotographic	S06-E
industrial machines	V04-Q30K V04-Q30S	electrosensitive	S06-J
instrumentation	V04-Q303 V04-Q30Q	external control of	S06-K07C1
land vehicles	V04-Q30B	paper feeding	S06-K03A
machine tools	V04-Q30B V04-Q30R	preventing illegal printing	S06-K07A3
medical equipment	V04-Q30M	impact	S06-F
military	V04-Q30N	ink, for ink-jet	S06-G04
personal articles	V04-Q30P	ink-jet	S06-G
photocopiers	V04-Q30F	interface	S06-K07C2
power supplies	V04-Q30L	laser	S06-E
printers	V04-Q30E V04-Q30F	layout control	S06-K03A
projectors	V04-Q30D	magnetic	S06-K
robotics	V04-Q30B V04-Q30R	media feeding	S06-K02
scanners	V04-Q30F	monitoring	S06-K07B
shiping	V04-Q30A	needle impact	S06-F01
signalling	V04-Q30A V04-Q30T	optical	S06-E
sports	V04-Q30K	photosensitive paper	S06-E01
telecommunication	V04-Q30K V04-Q30G	print job	S06-K07C1A
telecontrol	V04-Q30G V04-Q30T	print queue	S06-K07C1A
toys	V04-Q301 V04-Q30K	ribbon, for impact type	S06-F03
video equipment	V04-Q30K V04-Q30H	recycling	S06-K04
·		secrecy	S06-K07C1
Printed circuit board - see PCB		sheet feeding	S06-K02

thermal	S06-H	semiconductor device testing	U11-F01C1
thermal ink composition	S06-H02A	semiconductor wafer testing	U11-F01D1
thermal ink-jet	S06-G01	Process control	T06-A
thermal printhead	S06-H03	application	T06-D
thermal ribbon	S06-H02	Process monitoring, production line	T05-G02B
thermal transfer	S06-H02		103-0025
thin-film heads for	U14-H01B	Processing	
typewriter, self contained	S06-K99A	data transmission	W01-A07F
using thermal paper	S06-H01	electromagnetic prospecting data	
using type	S06-F02	particle movement	S03-G01A
wire dot impact	S06-F01	seismic data	S03-C01X
Printing		Processing, audio signals (general)	W04-G
colour separation	S06-C02B	compression and expansion	W04-G04
composition or typesetting	P74-B01	improving S/N ratio	W04-G03A
computer - see Printer, compute	er S06-K99C	noise reduction	W04-G03
computer-to-plate	S06-C02A1	reducing acoustic feedback	W04-G03C
digital photography	W04-D10	Processing, image - see Image proce	essing
	W04-M01B1	Processing, video signals	W04-P
electrophotographic - see			****
Electrophotography	S06-K99B	Processing device	VOE E0E 4.7
facsimile - see Facsimile	S06-K99D	characterised by beam type	V05-F05A7
imposition	P74-B02	complete device device details	V05-F05E1 V05-F05E3
intaglio	P74-A03	for surface treatment	V05-F08D5
lithography	P74-A02	novel details	V05-F05E
photoelectronic composing	S06-C01	using beams	V05-F05A
photographic - see <b>Photograph</b> y		using beams using electron beam	V05-F05A7A
plate production	S06-C02A	using electron beam	V05-F05A7C
press printing	P74-A01	with flood effect beam	V05-F05A5
screen printing	P74-A04	with focused beam	V05-F05A1
surface preparation	P74-B03		
textile printing	X25-T04D T05-C01	Processing tube	V05-F05
ticket, receipt		beam masking element	V05-F04X
Printing, duplicating or manifoldin		beam tube	V05-F05A V05-F05A7
carbon copying	P75-D01	characterised by beam type charge-up prevention element	V05-F03A7 V05-F04X
hectographic printing	P75-D01	circuitry	V05-F05E5
pressure-sensitive layers or interr		cleaning, maintenance	V05-F05E9
	P75-D01	cooling	V05-F04K
Printing press	S06-C	electron beam tube	V05-F05A7A
	P74-C02	electron cyclotron resonance (ECR	
collator, collector, folder	S06-C09	creed on cyclotron resonance (Eor	V05-F05C3
composing	S06-C01	equipment function - see <b>Processi</b>	
control	S06-C03A	function	V05-F08
plate production	S06-C02A	externally applied ionising energy	
Prisms		flood effect beam tube	V05-F05A5
generating spectrum	S03-A02A	focused beam tube	V05-F05A1
testing	S02-J04A9	heating arrangement	V05-F04X
Probe		ion beam tube	V05-F05A7C
bed-of-nails type	V04-R06G1A	magnetron effect	V05-F05C3A
board	S01-H03A	microwave excitation of plasma	V05-F05C1A
contact type	V04-R06G1	monitoring	V05-F05E5A
flying	V04-R06G1B	multiple beam tube	V05-F05A3
generic	V04-R06G1C	operation of device	V05-F05E5
inductive	V02-G01E	optical excitation of plasma	V05-F05C1C
MEMS type	V04-R06G5	plasma	V05-F05C
multiple-probe arrangement	S01-H03A	plasma confinement/manipulation	
non-contact type	V04-R06G2	plasma, capacitively coupled	V05-F05C1G
single	S01-H03B	plasma, inductively coupled	V05-F05C1E
ultrasonic	S03-E08X	power supplies	V05-F05E5
Probe cards	V04-Q08	RF feed arrangement	V05-F04X
probe cards, horizontal	V04-Q08A	specimen holder	V05-F04G
probe cards, nonzontal	V04-Q08B	tunnelling effect tube	V05-F05D
p. 0.00 00. 00, voi dioui		I	

UV source	V05-F04X	fluidic, non-numerical	T06-A04B3
workpiece holder	V05-F04G	FMS	T06-A04B7
Processing tube function	V05-F05	graph set processing-type	T06-A04B1
-	V05-F08	logic controller	T06-A04B1
coating	V05-F08D1		U21-C03B3
cutting	V05-F08E3	manual data input, NC	T06-A04A4
etching	V05-F08E1	MDI, NC	T06-A04A4
fluid processing	V05-F08F	monitoring, NC	T06-A04A6
ion implantation	V05-F08D3	multi-machine	T06-A04B7
lithography	V05-F08C1	NC, using measuring device	T06-A04A1
machining	V05-F08E5	non-numerical	T06-A04B
powder synthesis	V05-F08G		T06-A04B1
removing material	V05-F08E	numerical	T06-A04A
sputtering	V05-F08D1A	numerical, using measuring device	eT06-A04A1
surface treatment	V05-F08D	open loop, numerical	T06-A04A9
	1001002	PLC	T06-A04B1
Product code reader	TO 4 A O 2 D 4		U21-C03B3
barcode type	T04-A03B1	positioning, NC	T06-A04A3
point of sale	T05-L01C	recording and playback, non-num	erical
Production line			T06-A04B5
pass-fail test	T05-E	relay ladder-type	T06-A04B1
process monitoring	T05-G02B	safety, NC	T06-A04A6
Profile tracing		sequence controller-type	T06-A04B1
land surfaces, cavities	S02-B02	teaching, non-numerical	T06-A04B5
using photographic surveying	S02-B04	tool path interpolation, NC	T06-A04A5
		total factory, numerical	T06-A04A2A
Program switch	V03-C08	using computer	T06-A04A2
Program control, computer	T01-F	Programmable array logic	U13-C04C
booting/initialisation	T01-F05B	r rogrammable array logic	U21-C01E
configuration	T01-F05B2		
execution of instructions	T01-F03	Programmable controller	U21-C03B3
high level language	T01-F05A	Programmable interconnect	U13-C04C
interrupt	T01-F02	Programmable logic array	U13-C04C
language processor	T01-F05A	. regrammable legic array	U21-C01E
microprogramming	T01-F01	Duramana kila la mia asatas ilan	
multitasking	T01-F02	Programmable logic controller	T01-F06
resetting	T01-F05B1		T06-A04B1
shell	T01-F05G3	laddentada	U21-C03B3
support programs	T01-F05C	ladder logic	T01-F06
system management	T01-F05	Programmable matter (4D printing)	X25-A08M8
terminal emulation	T01-F05G3	Programme guide system (EPG)	
Applets	T01-H07C3E	head-end/general system details	W02-F10E5
Program guide (EPG)		receiver details	W03-A13J
system aspects	W02-F10E5	subscriber-end interactive details	W03-A16C5E
TV set aspects	W03-A13J	recorder details	W04-E04C8
video recorder aspects	W04-E04C8	Programming/erasing circuitry for r	nemory
Program management, computer	T01-J12	r rogramming, crasing circulary for r	=
icons, use of	T01-J12D		U14-A07B
prompting	T01-J12A	Programming hearing aids	W04-Y03P
security	T01-J12C	Projection television	W04-Q01
split screen display	T01-J12B	beam splitter	W04-Q01E7A
user interface management syste		cathode ray tube type	W04-Q01A
window display	T01-J12B	circuitry	W04-Q01J
· -		convergence control, CRT	W03-A08A5C
Program monitoring, computer	T01-G05		W04-Q01A
Program-control system	T06-A04	cooling	W04-Q01H5
CIM	T06-A04B7	copy protection systems	W04-Q01J5
CNC	T06-A04A2	deformable mirror device (DMD)	
computer integrated manufactur	ng T06-A04B7	direct retinal projection, general d	
contouring, NC	T06-A04A3	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	W04-Q01L
direct/distributed numerical	T06-A04A2A		W05-E07
DNC	T06-A04A2A		
flexible manufacturing	T06-A04B7		
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direct retinal projection, TV display		ship	Q24-E
ander owner projection, it allopia	W03-A08E7A	5p	W06-C01A1
	W04-Q01L	spacecraft	Q25-S04
direct retinal projection, virtual rea		trolley bus	X21-A01
display	1404 0041	Prospecting	S03-C
1 7	W04-W07E1A	acoustic	S03-C01
filter, colour separation	W04-Q01E3A	calibrating of equipment	S03-C01
filter, IR-blocking	W04-Q01E3C	compensation aspects	S03-C10
laser light source	W04-Q01B1	electric current	S03-C02A
lens details	W04-Q01E1C	electric field	S03-C02B
lens focusing	W04-Q01E1A	electromagnetic	S03-C02
lens system	W04-Q01E1	electromagnetic, processing data	
lens/optics associated with CRT	V05-D01B	gas	S03-C
	V05-D07C5A	gravimetric	S03-C04
	W04-Q01A	in water covered areas	S03-C01C1
	W04-Q01E		S03-C07B
light valve system	W04-Q01B	magnetic field	S03-C02B
light valve system with laser source		nuclear radiation	S03-C03
mirror	W04-Q01E5	nuclear radiation, processing data	S03-C03
monitoring display output	W04-Q01J1	oil	S03-C
novel light source	W04-Q01B7	optical	S03-C04A
novel light valve	W04-Q01B5	seismic	S03-C01
optical system	W04-Q01E	seismic, processing data	S03-C01X
polariser	W04-Q01E7C	testing of equipment	S03-C10
stereoscopic and 3-dimensional d		thermal	S03-C04A
	W04-Q01S	using ESR/EPR	S03-C02F9
volumetric, non-planar projection		using MRI	S03-C02F3
or media	W04-Q01F5	using NMR	S03-C02F1
Projector, computer	T04-H03E	using NQR	S03-C02F5
Projector, photographic - see Photo	graphic	using Nuclear Quadrupole Resona	
projector	S06-B06A		S03-C02F5
Projector, video - see Projection tele	vision	using quantised spin properties	S03-C02F
		11.1	CO2 CO4CE
r rojector, video - see i rojection tere		well logging	S03-C01C5
	W04-Q01		S03-C07A
PROM - see ROMs, programmable	W04-Q01	Prosthesis	S03-C07A S05-F
	W04-Q01	Prosthesis arm or leg	S03-C07A S05-F S05-F03
PROM - see ROMs, programmable Prompting, computer	W04-Q01 P T01-J12A	Prosthesis arm or leg artificial heart pump	S03-C07A S05-F S05-F03 S05-F04
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material	W04-Q01 P T01-J12A	Prosthesis arm or leg	S03-C07A S05-F S05-F03 S05-F04 S05-F10
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion	W04-Q01 P13-B01	Prosthesis arm or leg artificial heart pump	S03-C07A S05-F S05-F03 S05-F04 S05-F10 T01-J15X
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material	W04-Q01  T01-J12A  P13-B01  Q25-C	<b>Prosthesis</b> arm or leg  artificial heart pump  design	S03-C07A S05-F S05-F03 S05-F04 S05-F10 T01-J15X T01-J06A
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft	W04-Q01  T01-J12A  P13-B01  Q25-C  W06-C01A1	Prosthesis  arm or leg artificial heart pump design  eyesight aids	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle	W04-Q01  T01-J12A  P13-B01  Q25-C  W06-C01A1  X21-A01C	Prosthesis  arm or leg artificial heart pump design  eyesight aids implantable general	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle electric bus	W04-Q01  T01-J12A  P13-B01  Q25-C  W06-C01A1  X21-A01C  X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle electric bus electric car	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F01
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle electric bus	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01F X21-A01B	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F01 \$05-F02 P32-M
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle electric bus electric car electric forklift truck	W04-Q01  P T01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01F X21-A01B X25-F05A	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle electric bus electric car	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01F X21-A01B	eyesight aids implantable dearing aid internal incontinence device medical	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F0
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle electric bus electric car electric forklift truck electric golf cart	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01F X21-A01B X25-F05A X21-A01E X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft electric bicycle electric bus electric car electric forklift truck electric golf cart electric motorcycle	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01F X21-A01B X25-F05A X21-A01E X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40 \$05-F
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter	W04-Q01  P T01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01E X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram	W04-Q01  P T01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01E X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40 \$05-F P32-A40B
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01E X21-A01F X21-A01F X21-A01F X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers Protection amplifier	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40 \$05-F P32-A40B
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle	W04-Q01  T01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01B X21-A01E X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers Protection amplifier	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40 \$05-F P32-A40B **Cord  T03-A01B5C  U24-G03C T01-J05A2G
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair  hybrid electric vehicle	W04-Q01  T01-J12A  P13-B01  Q25-C  W06-C01A1  X21-A01C  X21-A01F  X21-A01B  X25-F05A  X21-A01B  X21-A01F  X21-A01F  X21-A01F  X21-A01F  P  X21-A01F  P  R  R  R  P  P  R  R  R  R  R  R  R	eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable erotecting coating, for magnetic rectarriers erotection amplifier copyright	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40 \$05-F P32-A40B **Cord  T03-A01B5C  U24-G03C T01-J05A2G T01-N01A2G
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair  hybrid electric vehicle microwave thruster, space vehicle	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01B X25-F05A X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X23-A01A X21-A01D X22-P04 W06-B03A	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers Protection amplifier copyright emergency protective circuits - see	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40B \$05-F P32-A40B \$05-F P32-A40B \$05-F P32-A40B
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair  hybrid electric vehicle microwave thruster, space vehicle plasma	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01B X25-F05A X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01D X22-P04 W06-B03A X14-F04	eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable erotecting coating, for magnetic rectarriers erotection amplifier copyright	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40B \$05-F T03-A01B5C U24-G03C T01-J05A2G T01-N01A2G
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair  hybrid electric vehicle microwave thruster, space vehicle	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01B X21-A01E X21-A01F X21-A01F X21-A01F X21-A01F X21-A01F X21-A01D X22-P04 W06-B03A X14-F04 W06-B03A	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers Protection amplifier copyright emergency protective circuits - see	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40B \$05-F P32-A40B \$05-F P32-A40B \$05-F P32-A40B \$05-F P32-A40B \$05-F P32-A40B \$05-F P32-A40B
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair  hybrid electric vehicle microwave thruster, space vehicle plasma plasma, space vehicle	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01B X25-F05A X21-A01E X21-A01F X21-A01F X21-A01F X23-A01A X21-A01F X23-A01A X21-A01D X22-P04 W06-B03A X14-F04  W06-B03A X14-F04	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers Protection amplifier copyright emergency protective circuits - see Protection circuits, emergency emergency protective devices - see	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40B \$05-F Cord T03-A01B5C U24-G03C T01-J05A2G T01-J05A2G T01-N01A2G EXTRACTOR TO TO TO TO TO TO TO TO TO TO TO TO TO
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair  hybrid electric vehicle microwave thruster, space vehicle plasma	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01E X21-A01E X21-A01F X23-A01A X21-A01F X23-A01A X21-A01F X23-A01A X21-A01D X22-P04 W06-B03A X14-F04 W07-E05A	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers Protection amplifier copyright emergency protective circuits - see	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 \$01-J15X \$01-J06A \$05-F05 \$932-A40A \$05-F01 \$05-F02 \$932-M \$932-A40 \$05-F \$932-A40B \$05-F \$05-F \$05-F02 \$05-F \$05-F02 \$05-F02 \$05-F02 \$05-F02 \$05-F02 \$05-F02 \$05-F03 \$05-F0
PROM - see ROMs, programmable Prompting, computer Propagation of vegetative material Propulsion aircraft  electric bicycle electric bus electric car electric forklift truck  electric golf cart electric motorcycle electric scooter electric train/tram electric vehicle electric wheelchair  hybrid electric vehicle microwave thruster, space vehicle plasma plasma, space vehicle	W04-Q01  PT01-J12A P13-B01  Q25-C W06-C01A1 X21-A01C X21-A01F X21-A01B X25-F05A X21-A01B X25-F05A X21-A01E X21-A01F X21-A01F X21-A01F X23-A01A X21-A01F X23-A01A X21-A01D X22-P04 W06-B03A X14-F04  W06-B03A X14-F04	Prosthesis arm or leg artificial heart pump design  eyesight aids implantable general implantable hearing aid internal incontinence device manufacture medical non-implantable Protecting coating, for magnetic rec carriers Protection amplifier copyright emergency protective circuits - see Protection circuits, emergency emergency protective devices - see	\$03-C07A \$05-F \$05-F03 \$05-F04 \$05-F10 T01-J15X T01-J06A \$05-F05 P32-A40A \$05-F01 \$05-F02 P32-M P32-A40 \$05-F P32-A40B \$05-F Cord T03-A01B5C U24-G03C T01-J05A2G T01-J05A2G T01-N01A2G EXTRACTOR TO TO TO TO TO TO TO TO TO TO TO TO TO

	,	1	
indicating apparatus	S02-K02C	protection algorithms, digital prot	
protective screens (in e.g. shops)			X13-C15N3
smart card, fraud prevention	T01-H01C1	protectors, thermal	X13-D12
transducer (pressure measuremer	*	protectors (not covered elsewhere	
	S02-F04E	PTs	X13-C01X
transducers, general	S02-K02C	reactor, current limiting	X12-C01F
transmitter power amplifier	W02-G01C5		X12-H01A3
X-ray, in medical use	S05-D02A3		X13-C03B
Protection, power system		short-circuit	X13-C01A
A/D signal conversion, digital pro	tection	signal conditioning, digital protec	
	X13-C15N2	simulators	X13-C20A
arrester, metal oxide	X13-C03A2	solid-state (analogue) relays	X13-C10
·	X12-A	spark gaps, surge limiting	X12-F01A
arrester, SF6	X13-C03A3		X13-C03A
arrester, silicon carbide	X13-C03A1	superconducting current limiter	X13-C03B1
arrester, spark gap	X12-F01A		X12-C05
5 7 7 7 7 5 7	X13-C03A	surge arrester (see <b>Arrester</b> )	X13-C03
arrester, varistor	X12-A	synchronism-loss	X13-C01X
, , , , , , , , , , , , , , , , , , , ,	X13-C03A	testing	X13-C20
artificial intelligence-type	X13-C15B	thermal , circuitry	X13-C02
auto-reclosures	X13-C01X	under-voltage	X13-C01C
automatic disconnection	U24-F01	varistors	X12-A
	X13-C01		X13-C03A
Buchholz relay	X13-C02	Protection, power system, applicati	ons
circuit breakers (see also <b>Circuit k</b>		accumulators	X13-C04X
	X13-D	arresters	X13-C04X
CTs	X13-C01X	batteries	X13-C04X
cutoffs, thermal	X13-D12	bus-bars	X13-C04X
differential	X13-C01D	capacitors (static)	X13-C04X
digital relays	X13-C15	capacitors (synchronous)	X13-C04B
discharge tube, surge protection	V05-A05	converter	U24-D01B
discharge tabe, sarge protection	X13-C03A	Converter	U24-F
distance	X13-C01E		X12-J01B
earth leakage	X13-C01B		X13-C04D
excess current/voltage limiting	U24-F02	distribution-gear	X13-C04X
expert system-type	X13-C15B1	feeders	X13-C04A
fault indicators	X13-C01X	generators	X13-C04B
frequency-deviation	X13-C01X	inverter	U24-D01B
fuses, electrical - see <b>Fuse</b>	X13-D01	inverter	U24-F
fuses, thermal	X13-D12		X12-J01B
fuzzy logic-type	X13-C15C		X13-C04D
gas discharge tube, surge protect		motors	X13-C04C
gas discridige tabe, sarge protect	X13-C03A	personnel	X13-C09
high power equipment	X13-C	reactors	X13-C04X
impedance	X13-C01E	rectifier	U24-D01B
lightning arresters	X13-C03A	1004	U24-F
line-breakage	X13-C02		X12-J01B
low power equipment	U24-F		X13-C04D
microprocessors	X13-C15A	sectionalised lines/cables	X13-C04A
neural networks	X13-C15B2	static capacitors	X13-C04X
numeric relays-type	X13-C15	synchronous capacitors	X13-C04B
overcurrent limiter	U24-F02	transformers	X13-C04B
overcurrent miner	X13-C03B		7(10 00 15
overcurrent, disconnection	X13-C01A	Protection circuits, emergency	
overload	X13-C01A	A/D signal conversion, digital pro	
overspeed	X13-C02		X13-C15N2
overspeed overvoltage limiter	U24-F02	arrester, metal oxide	X13-C03A2
overvoitage infliter	X13-C03A		X12-A
overvoltage, disconnection	X13-C03A X13-C01C	arrester, SF6	X13-C03A3
Peterson coils, current limiting	X13-C03B	arrester, silicon carbide	X13-C03A1
power-reversal	X13-C01X	arrester, spark gap	X12-F01A
Power-reversal	710-C017		X13-C03A

arrester, varistor	X12-A	thermal , circuitry	X13-C02
	X13-C03A	under-voltage	X13-C01C
artificial intelligence-type	X13-C15B	varistors	X12-A
auto-reclosures	X13-C01X		X13-C03A
automatic disconnection	U24-F01	Protection circuits, emergency, ap	nlications
	X13-C01	accumulators	X13-C04X
Buchholz relay	X13-C02	arresters	X13-C04X X13-C04X
circuit breakers (see also <b>Circuit</b> l			
en eure si eurere (eee uiee <b>en eur</b> e	X13-D	batteries	X13-C04X
CTs	X13-C01X	bus-bars	X13-C04X
cutoffs, thermal	X13-C01X X13-D12	capacitors (static)	X13-C04X
differential	X13-C01D	capacitors (synchronous)	X13-C04B
		charging (low-power)	U24-F08
digital relays	X13-C15	converter	U24-D01B
discharge tube, surge protection			U24-F
	X13-C03A		X12-J01B
distance	X13-C01E		X13-C04D
earth leakage	X13-C01B	distribution-gear	X13-C04X
excess current/voltage limiting	U24-F02	feeders	X13-C04A
expert system-type	X13-C15B1	generators	X13-C04B
fault indicators	X13-C01X	inverter	U24-D01B
frequency-deviation	X13-C01X	mverter	U24-F
fuses, electrical - see <b>Fuse</b>	X13-D01		X12-J01B
fuses, thermal	X13-D12		
fuzzy logic-type	X13-C15C	and the second	X13-C04D
gas discharge tube, surge protec		motors	X13-C04C
gas discharge tabe, sarge protec	X13-C03A	personnel	X13-C09
high power equipment	X13-C03A X13-C	reactors	X13-C04X
	X13-C01E	rectifier	U24-D01B
impedance			U24-F
lightning arresters	X13-C03A		X12-J01B
line-breakage	X13-C02		X13-C04D
low power equipment	U24-F	sectionalised lines/cables	X13-C04A
microprocessors	X13-C15A	static capacitors	X13-C04X
neural networks	X13-C15B2	synchronous capacitors	X13-C04B
numeric relays-type	X13-C15	transformers	X13-C04B
overcurrent limiter	U24-F02		
	X13-C03B	Protection, general	DOE 400E
overcurrent, disconnection	X13-C01A	breathing equipment for	P35-A03E
overload	X13-C01A	chemical protection	P35-A03G
overspeed	X13-C02	clothing for	P35-A03C
overvoltage limiter	U24-F02	Protective clothing	P35-A03C
overvoltage infiniter	X13-C03A	Protocol for data transmission	
overvoltage, disconnection	X13-C01C		T01 1107D
Peterson coils, current limiting	X13-C01C X13-C03B	computer communication	T01-H07B
power-reversal	X13-C03B X13-C01X	data networks - see <b>Network pr</b>	
•			W01-A06F
protection algorithms, digital pro		general	W01-A07G
	X13-C15N3	Proximity switches	U21-B02C
protectors, thermal	X13-D12	displacement	U21-B02C2
protectors (not covered elsewher	,	non-displacement	U21-B02C1
PTs	X13-C01X	optical	U21-B02C3
reactor, current limiting	X12-C01F	•	
	X12-H01A3	Proximity/presence detection	S03-C06
	X13-C03B	acoustic	S03-C01B
short-circuit	X13-C01A	electrical/magnetic, using electri	
signal conditioning, digital protec	ction X13-C15N1		S03-C02A
simulators	X13-C20A	electrical/magnetic, using	
solid-state (analogue) relays	X13-C10	electric/magnetic field	S03-C02B
spark gaps, surge limiting	X12-F01A	electrical/magnetic, using HF em	fields
opain gapo, sarge mining	X13-C03A	5 . 5	S03-C02X
superconducting current limiter	X13-C03B1	optical- see also Light barriers	S03-C08
superconducting current limiter		other types	S03-C04
	X12-C05	• •	
surge arrester (see <b>Arrester</b> )	X13-C03	Proxy/DNS Proxy	W01-A06E1P
synchronism-loss	X13-C01X	Pseudo-stereophonic system	W04-R01A
testing	X13-C20		

Phase shift keying	W01-A09B	FET implementation	U22-A02B
	U23-P01A3	integrated bipolar implementation integrated FET implementation	U22-AU2A1 U22-A02B1
Psychrometry	S03-E01B	Josephson junction device implem	
PT	S01-D01D1A		U22-A02X
	V02-G01B	logic gate implementation	U22-A02D
	X12-C01G	monostable type	U22-A04B
Public address system	W04-S05	multistable type	U22-A04X
aircraft	W04-S05 W06-B01C7	on-chip control circuits	U22-B02
ship	W04-S05	operational amplifier implementat output regulation	U22-B01
31110	W06-C01C6	parameter compensation	U22-B05
Public information board	P85-A50E	pulse train generation	U22-A01
Public telephone	W01-C07A	radar system application	W06-A04D1
antifraud measures	W01-C07A3	random/pseudorandom type	U22-A01A
card operated	T05-H02C1	stored energy release type	U22-A03
	T05-H05C	Pulse generator for radar	W06-A04D1
	W01-C07A5	Pulse manipulation	
coin operated	T05-H01	amplification	U22-D01A1
	T05-H05C	bipolar transistor implementation	U22-D10A
a a natruction	W01-C07A5 W01-C07A1	changing duration	U22-D01A6
construction control and signalling	W01-C07A7	changing duration using time refe	
for railway train	X23-C01	signals	U22-D01A6C
internet access facility	W01-C05B4E	changing duration without time re	
, <b>,</b>	W01-C07A9	signals	U22-D01A6A
payment apparatus details	T05-H05C	changing pulse train pattern changing timing using active circu	U22-D05
	W01-C07A5	changing tilling using active circu	U22-D04A
pin fraud prevention	W01-C07A3	changing timing using passive circ	
telephone card	W01-C07A5A	ananging aning basis and	U22-D04C
Public transport timetable	P85-A50A	circuit implementation	U22-D10
Public transport vehicle		comparator implementation	U22-D10F
displaying information to controlle	er T07-A05A3	comparison	U22-D02
location display for passenger	T07-A05A1	demodulation	U22-E05A
position monitoring (external)	T07-A05A	distribution	U22-D06
Puffer type circuit breaker	X13-B03A1	FET implementation frequency multiplication/division	U22-D10B
Pulse code modulation		level clamping, shaping	U22-D01A1A
television systems	W02-F07	logic block implementation	U22-D10D
transmission (general)	W02-C06	modulation	U22-E
Pulse comparison (by)	U22-D02	offset establishing / removing	U22-D01A1A
amplitude	U22-D02A	operational amplifier implementat	ion U22-D10X
duration	U22-D02G	operational amplifier/comparator	
frequency	U22-D02E	implementation	U22-D10X
phase	U22-D02C	PAM PFM	U22-E01E U22-E01G
Pulse compression for radar	W06-A04D3	PPM	U22-E01C
Pulse counter - see Counters	U21-D	pulse delivery as function of input	
Pulse demodulation	U22-E05A	PWM	U22-E01A
Pulse distribution	U22-D06	responding to power supply	U22-D07A
frequency variation in output puls	es U22-D06C	shaping	U22-D01
phase variation in output pulses	U22-D06A	sorting	U22-D02
switching	U21-B05X	thresholding, shaping	U22-D01A1C
Pulse generation	U22-A	transforming modulation type	U22-E05C U22-D07A
astable implementation	U22-A04A	zero-crossing responsive circuit	
bipolar implementation	U22-A02A	Pulse monitoring (by)	U22-D03
bistable type	U22-A04C	amplitude duration	U22-D03A U22-D03G
Blumlein type	U22-A03	frequency	U22-D03G
comparator implementation control details	U22-D10F U22-B	phase	U22-D03C
control details counter circuit implementation	U22-B U22-A02D	Pulse offset adjustment	U22-D01A1A
energy storage type	U22-A02D		
shorg, storage type	3227.00		

Pulse stuffing		α	
Digital TDM synchronisation	W01-A04A9	Q-factor measurement	S01-D05A5
TDM (general)	W02-K02A3		
Pulse transformer	V02-F02	QAM circuits	U23-P01E1
Pulses		QAM data transmission	W01-A09C1
characteristics, measuring	S01-D06	QoS (data networks)	W01-A06A3
comparing demodulating, from carriers	U22-D02 U23-P01	QPSK circuits	U23-P01A3
distributing, from carriers	U22-D06	QPSK data transmission	W01-A09B
finite slope generation	U22-C	Quad antenna (box-kite type)	W02-B04D5
generation using energy-accumu	lating	Quadrifilar helix antenna (QFH)	W02-B01C3
element	U22-A03	Quadraphonic systems	W04-R01E
manipulation	U22-D	Quadrature amplitude modulation	
modulating carriers (using)	U23-P01	•	
monitoring shaping	U22-D03 U22-D01	Quadrature phase shift keying	W01-A09B
sorting	U22-D01	Quality control	
stepped portion	U22-C	computer-controlled manufacture	
triangular shape generating	U22-C01	magnetic record carrier manufact	ure 103-A02
Pump		Quantization, video coding	14/04 D04 A
apparatus, semiconductor manuf	acture	hybrid coding predictive coding	W04-P01A4 W04-P01A5
	U11-C09Q	transform coding	W04-F01A3
electromagnetic pump - low pow		Quantized spin properties measure	
electromagnetic pump - high pov		Quantized spin properties measure	
conduction type, electrodynamic heart, medical	X11-H03B S05-F04		S01-E02A
induction type, electrodynamic	X11-H03B	Quantum cryptography	W01-A05E
industrial electric	X25-L03A	Quantum interference devices	U12-D02K
ion	V05-K	Quantum processor	T01-M06Q
medical	S05-H	Quantum processing	T01-E05Q
Pumping, laser - see Laser pumping	V08-A02	Quantum wells, wires, boxes depos	sition
Pumping station	Q42-P		U11-C01J6
Punch, for card or tape	T04-A01	FET, quantum well	U12-D02D2
Punching	X25-A02D	FET, quantum wire	U12-D02D1
engraving systems	X25-X10	for semiconductor structures	U12-E01B2
Purification/sterilization		structures, for semiconductor lase	rs U12-
by use of transducers	V06-V04T	A01B1B	
Push-pull amplifier	U24-G02C5	Quarrying - see Mining	
Push-pull converter	U24-D02B3	Quartz oscillator	604 5005
control	U24-D02B3	clock application circuitry	S04-B02B U22-A04A2
	U24-D01A	Circuitry	U23-A04A2
Push to talk over packet network	W01-C05B4G	resonator details	V06-V01B
Pushbutton switch	V03-C01A		V06-V01E
- 40	X13-A04B2	watch application	S04-B02B
details (constructional)	V03-C01A3	Question and answer apparatus	P85-A07
multi-pushbutton	V03-C01A2		W04-W01
single-pushbutton	V03-C01A1		
PWR	X14-A02		
Pyroelectric devices	U14-E01		
characterised by material	U11-A02		
	U14-E01A		
ala a da a da a da a al IIII de de de de de de de de de de de de de	U14-E01B		
characterised by structure	1114 E01C		
manufacture	U14-E01C		
manufacture  Pyrometry	S03-A03		
manufacture			

R		vehicle, driver information	W06-A
Radar			X22-E11
absorber	W02-B03D	vehicle, traffic management	W06-A
absorber	W06-A04X	athan	X22-E11
acoustic - see sonar	W06-A05	weather	S03-D05 W06-A04H2
antennas and antenna control	W06-A04G7		VVU0-AU4HZ
anticollision	W06-A04H1K	Radiation detector (nuclear)	502 500
antijamming	W06-A04E1C	general	S03-G02
applications	W06-A04H	tube manufacture	V05-L05H V05-H
bistatic	W06-A04L	tube per se	
calibration	W06-A04E3A	Radiation diagnosis, medical	S05-D02
chaff	W02-B03B2A	Radiation hardened integrated circu	it
	W06-A04E1		U13-D08
clutter supression	W06-A04E5	Padiation imaging using stimulable	0.0200
constant false alarm rate (CFAR)	W06-A04E5	Radiation imaging using stimulable	
continuous wave (CW)	W06-A04F	phosphor sheet general	S03-E06B3
detecting existence/position of ra		general	S06-K99G
0. 1	W06-A04E3C	medical	S05-D02A5C
displays	W06-A04C		303-D02A3C
Doppler (RF)	W06-A04A2	Radiation measurement	CO2 FO/C
FM-CW	W06-A04F	back-scattering radiation	S03-E06C
for aircraft for motor vehicle	W06-A04H1B	chemical dosimetry contamination	S03-G02A S03-G02B
for motor venicle	W06-A04H1A X22-J05A	diffraction, materials investigation	
for ship	W06-A04H1C	luminescent dosimetry	S03-E00C
for vehicle	W06-A04H1	photographic dosimetry	S03-G02A
imaging	W06-A04H1	reflecting, materials investigation	S03-E06C
industrial	W06-A04H8	scattering, materials investigation	
jamming, active	W06-A04E1A	whole body counter	S03-G02B
maintenance	W06-A04E3A	Radiation sensing tube	V05-H
mapping	W06-A04H3	manufacture	V05-L05H
monitoring	W06-A04E3A		
monopulse	W06-A04A1	Radiation sensitive semiconductor d	
MTI	W06-A04A2	energy conversion application	U12-A02A U13-A01
optical - see Optical radar	W06-A06	for imaging application pyroelectric devices	U14-E01
over-the-horizon (OTH)	W06-A04X	wavelength conversion layers	U13-A01G
police speed trap	T07-A01A1		
	W06-A04A2	Radiation therapy, medical	S05-A03
police speed trap warning receive		other radiation	S05-A03X S05-A03F
	W06-A04G3	X-ray	
PPI	X22-E08 W06-A04C	Radiation treatment, semiconductor	·U11-C03A
primary	W06-A04C W06-A04A	Radiative cooling	
processing	W06-A04A W06-A04E9	discharge tube (general)	V05-M07A
pulse compression	W06-A04D3	electronic apparatus (general)	V04-T03A
pulse generators	W06-A04D1	semiconductor device	U11-D02
pulse system details	W06-A04D	vacuum tube	V05-B01B6
receiver circuitry	W06-A04G3	Radio	
relative movement detection	W06-A04A2	alarms, centralised signalling	W05-B05B2
secondary	W06-A04B		W05-B05G5
signal-to-noise ratio improvemen	t W06-A04E5	ALE system	W02-C03E5
signature reduction	W06-A04X		W02-C03X
synthetic aperture	W06-A04J	allocation in frequency domain	W02-C03R1B
target position determination.	W06-A04A1	allocation in time domain	W02-C03R1A
tracking, target seeking	W06-A04H5	allocation in variable band	W02-C03R1C
traffic control and monitoring	W06-A04H7	antenna testing	S01-G08A5 W02-B08A1
transforming co-ordinates	W06-A04E3E	bandwidth reduction	W02-B08A1
transmit/receive switching	W06-A04G5	broadcast receiver - see Broadcast	
transmitter circuitry	W06-A04G1	receiver	W03-B
using different response medium	VVU6-AU4B/	cellular systems	W02-C03C1
		citizen's band equipment	W02-G02
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cognitive radio systems	W02-C03G5	digital	W02-D05C
communications equipment (gen		digital, multiplex transmission	W02-D05C1
construction	W02-G06	Digital Radio Mondiale (DRM)	W01-A09C1
communications receiver - see Ra	dio		W02-D05C1
communications receiver	W02-G03		W02-K07C
distributed antenna system	W02-C03C1F	digital, stereophonic	W02-D02
diversity systems	W02-C03A		W02-D05C
Doppler shift compensation	W02-C03E4	emergency broadcasts	W02-D07A
downlink management	W02-C03R1G	general	W02-D05
echo cancelling systems	W02-C03E2	monitoring	W02-D04
equalising systems	W02-C03E1		W02-D05
equipment rack (general)	W02-G06	multiplex, digital	W02-D05C1
grant-free scheduling	W02-C03R1E	radio data system (RDS)	W02-E01B
hot standby system	W02-G08A	satellite	W02-D05A
ionospheric scatter communication		signal testing	W02-D03A
link modelling	W02-C03E5	stereophonic (analog)	W02-B04A1 W02-E
	W02-C03E3 W02-C03G5		
Mitola (cognitive) systems	W02-C03G5 W02-C03C	stereophonic, with additional infor	W02-E01
mobile systems			
personal calling arrangements	W05-A05A	stereophonic, with additional prog	
point-to-point link	W02-C03D		W02-E01A
power control, radio system	W02-C03E3	stereophonic, with dynamic range	
power control, radio transmitter	W02-G01C1		W02-E01B1
radio-over-fiber	W02-C04B1F		W02-G04B1
radio systems	W02-C03	stereophonic, with program conte	
redundancy	W02-G08		W02-E01B1
relay systems	W02-C03B	stereophonic, with station-unrelate	ed data
remote control	W05-D06A1A		W02-E01B5
	W05-D08C	stereophonic, with station-related	data
remote monitoring	W05-D06A1A		W02-E01B1
	W05-D08E	Radio communication connector - se	e Connector
repeater	W02-G05C		.c commetter
resource allocation	W02-C03R1	Radio communication receiver	
resource/traffic management	W02-C03R	(for broadcast type, see <b>Broadcas</b>	
resource management for broadc	ast services	receiver)	W03-B
	W02-C03R5	AFC	U25-J05
			$\lambda \lambda \lambda \Delta
resource management for direct r	node		W02-G03A7A
resource management for direct r	node	AGC	U24-C01
resource management for direct r communication			U24-C01 W02-G03D
communication	W02-C03R6	audio amplifier	U24-C01 W02-G03D W02-G03F
	W02-C03R6 user or terminal		U24-C01 W02-G03D
communication selection of wireless resources by	W02-C03R6 user or terminal W02-C03R2	audio amplifier	U24-C01 W02-G03D W02-G03F
communication selection of wireless resources by semi-persistent scheduling (SPS)	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D	audio amplifier baseband bandwidth control	U24-C01 W02-G03D W02-G03F W02-G03B8
communication selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B	audio amplifier baseband bandwidth control construction	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H
communication selection of wireless resources by semi-persistent scheduling (SPS)	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4E
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4E W02-G03E W02-G03K
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele simulation systems	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4E W02-G03E W02-G03K W02-G03A8
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele simulation systems single-sideband	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4E W02-G03E W02-G03K W02-G03A8 W02-G03B7
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele simulation systems single-sideband standby system	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03A8 W02-G03B7 W02-G03A7A
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele  simulation systems single-sideband standby system telephone systems	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03A8 W02-G03A7 W02-G03A7A
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele  simulation systems single-sideband standby system telephone systems time compression or expansion	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03A8 W02-G03A7A W02-G03A8 W02-G03A8
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele  simulation systems single-sideband standby system telephone systems	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03A8 W02-G03A7A W02-G03A7A W02-G03A8 W02-G03A8
communication  selection of wireless resources by  semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele  simulation systems single-sideband standby system telephone systems time compression or expansion	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03A8 W02-G03A7A W02-G03A7A W02-G03A8 W02-G03C1 W02-G03B2C W02-G03C
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03A8 W02-G03A7A W02-G03A7A W02-G03A8 W02-G03C1 W02-G03C5
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele simulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03K W02-G03A7 W02-G03A7 W02-G03A7 W02-G03A8 W02-G03A8 W02-G03C1 W02-G03B2C W02-G03C5 W02-G03B4A
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele simulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03K W02-G03A7 W02-G03A7 W02-G03A7 W02-G03A8 W02-G03C1 W02-G03C W02-G03C5 W02-G03B4A W02-G03B4A
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/tele simulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitte transponder	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03K W02-G03A7 W02-G03A7 W02-G03A7 W02-G03A7 W02-G03C1 W02-G03C5 W02-G03B4A W02-G03B4A W02-G03B4A W02-G03B4A
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05 on W02-C03X W02-C03R1F	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4E W02-G03K W02-G03K W02-G03A7 W02-G03A7A W02-G03A7A W02-G03B2C W02-G03C1 W02-G03B2C W02-G03C5 W02-G03B4A W02-G03B4A W02-G03B4A
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management volume compression/expansion	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-G04A1 W02-G03R3 W02-G02 ur W02-G01 W02-G05 on W02-C03X W02-C03R1F W02-G04B1	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction local oscillator	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03E W02-G03K W02-G03K W02-G03A7 W02-G03A7A W02-G03A7A W02-G03B2C W02-G03C W02-G03C5 W02-G03C5 W02-G03B4A W02-G03B1 W02-G03B4E W02-G03B4E W02-G03B4E W02-G03B4E
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management volume compression/expansion white space utilization	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05 on W02-C03X W02-C03R1F	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4 W02-G03E W02-G03A8 W02-G03A7 W02-G03A7A W02-G03A8 W02-G03C1 W02-G03C5 W02-G03C5 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B4E W02-G03B4E W02-G03A7 W02-G03A8
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management volume compression/expansion white space utilization sadio broadcast systems	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05 on W02-C03X W02-C03R1F W02-G04B1 W02-C03G5	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction local oscillator low-IF mixer	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4 W02-G03E W02-G03K W02-G03A8 W02-G03A7 W02-G03A7A W02-G03A7A W02-G03C1 W02-G03C5 W02-G03C5 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B4E W02-G03B4E W02-G03B4E W02-G03A7 W02-G03A5A
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management volume compression/expansion white space utilization radio broadcast systems	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05 on W02-C03X W02-C03R1F W02-G04B1 W02-C03G5 W02-E01B5	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction local oscillator low-IF	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4 W02-G03E W02-G03K W02-G03A8 W02-G03A7 W02-G03A7A W02-G03A7A W02-G03C1 W02-G03C5 W02-G03C5 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B4E W02-G03B4E W02-G03B4E W02-G03A7 W02-G03A5A
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management volume compression/expansion white space utilization (adio broadcast systems).	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05 on W02-C03X W02-C03R1F W02-C03R5 W02-C03R1F W02-C03G5 W02-C03G5	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction local oscillator low-IF mixer	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4 W02-G03E W02-G03K W02-G03A8 W02-G03A7 W02-G03A7A W02-G03A7A W02-G03C1 W02-G03C5 W02-G03C5 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B4E W02-G03B4E W02-G03B4E W02-G03A7 W02-G03A5A
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management volume compression/expansion white space utilization radio broadcast systems	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-G04A1 W02-G04A1 W02-G05 on W02-G01 W02-G05 on W02-C03X W02-C03R1F W02-G04B1 W02-G04B1 W02-C03G5 W02-C03G5	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction local oscillator low-IF mixer multipath reception compensation	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4 W02-G03E W02-G03A8 W02-G03A7 W02-G03A7A W02-G03A8 W02-G03C1 W02-G03C5 W02-G03C5 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1 W02-G03B1
selection of wireless resources by semi-persistent scheduling (SPS) signal predistortion signal transmission, telemetry/telessimulation systems single-sideband standby system telephone systems time compression or expansion traffic management transceiver transmitter - see Radio transmitter transponder tropospheric scatter communication uplink management volume compression/expansion white space utilization (adio broadcast systems).	W02-C03R6 user or terminal W02-C03R2 W02-C03R1D W02-G04B control W05-D06A1A W02-C03E5 W02-G04C W02-G08 W01-B05A1 W02-G04A1 W02-C03R3 W02-G02 ur W02-G01 W02-G05 on W02-C03X W02-C03R1F W02-C03R5 W02-C03R1F W02-C03G5 W02-C03G5	audio amplifier baseband bandwidth control construction cross-modulation reduction demodulator digital architecture direct conversion frequency compressive feedback frequency control homodyne IF filter IF shift IF system IF system, amplifier image response reduction image rejection mixer inter-station noise suppression intermodulation reduction local oscillator low-IF mixer multipath reception compensation muting	U24-C01 W02-G03D W02-G03F W02-G03B8 W02-G03H W02-G03B4 W02-G03E W02-G03K W02-G03A8 W02-G03A7A W02-G03A8 W02-G03A5 W02-G03C1 W02-G03C5 W02-G03C5 W02-G03B1 W02-G03B1 W02-G03B4 W02-G03B1 W02-G03B4 W02-G03A5 W02-G03B1 W02-G03A5 W02-G03B1 W02-G03A5

offset reduction (DC receiver)	W02-G03A8	communications - see Radio	
	W02-G03B4G	communications receiver	W02-G03
power management	W02-G03P5	Radio relay systems	W02-C03B
power measurement	W02-G03J7	Radio transceiver	W02-G02
power supply	W02-G03P1	base station	W02-G02 W02-G02B
rake receiver	W02-G03B6A	construction	W02-G02B W02-G02H
RF amplifier	W02-G03A3	control	W02-G02C
RSSI	W02-G03J1	digital architecture	W02-G02K
S/N ratio improvement	W02-G03B	duplex	W02-G02A5B
spurious signal reduction	W02-G03B4C	hand-held	W02-G02A2
squelch circuits	W02-G03B1	mobile (vehicle)	W02-G02A2
synchrodyne	W02-G03A8	PTT	W02-G02A5A
testing	S01-G08A3 W02-C05B	VOX	W02-G02A5C
	W02-G03B	Radio transmitter	W02-G01
thermal noise reduction	W02-G03 W02-G03B3	broadcast	W02-D05
threshold extension (FM)	W02-G03B3 W02-G03B7	broadcast	W02-G01
tuner circuitry	W02-G03B7 W02-G03A	construction	W02-G01H
variation of RF/IF passband	W02-G03B2	cooling	V04-T03
zero-IF	W02-G03A8A	3	W02-G01H
		digital architecture	W02-G01K
Radio direction finding	W06-A02A	frequency control	W02-G01A3
automatic equipment	W06-A02A1	frequency translating	W02-G01A5
Radio equipment		impedance matching	W02-G01E
broadcast receiver -see <b>Broadcas</b>		modulator	W02-G01D
receiver	W03-B	oscillator	W02-G01A1
communications receiver -see Rac		power amplifier	W02-G01B
communications receiver	W02-G03	power control	W02-G01C1
repeater	W02-G05C W02-G08	power limiting	W02-G01C5
standby arrangements testing methods	S01-G08A	protection	W02-G01C5
testing methods	W02-C05B	testing	S01-G08A1
transceiver	W02-G03B W02-G02		W02-C05B
transmitter - see Radio transmitte		tuning	W02-G01E
transponder	W02-G05A	Radioactive cell	X14-E
Radio link	1102 300/1	Radioactive waste	X14-D
ALE system	W02-C03E5	Radiotelephone system	
ALL System	W02-C03L3 W02-C03X	airborne relay	W02-C03B1F
Bluetooth® interface	W01-A07H2A	broadcasting	W01-B05A1M
Bluetooth® network	W01-A06C4A	cellular	W01-B05A1A
clock setting	S04-B03		W02-C03C1
olook ootung	S04-B06	cellular applications	W02-C03C1J
data networks	W01-A06C4	cordless (subscriber location)	W01-C01D1
data interface	W01-A07H2	cordless call point system	
DECT interface	W01-A07H2C	(e.g. CT2, DECT)	W01-B05A1B
IEEE 802.11 network link	W01-A06C4E		W02-C03C3
IEEE 802.16 network link	W01-A06C4G	digital short range radio system	W01-B05A1D
long range link	W01-A06C4P	direct mode connection	W01-B05A1D
millimetre wave (mmWave) link	W01-A06C4L	fifth generation	W01-B05A1A
point-to-point systems	W02-C03D		W02-C03C1L
telecontrol/telemetry transmission	W05-D06A1A	fixed radio access	W01-B05A1G
terahertz (THz) link	W01-A06C4N	fourth generation	W01-B05A1A
UWB and impulse network link	W01-A06C4K		W02-C03C1H
	W02-K05A9	location register details	W01-E01C1
UWB and impulse interface link	W01-A07H2K	macrocellular	W01-B05A1A
7: 5 8: (	W02-K05A9	microcellular	W01-B05A1A
ZigBee® interface	W01-A07H2A	multichannel access	W01-B05A1
ZigBee® network	W01-A06C4A	personal bear divide and (DLIC)	W02-C03C3
Radio-over-fiber	W02-C04B1F	personal handyphone (PHS)	W01-B05A1B W02-C03C3
Radio receiver		satellite telephone connection	W01-B05A1E
broadcast - see Broadcast radio		Satemic telephone connection	W02-C03B1A
receiver	W03-B		W02-C03C1A
		1	

		1	
short messaging service	W01-B05A1F	heating	Q21-J02
subscriber registration	W01-E01C3	maintenance	Q21-M
subscriber roaming	W01-E01A		X23-X16
third generation	W01-B05A1A	manufacture	Q21-M05
•	W02-C03C1A		X23-X20
	W02-C03C1G	passenger safety systems	X23-A15
trunked radio interconnection	W01-B05A3	rail engaging elements	Q21-D10
	W01-B03A3		
RAID		sanitation arrangements	Q21-J04
computer data stores	T01-H01B1A	seats	Q21-J03
disk drives	T03-A08A5A	servicing	Q21-M02
Rail, low power	V04-H01		X23-X16
		steps	Q21-J05
Railcar type	Q21-C03	superstructure	Q21-D01
	X23-D	tarpaulin	Q21-D17
breakdown train	Q21-M03	testing	X23-X16
buffer car	Q21-C03H	tilt control	Q21-D05
freight	Q21-C03B	track maintenance	X23-X
hopper	Q21-C03D	transmission system	Q21-D13
поррег	X23-D02	underframe	Q21-D13
mine car	Q21-C03F		
mine car		wheel guards	Q21-D11
	X23-D04	window	Q21-D16
passenger	Q21-C03A	Railway signalling - see Electric rail	wav
	X23-D05		=
railway inspection trolley	Q21-C03I	Railway timetable	P85-A50A
sleeper car	Q21-J01	passenger display	X23-C
tanker	Q21-C03C	Railway type	Q21-B
	X23-D03	, .,,,	X23-P
tipping	Q21-C03E	cableway	Q21-B03
tramway vehicle	Q21-C03G	cableway	X23-P03
wagon/truck	Q21-C03B	convertible (road/rail)	Q21-C03X
	X23-D01		X23-D09
Railway, electric - see Electric rails	way X23	elevated	Q21-B01
Railway, mechanical	Q21		X23-P01
bridge	Q21-A12	freight car	Q21-C03
9			X23-D01
construction	Q41-E	funicular	Q21-B03A
cargo handling	Q21-A04	hopper car	Q21-C03D
derailer	Q21-A08		X23-D02
level crossing	Q21-S07	magnetic levitation	Q21-B05A
passenger handling	Q21-A04	magnetic levitation	X23-P05
shunting devices	Q21-A07	mine car	Q21-C03F
station	Q21-A03	Tillie Cal	X23-D04
track construction	Q21-A01	.,	
traffic control	Q21-S05	monorail	Q21-B02
tunnel	Q21-A12		X23-P02
turntable	Q21-A06	passenger	Q21-C03A
	Q21-A00		X23-D05
Railway train		power-and-free	Q21-B03B
air-conditioning	Q21-J02	rack	Q21-B04
assembly	Q21-M05	rope/cable	Q21-B03
axle box	Q21-D06	ski-lift	Q21-B03C
bogie	Q21-D03	sliding/levitation	Q21-B05
brake actuator	Q21-F05		Q21-C03C
brake components, hoses	Q21-F09	tanker wagon	
	Q21-F		X23-D03
brake system		tramway	Q21-B03A
buffers	Q21-D12C	underground	Q21-B06
cargo compartment	Q21-J07		X23-P06
cargo handling	Q21-J06	Rain detection	S03-D02B
chassis	Q21-D02	for automatic actuation of vehicle	
cleaning	Q21-M01		
couplings	Q21-D12	windscreen wipers	S03-D02B1
design	X23-X16		X22-X06E
door	Q21-D15	for non meteorological applicatio	n S03-D02B1
draw gear	Q21-D13	Rainfall measuring	S03-D02A
uraw gear	QZ 1-D 1ZD		<del></del> -

Rainwater harvesting	Q43-H	RDS	
Raised pad, semiconductor wiring	U11-D03A2	decoder in broadcast receiver	W03-B02C5
Rake receiver	W02-G03B6A		W03-B08
Raman laser	V08-A04X	message/bulletin storage	W03-B08A1
		programme content storage transmission system details	W03-B08A5 W02-E01B
Raman spectrometry for materials investigation	S03-A02B S03-E04D1	-	U25-C
		Reactance multiplier	U25-C
Ramp, load/unload for hard disk dr	T03-A05G	Reactive CVD, semiconductor	
	T03-A08A1C	Reactor (inductive, low power)	\/02 F02 A 2
RAMs		casing, hf casing, power supply	V02-F03A3 V02-G02A3
dynamic, matrix layout	U13-C04B1A	coil connection, hf	V02-G02A3
dynamic, with capacitor store	U14-A03B4	coil connection, power supply	V02-G02B
dynamic, with stacked capacitor s	tructure	coil/winding insulator, hf	V02-F03B1
	U13-C04B1A	coil/winding insulator, power sup	
	U13-D03A	coil/winding manufacture, hf	V02-H01A
dynamic, with trench capacitor str	U14-A03B4	coil/winding manufacture, power	supply V02-H01A
dynamic, with tremen capacitor str	U13-C04B1A	coil/winding, hf	V02-F03B
	U13-D03A	constructional details, hf	V02-F03
	U14-A03B4	constructional details, power supp	
dynamic/static, matrix layout	U13-C04B1	control	V02-F03C
static, matrix layout	U13-C04B1B		V02-G02C
static, with bipolar transistors static, with bistable FET cells	U14-A03A1	control using current collector, hf	V02-F03C
with magnetic elements	U14-A03B1 U14-A04	control using current collector, power supply	V02-G02C
with programmable conductor lay		control using movable coil windin	
with ROM in memory cell	U14-A03B9	control using movable coil/windir	
Random access memories - see RAM	Иs	, and the second second second second second second second second second second second second second second se	V02-F03C2
Random number generator	T01-E04	control using movable core	V02-G02C2
for lottery apparatus	T05-F	control using movable core, hf	V02-F03C2
Random pulse generators	U22-A01A	control using movable shield control using movable shield, hf	V02-G02C2 V02-F03C2
Rangefinder		control using thovable shield, hi	
optical	S02-B01	3 17 3 3 17	V02-G02C1
photographic camera	S06-B01A	control using tappings on coil/wir	nding, hf
reflection-based (laser type)	W06-A06D1		V02-F03C1
reflection-based (lidar type)	W06-A06D1	cooling	V02-G02A1
reflection-based (radar type) reflection-based (sonar type)	W06-A04A1	cooling, hf core manufacture	V02-F03A1 V02-H03E
video camera	W06-A05D1 W04-M01D2C	core, hf	V02-F03L
		core, power supply	V02-G02A2
Rankine cycle plant	X11-C05	hf-type	V02-F01
Rapid prototyping	X25-A08	low power	V02-G01C
Raster distortion correction in TV C		manufacture	V02-H
	W03-A08A1D	manufacture, whole device mounting	V02-H09 V02-G02A
Raster scanning electrophotograph	ic exposure	mounting mounting, hf	V02-G02A V02-F03A
		power - see <b>Power reactor</b>	X12-C
	S06-D01B	power supply, coil/winding	V02-G02B
Ratio control	T06-B08	screen	V02-G02D
engine air/fuel ratio	X22-A03A2A	screen, hf	V02-F03D
fluids, electrical	T06-B08A1	shield	V02-G02D
non-electric auxiliary power-type	T06-B08A9	shield, hf terminal	V02-F03D V02-G02X
non-electric without auxiliary pow	T06-B08A9	terminal, hf	V02-G02X V02-F03X
several fluids flow	T06-B08A	Read only memories - see ROMs	
	T06-B08A	Read only memories - see ROMs	1114 007
several fluids flow  Rayleigh scattering  RCCB		Read only memories - see ROMs Read/write circuitry for memories	U14-A07

barcode	Reader		container - see Record carrier (dy	/namic)
digital mark   T04-A03   Relectrostatic, digital   T04-A034   R. UV or optical, digital   T04-A034   R. UV or optical, digital   T04-A034   T03-B011D   T03-B011	barcode	T04-A03B1	· •	
R. Uv or optical, digital   T04-A03B   R. Uv or optical, digital   T04-A03B   magnetic, digital   T04-A03B   magnetic, digital   T04-A03B   magnetic, digital   T04-A03A   microfilm, microform   S06-B06C   smart card   T04-K02   floppy magnetic disk   T03-B01Da   floppy magnetic disk   T03-B01Da   floppy magnetic disk   T03-B01Da   floppy magnetic disk   T03-B01B   floppy magn				
IR, UV or optical, digital   T04-A038   magnetic, digital   T04-A034   magnetic, digital   T04-A034   magnetic, digital   T04-A034   magnetic, digital   T04-A034   magnetic, digital   T04-A035   T03-B014   magnetic, digital   T04-A074   magnetic disk   T03-B014			digitial versatile disk	
magnetic, digital   T04-A03A   microfilm, microform   T04-R02   floppy magnetic disk   T03-A01C1   floppy magnetic disk			P. I	
microfilm, microform   S06-B06C   smart card   T04-R02   T03-B012   T03-B013   T03-B01			disk cassette	
Total Note			alastus autisal	
Reading digital static stores   U14-A07   Real space transfer   U12-D02J1   U12-D02J1   T03-B01   T03-B0				
Real space transfer				
Reclamation of contaminated soil or ground   P43-J   Ct ag   T03-B01	Reading digital static stores	U14-A07		
P43-J   File	Real space transfer	U12-D02J1	nara magnetic disk	
Second   Woz.F10Q3   Woz.F10	Reclamation of contaminated soil		housing (removable)	T03-L01A
W02-F10Q3	or ground	P43-J	IC tag	T03-H02A3
T03-A01	Recommendation system, interactive	e broadcasting		
Received signal strength indicator (RSSI)		W02-F10Q3	magnetic - see <b>Magnetic record</b> (	
Received signal strength indicator (RSSI)	Receipt issuing	T05-C01	magnatic card	
Receiver	•			
Receiver         broadcast radio - see Broadcast radio receiver         W03-B work and the position in general position ing, capacitive         T03-D01A optical to position ing, capacitive         T03-B01 to 3-B01		W02 C03 I1		
broadcast radio - see Broadcast radio receiver cable TV receiver w003-A16C1 communications - see Radio communications receiver data (general) optical communications w002-G03 optical communications w002-G04A3 optical communications w002-C04A3 optical communications positioning, ageneral positioning, magnetic w03-A08 positioning, magnetic positioning, magnetic w03-B01 positioning, magnetic w03-C03 w03-C01 w03-B01 positioning, magnetic w03-C01 w03-B01 w03-C01 w03-B01 w03-C01 w03-C01 w04-V w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w05-F08C3 w	• •	WUZ-GU331		
receiver cable TV receiver communications - see Radio		1! -		
receiver cable TV receiver (W03-A16C1 communications - see Radio communications - see Radio communications - see Radio communications - see Radio communications - w02-G03 data (general) W01-A07D woptical communications W02-C04A3 positioning, general positioning, magnetic T03-A08 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, magnetic T03-B03 positioning, tunnel current T03-B03 positioning, tunnel current T03-B03 positioning, tunnel current T03-B03 positioning, tunnel current T03-B03 positioning, tunnel current T03-B03 positioning, magnetic T03-B03 positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, positioning, po				
T03-F			positioning, capacitive	T03-C01
communications receiver data (general) optical communications receiver-in-canal (RIC) satellite radio broadcast receiver satellite radio broadcast receiver satellite TV receiver television - see TV receiver work and the receiver of the re		W03-A10C1		T03-F
data (general) W01-A07D woptical communications v02-C04A3 optical communications v02-C04A3 receiver-in-canal (RIC) v06-V04K satellite Tradio broadcast receiver satellite Traceiver w03-A16A television - see TV receiver w03-A v05-F01A5 v05-F01A		W02-G03		
optical communications v02-C04A3 receiver-in-canal (RIC) v06-V04K satellite radio broadcast receiver satellite radio broadcast receiver satellite TV receiver w03-A w03-A16A television - see TV receiver w03-A w03-A16A wobs-Fo8C3 w05-Fo1A5 v05-Fo1A5 v05-Fo1A5 v05-Fo1A5 v05-Fo1A5 v05-Fo8C3 w16-Fo8C3		1 5. 5		
satellite radio broadcast receiver satellite TV receiver w03-A16A television - see TV receiver w03-A16A television - see TV receiver w03-A16A w03-A w0		W02-C04A3		
satellite TV receiver television - see TV receiver W03-A16A television - see TV receiver W03-A W05-F08C3 W	receiver-in-canal (RIC)	V06-V04K		
Rechargeable cell X16-B  Recognition	satellite radio broadcast receiver	W03-B06A	positioning, tunnel current	
Rechargeable cell X16-B  Recognition				
Recognition character or pattern - see pattern eye T04-D07F1A human feature S05-D01C5A T04-D07F human feature, for entry or exit control Iris T04-D07F1A speech W04-V for vehicle X22-L Record carrier digitally marked, magnetic T03-M01A digitally marked, optical, IR, UV mechanism actuated by Smart card T03-H01A cassette disk T03-H01A authentication mark T03-H01A cassette tape T03-H01B cassette tape T03-H01B T03-N01 cleaning T03-H02B compact disk T03-B01D1  superconducting, magnetic T03-A01E superconducting, magnetic T03-A01E superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic tape cassette tape cassette T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, non-magnetic tape cassette tape Cassette T03-H01B superconducting, magnetic T03-H01B superconducting, non-magnetic tape cassette tape cassette T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, magnetic T03-H01B superconducting, non-magnetic tape cassette superconducting, non-magnetic tape cassette superconducting, non-magnetic tape cassette superconducting, non-magnetic tape cassette	television - see TV receiver	W03-A		
Recognition character or pattern - see pattern eye T04-D07F1A human feature S05-D01C5A T04-D07F human feature, for entry or exit control Iris T04-D07F1A speech W04-V for vehicle X22-L  Record carrier digitally marked, magnetic T04-C01 digitally marked, optical, IR, UV T04-C02 mechanism actuated by T05-H02C smart card T03-H01A record carrier (dynamic) authentication mark T03-H01A cassette disk T03-H01A cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H01B cassette tape T03-H02B compact disk T03-B01D1	Rechargeable cell	X16-B	superconducting, magnetic	
tape cassette	Recognition			
human feature	character or pattern - see pattern			T03-H01B
human feature, for entry or exit control T05-D01B Iris T04-D07F1A speech W04-V for vehicle X22-L  Record carrier digitally marked, magnetic T04-C01 digitally marked, optical, IR, UV T04-C02 mechanism actuated by T05-H02C smart card T03-H01A capacitive T03-H01A cassette tape T03-H01B T03-N01 cassette tape T03-H01B T03-N01  Record carrier (dynamic) container disk casse T03-L01A1 T03-N01 disk cassette manufacture T03-H01A T03-N01 disk cassette per se T03-H01A T03-N01 disk storage rack T03-L01C1 T03-N01 tape cassette case T03-L01A1 T03-N01 tape cassette per se T03-H01B T03-N03 T03-N03 T03-N03 T03-N03 T03-N01 disk/drum/card, etc. T03-N03 Lape transport tape transport tape transport tape transport tape transport tape transport tape cassette library T03-N03 T03-Q05 magnetic tape cassette library T03-N03 T03-Q01 W04-B16				T03-N03
human feature, for entry or exit control  T05-D01B Iris Speech W04-V for vehicle X22-L  Record carrier  digitally marked digitally marked, magnetic digitally marked, optical, IR, UV mechanism actuated by Smart card  Record carrier (dynamic) authentication mark capacitive cassette disk  T03-N01  disk cassette manufacture  T03-N01  disk cassette manufacture  T03-N01  disk cassette per se T03-H01A T03-N01  disk storage rack T03-L01C1 T03-N01  tape cassette case T03-L01A1 T03-N03  tape cassette per se T03-H01B T03-N03  T03-N03  Record carrier (dynamic)  tape cassette storage rack T03-L01C3 T03-N03  T03-N03  Record carrier positioning (general) disk/drum/card, etc. T03-P01  disk/drum/card, etc. T03-P01  disk/drum/card, etc. T03-P03-P01  disk/drum/card, etc. T03-P01 T03-N03  r03-R01  disk/drum/card, etc. T03-P01 T03-	human feature		tunnel current	T03-C05
T05-D01B			Record carrier (dynamic) container	
Iris speech W04-V Speech W04-V Speech W04-V Speech	numan feature, for entry or exit co		disk case	T03-L01A1
speech for vehicle X22-L disk cassette manufacture T03-N01 T03-N01 for vehicle X22-L disk cassette manufacture T03-N01 T03-N01 for vehicle X22-L disk cassette manufacture T03-N01 T03-N01 for vehicle X22-L disk cassette manufacture T03-N01 T03-N01 for vehicle T04-C0 disk cassette per se T03-H01A T03-N01 for digitally marked, magnetic T04-C01 for digitally marked, optical, IR, UV T04-C02 for mechanism actuated by T05-H02C for mechanism actuated by T05-H02C for mechanism actuated by T05-H02C for mechanism actuated by T04-K01 for mechanism actuated by T04-K01 for mechanism actuated by T03-H02C for mechanism actuated by T03-H01B for mechanism	lrie			
For vehicle X22-L disk cassette per se T03-H01A  Record carrier  digitally marked, magnetic T04-C01 digitally marked, optical, IR, UV T04-C02 mechanism actuated by T05-H02C smart card T03-H01A  Record carrier (dynamic) authentication mark capacitive cassette disk T03-H01A cassette disk T03-H01A T03-N01 cassette tape T03-H01B T03-N01 cassette tape T03-H01B T03-N01 cassette tape T03-H01B T03-N03 cleaning T03-H02B compact disk T03-B01D1  disk cassette per se T03-H01A tape cassette case T03-L01A1 tape cassette storage rack T03-H01B tape cassette per se T03-H01B tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette storage rack T03-L01C3 T03-N03 tape cassette per se T03-H01B tape cassette per se T03-H01B tape cassette case T03-L01A1 tape cassette per se T03-H01B tape cassette tape se T03-H01B T03-N03 tape cassette storage rack T03-L01C3 T03-N03 T03-N			disk cassette manufacture	
Record carrier digitally marked, magnetic T04-C01 digitally marked, optical, IR, UV T04-C02 mechanism actuated by T05-H02C smart card T03-H02A1C capacitive cassette disk T03-H01A cassette tape T03-H01B T03-N01 cassette tape T03-H01B T03-N03 cleaning compact disk T03-H02B compact disk T03-B01D1  T03-N01 disk storage rack T03-L01C1 tape cassette case T03-L01A1 tape cassette ease T03-H01B tape cassette ease T03-H01B T03-N03 tape cassette per se T03-H01B T03-N03 tape cassette storage rack T03-L01C3 T03-N03  Record carrier positioning (general) disk/drum/card, etc. T03-E tape transport T03-E library systems for disks T03-Q05 magnetic tape cassette library T03-N03 T03-Q01 W04-B16	•	-	dial. accepts a cons	
digitally marked digitally marked, magnetic T04-C01 digitally marked, optical, IR, UV T04-C02 mechanism actuated by T05-H02C smart card T03-H02A1C capacitive cassette disk T03-H01A T03-N01 disk/drum/card, etc. T03-R03 magnetic tape cassette library T03-R03 magnetic tape cassette library T03-R03 magnetic tape cassette library T03-N03 magnetic tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T03-L01C1 tape cassette case T	Record carrier		disk cassette per se	
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copy marking, video copy prevention, audio copy prevention, video copy prevention, (general) copy prevention, (general) copy prevention, hardware delayed recording detecting carrier defect disk (general) disk changing  disk drive/positioning  W04-F01L1 power supply details reel-to-reel (general) remote control, audio video W04-E04A reverse mode, audio video W04-E04A reverse mode, audio video W04-E04A reverse mode, audio video W04-E04A set-top box video recorder W03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E20M slow-speed mode, audio/video W04-E20C1 r03-N01 splicing splicing, audio/video W04-H05C				optical, audio/video	W04-C10
copy prevention, audio copy prevention, video w04-F01L1 copy prevention, video copy prevention, (general) copy prevention, (general) copy prevention, hardware delayed recording detecting carrier defect disk (general) disk changing  disk drive/positioning  w04-G01L1 reel-to-reel (general) remote control, audio video w04-E04A reverse mode, audio video set-top box video recorder w03-A16E1 shock absorbing and damping w04-E20M remote control, audio video w04-E04A reverse mode, audio video w04-E04A reverse mode, audio video w04-E04A reverse mode, audio video shock absorbing and damping w04-E20M remote control, audio video w04-E04A reverse mode, audio video w04-E04A reverse mode, audio video shock absorbing and damping w04-E20M remote control, audio video w04-E04A reverse mode, audio video shock absorbing and damping w04-E20M remote control, audio video w04-E04A reverse mode, audio video w13-A16E1 remote control, audio video w04-E04A reverse mode, audio video w13-A16E1 remote control, audio video w04-E04A reverse mode, audio video w13-A16E1 remote control, audio video w13-E04A reverse mode, audio video w13-A16E1 remote control, audio video w13-E04A reverse mode, audio video w13-A16E1 remote control, audio video w13-E04A reverse mode, audio video w13-E04 reverse mode, audio video w13-E04 reverse mode, audio video w13-E04 reverse mode, audio video w13-E04 reverse mode, audio video w13-E04 reverse mode,				personal video recorder (PVR)	W04-B14C3
copy prevention, video copy prevention, (general) copy prevention, (general) copy prevention, hardware copy prevention, hardware delayed recording detecting carrier defect disk (general) disk changing  disk drive/positioning  W04-F01L1 remote control, audio video W04-E04A reverse mode, audio video W04-E04A reverse mode, audio video W04-E04A reverse mode set-top box video recorder W03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E20M slow-speed mode, audio/video W04-E20M slow-speed mode, audio/video W04-E20C1 splicing Splicing, audio/video W04-E04A reverse mode, audio video w13-N01 remote control, audio video w04-E04A reverse mode, audio video w13-N01 remote control,					T03-M05
copy prevention, (general) copy prevention, hardware copy prevention, hardware delayed recording detecting carrier defect disk (general) disk changing  disk drive/positioning  T03-P07A T03-P07A T03-P07A Temote Control, audio video W04-E04A reverse mode, audio video W04-E04A set-top box video recorder W03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E20M slow-speed mode, audio/video W04-E20M slow-speed mode, audio/video W04-E20M slow-speed mode, audio/video W04-E04A reverse mode, audio video W04-E04A set-top box video recorder W03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E20M slow-speed mode, audio/video W04-E20M splicing Slow-speed mode, audio/video W04-E04A set-top box video recorder W03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E04A set-top box video recorder W03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E20M slow-speed mode, audio/video W04-E20M slow-speed mode, audio/video W04-E04A set-top box video recorder W03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E04A				reel-to-reel (general)	T03-N04
copy prevention, hardware delayed recording w04-E20V detecting carrier defect disk (general) disk changing T03-N01 disk drive/positioning T03-F02 mode to delayed recording w04-E20V set-top box video recorder w03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video w04-E20M slow-speed mode, audio/video w04-E20C1 splicing T03-K01A splicing, audio/video w04-H05C				remote control, audio video	W04-E04A
delayed recording w04-E20V detecting carrier defect T03-K07E disk (general) T03-N01 disk changing T03-F01 T03-N01 disk drive/positioning T03-F02 T03-N01 T03-N01 T03-F02 Set-top box video recorder w03-A16E1 shock absorbing and damping T03-L05S simultaneous play and record mode (different sections), audio video W04-E20M slow-speed mode, audio/video W04-E20C1 splicing T03-K01A splicing, audio/video W04-H05C				reverse mode, audio video	W04-E04A
detecting carrier defect disk (general) disk changing T03-N01 disk drive/positioning T03-F02 T03-N01 disk drive/positioning T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-N01 T03-F02 T03-F02 T03-F02 T03-F03 T0					W03-A16E1
disk (general)  disk changing  T03-N01  disk changing  T03-F01  T03-N01  disk drive/positioning  T03-F02  T03-N01  T03-F02  T03-N01  T03-F02  T03-N01  T03-F02  T03-N01					
disk changing T03-F01 slow-speed mode, audio/video W04-E20C1 splicing T03-K01A splicing, audio/video W04-E20C1 splicing T03-K01A splicing, audio/video W04-E20C1					
T03-N01 splicing T03-K01A splicing, audio/video W04-L20C1 splicing T03-K01A splicing, audio/video W04-L20C1 splicing, audio/video W04-L20C1					
disk drive/positioning T03-F02 splicing, audio/video W04-H05C	disk changing			· · · · · ·	
Top Not	disk drive/positioning				
stands for recording equipment T03-L05A	alak arive/positioning				
		. 30	1	stands for recording equipment	103-L05A

stands for recording equipment,		Recording measured values	
audio/video	W04-L05A	apparatus components (see also	Indicating
still video floppy (SVF) recorder	W04-B14A	apparatus)	S02-K06
	W04-M01B1A	calibrating	S02-K07
still-picture mode, video	W04-E20C5	chart/pen recorders	S02-K05
storage rack for carriers	T03-L01C	converting sensor output mechan	nically
superconducting	T03-C07		S02-K03X
superconducting magnetic	T03-A06K	converting sensor output using flu	uid S02-K03X
synchronising	T03-J03	electric elements	S02-K06B1
television signal processing - see \		heated elements	S02-K06B1
recording signal processing	W04-F	ink transfer recording elements	S02-K06B2
testing	W04-J07	magnetic elements	S02-K06B1
testing, during manufacture	T03-K07A	noise reduction	S02-K02D
testing, during manufacture, audio		optical elements	S02-K06B1
testing, danng manataetare, adak	W04-J07A	perforating elements	S02-K06B1
testing, post-manufacture	T03-K07C	plotters	S02-K05
testing, post-manufacture, audio/v		protection	S02-K03
J07C	ndeo vvo+-	recording elements	S02-K02C
time code recording	T03-J01A	remote reading	S02-K08A
time code recording time code recording, audio/video		testing	S02-K00A
time lapse mode, audio/video	W04-F101A W04-E20C3	transferring/converting sensor ou	
	W04-E04C		•
time programming, audio/video tunnel current		Recording/reproducing head (dyna	
tunnel current	T03-C05	general arrangements	T03-G
	V05-F05D	magnetic	T03-A03
	V05-F08C3	magneto-optical	T03-D01C
use of data recording apparatus fo			T03-D01F
non-recording applications	T03-S	optical	T03-B02B
vibration reduction using	TOOLOFN	positioning (capacitive)	T03-C01
constructional techniques	T03-L05N		T03-G
video compact disk	W04-C10A3	positioning (general)	T03-G
video magnetic	W04-B	positioning (magnetic)	T03-A05
video magneto-optical	W04-D20	positioning (magneto-optical)	T03-D01D
video set-top box	W03-A16E1		T03-D01F
video signal processing - see <b>Vide</b>		positioning (optical)	T03-B02A
recording signal processing	W04-F	positioning (tunnel current)	T03-C05
video tape - see <b>Video tape reco</b>			T03-G
	W04-B10		V05-F05D
video-on-demand (VOD) file serve			V05-F04B8A
	W02-F10K		V05-F08C3
	W04-K05A	track aligning (general)	T03-G02C
Recording equipment (dynamic) int	erfacing	track selecting (general)	T03-G02B
audio tape recorder	W04-B12C	Recording/reproducing methods (c	dynamic)
general	T03-M07	capacitive	T03-C01
magnetic recorder/player	T03-A10	capacitive	W04-D
magneto-optical recorder/player	T03-D01E5	combination methods	T03-D
optical recorder/player	T03-B08	combination methods	W04-D
video tape recorder	W04-B10C	hard-copy video	W04-D10
Recording indexing	T03-J01	holographic	T03-B12
Recording indexing	W04-H01	magnetic	T03-B12
arrar management information	T03-J01E	magneto-optical	T03-A00
error management information		magneto-optical	W04-D
record carrier IC	W04-H01E		W04-A
	T03-H02A3	mechanical	
table-of-contents (TOC)	T03-J01C	optical	T03-B05A
	W04-H01C		W04-C05
time code	T03-J01A	tunnel current	T03-C05
	W04-H01A		V05-F05D
user table-of-contents (UTOC)	T03-J01C1		V05-F08C3
	W04-H01C1	using combination of methods	T03-D
		Recovery, material (general electro	onic
		component)	V04-X01C
		<u> </u>	

Recreation	W04-X03G	Redundancy components for mem	ories
bar	W04-X03G4	, .	U14-D01B
club	W04-X03G4	using fuses	U14-D01B
cinema	W04-X03G5		
disco	W04-X03G4	Reed-based musical instruments	P86-A01A3
fairground	W04-X03G3	Reed organ (instrument)	P86-A01C1
restaurant	W04-X03G4	Reed relay	V03-D04A5
theatre	W04-X03G1	Reed Solomon error correction	, , , , , , , , , , , , , , , , , , , ,
theme park	W04-X03G3		W01-A01B1C
Recrystallisation, for semiconductor	manufacture	data transmission general	U21-A06A4
<b>,</b>	U11-C03J1		
	011-0031	Reed switch	V03-C06A
Rectifier - see Converter, AC-DC		Reel storage, for tape	T03-L01A3
Rectifier diodes	U12-C01C	Reel-to-reel recorder	T03-N04
Schottky barrier	U12-C01C	Reflective light barrier, coupled wi	ith emitter
Rectifier gain control signal	U24-C03	itenedate light barrier, coupled to	U12-A02C2
Rectifier, synchronous	U24-D04G	- a .	012-A02C2
Rectifier, semiconductor		Reflector	14/00 D00D
bridge, package for	U11-D01B3	aerial	W02-B03B
cooling	U11-D01B3	light fitting/fixture	X26-D01A V07-F02A
_		optical radar	W02-B03B
Rectifier, semiconductor controlled	U12-D01B4		
Rectifier, signal	U24-C03	Reflex amplifier	U24-G02X
Recycling processes / systems		Reflex and reaction measurement,	medical
AV equipment	W03-G10C		S05-D01F
clay/slip	P64-R	Reflex reflector	
combustion apparatus	Q73-R	optical	P81-A03
drying components	Q76-R	radio frequency (RF)	W02-B03B2
furnace components	Q77-R		
HVAC components	Q74-R	Reflow soldering, general	X24-A02E
incinerators	X25-W01A	Reflow soldering, iron	X24-A02A
heat exchanger	Q78-R	Refraction, optical, materials inves	tigation
lighting components	Q71-R		S03-E04B5
mobile phone	W01-C01D3C	Refractive index	S03-E04B5
paper recycling	W01-C01W X25-T09G		
paper recycling	X25-W04	Refractor, aerial	W02-B03A
photographic processing agents	P83-R	refresh, computer memory	T01-H01C3
photographic materials	P84-R	Refractor, light fitting/fixture	X26-D01B
printer/copier	S06-K04	Refrigerant	X27-F
smartphone	W01-C01G8S		Q75
5d. (p.1.51.5	W01-C01W	refrigerant used	
sorting	X25-F06	HFC	Q75-A20A
television	W03-A19C	HCFC	Q75-A20B
water	X25-H03	CFC	Q75-A20C
	X25-W04	Refrigeration	X27-F
wood	P63-R		Q75
Recycling/destroying recording me	dia	accessory	X27-F
magnetic	T03-A01R	accessory, deodoriser	X27-F
optical	T03-B01R	accessory, display card for freeze	er contents
magneto-optical	T03-D01R		X27-F
general	T03-H02R	accessory, ice-cube tray	X27-F01
Redox battery	X16-C	accessory, water dispenser	X27-F
_	X10 C	components	X27-F02C
Redundancy	W02 G08	components, absorber	Q75-T02
communications equipment	W02-G08 T01-G01	components, adsorber	Q75-T02
data representation		components, air intake filter	Q75-T09
error detection/correction, compu	T01-G	components, boiler	Q75-T02
hardware	T01-G	components, compressor	X25-L03B
integrated circuit repair	U11-C19A		X27-F02C1
operation	T01-G03		Q75-T01
operation	101-000	I	

U24-E03X

components, condenser	X27-F02C	types of refrigeration systems	
	Q75-T03	compression systems	Q75-A02A
components, defroster	X27-F02C	cyclic systems	Q75-A02
components, electric motor	V06-M	heat pump systems	Q75-A02C
	X27-F02C1	non-cyclic systems	Q75-A01
components, evaporator	X27-F02C	sorption systems	Q75-A02B
	Q75-T03	water/ice dispenser	Q75-T08
components, expansion valve	X27-F02C	Refrigeration (applications)	X27-F
components, frost sensor	X27-F02C2	domestic	Q75-U01
components, heat exchanger	X27-F02C	food industry	Q75-U07
	Q75-T03	industrial	Q75-U40
components, light	X27-F02C2	sports, toys, entertainment, leisure	
components, other	X27-F02X	vehicle	Q75-U03
components, pipe	Q75-T09	Refrigerator - see Refrigeration	X27-F
components, pump	X25-L03A		
	X27-F02C1	Refuse collection vehicle	Q19-C04
components, manufacture	Q75-G		X22-P05X
components, refrigerant pipes	X25-F02C		X25-W01
components, switch	X27-F02C2	Regenerative braking	
components, thermostat	V03-C06B	electric machines	V06-N06
	X27-F02C2		X13-H01B
components, valve	Q75-T03	electric train	X23-A01B3
construction	X27-F01	electric vehicle	X21-A03C
construction, built-in water dispe		Registering and indicating	T05-G
	X27-F01	machine working	T05-G02
construction, cabinet	X27-F01	time of events	T05-G03
	Q75-T06	vehicle working	T05-G01
construction, door	X27-F01	Registers, computing	T01-H01D
construction, housing	Q75-T06		
construction, refrigerant pipes	X25-F02C	Registration, cellular / wireless	W01-E01C
construction, seal	X27-F01	location register details	W01-E01C1
construction, shelf	Q75-T06	mobile station registration	W01-E01C3
	X27-F01		
construction, wall	Q75-T06	transfer of registration information	
control	X27-F03 Q75-T20	Registration control for colour vide	o camera
control, defrosting	X27-F03		W04-M01D9
cooling fluid circulation	Q75-T09	Regulating current/voltage	U24-E
defrosting	X27-F02A	AC or DC with feedback	U24-E02C
denosting	Q72-A03	AC, feedback system	U24-E02A
de-icing	Q72-A03	AC, non-feedback system	U24-E01
drug storage	S05-M03	DC, feedback system	U24-E02B
electrocaloric cooling	X27-F02B1	DC, feedback system with protect	ion
for vending machine	T05-H04B		U24-E02B1
ice formation monitoring	X27-F03		U24-E02B1A
ice manufacture	X27-F04	DC, feedback system with switching	ng
.comanaracia.c	Q75-E	regulator	U24-E02B2A
ice storage and distribution	Q75-E	DC, feedback system with transist	or
intelligent refrigerator	X27-F051		U24-E02B2
leak monitoring	X27-F03	DC, feedback with dissipative reg	ulator
magnetic cooling	X27-F02A1		U24-E02B2D
manufacture	Q75-G	DC, non-feedback system	U24-E01
Peltier effect	X27-F02B1	DC, other type	U24-E02B9
refrigerant used		feedback system	U24-E02
HFC	Q75-A20A	linear	U24-E02B2D
HCFC	Q75-A20B	non-feedback system	U24-E01
CFC	Q75-A20C	voltage control, power supply/dis	tribution
repair	Q75-G		X12-H01A1
safety	Q75-T20	Regulating electric variable	
solid state heat pump	X27-F02B1	input deviation detecting-type	U24-E03
system (general)	X27-F02A	input deviation detecting-type	
thermoelectric cooling	X27-F02B1	input deviation detection using in	
· · · <b>3</b>		pat deviation detection doing in	1124-F03X

input deviation detection using th		avionics	V03-U03B
input deviation detection using tra	U24-E03A	broadcasting cameras	V03-U05 V03-U12
input deviation detection using the	U24-E03X	control	V03-U16
input deviation detection using tra		domestic	V03-U01
input deviation detection doing the	U24-E03B	doors	V03-U18
input deviation detection using tri		games	V03-U08
Regulating magnetic variable	U24-E04	HVAC	V03-U17
transductor	U24-E04	industrial	V03-U07
		information equipment	V03-U04
Regulating power	U24-E X12-H01A	instrumentation	V03-U13
maximum energy transfer	U24-E02D1	land vehicles	V03-U03A
maximum energy transfer for sola		lighting	V03-U11
power generator	U24-E02D1	machine tools	V03-U06
solar system interconnected to uti		medical 	V03-U10
system	U24-E02D1A	military 	V03-U03D
-9	X12-H01B1	monitoring	V03-U16
with feedback	U24-E02D	personal refrigeration	V03-U02 V03-U17
Regulatory information		robotics	V03-U17 V03-U14
data processing	T01-J05A2L	shipping	V03-U14 V03-U03C
on-line systems	T01-N01A2L	signalling	V03-003C V03-U15
Relaxation		sports	V03-U08
	S05-A09	telecommunication	V03-U05
Relaxation oscillator, pulse generat	ion	toys	V03-U08
	U22-A04A4	vehicles	V03-U03
Relay attack protection		video equipment	V03-U09
communications (general)	W02-L07C	windows	V03-U18
data transmission (general)	W01-A05L5	Relay with contacts, details	
remote control system	W05-D05B5A	cases	V03-D06A
Relay with contacts		contacts - see Contacts	V03-A
cooling	V03-D06A	contacts arrangements	V03-D03C
dynamo-electric	V03-D05E	delaying operation	V03-D01
electroadhesion	V03-D05C	driving arrangements	V03-D03D
electrodynamic	V03-D05E	energising-current supply	V03-D02
electromagnetic	V03-D04	holders	V03-D06A
electrostatic	V03-D05C	indicators	V03-D06A
electrostrictive	V03-D05A	magnetic circuit	V03-D03A
electrothermal	V03-D05D	manufacture	V03-D06B
ferrodynamic	V03-D05E	micromachining for manufacture	V03-D06B1 V03-D01
hybrid relays induction	V03-D15 V03-D05E	modifying operation operation-delay	V03-D01 V03-D01
intelligent relays	V03-D03E V03-D20	seals	V03-D01
magnetodynamic	V03-D20 V03-D05E	shielding	V03-D06A
magnetodynamic	V03-D05E V03-D05B	terminals	V03-D06A
manufacture	V03-D03B V03-D06B	testing	V03-D06B
MEMS relay	V03-D10	windings	V03-D03B
micromachining for manufacture	V03-D06B1	Remanence measurement	S01-E02X
microrelays	V03-D10	Remainered incasarement	S03-E11C
nanorelays	V03-D10A	Reminder alarm	W05-A10A
NEMS relay	V03-D10A		WU5-ATUA
non-polarised	V03-D04X	Remote control	W/05 D 07N
piezoelectric	V03-D05A	agricultural application	W05-D07N
polarised	V03-D04A1	audio/video equipment (general)	
reed	V03-D04A5	Audio/video equipment (geno remote control	
sealed, electromagnetic	V03-D04A5		W03-G05A
		building control application	
smart relays	V03-D20	building control application	W05-D07C
	V03-D20 S01-G10	building control application camcorder	W04-B10C
smart relays testing	V03-D20		W04-B10C W04-E04A
smart relays testing  Relay with contacts, applications	V03-D20 S01-G10 V03-D06B		W04-B10C
smart relays testing	V03-D20 S01-G10		W04-B10C W04-E04A W04-M01D1A

constructional details	W05-D08N	internet of things (IoT)	W05-D06E1
data network-based	W05-D06F	meter reading application	W05-D07G
	W01-A06	monitoring (general)	W05-D05C
earth drilling and well logging	W05-D07H	noise suppression/compensation	(general)
factory automation application	W05-D07B	···	W05-D05A
farming application	W05-D07N	office automation application	W05-D07E
free-space link	W05-D06A3	optical fibre link	W05-D06C
general	W05-D00A5	power generation/distribution	X12-H03A
9		power generation/distribution	
home automation application	W05-D07A	1. 1. 1	W05-D07F
internet-based	W05-D06E	power line link	W05-D06P
internet of things (IoT)	W05-D06E1		X12-H03E
lamp switching	X26-C03C	power supply details	W05-D08P
'Learning' type remote controlle	rs W05-D08L	radio link (general)	W05-D06A1A
meter reading application	W05-D07G	security (general)	W05-D05B
monitoring (general)	W05-D05C	transponder-based (general)	W05-D08G
noise suppression/compensation	n (general)	ultrasonic link (general)	W05-D06A5
	W05-D05A	utility meter reading application	W05-D07G
office automation application	W05-D07E	vehicle application	W05-D07D
optical fibre link	W05-D07E	vehicle application  vehicle service monitoring	X22-X16
•			
photography	S06-B02C1	vehicle theft	X22-D03C
power generation/distribution	X12-H03A	wireless data network-based	W05-D06F1
	W05-D07F	Remote reading	
power line link	W05-D06P	electricity meter	S01-B01
	X12-H03E	ologinolty motor	S02-K08A
power supply details	W05-D08P		X12-H04A
radio link (general)	W05-D06A1A	gas meter	S02-K08A
recording equipment	W04-E04A	gas meter	
security (general)	W05-D05B	pressure measurement	S02-F04E
testing (general)	W05-D05C	water meter	S02-K08A
	W05-D03C W05-D08G	Removable lens, digital/video came	era W04-
transponder-based (general)		M01C1D	
TV camera	W04-M01D1A	Repair	
TV receiver - see TV receiver re		circuit breakers	X13-B08
control	W03-A02C	electric machines	V06-M11M
ultrasonic link (general)	W05-D06A5	electric macrimes	
vehicle application	W05-D07D	· · · · · · · ·	X11-J08M
vehicle locking	X22-D01A1	integrated circuits	U11-C19A
vehicle starting	X22-A08A	moulded case circuit breakers	X13-D08
video camera	W04-M01D1A	switchgear	X13-E08
wireless data network-based	W05-D06F1	Repeater	
		data transmission	W01-A06G5G
Remote control extender	W03-G05A8	line	W01700030
Remote examination/testing	T01-N01B3A	I -	W02-C01L W02-C04A5
<u>-</u>		optical communications systems	
Remote keyless entry (RKE)	W05-D06A	radio	W02-G05C
	W05-D07D	Re-recording	
	W05-D08C	magnetic carrier	T03-A07B
			T03-D01E
	X22-D01A2	magneto-optical carrier	
Remote metering nower		magneto-optical carrier	
Remote metering, power	X12-H04A		W04-D
		magneto-optical carrier optical carrier	W04-D T03-B05
Remote monitoring (measuring)	X12-H04A S01-B01	optical carrier	W04-D T03-B05 W04-C05
	X12-H04A		W04-D T03-B05
Remote monitoring (measuring)	X12-H04A S01-B01	optical carrier	W04-D T03-B05 W04-C05
Remote monitoring (measuring) agricultural application access control (general)	X12-H04A S01-B01 W05-D07N W05-D05B	optical carrier  Rescue equipment  cushioning equipment	W04-D T03-B05 W04-C05 P35-A01
Remote monitoring (measuring) agricultural application access control (general) building control application	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C	optical carrier  Rescue equipment	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general)	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B	optical carrier  Rescue equipment  cushioning equipment  escape chutes and slides	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A
Remote monitoring (measuring) agricultural application access control (general) building control application	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F	optical carrier  Rescue equipment cushioning equipment escape chutes and slides harness	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A P35-A03A
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general) data network-based	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F W01-A06	optical carrier  Rescue equipment cushioning equipment escape chutes and slides harness winch	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A P35-A03A P35-A01A
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general) data network-based earth drilling and well logging	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F W01-A06 W05-D07H	optical carrier  Rescue equipment cushioning equipment escape chutes and slides harness	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A P35-A03A P35-A01A X16-A03
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general) data network-based earth drilling and well logging factory automation application	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F W01-A06 W05-D07H W05-D07B	optical carrier  Rescue equipment cushioning equipment escape chutes and slides harness winch	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A P35-A03A P35-A01A
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general) data network-based earth drilling and well logging factory automation application farming application	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F W01-A06 W05-D07H W05-D07B W05-D07N	optical carrier  Rescue equipment     cushioning equipment     escape chutes and slides     harness  winch  Reserve cell	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A P35-A03A P35-A01A X16-A03
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general) data network-based  earth drilling and well logging factory automation application farming application free-space link	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F W01-A06 W05-D07H W05-D07B W05-D07N W05-D06A3	optical carrier  Rescue equipment     cushioning equipment     escape chutes and slides     harness  winch  Reserve cell     sea-water     thermal	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A P35-A03A P35-A03A X16-A03 X16-A03B X16-A03A
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general) data network-based earth drilling and well logging factory automation application farming application	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F W01-A06 W05-D07H W05-D07B W05-D07N	optical carrier  Rescue equipment     cushioning equipment     escape chutes and slides     harness     winch  Reserve cell     sea-water	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01A P35-A03A P35-A03A X16-A03 X16-A03B
Remote monitoring (measuring) agricultural application access control (general) building control application coding for security (general) data network-based  earth drilling and well logging factory automation application farming application free-space link	X12-H04A S01-B01 W05-D07N W05-D05B W05-D07C W05-D05B W05-D06F W01-A06 W05-D07H W05-D07B W05-D07N W05-D06A3	optical carrier  Rescue equipment     cushioning equipment     escape chutes and slides     harness  winch  Reserve cell     sea-water     thermal	W04-D T03-B05 W04-C05 P35-A01 P35-A01G P35-A01E P35-A01A P35-A03A P35-A03A X16-A03 X16-A03B X16-A03A

W05-D06E

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Resin encapsulated semiconductor	-	mounting	V01-A01B
	U11-D01A1	network	V01-A02G1
mfg. steps	U11-E02A	piezoresistor	V01-A02J X12-A
Resins		power semiconductor	U12-C03
analysis	S03-E14D7	semiconductor	U12-C03
Resist			V01-A04H1
coating, semiconductor manufac	ture lithography	sorting shielding	V01-A04111
country, sermeoridactor manara	are innegraping	substrate details	V01-A01A
	U11-C04A1B	surface mounting	V01-A01A V01-A02D
for PCB manufacture	V04-R01A	temp. compensation	V01-A02D V01-A02H
for semiconductor manufacture	U11-A06	temp. dependent	V01-A0211
inorganic, for semiconductor mai		temp. dependent	V01-A02A V01-A01C5
morganie, for semiconauctor mai	U11-A06B	testing - see also <b>Resistor manuf</b> a	
layer processing, for semiconduc		testing - see also <b>Resistor manufa</b>	S01-G12A
layer processing, for semiconade	U11-C04A1F	testing - see <b>Resistor manufactur</b>	
organic, for semiconductor manu		thermistor - see <b>Thermistor</b>	V01-A04HT
organic, for sermeoridactor mane	U11-A06A	thick film (discrete device only)	V01-A02A V01-A02C3C
stripping, semiconductor manufa		thin film (discrete device only)	V01-A02C3C
C04A1C		variable - see <b>Variable resistor</b>	V01-A02C3A V01-A03
	acieta ne -	varistor/voltage dependent - see \	
Resistance cutting - see Welding, re		vanston voltage dependent - see	V01-A02B
	X24-C	winding	V01-A02B V01-A04G2
Resistance element - see Resistor		wire-wound	V01-A02F
Resistance welding - see Welding,	resistance		
Resistance Welding - see Welding,		Resistor manufacture	V01-A04
	X24-C	attaching leads	V01-A04F
Resistance butt welding - see Weld	ling, resistance	bandolier	V01-A04J
butt	X24-C09	characterised by type	V01-A04K
Resistance, measuring	S01-D05B1	chip resistor	V01-A04K4
in resistor manufacture	S01-D05B1	coating substrate	V01-A04B
	S01-G12A	composite (RC, RL etc.)	V01-A04K9
	V01-A04H1	encapsulation	V01-A04D
Resistive braking, electric machine	• VO4 NO4	film resistor (discrete device only)	V01-A04R3 V01-A04E
Resistive braking, electric machine	X13-H01B	firing heat treatment	V01-A04E V01-A04E
electric vehicle	X21-A03C	leadless resistor	V01-A04L V01-A04K4
railway vehicle	X23-A01B3	marking	V01-A04R4 V01-A04H5
· · · · · · · · · · · · · · · · · · ·		multistep process	V01-A04F13
Resistive transducers	S02-K03A2A	packing	V01-A04G1
conversion of sensor output	S02-K03A2A	potentiometer	V01-A045 V01-A04K6
Resistor	V01-A	resistive material deposition	V01-A04R0 V01-A04B
aging test	V01-A04H1	semiconductor devices	U11-C05G1A
array	V01-A02G1	separation of chip elements	V01-A04K4
chip	V01-A02D	separation of ellip elements	V01-A04K4
coding	V01-A01D	sintering	V01-A04E
composite	V01-A02G	sorting	V01-A04E V01-A04H1
composite RC component	V01-A02G5	surface mounting resistor	V01-A04K4
	V01-B03C8	tape carriers	V01-A04J
current responsive	V01-A02B	testing	S01-G12A
electrodes	V01-A01C1	9	V01-A04H1
encapsulation	V01-A01B1	thermistor	V01-A04K1
film (discrete device only)	V01-A02C	treating deposited layer	V01-A04C
film, novel composition	V01-A02C3	trimming	V01-A04H3
film, thick	V01-A02C3C	varistor	V01-A04K2
film, thin	V01-A02C3A	wirewound resistor	V01-A04K5
fixed	V01-A02	Resonant LC circuit	
housings	V01-A01B		U25-E05B1
lead arrangements	V01-A01C5	Resonant dc-dc converter	U24-D02B7
leadless	V01-A02D	control	U24-D01A
liquid (low power)	V01-A02X		U24-D02B7
manufacture - see Resistor manuf		Resonant tunnelling bipolar transist	or
12 1 2 2	V01-A04		U12-D01A4
marking details	V01-A01D		3.2 301/44

Resonant tunnelling FET	U12-D02J2	breathing mask (safety/rescue)	P35-A03E1
Resonator		measurement	S05-D01C1
electromechanical - see <b>Resonato</b>	Nr.	respiratory massage	S05-A05A
electromechanical	V06-V01E	retinal projection display	W04-Q01L
for transit-time tubes	V05-C02C1		W05-E07
optical	V03-C02C1 V08-A01A	TV receiver	W03-A08E7A
waveguide - see <b>Waveguide res</b> c			W04-Q01L
waveguide - see waveguide resc	W02-A03A	virtual reality	W04-Q01L
	VVUZ-AU3A	· · · · · · · · · · · · · · · · · · ·	W04-W07E1A
Resonator, electromechanical	V06-V01E	B	
arrays of electrodes	V06-V02B	Retort - see Furnaces	Q77
bases	V06-V02E	Returnable container, for reverse ve	ending
ceramic type	V06-V01B		T05-H02E
circuits	V06-V02S	B. I. at a state of the state o	
coils	V06-V02C	Reverberation time measurement	S02-E01
comb electrodes	V06-V02B	Reverberation, for musical instrume	ents
crystal type	V06-V01B		W04-U03E
delay lines	V06-V04D2	B	
electric wave resonators	V06-V01E	Reverse engineering	1144 O40D
electrodes	V06-V02B	protection against, for IC	U11-C19B
electrostrictive	V06-V01B	protection against, package adap	
filters	V06-V04D1		U11-D01C3
forks	V06-V02B	Reverse vending	T05-H02E
housings	V06-V02E	RF absorber	
interdigitated	100 1022		
electrodes	V06-V02B	general	W02-B03D
magnetostatic backward	V00-V02B	waveguide component	W02-A04B
volume wave type	V06-V01E3	RF tuner circuitry	
magnetostatic forward	V00-V01E3	broadcast radio receiver	W03-B01A
volume wave type	V06-V01E3	communications receiver	W02-G03A
magnetostatic surface	V00-V01E3	TV receiver	W03-A01B
wave type	V06-V01E3		
	V06-V01L3 V06-V01D	RFI shielding (screening)	V04-U
magnetostrictive		building, for	V04-U02
manufacture	V06-V03A	cable, for, (integral)	X12-D03E
manufacture,	\/O/\/O2\\7	cable, for, (mountable)	V04-U
micromachining	V06-V03A7	cans	V04-U03
microresonator	V06-V01K1	casings	V04-U03
monitoring	V06-V03B	computer equipment, for	T01-L02D
mounts	V06-V02F	elements	V04-U04
MSBVW type	V06-V01E3	EMC testing	V04-U20
MSFVW type	V06-V01E3	Faraday cage, building	V04-U02
MSSW type	V06-V01E3	Faraday cage, room	V04-U02
nanoresonator	V06-V01K2	gaskets	V04-U04
oscillator application (sinusoidal)	U23-A01A	manufacture	V04-U15
piezoelectric	V06-V01B	materials	V04-U01
quartz type	V06-V01B	materials, superconducting	U14-F01
SAW type	U14-G		V04-U01A
	V06-V01E1		X12-D06B
seals	V06-V02E	measuring instruments, for	S01-J02C
sensor	V06-V04G2	panels	V04-U04
supports	V06-V02F	PCB, for, (non-track type)	V04-Q02A5
surface acoustic wave type	U14-G	PCB, for, (track type)	V04-Q05A
	V06-V01E1	room, for	V04-U02
testing	V06-V03B	telephone, for	W01-C01A4
tuning forks type	V06-V01B	testing for EMC	V04-U20
ultrasonic	V06-V01N	RFI suppression (at source)	W02-H01
Resource allocation, communication	ns		
data networks	W01-A06E1L	communications equipment	W02-H01C
radio	W02-C03G1	electric machines	V06-M14
	1,02 00001		X11-J04
Respiration	I) COE COOE	non-communications equipment	W02-H01A
breathing aids/ventilators (medica		power converters	U24-D01E5
breathing equipment (safety/resc	ue) P35-A03E5		W02-H01
			X12-J01E5

	X12-D03A1	control	T06-D07B
Ribbon techniques, semiconductor	crystal		X25-A03E
growth	U11-B04		X25-A03F X27-U
Ribbon, printer			S05-B07
heat sensitive	S06-H02		X27-V
impact type	S06-F03	The state of the s	X25-A03E
Rice cooker, electric	X27-C04	, , , , , , , , , , , , , , , , , , ,	X22-X20A
Rider assist			X25-X14
Electric motorcycle	X21-R	3	X25-F05A X25-A03E1
Motorcycle	X22-R		
Rifle shooting (sport)	P36-A05		Q38-B T06-B01A
	W04-X01K5E	9 .	X25-F05A
Rigid printed circuit board manufacture)	ture (see also V04-R05C	goods conveying, control	T06-D08F X25-F05A
Ring Laser Gyroscope (see also Gyro	oscope)	passenger guidance robot (airport	
	S02-B07B	5	X25-F05A1
Ringing, telephone set	W01-C01F1	,	T06-D08F
accessory ringer	W01-C01F1E		X27-D04R
call type dependent	W01-C01F1M	110 011 01 0101101	P41-A01
mechanical ringer	W01-C01F1F		P41-V22
memory storage input for ring tone generation	W01-C01F1P		P73-V30
optical ringer	W01-C01F1G	Rocker switch	V03-C04
controlling A/V equipment	W01-C01F6		Q25-S
controlling A/V equipment, intern	al W01-	The second secon	W07-A
C01F6A		'	W06-B03
controlling A/V equipment, extern C01F6C	al W01-	,	X25-B01D
volume control	W01-C01F1B	Roll crusher	P41-A01E
volume dependent upon ambient		Roller, fixing, electrophotographic	S06-E06B
·	W01-C01F1D	Roller mill	P41-A03A
Rinsing, lithography, semiconducto	<b>f</b>	Rolling	X25-A02B
kinising, intrography, semiconducto	r manutacture	Komiig	A23-A02B
Kinsing, ittiography, semiconducto	U11-C04A1A	control	T06-D05A1
Riveting	U11-C04A1A T06-D06A	control	T06-D05A1 X25-A02B
	U11-C04A1A	control motors	T06-D05A1 X25-A02B X11-H02
	U11-C04A1A T06-D06A	control	T06-D05A1 X25-A02B X11-H02 <b>nical</b>
Riveting	U11-C04A1A T06-D06A X25-A03R Q41-B	control  motors  Roofs- see Buildings, general mecha	T06-D05A1 X25-A02B X11-H02 <b>nical</b>
Riveting  Road construction	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur o	T06-D05A1 X25-A02B X11-H02 <b>nical</b>
Riveting  Road construction  Road maintenance	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur o	T06-D05A1 X25-A02B X11-H02 nical :
Riveting  Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of ROMs electrically erasable (alterable)	T06-D05A1 X25-A02B X11-H02 <b>nical</b> se <b>ell</b> X16-B01C2
Riveting  Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the construction and structural elements ROMS  electrically erasable (alterable) (EEPROM), matrix layout	T06-D05A1 X25-A02B X11-H02 nical seell X16-B01C2
Riveting  Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05E	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the construction and structural elements ROMS  electrically erasable (alterable) (EEPROM), matrix layout electrically erasable, flash	T06-D05A1 X25-A02B X11-H02 nical sell X16-B01C2 U13-C04B2 U13-C04B2
Riveting  Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs matrix displays	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05E T07-B05C	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the second s	T06-D05A1 X25-A02B X11-H02 nical seell X16-B01C2
Riveting  Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs matrix displays motorway lane closure indication	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05E T07-B05C	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the second s	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04A1
Riveting  Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs matrix displays	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05E T07-B05C	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the second s	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04B2 U13-C04A1 U14-A03B7
Riveting  Road construction  Road maintenance cleaning, gritting  Road signs     ancillary signalling fixed display illuminated direction signs matrix displays motorway lane closure indication movable display	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05E T07-B05C T07-B05C T07-B05G	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of ROMS  electrically erasable (alterable) (EEPROM), matrix layout electrically erasable, flash electrically programmable ROM electronically erasable (alterable) (EEPROM) erasable programmable (EPROM) erasable programmable (EPROM) erasable programmable (EPROM),	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7
Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs matrix displays motorway lane closure indication movable display temporary speed limit indication  Roaming, cellular / wireless	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05E T07-B05C T07-B05C T07-B05C	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the selectrically erasable (alterable) (EEPROM), matrix layout electrically erasable, flash electrically programmable ROM electronically erasable (alterable) (EEPROM) erasable programmable (EPROM) erasable programmable (EPROM), matrix layout	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U13-C04A1
Road construction  Road maintenance     cleaning, gritting  Road signs     ancillary signalling     fixed display     illuminated direction signs     matrix displays     motorway lane closure indication     movable display     temporary speed limit indication  Roaming, cellular / wireless     between different network types	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C W01-E01A W01-E01A	roontrol  motors  Roofs- see Buildings, general mechal construction and structural elements  Room temperature sodium-sulphur of the selectrically erasable (alterable) (EEPROM), matrix layout electrically erasable, flash electrically programmable ROM electronically erasable (alterable) (EEPROM) erasable programmable (EPROM) erasable programmable (EPROM), matrix layout fixed program	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U13-C04A1 U14-A06B
Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs matrix displays motorway lane closure indication movable display temporary speed limit indication  Roaming, cellular / wireless between different network types between same-standard networks	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C W01-E01A W01-E01A	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of ROMs  electrically erasable (alterable) (EEPROM), matrix layout electrically erasable, flash electrically programmable ROM electronically erasable (alterable) (EEPROM) erasable programmable (EPROM) erasable programmable (EPROM), matrix layout fixed program ion implantation programmable	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U14-A03B7
Road construction  Road maintenance   cleaning, gritting  Road signs   ancillary signalling   fixed display   illuminated direction signs   matrix displays   motorway lane closure indication   movable display   temporary speed limit indication  Roaming, cellular / wireless   between different network types   between same-standard networks   between wireless networks	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C W01-E01A W01-E01A3	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of ROMs  electrically erasable (alterable) (EEPROM), matrix layout electrically erasable, flash electrically programmable ROM electronically erasable (alterable) (EEPROM) erasable programmable (EPROM) erasable programmable (EPROM), matrix layout fixed program ion implantation programmable	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U14-A06B U14-A06B U14-A06B U14-A06B5 U13-C04A1
Road construction  Road maintenance   cleaning, gritting  Road signs   ancillary signalling   fixed display   illuminated direction signs   matrix displays   motorway lane closure indication   movable display   temporary speed limit indication  Roaming, cellular / wireless   between different network types   between same-standard networks   between wireless networks   and mobile phone networks	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05C T07-B05C T07-B05G W01-E01A W01-E01A3 W01-E01A3	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Rom electrically erasable (alterable) (EEPROM) electronically erasable (alterable) (EEPROM) erasable programmable (EPROM) erasable programmable (EPROM), matrix layout fixed program ion implantation programmable mask-programmable	T06-D05A1 X25-A02B X11-H02 nical icell X16-B01C2 U13-C04B2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U14-A03B7
Road construction  Road maintenance     cleaning, gritting  Road signs     ancillary signalling     fixed display     illuminated direction signs     matrix displays     motorway lane closure indication     movable display     temporary speed limit indication  Roaming, cellular / wireless     between different network types     between same-standard networks     between wireless networks     and mobile phone networks     international roaming	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05G T07-B05G W01-E01A W01-E01A3 W01-E01A3E	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the composition of the construction and structural elements Room temperature sodium-sulphur of the composition of the construction	T06-D05A1 X25-A02B X11-H02 nical is:ell X16-B01C2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U14-A06B U14-A06B U14-A06B U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06B5
Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs matrix displays motorway lane closure indication movable display temporary speed limit indication  Roaming, cellular / wireless between different network types between same-standard networks between wireless networks and mobile phone networks international roaming  Robot	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05C T07-B05G W01-E01A W01-E01A3 W01-E01A3E W01-E01A5 X25-A03E	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Roms electrically erasable (alterable) (EEPROM), matrix layout electronically erasable (alterable) (EEPROM) erasable programmable (EPROM) erasable programmable (EPROM), matrix layout fixed program ion implantation programmable mask-programmable non-electrically erasable	T06-D05A1 X25-A02B X11-H02 nical is:ell X16-B01C2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U14-A06B U14-A06B U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06C
Road construction  Road maintenance     cleaning, gritting  Road signs     ancillary signalling     fixed display     illuminated direction signs     matrix displays     motorway lane closure indication     movable display     temporary speed limit indication  Roaming, cellular / wireless     between different network types     between same-standard networks     between wireless networks     and mobile phone networks     international roaming	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05G T07-B05G W01-E01A W01-E01A3 W01-E01A3E	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Room temperature sodium-sulphur of the construction o	T06-D05A1 X25-A02B X11-H02 nical is cell X16-B01C2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U14-A06B U14-A06B U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06C U14-A06C
Road construction  Road maintenance cleaning, gritting  Road signs ancillary signalling fixed display illuminated direction signs matrix displays motorway lane closure indication movable display temporary speed limit indication  Roaming, cellular / wireless between different network types between same-standard networks between wireless networks and mobile phone networks international roaming  Robot	U11-C04A1A T06-D06A X25-A03R Q41-B X25-U05 X25-U05 X25-U05 T07-B T07-B07 T07-B05E T07-B05C T07-B05C T07-B05C T07-B05C T07-B05G W01-E01A W01-E01A3 W01-E01A3E W01-E01A5 X25-A03E X25-A03E	motors  Roofs- see Buildings, general mecha construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Room temperature sodium-sulphur of the construction and structural elements Roms electrically erasable (alterable) (EEPROM), matrix layout electronically erasable (alterable) (EEPROM) erasable programmable (EPROM), matrix layout fixed program ion implantation programmable mask-programmable mask-programmable non-electrically erasable	T06-D05A1 X25-A02B X11-H02 nical is:ell X16-B01C2 U13-C04B2 U13-C04A1 U14-A03B7 U14-A03B7 U14-A06B U14-A06B U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06B5 U13-C04A U14-A06C

non-reprogrammable, using diode	es U13-C04A U14-A06B1
non-reprogrammable, using fuses	- see
ROMs, non-reprogrammable,	
using fuses	U13-C04A
non-volatile, non-electrically erasa	U14-A06B1
non-volume, non-electrically erasa	U13-C04A
	U14-A06C
non-volatile, ultraviolet erasable	U13-C04A
	U14-A06C
one-time programmable	U14-A06B
permanent programmable (PROM), matrix lay	U14-A06
programmable (FROM), matrix lay	U13-C04A
semi-permanent	U14-A06
ultraviolet erasable	U13-C04A
with RAM within memory cell	U14-A03B9
Rostrum camera (video)	W04-M01J
Rotameter	S02-C01A9
Rotary actuator, solenoid-type	V02-E02A4
Rotary anode system	
bearings	V05-E01B1
support shaft	V05-E01B1
Rotary anode X-ray tube	V05-E01H1
manufacture	V05-L05E
rotary drive system	V05-E01B3
Rotary drive system, X-ray tube	
bearings	V05-E01B1A
with anode assembly forming part motor	V05-E01B3C
with separate motor drive	V05-E01B3A
Rotary encoder - see Position encod	er.
Rotary switch	V03-C02
notally strictle	X13-A04C
Rotary solenoid	V02-E02A4
Rotary transformer	V02-F02D
helical scan recording	T03-A05D3A
3	V02-F02D
Rotary UPS	X12-H02C
Rotor	V06-M07B
Roughness measurement	S02-A10E
using mechanical method	S02-A10L
g	S02-A10E
using optical method	S02-A03
	S02-A10E
using sound or ultrasound	S02-A05B S02-A10E
B. 1.11	
Roulette	P36-C09 W04-X02B
	W04-X02E
Router, data networks	W01-A06G5E
Routing	TOT ACCUSE
data transfer, computing	T01-H07C
networks	W01-A06E1J
RSSI (received signal strength	
indicator)	W02-G03J1

Rubber	
analysis	S03-E14D7
working	X25-A07
control	T06-D14
Ruby laser	V08-A04C
Rug	P27-B04
Rule-base control system	T06-A05A
Rulers	S02-A01A
Run length code conversion	U21-A05A2B
Running, sport and leisure	P36-A03
	W04-X01K3A
Runway lights	W06-B02E
	X26
Rusty bolt effect, interference	
avoidance or reduction	W02-H01

5/N ratio improvement in radio receivers         W02-G03B (w02-G03B)         Sampling         S03-E138 (source of the potential mode)         S04-E138 (source of the potential mode)         S04-E138 (source of t	S		Sample modification	U21-A03F6D
W02-G03B   gases   S03-E13C   gases   S03-E13C   gases   S03-E13C   gases   S03-E13C   gases   S03-E13C   s0		ivers		S03-E13
S/N ratio, measuring (for) electronic amplifier         \$01-008B electronic amplifier         \$01-008B3 solids         \$03-113B indicates         \$03-1	3/N ratio improvement in radio rece		_	
Sacrificial anode			5	
Sacrifical anode         X25-R06           Sacrifical anode         X25-R06           Safe, for storing valuables         Q47-U55 T05-U55A           T05-U55A         T05-U55A           Safety         W06-B02S engine ignition safety         X22-A0147 general industrial safety system motor vehicle battery cut-off or protecting frior passengers of protecting frior passengers of protecting frior passengers of protecting frior passengers of protecting frior passengers of protecting frior passengers of protecting rear passengers of protecting frior passengers of			5	
Sacificial anode         X25.R06         solids         S03-£13A           Safe, for storing valuables         Q47-U55 T05-L05A         C47-U55 T05-L05A         C47-U55 T05-L05A         C47-U55 T05-L05A         C47-U55 T05-L05A         C47-U55 T05-L05A         C47-U55 Sampling signals         Q12-A03F6/B         Cu21-A03F6/B         Cu21-A03F6/B </th <th>electronic amplifier</th> <th></th> <th>· ·</th> <th></th>	electronic amplifier		· ·	
Safe, for storing valuables         0.47.U55 T05-L05A         Sampling signals (digitisting analogue signals)         U21-A03Feb U21-A03Feb oversampling         U21-A03Feb U21-A03Feb sample modification           Safety         W06-8025 engine iginition safety general industrial safety system motor vehicle battery cut-off         X22-A01A7 general industrial safety system work vehicle airbag         V22-A01A7 O14-C020 dashboard mounted airbag         V22-A01A7 O14-C020 dashboard mounted airbag         V21-A03Feb Sanitary equipment         V22-A01A7 Sanitary equipment         V22-A01A7 V22-Banitary equipment         V22-Banitary equipment				
Color			Sampling signals	
Safety         oversampling         U21-A03F6B           airport safety         W06-B02S         sample ignition safety         W22-A01A7           general industrial safety system         X25-X12         sample modification         U21-A03F6B           motor wehicle abstery cut-off         X25-X12         SAN         T01-N02A2D           vehicle airbag         014-C022         dashboard mounted airbag         014-C022           for protecting front passengers         014-C0241         5AO (Sample Adaptive Offset), hybrid         video coding         W04-P01A4L           for protecting front passengers for protecting regraps wheel mounted airbag of protecting wheel mounted airbag of 14-C02C1         014-C02C1         SAO (Sample Adaptive Offset), hybrid         video coding         W04-P01A4L           vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific vehicle specific vehicle passenger safety         014-C02C2         Sanitizing stations (in e.g. shops)         W04-P01A4L           vehicle passenger safety         014-C02C2         Sanitizing stations (in e.g. shops)         W04-P01A4L           vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific clothing vehicle specific vehicle specific vehicle specific clothing vehicle specific vehicle specific vehicle specific vehicle specific vehicle specific	Safe, for storing valuables			U21-A03F6
airport safety engine ignition safety general industrial safety system motor vehicle battery cut-off dashboard mounted airbag of protecting front passenger for protecting front passenger	Catana	105-L05A	oversampling	U21-A03F6B
general industrial safety system motor vehicle battery cut-off vehicle airbag on 214-C02C3 dashboard mounted airbag of 14-C02C3 for protecting front passenger for protecting front passenger inflatable kinee bolster or 14-C02C1 roof mounted airbag of 14-C02C1 roof mounted airbag of 14-C02C1 roof mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C3 statering wheel mounted airbag of 14-C02C4 roof which is specific clothing of 14-C02C3 statering wheel mounted airbag of 14-C02C4 roof which is statering wheel mounted airbag of 14-C02C4 roof wide coding wounted airbag of 14-C02C1 roof wounted airbag of 14-C02C1 roof wounted airbag of 14-C02C4 roof wounted airbag of 14-C02C1 roof wounted airbag of 14-		WOA BOSS		
Sanitary equipment			sample modification	U21-A03F6D
motor vehicle battery cut-off vehicle airbag O14-C02 dashboard mounted airbag O14-C02A3 for protecting front passenger for protecting front passenger inflatable knee boltser O14-C02A3 inflatable knee boltser O14-C02C1 roof mounted airbag O14-C02C4 side/curtain airbag O14-C02C4 steering wheel mounted airbag O14-C02C3 steering wheel mounted airbag O14-C02C3 vehicle specific clothing X22-J11C vehicle passenger safety O14-C15 x22-J11B pedestrian safety O24-B09 w06-C015 whip wof-C015 whip wof-C015 whip wof-C015 whip wof-C015 whip wof-C015 belt P35-A03A presthing equipment P35-A03A presthing mask P35-A03E breathing mask P35-A03E harmful chemicals protection P35-A03C harmful gas protection P35-A03C harmful gas protection P35-A03C safety belt P35-A03C safety belt P35-A03A p23-A03E safety belt P35-A03A p23-A03E safety belt P35-A03A p23-A03E safety belt P35-A03A p23-A03E safety belt P35-A03C safety harness P35-A03A p23-A03E safety belt P35-A03C safety harness P35-A03A p23-A03E safety belt P35-A03C safety harness P35-A03A p23-A03E safety belt P35-A03C safety harness P35-A03A p23-A03E safety belt P35-A03C safety harness P35-A03C			_	
vehicle airbag dashboard mounted airbag for protecting driver for protecting driver for protecting front passenger for protecting rear passengers inflatable knee bolster roof mounted airbag side/curtain airbag steering wheel mounted airbag vehicle specific clothing vehicle passenger safety         Q14-C02C1 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C02C2 Q14-C03C2 Q14-C			Sanitary equipment	
for protecting driver for protecting front passenger for protecting rear passengers for protecting rear passengers inflatable knee bolster roof mounted airbag of 14-C02C4 side/curtain airbag of 14-C02C2 steering wheel mounted airbag vehicle specific clothing x22-J11C vehicle passenger safety of 14-C16 x22-J11 pedestrian safety Q14-C16 x22-J11 pedestrian safety Q14-C16 x22-J11 pedestrian safety Q14-C16 x22-J11 pedestrian safety Q14-C16 x22-J11 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C15 pedestrian safety Q14-C16 pedestrian sa				
for protecting front passenger for protecting rear passengers of protecting rear passengers inflatable knee bolster         014-02C1         video coding         W04-P01A4L           for protecting rear passengers inflatable knee bolster roof mounted airbag side/curtain airbag         014-02C2         receiver decoder, radio         w03-B02C5           side/curtain airbag         014-02C2         receiver decoder, radio         w03-B02C5           steering wheel mounted airbag vehicle specific clothing         014-02C3         transmission, radio         w02-E01A           vehicle passenger safety         014-C16         transmission, Txdio         w02-E01A           vehicle passenger safety         014-C15         X22-J11         w01-C01B0           vehicle passenger safety         014-C15         W01-C01B         W01-C01B0           x22-J11         passenger safety         W01-C01B         W01-C01B0           x22-J11 b         w06-C01S         SAR (specific absorption ratio)         w01-C01BA           x22-J11 b         w06-C01S         Safety systems, general         P35-A03B         w01-C01D3C           belt         P35-A03A         p35-A03B         w01-C01BA         w01-C01D3C           belet         P35-A03B         altitude control         w06-B03F           breathing equipment         P35-A03C         (radio relay station			Sanitizing stations (in e.g. shops)	P34-A01
for protecting rear passengers inflatable knee bolster			SAO (Sample Adaptive Offset), hyb	rid
inflatable knee bolster roof mounted airbag	for protecting from passengers		video coding	W04-P01A4L
roof mounted airbag side/curtain airbag vehicle specific clothing vehicle specific clothing vehicle passenger safety         Q14-C02C3 Q14-C16 X22-J11C Vehicle passenger safety         Q14-C16 X22-J11C Vehicle passenger safety         SAR (specific absorption ratio) measurement, mobile phone         W01-C01A4 W01-C01D3C W01-C01B3C W01-C01B3C W01-C01B3C           Safety systems, general         P35-A03 V06-C01S P35-A03A Dreathing equipment         P35-A03 P35-A03E Dreathing equipment         P35-A03 P35-A03E Dreathing mask         P35-A03E P35-A03A P35-A03B Dreathing passe         P35-A03E P35-A03A P35-A03C Dreathing passe         V02-C03B1F V06-B03F           breathing equipment         P35-A03 P35-A03C Dreathing passe         P35-A03E P35-A03A Dreathing passe         V06-B03F V06-B03F           breathing approtection         P35-A03C Dreathing passe         V06-B03F V06-B03F           breathing passe         P35-A03C Dreathing passe         V06-B03F V06-B03F           breathing equipment         P35-A03C Dreathing passe         V06-B03F V06-B03F           breathing equipment         P35-A03C Dreathing passes         V06-B03F V06-B03F           breathing equipment         P35-A03C Dreathing passes         V06-B03F V06-B03F			SAP (second/separate audio progra	amme)
side/curtain airbag         Q14-C02C2         receiver decoder, TV         W03-A12B1A           steering wheel mounted airbag vehicle specific clothing         Q14-C16         X22-J11C         W02-E016B5           vehicle specific clothing         X22-J11         W02-E06B5         W02-E06B5           vehicle passenger safety         Q14-C1         X22-J11         W01-C01A4           pedestrian safety         Q14-C15         W01-C01B         W01-C01LA           ship         Q24-B09         W06-C01S         W01-C01A4           ship         Q24-B09         W01-C01D3C         W01-C01D3C           belt         P35-A03         G68-S         W01-C01D3C           belt         P35-A03A         P35-A03A         W01-C01D3C           breathing equipment         P35-A03E         W06-B03F         W02-C03B1F           breathing mask         P35-A03E         altitude control         W06-B03F           carabiner         P35-A03E         attitude control         W06-B03F           harmess         P35-A03C         (radio relay station)         W06-B03F           harmful chemicals protection         P35-A03C         (radio relay station)         W06-B03A           NBC suit         P35-A03C         (radio relay station)         W06-B03A			•	W03-B02C5
vehicle specific clothing X22_J11C vehicle passenger safety Vehicle passenger safety Vehicle passenger safety Vehicle passenger safety Vehicle passenger safety Va2_J11  pedestrian safety Va2_J11B Ship Va2_H809 V06_C01S Safety systems, general V01_C01A4 Ship V04_C01S Safety systems, general V02_H809 V06_C01S Safety systems, general V01_C01A4 V01_CollA V01_CollA V01_CollA V01_CollA V01_CollA V01_CollA V01_CollA V01_CollA V01_CollA V01_CollA V06_B03F Airbord Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord V06_B03F Airbord		Q14-C02C2		
Vehicle passenger safety         X22-J11C Vehicle passenger safety         X22-J11 Vehicle passenger safety         X22-J11 Vehicle passenger safety         X22-J11 Vehicle passenger safety         X22-J11 Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X22-J11B Vehicle passenger safety         X01-C01DAC Vehicle passenger safety         X02-C03B1F         Satellite         Sat	steering wheel mounted airbag	Q14-C02C3	I	
vehicle passenger safety         Q14-C X22-J11 Dedestrian safety         Q14-C15 V22-J11B V22-B09 W06-C015         measurement, mobile phone         W01-C01A4 W01-C01A W01-C01BX           Safety systems, general         P35-A03 Q68-S Delt         Safety systems, general         P35-A03 P35-A03A P35-A03A P35-A03E Deathing equipment         Satellite           belt         P35-A03A P35-A03A P35-A03E Deathing mask         P35-A03E P35-A03E P35-A03E Deathing mask         W02-C03B1F P35-A03A P35-A03E Date on the mobile phone         W01-C01A4 W01-C01D3C           Satellite         airborne radio relay altitude control         W02-C03B1F W06-B03F           antenna         W02-C03B1F W06-B03F           attitude control         W06-B03F           communications equipment (on-board - physical aspects)         W06-B03F           (radio relay station)         W02-C03B1B W06-B03A           safety belt         P35-A03C P35-A03C         instrumentation         W06-B03H W06-B03A           safety harness         P35-A03A P35-A03A         mechanical aspects N06-B03A         C25-S01A N06-B03A           Sagnac effect gyroscope         S02-B07B X15-C         Solar panel         W06-B03B W06-B03A	vehicle specific clothing		'	W02-F06B5
Pedestrian safety				14/04 604 4 4
Pedestrian safety	venicle passenger safety		measurement, mobile phone	
ship Q24-B09 W06-C01S  Safety systems, general P35-A03 D68-S Delt P35-A03A P23-A06 Dreathing equipment P35-A03E Dreathing mask P35-A03A P35-A03A P35-A03C Dreathing environmental suit P35-A03A Darmful chemicals protection P35-A03A Darmful gas protection P35-A03E Darmful gas protection P35-A03C DBC suit P35-A03C Safety belt P35-A03C Safety belt P35-A03A Safety belt P35-A03A Safety belt P35-A03A Safety belt P35-A03A Safety belt P35-A03A Safety belt P35-A03A Safety darmess P35-A03A Safety darmess P35-A03A Sagnac effect gyroscope S02-B07B Salinity gradient power generation X11-B09 X15-C Salva analysis S03-E14H9 Salvage of discharge tube parts Salvaging/recycling of aircraft/spacecraft equipment/materials W06-B01B Sample adaptive offset (SAO), hybrid video coding W04-P01A4L Sample-and-hold circuits  Satellite airborne radio relay altitude control W06-B03F altitude control T06-B01B w06-B03F communications equipment (on-board - physical aspects) (radio relay station) W06-B03C rommunications equipment (on-board - physical aspects) (radio relay altitude control T06-B01B w06-B03F attitude control T06-B01B w06-B03F communications equipment (on-board - physical aspects) (radio relay altitude control T06-B01B w06-B03C T06-B01B w06-B03C T06-B01B w06-B03C w06-B03C w06-B03C tommunications equipment (on-board - physical aspects) (v06-B03C w06-B03C w06-B03C w06-B03C w06-B03C w06-B03C w06-B03C w06-B03A mechanical aspects navigation S02-B08C w06-A03ASC Satellite navigation system So2-B08C w06-A03ASC Satellite navigation system (GPS) w06-C01B1 for train X23-B05C w06-A03AS	pedestrian safety			
Ship         Q24-B09 W06-C01S D735-A03 Q68-S         Satellite         W01-C01D3C           belt         P35-A03A P23-A06 P23-A06 breathing equipment         P35-A03A P23-A03E Dreathing mask         altitude control         W06-B03F W06-B03F           breathing equipment         P35-A03E P35-A03E Dreathing mask         P35-A03E P35-A03E Dreathing mask         attitude control         T06-B01B W06-B03E           carabiner         P35-A03A P35-A03A Darmess         communications equipment (on-board - physical aspects)         W06-B03C W06-B03F           harmful chemicals protection         P35-A03C P35-A03A Darmat suit         P35-A03E P35-A03C P35-A03A         communications equipment (on-board - physical aspects)         W06-B03C W06-B03L W06-B03H           NBC suit         P35-A03E P35-A03A         instrumentation         W06-B03L W06-B03J W06-B03A           safety harness         P35-A03A P23-A06 Safety harness         P35-A03A P23-A06 P35-A03A         mechanical aspects navigation         Q25-S01A S02-B08C           Salinity gradient power generation         X11-B09 X15-C         Solar panel         W06-B03A W06-B03A W06-B03A           Salivage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials         W06-B10 W06-B01 W06-B01 W06-B01 For train         Satellite avigation system         S02-B08C W06-A03A5           Sample adaptive offset (SAO), hybrid         for aircraft For train         W06-B01B W06-C01B1 For train	p o a com an oan o sy		reduction, mobile phone	
Delt	ship	Q24-B09		
belt P35-A03A P23-A06 breathing equipment P35-A03E breathing mask P35-A03E1 carabiner P35-A03E1 attitude control antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03C antenna W02-B08F7 W06-B03F W06-B03F work and particular special spec			Satellite	
belt P35-A03A P23-A06 breathing equipment P35-A03E breathing mask P35-A03E carabiner P35-A03A P35-A03C harness P35-A03C harmful chemicals protection P35-A03C harmful gas protection p35-A03C	Safety systems, general		airborne radio relay	W02-C03B1F
breathing equipment P35-A03E attitude control T06-B01B W06-B03C T06-B01B wondershing mask P35-A03E1 carabiner P35-A03A communications equipment P35-A03C (on-board – physical aspects) W06-B03C (radio relay station) w02-C03B1B electrical installations w06-B03H harmful chemicals protection P35-A03C (radio relay station) w06-B03H harmful gas protection P35-A03C (radio relay station) w06-B03H electrical installations w06-B03H instrumentation w06-B03J ion thruster w06-B03J ion thruster w06-B03A mechanical aspects on Avigation w06-B03A mechanical aspects on Avigation w06-B03A w06-B03A mechanical aspects on Avigation w06-B03A w06-B03A w06-B03A w06-B03A w06-B03A w06-B03A w06-B03B w06-B03A w06-B03B wondership wondership w06-B03B wondership wondersh	halt			
breathing equipment breathing mask p35-A03C carbiner breathing mask p35-A03C carbiner breathing mask p35-A03C carbiner breathing mask p35-A03C carbiner breathing mask p35-A03C communications equipment (on-board - physical aspects) (radio relay station) w06-B03H electrical installations w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03A mechanical aspects navigation s02-B08C w06-A03A5C Sagnac effect gyroscope s02-B07B solar panel w06-B03B X15-A02C Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials w06-B10 Sample adaptive offset (SAO), hybrid video coding w04-P01A4L saltitude control w06-B03B w06-B03C propulsion solar panel w06-B03B X15-A02C Satellite navigation system solar panel w06-B03B X15-A02C Satellite navigation system solar panel w06-B01B w06-B01B w06-B03B x15-A02C Satellite navigation system solar panel w06-B01B w06-B03B wof-B03C wof-B0	beit		antenna	
breathing mask carabiner P35-A03E1 carabiner P35-A03A P35-A03A P35-A03A P35-A03A P35-A03A P35-A03A P35-A03A P35-A03A P35-A03A P35-A03A P35-A03B P35-A03B P35-A03B P35-A03B P35-A03B P35-A03B P35-A03B P35-A03C P35-A03C P35-A03C P35-A03C P35-A03C P35-A03A P35-A03C P35-A03A P35	breathing equipment		attituda cantrol	
carabiner P35-A03A environmental suit P35-A03C harness P35-A03A harmful chemicals protection P35-A03G harmful chemicals protection P35-A03G harmful gas protection P35-A03E harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protection P35-A03A harmful gas protec	breathing mask		attitude control	
environmental suit harness harness harmful chemicals protection harmful gas protection harmful gas protection hazmat suit hazmat suit NBC suit safety belt safety harness  Sagnac effect gyroscope Salinity gradient power generation Saliva analysis Salvage of discharge tube parts Salvaging/recycling of aircraft/spacecraft equipment/materials Sample adaptive offset (SAO), hybrid video coding  W06-B03C (radio relay station) W06-B03H W06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03H instrumentation w06-B03A mechanical aspects Q25-S01A navigation S02-B08C w06-A03A5C Solar panel  Satellite navigation system S02-B08C W06-B03B X15-A02C  Satellite navigation system S02-B08C w06-A03A5 for aircraft w06-B01B1 for ship for train X23-B05C y06-A03A5 W06-A03A5			communications equipment	1100 2001
harmful chemicals protection harmful gas protection p35-A03E electrical installations w06-B03H instrumentation w06-B03J ion thruster w05-E05A w06-B03A w06-B03A p23-A03A p23-A06 safety harness p35-A03A p23-A06 safety harness p35-A03A p23-A06 safety harness p35-A03A p23-A06 safety harness p35-A03A p23-A06 p35-A03A w06-B03B w06-B03A w06-B03B w06-B03A w06-B03B w06-B03A w06-B03B w				W06-B03C
harmful gas protection hazmat suit hazmat suit NBC suit safety belt safety harness P35-A03A P23-A06 Sagnac effect gyroscope Salinity gradient power generation Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials W06-B03 W06-B03A M06-B03A M06-B03B M06-B03A M06-B03B M				W02-C03B1B
hazmat suit NBC suit Safety belt P35-A03C Sagnac effect gyroscope Salinity gradient power generation Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials Sample adaptive offset (SAO), hybrid video coding W06-B03C ion thruster V05-E05A W06-B03A Mechanical aspects NBC sulvagation M06-B03A Mechanical aspects NBC sulvagation M06-B03A Mechanical aspects NBC sulvagation M06-B03A Mo6-A03A5C Solar panel M06-B03A W06-B03B X15-A02C Satellite navigation system S02-B08C W06-A03A5 W06-B03B X15-A02C Satellite navigation system S02-B08C W06-A03A5 W06-B01B1 For aircraft For aircraft For ship For train M06-C01B1 X23-B05C W06-A03A5 W06-A03A5 W06-A03A5 W06-B03B M06-B03A M06-B03B M06-B03A M06-B03B M06-B03B M06-B03A M06-B03B M06-B03B M06-B03A M06-B03B M06-B03A M06-B03A M06-B03B M06-B03A M06-B03B M06-B03B M06-B03B M06-B03B M06-B03A M06-B03B M06-B03B M06-B03A M06-B03B M06-B03B M06-B03A M06-B03B M06-B03B M06-B03B M06-B03B M06-B03A M06-B03B M0				
NBC suit safety belt P35-A03C P23-A06 P23-A06 Safety harness P35-A03A P23-A06 Safety harness P35-A03A P23-A06 Safety harness P35-A03A  Sagnac effect gyroscope S02-B07B Salinity gradient power generation S11-B09 X15-C Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials Sample adaptive offset (SAO), hybrid video coding W04-P01A4L Sample-and-hold circuits V05-B03A Mechanical aspects N06-B03A Mo6-A03A5 N06-B03A N06-B03A Solar panel V06-B03B X15-A02C Satellite navigation system S02-B08C W06-B03B X15-A02C Satellite navigation system For aircraft for ship for train S23-B05C Y06-A03A5 N06-A03A5 Sample-and-hold circuits V06-A03A5 Saplobal positioning system (GPS) V06-A03A5	9 .			
safety belt P35-A03A P23-A06 safety harness P35-A03A Sagnac effect gyroscope S02-B07B propulsion Q25-S04  Salinity gradient power generation X11-B09 X15-C solar panel W06-B03A  Saliva analysis S03-E14H9  Salvage of discharge tube parts Salvaging/recycling of aircraft/spacecraft equipment/materials W06-B10  Sample adaptive offset (SAO), hybrid video coding W04-P01A4L  Sample-and-hold circuits U21-B03  mechanical aspects N025-S01A navigation S02-B08C W06-A03A5 S02-B08C N06-B03B X15-A02C Satellite navigation system S02-B08C W06-B03B X15-A02C Satellite navigation system S02-B08C W06-B03B Y06-B03B Y06-B03B Y06-B03B Y06-B03B For aircraft N06-B01B1 for ship Solar panel S23-B05C For eircraft N06-B01B1 For train Y23-B05C Y06-A03A5 Y06-A03A5			ion thruster	
safety harness P35-A03A navigation S02-B08C W06-A03A5C  Sagnac effect gyroscope S02-B07B propulsion Q25-S04  Salinity gradient power generation X11-B09 W06-B03A  Saliva analysis S03-E14H9  Salvage of discharge tube parts Salvaging/recycling of aircraft/spacecraft equipment/materials W06-B10  Sample adaptive offset (SAO), hybrid video coding W04-P01A4L  Sample-and-hold circuits U21-B03  Sample discharge tube parts W04-P01A4L  Solvaging/recycling of aircraft/spacecraft equipment/materials W06-B10  Sample solvagition system W06-B03B  Solar panel W06-B03B  X15-A02C  Satellite navigation system  S02-B08C W06-B03B  X15-A02C  Satellite navigation system  S02-B08C W06-B03B  X15-A02C  Satellite navigation system  S02-B08C W06-B03B  X15-A02C  Solar panel  For aircraft for ship for train for train X23-B05C X22-E06B Solar panel X22-E06B Solar panel X15-A02C  Satellite navigation system  Solar panel X15-A02C  Satellite navigation system  S02-B08C W06-B03B X15-A02C  Solar panel X15-A02C  S	safety belt		mechanical aspects	
Sagnac effect gyroscope  So2-B07B  Salinity gradient power generation  X11-B09  X15-C  Saliva analysis  So3-E14H9  Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials  Sample adaptive offset (SAO), hybrid video coding  W06-A03A5  W06-B03B  X15-A02C  Satellite navigation system  So2-B08C  W06-B03B  X15-A02C  Satellite navigation system  For aircraft for ship for train for ship for train X23-B05C X22-E06B  Sample-and-hold circuits  W06-A03A5			·	
Saliva analysis  Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials  Sample adaptive offset (SAO), hybrid video coding  Saliva analysis  X11-B09 X15-C Solvaging panel  W06-B03B X15-A02C  Satellite navigation system  Solvaging panel  W06-B03B X15-A02C  Satellite navigation system  Solvaging panel  W06-B03B X15-A02C  Satellite navigation system  Solvaging panel  W06-B03B X15-A02C  Solvaging panel  W06-B03B  W06-A03A5  W06-A03A5  For aircraft for ship for train for train X23-B05C Y22-E06B Solvaging panel  W06-B03B X15-A02C  Solvaging panel  W06-B03B X15-A02C  W06-A03A5  W06-A03A5  W06-A03A5  Solvaging panel  W06-B03B  W06-A03A5  W06-A03A5  W06-B03B  W06-A03A5  W06-A03A5  W06-A03A5  Solvaging panel  W06-B03B  W06-A03A5  W06-A03A5  W06-A03A5  Solvaging panel  W06-B03B  W06-A03A5  W06-A03A5  W06-A03A5  Solvaging panel  W06-B03B  W06-B03B  W06-B03B  W06-B03B  W06-A03A5  W06-A03A5  Solvaging panel  W06-B03B  W06-B03B  W06-B03B  W06-B03B  W06-B03B  W06-B03B  W06-A03A5		P35-A03A	j i	W06-A03A5C
Saliva analysis  Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials  Sample adaptive offset (SAO), hybrid video coding  W04-P01A4L Salvaging/recycling of aircraft/ spacecraft equipment/materials  W06-B03B X15-A02C Satellite navigation system  Sour panel W06-B03B X15-A02C Satellite navigation system W06-A03A5 W06-A03A5 For aircraft for ship for train X23-B05C For vehicle Sample-and-hold circuits U21-B03 Solar panel W06-B03B X15-A02C W06-B03B X15-A02C W06-A03A5 W06-A03A5 W06-A03A5 W06-A03A5 W06-A03A5 W06-A03A5 W06-A03A5	Sagnac effect gyroscope	S02-B07B	propulsion	
Saliva analysis  Solvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials  Sample adaptive offset (SAO), hybrid video coding  W04-P01A4L Sample-and-hold circuits  Solvaging/recycling of aircraft/ W06-B10  Satellite navigation system Solvaging system W06-A03A5 W06-B10  for aircraft for ship for train X23-B05C X15-A02C W06-A03A5 W06-A03A5 W06-A03A5 Satellite navigation system W06-B01B1 for ship for train X23-B05C X22-E06B Slobal positioning system (GPS) W06-A03A5	Salinity gradient power generation			
Salvage of discharge tube parts Salvaging/recycling of aircraft/ spacecraft equipment/materials Sample adaptive offset (SAO), hybrid video coding  W04-P01A4L Sample-and-hold circuits Source Satellite navigation system S02-B08C W06-A03A5 W06-B01B1 for aircraft for ship for train X23-B05C Supple-and-hold circuits V04-P01A4L global positioning system (GPS) W06-A03A5		X15-C	solar panel	
Salvaging/recycling of aircraft/ spacecraft equipment/materials W06-B10  Sample adaptive offset (SAO), hybrid for train X23-B05C video coding W04-P01A4L  Sample-and-hold circuits U21-B03  W06-A03A5  W06-A03A5  for aircraft W06-B01B1  for ship W06-C01B1  X23-B05C  for vehicle X22-E06B  global positioning system (GPS) W06-A03A5	<u> </u>		Satellite navigation system	
spacecraft equipment/materials W06-B10 for ship W06-C01B1  Sample adaptive offset (SAO), hybrid for ship W06-C01B1  video coding W04-P01A4L for vehicle X22-E06B  Sample-and-hold circuits U21-B03 global positioning system (GPS) W06-A03A5		V05-L07E6		
Sample adaptive offset (SAO), hybrid for train X23-B05C video coding W04-P01A4L for vehicle X22-E06B Sample-and-hold circuits U21-B03 global positioning system (GPS) W06-A03A5		WOA RIO	for aircraft	W06-B01B1
video codingW04-P01A4Lfor vehicleX22-E06BSample-and-hold circuitsU21-B03global positioning system (GPS)W06-A03A5			·	
Sample-and-hold circuits U21-B03 global positioning system (GPS) W06-A03A5	• •			
Jampie-and-noid Circuits 021-b03	•			
Sample carrier, holder, storage S03-E13F	Sample-and-hold circuits	U21-B03	giobai positioning system (GPS)	VVUU-AUSAS
	Sample carrier, holder, storage	S03-E13F		

Satellite radio broadcasting		mechanical TV display	W03-A08F
receiver	W03-A16A	mechanical video camera	W04-M01E5
	W03-B06A	optical beam	V07-K05
system	W02-D05A	Scanning Tunnelling Microscope - s	
Satellite radio	14/00 00004	analysing tube	S03-E02F1
communications system cellular communication	W02-C03B1 W02-C03B1	cantilever cantilever displacement detection	V05-F04B6A
Celidial Communication	W02-C03B1 W02-C03C1	cantilever displacement detection	V05-L01B2
ground station	W02-C03B1C	circuitry	V05-F01B5
multiple access	W02-C03B1D	for processing materials	V05-F05D
satellite (on-board) aspects	W02-C03B1B	for processing semiconductors	U11-C11
system aspects	W02-C03B1A	manufacture	V05-L05F1A
tracking equipment	W02-B06	probe	V05-F04B6A
	W02-C03B1C W06-A02A1	probe manufacture	V05-L01B2 V05-F01A5
transponder	W02-C03B1B	to measure atomic dimensions	S02-A02
transportaci	W02-G05C	to measure atomic amensions	S02-A10X
VSAT	W02-C03B1C	Scaring thieves	W05-B01D1
	W02-G02	SCART connector	VV03 B01B1
Satellite telephone		general	W03-G07A
switching system	W01-B05A1E	TV receiver	W03-A18C
telephone equipment	W01-C01D3E	VTR	W04-B10C
Satellite transponder	W02-G05C		W04-K07
Satellite TV		Scatter radio communication systen	n W02-C03X
ancilliary receiver equipment	W03-A16A	Scattering	
converter	W03-A01A1	nuclear radiation, materials investi	gation
broadcast system aspects	W02-F06A		S03-E06C
Sauna	X27-E03A1	optical radiation, materials investi	
medical use	S05-A09	OTDR	S03-E04C
SAW device - see Surface			S03-E04C
acoustic wave device	U14-G	parameters measuring	S01-D05B5A
acoustic wave device	V06-V01E1	Scattering spectrometry	S03-A02B
	-	Scattering spectrometry Scattering/diffuse reflection, optica	S03-A02B
Sawing	V06-V01E1 V06-M06D	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid	S03-A02B I S03-E04C1
	V06-V01E1	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container	S03-A02B
Sawing timber industry tools	V06-V01E1 V06-M06D X25-X01 X25-A03B2	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation	\$03-A02B I \$03-E04C1 \$03-E04C2 \$03-E04C
Sawing timber industry tools Saxophone	V06-V01E1 V06-M06D X25-X01	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container	S03-A02B I S03-E04C1 S03-E04C2
Sawing timber industry tools Saxophone Scale	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-E04C \$01-J11F \$01-N03A3
Sawing timber industry tools Saxophone Scale dial	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing)	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$01-J11F \$01-N03A3 \$01-J13
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals)	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$01-J11F \$01-N03A3 \$01-J13
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C T01-J11F T01-N03A3 T01-J13 W02-D07P
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$01-J11F \$01-N03A3 \$01-J13
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS indicia	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-E04C \$01-J11F \$01-N03A3 \$01-J13 \$02-D07P \$022-A04D5 \$022-A02E
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS indicia pointer	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-E04C \$01-J11F \$01-N03A3 \$01-J13 \$02-D07P \$022-A04D5 \$022-A02E \$012-D01B4
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS indicia pointer Scalpel	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-E04C \$01-J11F \$01-N03A3 \$01-J13 \$02-D07P \$022-A04D5 \$022-A02E
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS indicia pointer Scalpel Scan testing	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A S02-K06A S02-K06A	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-E04C \$01-J11F \$01-N03A3 \$01-J13 \$02-D07P \$022-A04D5 \$022-A02E \$012-D01B4 \$012-C01C
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS indicia pointer Scalpel Scan testing for integrated circuits, at wafer le	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A S02-K06A S02-K06A	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-E04C \$01-J11F \$01-N03A3 \$01-J13 \$02-D07P \$022-A04D5 \$022-A02E \$012-D01B4 \$012-C01C
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS indicia pointer Scalpel Scan testing	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A S02-K06A P31-A01	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C T01-J11F T01-N03A3 T01-J13 W02-D07P U22-A04D5 U22-A02E U12-D01B4 U12-C01C cture U11-C05E1
Sawing timber industry tools  Saxophone  Scale dial for indicating/recording measure for weighing for POS indicia pointer  Scalpel  Scan testing for integrated circuits, at wafer le F01D2A	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A S02-K06A S02-K06A	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-
Sawing timber industry tools Saxophone Scale dial for indicating/recording measure for weighing for POS indicia pointer Scalpel Scan testing for integrated circuits, at wafer le	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A S02-K06A P31-A01	Scattering spectrometry Scattering/diffuse reflection, optical flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C T01-J11F T01-N03A3 T01-J13 W02-D07P U22-A04D5 U22-A02E U12-D01B4 U12-C01C cture U11-C05E1 V06-M06 X11-H09
Sawing timber industry tools  Saxophone  Scale dial for indicating/recording measure for weighing for POS indicia pointer  Scalpel  Scan testing for integrated circuits, at wafer le F01D2A  Scanner (for computer input)	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A P31-A01 vel U11- U13-C07	Scattering spectrometry Scattering/diffuse reflection, optical flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa Schrage motor Scintillation detectors	\$03-A02B \$03-E04C1 \$03-E04C2 \$03-E04C \$03-
Sawing timber industry tools  Saxophone  Scale dial for indicating/recording measure for weighing for POS indicia pointer  Scalpel  Scan testing for integrated circuits, at wafer le F01D2A  Scanner (for computer input) 2D scanner 3D scanner constructional details	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A P31-A01 vel U11- U13-C07 T04-M01 T04-M05 T04-M03	Scattering spectrometry Scattering/diffuse reflection, optical flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa Schrage motor Scintillation detectors sensor for investigating materials	\$03-A02B  \$03-E04C1 \$03-E04C2 \$03-E04C  T01-J11F T01-N03A3 T01-J13  W02-D07P  U22-A04D5 U22-A02E U12-D01B4 U12-C01C  cture U11-C05E1 V06-M06 X11-H09 \$03-G02B1 \$03-E06H5B
Sawing timber industry tools  Saxophone  Scale dial for indicating/recording measure for weighing for POS indicia pointer  Scalpel  Scan testing for integrated circuits, at wafer le F01D2A  Scanner (for computer input) 2D scanner 3D scanner constructional details control circuitry	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A P31-A01 vel U11- U13-C07 T04-M01 T04-M05 T04-M03 T04-M04	Scattering spectrometry Scattering/diffuse reflection, optical flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa Schrage motor Scintillation detectors	\$03-A02B  \$03-E04C1 \$03-E04C2 \$03-E04C  T01-J11F T01-N03A3 T01-J13  W02-D07P  U22-A04D5 U22-A02E U12-D01B4 U12-C01C  cture U11-C05E1 V06-M06 X11-H09 \$03-G02B1 \$03-E06H5B P36-A
Sawing timber industry tools  Saxophone  Scale dial for indicating/recording measure for weighing for POS indicia pointer  Scalpel  Scan testing for integrated circuits, at wafer le F01D2A  Scanner (for computer input) 2D scanner 3D scanner constructional details	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A P31-A01 vel U11- U13-C07 T04-M01 T04-M05 T04-M03	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa Schrage motor  Scintillation detectors sensor for investigating materials Scoring, sports	\$03-A02B \$1 \$03-E04C1 \$03-E04C2 \$03-E04C \$1 \$03-E04C \$1 \$03-E04C \$1 \$11-D11F \$101-N03A3 \$101-J13 \$102-D07P \$1022-A04D5 \$1022-A02E \$1022-A02E \$1012-C01C  **Cture** **U11-C05E1 **V06-M06 **X11-H09 **S03-G02B1 **S03-E06H5B **P36-A **W04-X01C3
Sawing timber industry tools  Saxophone  Scale dial for indicating/recording measure for weighing for POS indicia pointer  Scalpel  Scan testing for integrated circuits, at wafer le F01D2A  Scanner (for computer input) 2D scanner 3D scanner constructional details control circuitry hand-held scanner  Scanning	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A P31-A01 vel U11- U13-C07 T04-M01 T04-M05 T04-M03 T04-M04 T04-M02	Scattering spectrometry Scattering/diffuse reflection, optical flowing fluid material in container materials investigation Scheduler Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa Schrage motor Scintillation detectors sensor for investigating materials	\$03-A02B  \$03-E04C1 \$03-E04C2 \$03-E04C  T01-J11F T01-N03A3 T01-J13  W02-D07P  U22-A04D5 U22-A02E U12-D01B4 U12-C01C  cture U11-C05E1 V06-M06 X11-H09 \$03-G02B1 \$03-E06H5B P36-A
Sawing timber industry tools  Saxophone  Scale dial for indicating/recording measure for weighing for POS indicia pointer  Scalpel  Scan testing for integrated circuits, at wafer le F01D2A  Scanner (for computer input) 2D scanner 3D scanner constructional details control circuitry hand-held scanner	V06-V01E1 V06-M06D X25-X01 X25-A03B2 P86-A01A1 S02-K06A d values S02-K06A S02-D T05-L01E S02-K06A S02-K06A P31-A01 vel U11- U13-C07 T04-M01 T04-M05 T04-M03 T04-M04	Scattering spectrometry Scattering/diffuse reflection, optica flowing fluid material in container materials investigation Scheduler  Scientific Analysis (processing) Scientific analysis systems (signals) Schmitt trigger novel circuit pulse generator circuit Schockley diode Schottky diode Schottky ohmic contacts formation, semiconductor manufa Schrage motor  Scintillation detectors sensor for investigating materials Scoring, sports	\$03-A02B  \$03-E04C1 \$03-E04C2 \$03-E04C  T01-J11F T01-N03A3 T01-J13  W02-D07P  U22-A04D5 U22-A02E U12-D01B4 U12-C01C  cture U11-C05E1 V06-M06 X11-H09 \$03-G02B1 \$03-E06H5B P36-A W04-X01C3 W02-C03B1

Scrambling		Sea power	X15-C
communications (general)	W02-L05	blade details	X11-B01
data for secret communications	W01-A05A	control	X15-C03
data for synchronisation loss	W01-A05A	maintenance	X15-C15
avoidance	W01-A02	manufacture	X15-C15
avoidance	W01-A04	monitoring	X15-C03
video signals	W02-F05A1	ocean current-type	X15-C03
<u> </u>	WUZ-1 UJA 1	ocean thermal energy conversion	
Screen			X15-C
charge storage for CRT	V05-D05A5	osmotic power	X11-B09
charge-storage for CRT	V05-D05A	colinity are dient newer	X11-609 X15-C
lamp fitting/fixture	X26-D01D	salinity gradient power	
luminescent for CRT	V05-D05B	and delay	X11-B09
manufacture , for discharge tubes	V05-L02	servicing	X15-C15
photoelectric for CRT	V05-D05A1	simulation	X15-C03
projection TV	W04-Q01F	testing	X15-C03
semiconductor diode array for CF	RT V05-D05A3	tide energy	X15-C02
testing for discharge tube manufa	icture	plant type, barrage	X15-C02A2
	V05-L02H	plant type, tidal lagoon	X15-C02A3
video projector	W04-Q01F	plant type, tidal stream system	X15-C02A1
Screening, EMI/RFI	V04-U	turbine arrangement	X15-C02B
building, for	V04-U02	thermal gradient-related energy u	
cable, for, (integral)	X12-D03E		X15-C
cable, for, (mountable)	V04-U	turbine details	X11-B01
cans	V04-U03		X11-J
	V04-U03	wave energy capture methods	X15-C01A
casings computer equipment, for	T01-L02D	attenuator	X15-C01A2
elements	V04-U04	buoy	X15-C01A1
	V04-U20	oscillating water column	X15-C01A3
EMC testing Faraday cage, building	V04-U02	overtopping device	X15-C01A4
	V04-U02	point absorber	X15-C01A1
Faraday cage, room	V04-U02 V04-U04	surface following	X15-C01A2
gaskets manufacture		terminator device	X15-C01A3
	V04-U15	wave power	X15-C01
materials	V04-U01	on-shore	X15-C01B1
materials, superconducting	U14-F01	near-shore/off-shore	X15-C01B2
	V04-U01A	power take-off	X15-C01C
	X12-D06B	wave energy capture methods	X15-C01A
measuring instruments, for	S01-J02C	Sea-water cell	X16-A03B
panels	V04-U04		X10-A03B
PCB, for, (non-track type)	V04-Q02A5	Seal	
PCB, for, (track type)	V04-Q05A	battery/cell case	X16-F01A
room, for	V04-U02	discharge tube	V05-M05C
telephone, for	W01-C01A4	for CRT	V05-D07A
testing for EMC	V04-U20	IC engine	Q51-A03C
Screen printing, hybrid/thick film c	ircuit		Q51-B03C
manufacture		for transit-time tubes	V05-C02B1A
	U14-H04A1	magnetic	X25-L06
Screen-print solders, for semicondu		Sealants for semiconductor	U11-A07
manufacture		Seam welding, arc	X24-B01
	U11-A05A	Search engines	T01-N03A2
Screw bayonet - see Lamp holder	X26-F	Searching, information retrieval, dat	
SDG (sustainable development goa	ls) T01-N01A3	processing	T01-J05B3
SDLC	W01-A06F	Searchlight positioning	X26 X26-L
SDMA (spatial division multiple acc	ess) W02-K10	, ,	
antenna beam steering aspects	W02-B06C	Seat switch	V03-B01E
cellular base station aspects	W02-B00C W02-C03C1B	Secondary cell	X16-B01
directional diversity aspects	W02-C03C1B	alkaline	X16-B01A
an ectional diversity aspects	. V U Z C U U A T	high temperature sodium-sulphur	
		lead-acid	X16-B01B
		lithium	X16-B01F1

low temperature sodium-sulphur		Sectional motor	X11-H02
·	X16-B01C2	Sectionaliser	X13-B01
maintenance	X16-B09		
metal-air cell	X16-D01	Secure dialling in subscriber tele	W01-C01B5A
metal-halogen	X16-B01D	card-based dialling mechanical lock	W01-C01B5A W01-C01B5D
metal-hydrogen	X16-B01A3	preventing dialling of	WUI-CUID3D
nickel-cadmium	X16-B01A1	preventing draining of predetermined numbers	W01-C01B5C
non-aqueous electrolyte	X16-B01F	voice recognition/input	W01-C01B5C
room temperature sodium-sulphi			WUT-CUTD3D
	X16-B01C2	Securing confidential data	W04 C04D0C
sodium-sulphur	X16-B01C	in mobile phones	W01-C01D3C
Secondary electron detector	V05-F04H		W01-C01Q8E
Secondary emission		Security, computer	T04 N00D4A
Auger spectroscopy	S03-E06D	file access firewalls	T01-N02B1A
detectors	S03-G02B2		T01-N02B1D T01-N02B1A
photoelectric effect	S03-E06D	parental control password, network	T01-N02B1A
tube	V05-K	password, fletwork password, general	T01-N02B1B
X-ray fluorescence	S03-E06D	user monitoring	T01-312C
Secondary emission electrodes, ma	nufacture	user privileges	T01-N02B2A
electron multiplier	V05-L01A5A		
photoelectric .	V05-L01A5B	Sedimentation measurement	S03-F05A
radiation induced emission	V05-L01A5X	Seeback effect devices - see	
Secondary radar systems	W06-A04B	Thermoelelectric devices	U14-E05
IFF	W06-A04B1	Seebeck effect for temperature r	neasurement
goods/cargo monitoring	W06-A04B5G	•	S03-B01A
industrial, workpiece monitoring	W06-A04B5E		303-D01A
livestock monitoring	W06-A04B5A	Seeds	D44 C02
object ID	W06-A04B5	handling/sowing	P11-C03
people monitoring	W06-A04B5C	analysis	S03-E14J
RFID tag	T04-K03B	Seismic	
-	W06-A04B5	prospecting	S03-C01
security and coding	W06-A04B3	well logging	X25-E02
vehicle or aircraft ID	W06-A04B1	waves, generating	S03-C01A
Secrecy		Seismic waves	
anti-eavesdropping telephone sy	stems	detection	S03-C01B
11 3 1 3	W01-C08F1C	generation	S03-C01A
facsimile transmission	S06-K07C7	recording	S03-C01B
general secret communication	W02-L	transmission	S03-C01B
subscription TV descrambling sys	tem	Seismology	S03-C01
	W02-F05A1B		W06-A05
	W03-A16C3A	generating seismic waves	S03-C01A
subscription TV scrambling syster		processing data	S03-C01X
subscription TV scrambling syster		water covered areas	S03-C01C1
telephone systems	W01-C08F1C	well logging	S03-C01C5
telephone set speech processing			X25-E02
	W01-C01C7L	Selection (telephony)	W01-B
Secret communication (general)	W02-L	direct selection	W01-B01
anti-eavesdropping	W02-L07C	indirect selection	W01-B02
antijamming	W02-L01C	mobile telephone system	W01-B05A1
eavesdropping	W02-L07A	multiplexing	W01-B07
jamming	W02-L01A	party line selection	W01-B04
scrambling	W02-L05	radio or inductive links	W01-B05
Secret data transmission	W01-A05	signalling	W01-B09
blockwise coding	W01-A05A	testing	W01-B08
data concealment	W01-A05L5	Selective calling system	
data interception	W01-A05L1	near-field paging system	W02-C02G5
data masking	W01-A05L5		W05-A05C2
ID verification/access control	W01-A05B	radio paging system	W02-C03C3A
quantum cryptography	W01-A05E		W05-A05C2
steganography	W01-A05L5	1	

Selective deposition	1	bias circuit	U12-A01B4
conductive layer, semiconductor			V08-A02A
	U11-C05C5	characterised by material (exclud	
insulating layer, semiconductor m		AIII-BV compounds)	U12-A01B6
	U11-C05B3		V08-A01D
semiconductor layer, semiconduc	U11-C01B1	connection to optical fibre	V08-A04A U12-A01C
		connection to optical libre	V07-G10C
Selective drop deflection computer	-	control circuitry	U12-A01B4
	S06-G02	55	V08-A03
Selective epitaxial growth			V08-A04A
for SOI, IC component isolation	U11-C08A6	distributed feedback	U12-A01B1
	U11-C08C		V08-A04A
for SOI, IC isolation	U11-C01J1	drive circuitry	U12-A01B4
Selector switch	V03-E		V08-A04A V08-A02A
Self-learning control system	T06-A05A	electrode formation	U11-C05F6
Selsyn	V06-M06A	heterojunction	U12-A01B1A
Semiconductor			V08-A01A
gas sensor	S03-E02A		V08-A04A
nuclear radiation sensor	S03-G02B2G	heterojunction, double	U12-A01B1B1
optical amplifier	V07-K01C1	homojunction	U12-A01B1
pressure transducer (see also <b>Pre</b>		manufacture	U12-A01B2
measurement)	S02-F04B3		V08-A04A
radiation detectors	S03-G02B2	packages	U12-A01B3
waveguide phase shifter	W02-A06C1	and an analysis of the second	V08-A04A
waveguide switch	W02-A04A5	packages with cooling arrangem	U12-A01B3A
Semiconductor capacitor	U12-C02		V08-A04A
for memories	U12-C02A1		V08-A05
MIM	U12-C02C	ridge waveguide	U12-A01B1A
MOS p-n junction	U12-C02A U12-C02B	19111911	V08-A01A
			V08-A04A
Semiconductor controlled rectifier		with quantum well	U12-A01B1B
Semiconductor devices (see also sp	ecific		V08-A01A
type of device)	1140 004		V08-A04A
bipolar simulation	U12-D01	Semiconductor materials	U11-A01
simulation	U11-F01 U11-G	AI-BIII-CVI compounds	U11-A01X
testing, at wafer or die level	S01-G02B1	AII-BIV-CV compounds	U11-A01X
testing, at water or die lever	U11-F01D	All-BVI compounds	U11-A01C
testing, completed (encapsulated		All-BV compounds	U11-A01B U11-A01D
3, 1 , 1	U11-F01C	AIV elements, compounds AIV-BVI compounds	U11-A01X
unipolar	U12-D02	chemical analysis	U11-F01A5
Semiconductor devices, interconne	ctions	for layer deposition	U11-C01J
- see Interconnections for semico	nductor devices	organic	U11-A01F
Semiconductor film measurement	U11-F01B	silicon	U11-A01A
by beam scanning	U11-F01B2	silicon, porous	U11-A01A1
during processing	U11-F01B1	Semiconductor memories	U14-A
in reaction vessel	U11-F01B1		U13-C04
optical/electron microscopic exar		Semiconductor on insulator - see S	OI
·	U11-F01B4	Semiconductor processing	U11-C
thickness	U11-F01B5	All-BVI compounds, doping	U11-C02J1B
using image recognition	U11-F01B3	All-BVI compounds, etching	U11-C07C4B
Semiconductor inductor	U12-C03B	All-BVI compounds, layer deposi	
Semiconductor lasers	U12-A01B	, , , , ,	U11-C01J3B
	V08-A04A	All-BVI compounds, treatment	U11-C03J8B
arrays	U12-A01B1J	AIII-BV compounds, etching	U11-C07C4A
-	V08-A04A	AIII-BV compounds, layer deposi	
	V08-A07	AUL DV	U11-C01J3A
		AIII-BV compounds, treatment	U11-C03J8A

AIV element/compound, etching	U11-C07C4C	viral deposition	U11-C12
AIV elements and compounds, do	oping	wafer charging prevention during	manufacture
•	U11-C02J1C	3 31	U11-C10
AIV elements and their compoun	ds.	wafer identification	U11-C15A
treatment	U11-C03J8C	wafer labelling	U11-C15A
AIV elements, compounds, layer		wafer shaping	U11-C15A
, av elements, compounds, layer	U11-C01J4A	waste processing	U11-C15Q
annealing	U11-C03J2A	water purification	U11-C15B3
beam treatment	U11-C03B		
		Semiconductor resistor	U12-C03A
chemical analysis	U11-F01A5	Semiconductor structures	U12-E01
chemical vapour deposition appa		chalcogenide/chalcopyrite comp	ounds
chemical vapour deposition, insu			U12-E01A4
layer	U11-C05B2	heterojunctions	U12-E01B1
chemical vapour deposition,		quantum well, wire, supperlatice	U12-E01B2
semiconductor layer	U11-C01B	silicon on insulator	U12-E01A5
conductive layer etching	U11-C07C2	with All-BVI compounds	U12-E01A3
conductive layer formation	U11-C05C	•	U12-E01A2
deposition of semiconductor laye	er U11-C01	with AIII-BV compounds	
doping	U11-C02	with AIV elements and their comp	
electrical treatment	U11-C03C		U12-E01A3
etching	U11-C07	Semiconductor wafer	
etching techniques	U11-C07D	circuit testing	S01-G02B1
etching, silicon layer	U11-C07C1	S	U11-F01D
gettering	U11-C03J2B	flatness measurements	U11-F01A3
heat treatment apparatus	U11-C03A	point defects, dust measurements	
IC copying and use protection	U11-C19B	beam scanning	U11-F01B2
insulating layer etching	U11-C07C3	9	01110102
interconnection formation		Semiconductors	
	U11-C05D	abrasives	U11-A10
laser treatment	U11-C03D	adhesives	U11-A09
layer formation	U11-C05	annealing for	U11-C03J2A
lithography	U11-C04	bipolar	U12-D01
localised beam treatment	U11-C03J5	blanket treatment, heat/radiation	U11-C03J3
localised radiation treatment	U11-C03J5	built-in self test	U11-F01D2
manufacturing control (general)	U11-C15D	carrier concentration measureme	nt U11-F01A1
multi-chamber apparatus	U11-C09M	carrier mobility measurement	U11-F01A1
nitridation	U11-C05B1	chalcogenide/chalcopyrite, solar	cell U12-
optical/electron microscopic exar	mination	A02A2E	
	U11-F01B4	chemical analysis	U11-F01A5
oxidation	U11-C05B1	cleaners	U11-A10
packaging	U11-D01	conductive materials	U11-A08B
physical deposition	U11-C01A	conductive materials (inorganic)	U11-A08B2
physical deposition, insulating lay	ver U11-C05B2	conductive materials (organic)	U11-A08B1
plasma apparatus	U11-C09C	containers	U11-D01
praema apparatae	V05-F05C		U11-D02
	X14-F02	cooling arrangements defects, control	U11-C03J2B
plasma treatment	U11-C03C	•	
process control	U11-C15C	deposition of	U11-C01
•	U11-C15C	developers	U11-A11
process simulation		dielectric materials	U11-A08A
radiation treatment	U11-C03A	dielectric test	U11-F01A9
. 10	U11-C03E	dislocations, measurement	U11-F01A2
recrystallisation	U11-C03J1	dopants	U11-A01M
resist layer processing	U11-C04A1F	doping	U11-C02J
resistive layer formation	U11-C05G	encapsulants	U11-A07
scanning tunnelling microscope p	processing	etchants	U11-A10
	U11-C11	etching	U11-C07
self-assembly-monolayer deposit	ion U11-C12	film measurement, by beam scan	
sputtering deposition apparatus	U11-C09A	, . <b>,</b> .,	U11-F01B2
strained layer	1144 004 174	film measurement, during proces	
strained layer	U11-C01J6A		
temperature measuring	U11-F01A4		
temperature measuring	U11-F01A4	film measurement, optical/electro	n
	U11-F01A4 epth profile	film measurement, optical/electro microscopic examination	n U11-F01B4
temperature measuring treatment producing localised de	U11-F01A4 epth profile U11-C03J7	film measurement, optical/electro microscopic examination gases, for manufacture	n U11-F01B4 U11-A12
temperature measuring	U11-F01A4 epth profile	film measurement, optical/electro microscopic examination	n U11-F01B4

**Sextants** 

S02-B05

handling	U11-F02	Separation of gases by pressure an	
headers	U11-D01		Q75-F
heating arrangements	U11-D02	constructional details	Q75-T
impurity reduction	U11-C03J2A	Separating materials	X25-H
indirect bandgap, LED insulating materials for dielectric	U12-A01A1D	sewage treatment	X25-H03
insulating materials for dielectric	U11-A08A	water treatment	X25-H03
insulators	U11-A08A	Separating solids	
layer formation	U11-C05	based on size or weight	P41-E06
lead arrangements	U11-D03	dry	P41-E01
lead attaching	U11-E01	magnetic	P41-E07
lithography	U11-C04		X25-H01
measuring, positioning	U11-F	using gas streams	P41-E03E
mountings	U11-D	using mechanical agitation	P41-E05
packages	U11-D	wet	P41-E03
polishers	U11-A10	Separation	
positioning	U11-F02B	electrostatic	X25-H02
precursor material for deposition		magnetic	X25-H01
	U11-A13	mechanical	X25-H06
recrystallising layer	U11-C03J1	Separator	
sealants	U11-A07	battery	X16-F02
temperature measuring	U11-F01A4	electrolysis, non-metal prodn.	X25-R01C
terminal arrangements	U11-D03	electrolytic capacitor	V01-B01B
terminals	U11-D U11-F01	SEPP converter	U24-D02B3
testing testing apparatus	U11-F01D3	control	U24-D01A
testing apparatus testing IC packaged device	U11-F01C3		U24-D02B3
testing of manufacturing appara		Serial-parallel conversion,	
testing probes for IC packaged of	device U11-F01C3	computer input	T01-C07C4
testing probes, for wafer level te	stina U11-F01D1	with additional features	T01-C07C4A
testing using electron microscop		Series transmission code	U21-A05C
testing, at wafer level	U11-F01D	Series-parallel code conversion	U21-A05B
unipolar	U12-D02	-	
ventilating arrangements	U11-D02	Servomotor (fluid-pressure actuato	
wafer holders	U11-F02A1	combined with telemotor	Q57-C
	U11-F02A2	Set-top box	W03-A16E
Sense amplifier for memories	U14-A07A	cable TV receiver	W03-A16C1
Sensing		and Illia TV and in a	W03-A16E
digital mark	T04-A03	satellite TV receiver	W03-A16A
Sensitiser		video recorder	W03-A16E W03-A16E1
electrophotography, charge app	dication		WUS-ATOLT
electrophotography, charge app	S06-E02	Set-up	
material in photoconductor	S06-E01A3	antenna	W02-B08A5
	000 20 17 10	hearing aid	W04-Y03P
Sensor addressing, telemetry	W05-D02J	tuned circuits	U25-K
addressing, teleffielty	W05-D025 W05-D08E	Server	T04 14040
compensation	S02-K02	general	T01-M06S
heat	S03-A03	interactive broadcasting	W02-F10K
image, facsimile	S06-D05	Services, coin or card actuated	T05-H05C
image, video camera	W04-M01B5	Servomotor	V06-M06E
inductive	V02-G01E	Sewage treatment - see Water	X25-H03
integrated optical waveguide	V07-F01A5S	for ship	Q24-B10
network	W05-D06F	Sewerage	Q42-E
	W05-D08E	service / cleaning / maintenance	Q42-E Q42-S
pH, electrochemical	S03-E03B2	_	
pH, non-electrochemical	S03-F10	Sewing machine	X25-T04C
Separating machine	X25-J	control	T06-D03D
control	T06-D04	textiles	X25-T04C X25-T04C
	X25-J	lighting (application)	X26-U99
		ingriting (application)	\\20-0//

SF6 circuit breaker	X13-B03A1A	computer equipment, for	T01-L02D
Shadow mask		elements	V04-U04
details of apertures	V05-D05D1A	EMC testing	V04-U20
manufacture	V05-L01B5	Faraday cage for building	V04-U02
mask construction	V05-D05D1	Faraday cage for room	V04-U02
mask material	V05-D05D3	for space vehicle	Q25-S06A V04-U04
mounting details	V05-D05D5	gaskets manufacture	
shape of mask	V05-D05D1C	materials	V04-U15 V04-U01
Shadow mask mounting	V05-D01B3	materials, superconducting	U14-F01
	V05-D05D5	materials, superconducting	V04-U01A
for removal and alignment during	)		X12-D06B
exposure	V05-D05D5A	measuring instruments, for	S01-J02C
Shape memory alloy		panels	V04-U04
actuator	V06-M06M	PCB, for, (non-track type)	V04-Q02A5
dynamic magnetic head adjustme	ent	PCB, for, (track type)	V04-Q05A
actuator	T03-A05A1A	room, for	V04-U02
switch	V03-C06B1	telephone, for	W01-C01A4
Shape of body measurement	S05-D01C5	testing for EMC	V04-U20
Shaping metal		Shift memories	U14-A01
bending	X25-A02D	bubble	U14-A01A1
control - see T06-D05 codes as a		charge transfer device	U14-A01B
control - see 100-200 codes as ap	T06-D05	FIFO	U14-A01X
control - see X25-A02 codes as a			U14-A08B1
2011101 300 723 7102 00003 03 0	X25-A02	magnetic	U14-A01A
extruding	X25-A02	Shift stores	U14-A01
forging	X25-A02C	charge transfer devices	U14-A01B
forming	X25-A02	FIFO	U14-A01X
hammering	X25-A02D	magnetic	U14-A01A
pressing	X25-A02A	Ship	W06-C01
punching	X25-A02D	accessories	Q24-B
rolling	X25-A02B	air-conditioning	Q24-B
wire drawing	X25-A02E	an-conditioning	W06-C01C5
Shaping networks, data transmission	on	anchoring equipment	Q24-C02
. •	W01-A08B2	attitude control	Q24-B09E
Chanina and an		ballasting	Q24-A01N
Shaping pulses	U22-D	bilge pump	Q24-A01N
Shaving equipment	P24-C02	breaking-up, recycling, disposal	W06-C08
Shears, electric	X25-A03	building	Q24-X05
Sheet			W06-C08
binding, in printing apparatus	S06-K05A	bulkheads	Q24-A01I
Sheet thickness measurement - see		cabin	Q24-B01
measurement	: IIIICKIIE33	capsize prevention	Q24-B09E
	TOE 1 04E	cargo compartment	Q24-B02A
Shelf edge display	T05-L01F	cargo handling	Q24-B02C
Shelters	Q46-B03	communications	W06-C01B7
Shielding		construction	Q24-A
antimagnetic, for clock or watch	S04-A04A1	control systems	W06-C01A
EMI - see EMI shielding	V04-U	data bus systems deck	W06-C01B8 Q24-A01H
magnetic heads	T03-A03J7	door	Q24-A01H Q24-A03B
measuring instruments	S01-J02	electric propulsion	W06-C01C7
radiation, for spacecraft	Q25-S06A	electrical power generation and d	
RFI - see <b>RFI shielding</b>	V04-U	creetifed power generation and a	W06-C01C3
thermal, for spacecraft	Q25-S06C		X12-H01B4
Shielding, EMI/RFI	V04-U	emergency/escape equipment	Q24-B09
aircraft, for	W06-B09	2 2 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	W06-C01S
building, for	V04-U02	engine control	W06-C01A1
cable, for, (integral)	X12-D03E	entertainment	W06-C01C6
cable, for, (mountable)	V04-U	fire extinguishing	P35-C01C7E
cans	V04-U03		Q24-B09A
casings	V04-U03		W06-C01C9

fuel s	ystems	Q24-E02M		transmission	Q24-E03
furnit	ure	Q24-B01A		using non-rotary flaps	Q24-E01A3
galle	/	Q24-B01		using supported land vehicle	Q24-E02F
heati	ng	Q24-B03		using water currents	Q24-E01X
hull	9	Q24-A01		vehicle drawn	Q24-E02G
mu	ltiple hull	Q24-A01P		water jet propulsion	Q24-E01A
	odymanic/hydrostatic featu	resQ24-A01A	c		W06-C15
hydro		Q24-A01A	3	<b>hip type</b> air cushion vessel	
inflata		Q24-A01M		air cushion vesser	Q24-P10
	mentation	Q24-B05		1.1.	W06-C15H
1113610	mentation	W06-C01B		amphibious vessel	Q24-P30
keel		Q24-A01D		1	W06-C15X
	iving equipment	Q24-X01		barge	Q24-P05
1110 30	iving equipment	W06-C10		cable laying vessel	Q24-P02
lighti	na	W06-C01C5		canal boat	Q24-P09
ligital	19	X26		canoe	Q24-P20
maint	enaince	W06-C08			W06-C15A
mast	enanice	Q24-A05		catamaran	Q24-A01P
	ry equipment	Q24-M		commercial	Q24-P25
	ing equipment	Q24-W		emergency rescue craft	Q24-P28
111001	ing equipment	W06-C07A			W06-C15C
Noise	e/Vibration/Harshness redu			environmental disaster cleaning	Q24-P06
INOISE	/ VIDIation/Harshness redu	Q24-N		_	W06-C15F
	enger handling	Q24-N Q24-B02E		ferry	Q24-P14
	on overboard alarm	W05-B07J3			W06-C15D
	equipment	W06-C07A		fishing vessel	Q24-P04
port l		Q24-A03A			W06-C15D1
•	equipment	Q24-A03A Q24-B09		for sports fishing	P36-A07
salety	r equipment	W06-C01S			W04-X01K7A
salva	aina	Q24-X06		floating building	Q24-P08
Salva	girig	W06-C09			W06-C15G
sanita	ation	Q24-B01C		drilling platform	W06-C15G
simul		W06-C04		flying boat	Q25-P12
		Q24-E05		ground effect craft	Q24-P12
steeri	ng	W06-C01A5		hovercraft	Q24-P10
	_			ice breaker	Q24-P03
testin toilet	g	W06-C05 Q24-B01C1		jet-ski	Q24-P21
traile	_				W06-C15A
traile		Q19-J		kayak	Q24-P20
		Q24-X11			W06-C15A
wasn	ng equipment	Q24-B01C2		life boat	Q24-B09C
windo		Q24-A03A		life raft	Q24-B09C
		Q24-A03A			Q24-P19
	ow, de-frosting of	W06-C01C5			W06-C15C
	ow, de-misting of	W06-C01C5		light ship	Q24-P16
Ship pro		Q24-E		marine vessel transporter	Q24-P07
anima	al drawn	Q24-E02G		military	Q24-P13
contr		W06-C01A1			W06-C15E
direc	tly acting on air	Q24-E01C		model boat	W04-X03E1B
electi		W06-C01C7		personal watercraft	Q24-P21
fuel s	ystem	Q24-E02M			W06-C15A
	ird motor	Q24-E02A3		pipe laying vessel	Q24-P01
interr	nal combustion engine	Q24-E02A		pontoon	Q24-P17
gas tı	urbine	Q24-E02B		raft	Q24-P19
musc	le power	Q24-E01G		recreational	Q24-P21
nucle	ar	Q24-E02E			W06-C15A
	oard motor	Q24-E02A1		sail board	Q24-P21
padd	le wheel	Q24-E01A1C			W06-C15A
prope	eller	Q24-E01A1A		sailing boat	Q24-P22
sails		Q24-E01E		salvage	W06-C15F
		Q24-P22		submarine	Q24-P11
steam	n engine	Q24-E02C			W06-C15B
steam	n turbine	Q24-E02C1			

submersible/semi-submersible	Q24-P11 W06-C15B	photographic film camera	S06-B02C W04-M01D5C
surfboard	Q24-P21	Sidelink communication	W01-B05A1D
	W06-C15A	Sidewall spacer, insulating layer,	***************************************
swamp boat	Q24-P30	semiconductor manufacture	U11-C05B9B
tanker	W06-C15X Q24-P24	Sidewall spacers, insulating layer,	
tariker	W06-C15D3	semiconductor manufacture	U11-C05E
trawler	Q24-P04	Signal connector - see Connector	
tuine a un n	W06-C15D1 Q24-A01P	Signal generators- testing	S01-G08B1
trimaran tug	Q24-A01P Q24-P15	Signal processing	
tag	W06-C15D	audio - see Audio signal process	
unmanned	Q24-P30		W04-G
	W06-C15U	speech - see <b>Speech processing</b>	W04-V
windsurfer	Q24-P21	video - see Video signal process	
Shipping container (general electronic component)	V04-X01A		W04-P
(general goods tracking)	X25-F11	Signal processing in recording equi	ipment
Shock absorber, testing	S02-J02A	analogue (general)	T03-P02
Shock absorbing in recording		audio (dynamic recording) audio (static recording)	W04-G01A W04-G01B
equipment	T03-L05S	audio (static recording) audio noise/distortion reduction	W04-G01D
Shock measurement	S02-G03	audio signal coding and decoding	g W04-G01F
calibration	S02-G07A	audio tape recorder	W04-B12B
compensation	S02-G07C S02-G07E	copy marking (audio) copy marking (general)	W04-G01L3 T03-P07C
testing		copy marking (general)	W04-F01L3
Shock switch	V03-C06C	copy prevention (audio)	W04-G01L1
Shock testing of structures	S02-J08	copy prevention (general)	T03-P07A
Shock wave generator, ultrasonic surgery	S05-B02	copy prevention (magnetic)	T03-A07A3B W04-B01C1A
uitiasonic surgery	V06-V01N	copy prevention (video)	W04-F01L1
	V06-V04C	digital (general)	T03-P01
	V06-V04K	digital compression coding (gene	
Shoes - see Footwear	V07 400D4D	error correction/detection (gener	T03-P01B al) T03-P01A
electrical details non-electrical details	X27-A02B1B P22	general	T03-P
Shooting, sport and leisure	P36-A05	video - see <b>Video recording sign</b>	
Shooting, sport and leisure	W04-X01K3J	processing	W04-F
Short messaging service (SMS)		video tape recorder	W04-B10B
selection and calling aspects	W01-B05A1F	Signal scrambling facsimile	S06-K07C8
subscriber telephone aspects	W01-C01G6A	general	W02-L05
telephone exchange aspects	W01-C02B7D	TV/video signals (general)	W02-F05A1A
Short-circuit protection	X13-C01A	TV/video signals, interactive broa	•
Short-circuit testing	S01-G04A1		W02-F10N1
Shower electrical details	X27-E03A1	Signal switching electronic switch arrangements	U21-B05E
non-electrical details	P28-B02	general/telephone	W01-B
shower head	P42-A03A	video	W04-N05B5
Shredder		Signal to noise ratio, measuring	S01-D08B
small/office use/domestic	X27-A02C	for electronic amplifier	S01-D08B1
large size shredder	X25-J	for optical amplifier	S01-D08B3
Shutter (window covering)	0.40.4	Signal transformation, video record	
constructional details electrical details	Q48-L X27-T		W04-F01
manufacturing details	Q48-M	Signal transmission medium for tel	econtrol
Shutter control for camera		or telemetry	MOE DO/E
digital camera	W04-M01B1	data network-based	W05-D06F W01-A06
	W04-M01D5C	hydraulic link	W05-D06M

mechanical link	W05-D06M	train detector	X23-B01
mud-pulse telemetry	W05-D06M1	train-end passage detection	X23-B01A
near field	W05-D06A1B	train/tram-mounted device to trac	
optical fibre link	W05-D06C		X23-B01
optical free-space link	W05-D06A3	transponder	X23-B02A
pneumatic link	W05-D06M	warning device along route	X23-B04E
power line	W05-D06P	Silicon carbide- see AIV elements ar	nd their
radio link	W05-D06A1A	compounds	
telephone line	W05-D06G1		
ultrasonic link	W05-D06A5	Silicon on insulator - see SOI	
Signalling (alerting and personal ca	lling)	Silicon on sapphire - see SOI	
orginaming (area ting and personal ta	W05-A	Silicon, porous	U11-A01A1
		Silicon-germanium semiconductor-	AIV
acoustic / audible	W05-A02	elements and their compounds	see AIV
acoustic alerting device (novel)	W05-A02A	•	
audio-visual indication	W05-A04	Silylating, lithography, semiconduc	tor manufacture
display-based indication	W05-A03C		U11-C04A1A
electromagnetically-operated ind		CIM soud	W01 C01D2D
	W05-A03X	SIM card	W01-C01D3D
electric transmission	W05-A01C	multi-SIM mobile phone	W01-C01D3K
electromagnetic transmission	W05-A05	SIMM	T01-H01B3A
hydraulic transmission	W05-A01A	SIMOX, IC component isolation	U11-C08A6
IR transmission	W05-A05B		
mechanical transmission	W05-A01A	SIMS - see also mass spectrometer	S03-E10A4
pneumatic transmission	W05-A01A	of non-electrical systems	T01-J15H
pagers	W05-A05C1	Simulator	
power line signalling	W05-A01C3	aircraft	Q25-X04
radio transmission	W05-A05A		W06-B04
siren	W05-A02	educational	P85-A05A
telephone signalling	W05-A01C1		W04-W07A
testing	W05-A		W04-W07C
•	W05-C	logic	U21-C03D
vibration signalling	W05-A01A1	medical procedures	S05-P
UV transmission	W05-A05B	military .	W07-D05
visible indication	W05-A03	nuclear power plant	W04-W07
visible indicator (novel)	W05-A03E		X14-C05X
visible light source	W05-A03A	power distribution/transmission sy	rstem
Signalling (train/tram)	X23-B	·	X12-H05
ATC	X23-B02	protection	X13-C20A
ATP	X23-B02 X23-B02	radio communications	W02-C03E5
ATS	X23-B02 X23-B02	ship	W06-C04
		training	P85-A05A
axle counter	X23-B01A	3	W04-W07A
classification yard	X23-B05		W04-W07C
electric train/tram	X23-B ol X23-B05C	vehicle driving	X22-X
integrated and central traffic conti		<del>-</del>	T0411024
lamp	X23-B03	Single character display, control of	104-H03A
marshalling system	X23-B05	Single chip computer	U13-C05
operating points	X23-B03	Single lens reflex digital camera	W04-M01B1S
points	X23-B03	Single Photon Emission Computed	
points/signals interlocking	X23-B04A	•	
points/signals interlocking, solid-s		Tomography - see nuclear imagin	g
	X23-B04A1	Single-sideband (SSB) radio	W02-G04C
radio communication link	X23-B02C	Sintered electrolytic capacitor elect	rode -
radio communication link for spee		see Electrolytic capacitor	V01-B01A1
	X23-B02C1		VUI-BUIAI
rail/road crossing system	Q21-S07	Sinusoidal oscillators (using)	
	X23-B05A	amplifier with feedback	U23-A01
railway, portable warning device	X23-B04E1	electomechanical resonator	U23-A01A
station blocking	X23-B04C	negative resistance elements	U23-A02
track circuit	X23-B01C	SAW resonator	U23-A01A1
track-side to train/tram-mounted o	device X23-	transit-time effects	U23-A02
B02		SISFET - see Field effect transistor	U12-D02A5
traffic control	X23-B05		0 10
	'		

SIT (static induction transistor) imag	er	contact type	T04-K02A
	U13-A01B1	data transfer system	V04-Q02A3B W02-C02G7
Sixth Generation (6G) mobile phone	systems- see	feeding	T04-K02C1
6G		fraud protection	T04-K04
	W02-C03C1M	hybrid	V04-Q02A3C
Skateboard	P36-E07 W04-X03E2	interface, digital computer media types	T01-C07C1 T04-K03
	VVU4-AU3EZ	printed circuit aspects	V04-Q02A3
Ski safety binding release force measurement	P36-A03	reader or writer	T04-K02
	P36-A08A	construction semiconductor package	T04-K02C2
	S02-F03A	twin	U11-D01A7 V04-Q02A3C
	W04-X01H W04-X01K3P	vending machine actuated by	T05-H02C5C
Skiing	P36-A03	Smartphone	W01-C01D3C
Skillig	W04-X01K3P		W01-C01G8S
Skin, passing drugs through	S05-J02	Smart protector	U24-F05
Slate crusher	P41-A01	Smart relay	V03-D20
	P41-V22	Smart sensor	V06-V01Q
Sledge	Q22-C01		V06-V04G
Sleeve for insulating direct connecti	ion	Smart transducer	V06-V01Q
	V04-A08	Smart TV	W03-A16C5K
Slide (playground equipment)	P36-E07	Smoke alarms	W05-B02A
	W04-X03E2	Smoke detection	600 540
Slide switch	V03-C01B	ionisation chamber	S03-E10 W05-B02A3
Clin vina	X13-A04B1	optical sensing	W05-B02A1
Slip-ring manufacture	V04-L01A V04-P02	scattering or diffuse light reflection	
manufacture, motors	V06-M11A		W05-B02A1
	X11-J08A	Smog detection	S03-D06
motors	V06-M12 X11-J03	Smoothing choke	U24-D01E
SLR digital camera	W04-M01B1S	SMPS	U24-E02B2A
SMA	VV04-IVI0 ID I3	SMPTE time code recording	W04-H01A
actuator	V06-M06M	Snap-action switch	V03-B03A
switch	V03-C06B1	S	X13-A04A
Small form-factor hard disk drive	T03-A08A1E	Snooker (game)	P36-A01 W04-X01K1E
Small scale power		Snow detection	S03-D02B
generation plant	V06-P02	for non meteorological application	
chip-scale MEMS-scale	V06-P01 V06-P01	for vehicle application	X22-X06E
solar	X15-A04	Snowboarding	P36-A03
wind	X15-B04		W04-X01K3P
Small scale solar power generation	X15-A04	Snow plough	X25-U05
Smart battery	X16-H09	Snubber circuits, power converters active	
Smart card - see smart media	T04-K03A	dissipative	U24-D01B1C U24-D01B1F
Smart connector	V04-M11	non-dissipative	U24-D01B1H
Smart glass	U14-L	passive	U24-D01B1A
Smart grid	X12-H08	Socket	1/04 1/00
Smart media	T04-K	CRT	V04-K09 V05-D08C5
antenna	T04-K01C	for hybrid circuits	U14-H05
media per-se	T04-K01 V04-Q02A3	- <b>,</b>	V04-B01
contactless	T04-K02B		V04-K02
	V04-Q02A3A		V04-M05
	I		

for IC testing	U11-F01C1	software registration and anti-pi	racy
3	V04-B01		T01-J20B2A
	V04-K02	specifications, tools and techniq	ues T01-J20B
	V04-M05	testing	T01-J20C
for semiconductor devices	U11-D01Q	verification	T01-J20C
	V04-B01	virus protection	T01-J20D
	V04-K02	Software update	T01-F05B2
	V04-M05	P	T01-J20B2
for semiconductor package tra		mobile phone	W01-C01D3C
(to prevent lead deformation		'	W01-C01Q3A
lamp	V04-K01	TV receiver	W03-A18A8A
	X26-F	SOI	
semiconductor device, printed		bipolar transistor	U12-D01A5
circuit-mounting	U11-D01Q	discrete devices	U12-E01A5
	V04-B01	IC component isolation	U11-C08A6
	V04-K02	integrated circuit structures	U13-D07
	V04-M05	unipolar transistor	U12-D02A4
Socket connector - see Connecto	r	Soil	012 002/11
Sodium-sulphur cell	X16-B01C		P43-J
electrode	X16-E10	contamination treatment	S03-E14E7
high temperature	X16-B01C1	investigation/analysis prevention of soil erosion	Q42-A11
low temperature	X16-B01C2	prevention of soil erosion	P13-A06
room temperature	X16-B01C2	reclamation	P43-J
Sofa	P26-B	shifting	X25-D01
manufacture	P26-M	shifting, control	T06-D08E
		siliting, control	X25-D01
SOFC	X16-C01A		7/25-D01
Software		Soil working	
assembly language program lis		cleaning, maintenance/repair of	•
claimed software product	T01-S03	anneton etianal eletrila efte alan	P11-G
computer program	T01-S01	constructional details of tools a	,
computer programming techni		un lainn na	P11-T
database applications	T01-J05B4P	raking tilling/tillage	P11-A04 P11-A05
error prevention for memories	U14-A11	using hand tools	P11-A03
information retrieval, data proc	•	using harrows	P11-A03
	T01-J05B4	using ploughs	P11-A03
low-level language listing	T01-S01A		
machine language program list		Soil working, planting and fertiliz	
networks	W01-A06E	planting, sowing	P11-B01
patents with algorithms	T01-S01C	types of goods produced	P11-E
patents with high-level languag		cereals & grasses	P11-E03
and the state of the land to be a little and the	T01-S01B	fibre plants	P11-E05
patents with low-level language		flowers	P11-E08
and and a state of the second and a second	T01-S01A	fruits & nuts	P11-E01
patents with pseudo-code	T01-S01C	latex & rubbers lawn & turf	P11-E09
program listing software content	T01-S01 T01-S		P11-E03
software content	T01-S01	mushrooms/fungi oil seeds/oil fruits	P11-E07
aaftuura davalaamant	T01-301 T01-J20		P11-E04
software development	T01-S02	sap & syrup tea, coffee & herbs	P11-E09 P11-E06
software patent			
software registration and anti-p source code listing	T01-S01B	vegetables & pulse crops	P11-E02
virus protection	T01-J20D	Solar cell	U12-A02A
virus protection	T01-N02B3		X15-A02A
		array	U12-A02A5
Software-controlled radio receive	er W02-G03K		X15-A02B
Software development	T01-J20	chalcogenide semiconductor	U12-A02A2E
Application Programming Inter	face T01-J20B1	chalcopyrite semiconductor	U12-A02A2E
computer programming techn	iques T01-J20A	characterised by structure	U12-A02A2Q
debug	T01-J20C	circuitry, power transfer	U12-A02A7
software libraries and version n	nanagement	cooling arrangement	X15-A02X
	T01-J20B2	CVD (large area), for mfg.	U11-C01C
general version managemen	t T01-F05F		

doping for	U11-C02J7	for spacecraft	W06-B03B
1 3	U12-A02A3	for domestic use	X15-A04
dye sensitised solar cells	U12-A02A8	for electric vehicle	X21-B04A
,	X15-A02D1	for motor vehicle	X22-F03
	X16-A04	for spacecraft	W06-B03B
electrode details	U12-A02A4A	Gratzel cell	X15-A02D1
for manufacture CVD (large area)		heat collecting panels	X15-A01A
Gratzel cell	X15-A02D1	heat collecting pipes	X15-A01A
manufacture	U12-A02A3	heliostat	X15-A01C3
organic	X15-A02F	hybrid solar plant	X15-A10
package	U12-A02A4E	large scale	X15-A10 X15-A05
panel	X15-A02C	lens	X15-A03
•			
panel, roof attachments	X15-A02X	maintenance	X15-A15
panel, electric vehicle	X21-B04A	manufacture 	X15-A15
panel, spacecraft	W06-B03B	micro application	X15-A04
panel, vehicle	X22-F03	mirror	X15-A01C1
panel, wiring	X15-A02X	monitoring	X15-A08
pigment sensitised solar cells	U12-A02A8	panel	X15-A02C
	X15-A02D1	panel, packaging	Q34-M99
radiation treatment (large area), fo	or manufacture	panel, repair	X15-A02X
-	U11-C03J4	panel, roof attachments	X15-A02X
repair	X15-A02X	panel, solar cell	X15-A02A
simulation	X15-A08	panel, solar cell assembly	X15-A02B
structure, with AI-BIII-CVI compou	nds	panel, wiring	X15-A02X
от 2011.	U12-A02A2E	parabolic mirror	X15-A01C1
structure, with AII-BIV-CV compou		photoelectrochemical cell	X15-A02D
structure, with All Biv ev compou	U12-A02A2E	priotoerectrochemicareen	X16-A04
structure, with AII-BIV-CVI compo		reflector	X15-A01C1
structure, with All-Biv-Cvi compo	U12-A02A2E	servicing	X15-A0161
atrications with All DV/I as managed		simulation	X15-A13 X15-A08
structure, with All-BVI compounds			
structure, with AIII-BV compounds		single cell details	X15-A02A
structure, with AIV elements and t			U12-A02
compounds	U12-A02A2C	small scale	X15-A04
structure, with amorphous,		solar/photovoltaic panel details	X15-A02C
polycrystalline semiconductor	U12-A02A2F	solar chimney	X15-A05A
substrate details	U12-A02A4B	solar Stirling engine	X15-A05B
tandem	U12-A02A4C	solar tower	X15-A05A
thin film	U12-A02A2	steam generation	X15-A09
	U12-B03B	sun tracker	X15-A01C3
wiring to solar battery	X15-A02X	testing	X15-A08
lar heating	X27-E01A5	water heating	X27-E03
=		working fluid	X15-A01A1
lar lighting	X26-S	Solder	
lar power	X15-A	cooling	X24-A09
cell (solar/photovoltaic -) details	X15-A02		X24-A07 X24-A09
single cell	X15-A02A	cream/paste application	
assembly of cells	X15-A02B	cream/paste application, pressur	
cogeneration solar plant	X15-A05K	dispensing	X24-A09
collector	X15-A01A	cream/paste application, screen p	
combination solar plant	X15-A10		X24-A09
concentrator	X15-A10 X15-A01C	cream/paste application, stencil p	orinter
heliostat	X15-A01C3		X24-A09
		dispenser	X24-A09
lens	X15-A01C2		P55-T02A
mirror	X15-A01C1	feeding device	X24-A09
parabolic trough	X15-A01C1		P55-T02C
tracking arrangement	X15-A01C3	for semiconductor terminals	U11-D03B3
working fluid	X15-A01A1	manufacture	P55-D01
	X15-A08	material	X24-A01A
control	X15-A02D1	material	P55-D01
control dye-sensitised solar cells	X13-A02D1		
	X16-A04	rocycling	
dye-sensitised solar cells	X16-A04	recycling	X24-A09
	X16-A04	recycling testing wettability measurement	

Soldering	X24-A	using gas streams	P41-E03E
accessories	P55-B01 X24-A04	using mechanical agitation wet	P41-E05 P41-E03
brazing	P55-B02		X16-B01S
3	X24-A09	<b>Solid state battery</b> quasi solid-state	X16-J01G
de-soldering	P55-B03	Solid state cooling	X27-F02B1
cooling system	P55-T20	_	
electric flux	X24-A	Solid state lasers	V08-A04C
fluxless, PCB	X24-A01A V04-R04A5C	Solid state protection relay	X13-C10
inspection	X24-A09	Solid thermionic cathode	V05-M02
iron	X24-A02A	Solid-state (analogue) protector	U24-F04
iron, bit	X24-A02A	Solid waste disposal (general)	P43-E
laser soldering	X24-A02X	by burning	P43-E01
lubricating system	P55-T20	by burying or dumping	P43-E03
material measurements	X24-A01A X24-A09	by treating or converting	P43-E05
method	X24-A01C	Soliton optical communication	W02-C04B7
reflow	X24-A02E	Sonar and analogous systems	W06-A05
reflow, electric heating	X24-A02E	Sonar system	
reflow, electric heating iron	X24-A02A	applications	W06-A05H
reflow, hot gas	X24-A02E	calibrating	W06-A05C6
reflow, IR	X24-A02E	determining target position displays	W06-A05D1 W06-A05C3A
reflow, laser	X24-A02E X24-D03	for air, sea, land vehicles	W06-A05C5A
reflow, vapour phase	X24-A02E	for aircraft	W06-A05H1B
simulation	X24-A09	for anti-collision purposes	W06-A05H1K
spray soldering	X24-A02X	for industrial applications	W06-A05H8
testing	X24-A09	for land vehicles	W06-A05H1A
ultrasonic soldering	X24-A02X	for object identification	W06-A05B5
wave wave, bath	X24-A02C X24-A02C	for ships for tracking, target seeking	W06-A05H1C W06-A05H5
•		for vehicle/boat identification	W06-A05B1
Solenoid actuator	V02-E02A V02-E02A	mapping/imaging	W06-A05H3
actuator, linear	V02-E02A V02-E02A3	monitoring	W06-A05C6
actuator, rotary	V02-E02A4	primary	W06-A05D
valve	V02-E02A1	receiver circuits	W06-A05C3
	X25-L01A	secondary security/coding aspects	W06-A05B W06-A05B3
Solenoidal motor	V06-M04	sonobuoys	W06-A05C5
Solidification of gases by pressure and cold		synthetic aperture	W06-A05J
treatment		testing	W06-A05C6
	Q75-F	transducers	V06-V01N
constructional details	Q75-T	21 22 21 22	W06-A05C7
Solid electrolyte	V4 ( 104	circuits	V06-V01N V06-V02S
battery battery, inorganic	X16-J01 X16-J01C	communications	V06-V025
battery, morganic battery, organic	X16-J01A		V06-V04B
Solid electrolytic capacitor - see Ele		instrumentation	V06-V01N
capacitor	sed ory de		V06-V04G1
Solid free form fabrication	V2F 400	manufacture	V06-V01N
	X25-A08	testing	V06-V03A V06-V01N
Solid oxide fuel cell	X16-C01A	testing	V06-V01N
monolithic tubular	X16-C01A3 X16-C01A1	transmitter circuits	W06-A05C1
		using different response medium	W06-A05B7
Solid polymer fuel cell	X16-C01C	using relative movement	W06-A05D2
Solid sampling	S03-E13A	Sonic diagnosis, medical	S05-D03
Solid separation	D41 F07	image processing	S05-D03E
based on size or weight	P41-E06	medical transducer details	S05-D03A1
dry magnetic	P41-E01 P41-E07	non-transducer details transducer arrangements	S05-D03B S05-D03A2
magnetic	X25-H01	uansuucei arrangemenis	303-D03A2

Sonic systems	ĺ	instrumentation	Q25-S03
hydrophone	W02-C07C	monamentation	W06-B03J
parametric audio system	W04-S05P	ion beam thruster	V05-E05A
sonic communication system	W02-C07A		W06-B03A
remote control or monitoring	W05-D06A5	launch systems	W06-B03L
using sonic link		life support systems	W06-B03D
Sonic/ultrasonic analysis of fluids	S03-E08C	load accommodation arrangemer	nts Q25-S11
<del>-</del>		microwave thruster	W06-B03A
Sonobuoys	W06-A05C5	moon buggy	Q25-S01D
SOR	X14-G02		W06-B03X
Sorter		navigation	Q25-S02
sheet, copier	S06-K02C		W06-B03F
Sorting	P41-K	on-board experimentation/mfg. sy	ystems W06-
coin (general)	T05-K01	B03E	
coins in coin freed apparatus	T05-H03	position / attitude control	W06-B03F
control	T06-D15	power supplies	W06-B03B
general record carriers	T04-J02	propulsion systems	Q25-S04
industrial	X25-F06		W06-B03A W06-B03A
manufactured objects	T05-K05	propulsion systems, plasma	X14-F04
recycling processes / systems	X25-W04	solid rocket booster	Q52-B03
semiconductor devices	U11-F01	space craft	Q25-S01B
using pattern recognition	T04-D07B	space rocket	Q25-S01C
valuable paper, banknotes, mail	T05-K02	space shuttle	Q25-S01B
Sound		space station	Q25-S01A
antiphase cancelling (electronic)	W04-V07	testing	W06-B05
damping (general)	P86-E05E	Spacesuit	Q25-X01
damping (roads, rail, bridges)	Q41-F	Spacesuit	W06-B03D
intensity measurement	S02-E	Succina alements	VV00 D00D
proofing (building constructions)	Q43-E	Spacing elements discharge tube, manufacture	V05-L03A1
transmission (general)	P86-E05A	plasma display, internal spacers, s	
wave analysis (electronic)	W04-V		
Sound detector for TV receiver	W03-A03C1	Spacing measurement	S02-A10B
Sound field control	W04-R05	using mechanical method	S02-A01 S02-A10B
Sound mixing	W04-G05	using magnetic/electric method	S02-A02
circuitry	W04-G05C	and grown areas areas areas	S02-A10B
control	W04-G05A	using optical method	S02-A03
interfacing	W04-G05B	3 1	S02-A10B
Sound-producing devices		using atomic or nuclear radiation	S02-A05A3
(non-musical)	P86-E		S02-A10B
alerting (electrical)	W05-A02A	using microwaves	S02-A05A1
bell	P86-E01A1		S02-A10B
klaxon	P86-E01C3	using sound or ultrasound	S02-A05B
rattle	P86-E01A5		S02-A10B
siren	P86-E01C1	Spam filtering	T01-N02B1C
whistle	P86-E01C5	Spark gap	X12-F01
Sound-to-light conversion equipme	nt W04-U08	arcing horn	X12-F01A
Space shuttle	Q25-S01B	3 3 3	X13-C03A
	W06-B03	circuit	X12-F02
Space vehicle	Q25-S	manufacture	X12-F09
Space venicle	W06-B03	overvoltage protection	X12-F01A
antenna	W02-B08F7		X13-C03A
artificial satellite	Q25-S01A	Spatial diversity radio communicat	ion
communications installations	W06-B03C	, , , , , , , , , , , , , , , , , , , ,	W02-C03A1
docking/coupling installations	W06-B03M	Consider the second of the second	
electrical installations	W06-B03H	Spatial division multiple access	W02-K10
electrical systems for on-board		antenna beam steering aspects	W02-B06B
experimentation or manufactur	e W06-B03E	cellular base station aspects	W02-C03C1B
fire extinguishing	P35-C01C7A	directional diversity aspects	W02-C03A4
	Q25-S06		
	W04-B03X		

W06-B03X

Spatial light modulation - see Optic modulation, spatial	al	reduction, mobile phone	W01-C01A4 W01-C01D3C
SPC telephone switching	W01-B02A1	Specific heat measurement	S03-E01C
Special effects		Specimen preparation	S03-E13
lighting	W04-X03C	automatic analysers	S03-E13D1
9	X26-M	materials investigation	S03-E13D
musical instrument	W04-U03E	SPECT - see Nuclear imaging	S03-G02C3
TV/video - see <b>TV special effects</b>	W04-N05C	Spectacles	X27-A02D
Special subscriber telephone servic	es	lenses	P81-A01
(exchange based)	W01-C02B		P81-A50G
alarm call systems	W01-C02B8	Spectacles for 3D viewing	X27-A02D
alarm monitoring	W01-C02B7B	with filters	W03-A08E7E
automated directory enquiries	W01-C02B7E	with polarizers	W03-A08E7E
call barring	W01-C02B2G	with shutters	W03-A08E7C
call diversion	W01-C02B2E	Spectrometer	
call forwarding	W01-C02B2L	energy	V05-J01A5
call holding	W01-C02B4A	gamma ray	S03-G02C3
call transfer	W01-C02B2M	mass	V05-J01A1
caller ID transmission	W01-C02B3C		S03-E10A
caller ID withholding	W01-C02B3E	neutron	S03-G02C3
camp-on and call back	W01-C02B3A	secondary ion mass (SIMS)	V05-J01A1
centralised answering centralised autodial	W01-C02B4	X-ray	S03-G02C3
checking entitlement and ID	W01-C02B5 W01-C02B6A		V05-F01A6
conference systems	W01-C02B0A W01-C02B1	Spectrometry	S03-A02
denying access to services	W01-C02B1	absorption	S03-A02B
directory enquiries (auto)	W01-C02B0C	atomic absorption	S03-E04A5G
direct inward dialling	W01-C02B2A	atomic emission	S03-E04D3
graded service	W01-C02B6	atomic emission, inductively coup	
Multimedia messaging service	W01-C02B7F		S03-E04D3A
paging	W01-C02B7A	attenuated total reflection	S03-E04A5S
Presence-Enhanced Contacts	W01-C02B2N	calibrating optical spectrometers	S03-E04P
reply dialling	W01-C02B5A	compensation aspects of optical	
SMS	W01-C02B7D	spectrometers	S03-E04P
successive ringing of extensions	W01-C02B2C	double-beam	S03-A02B
time-dependent call handling	W01-C02B2J	dual wavelength	S03-E04A4
voice mail	W01-C02B7C	emission, optical	S03-A02X
pecial subscriber telephone equip	ment	energy	S03-E10B
	W01-C01G	flicker	S03-A02B
conference telephone	W01-C01G5	FTIR	S03-A02F
email-equipped phone	W01-C01G6C	generating spectrum by diffractio	
hands-free kit (headset)	W01-C01G0C	grating or prism	S03-A02A
instant messaging	W01-C01G6F	infrared	S03-E04A5B
intercom	W01-C01G1	interferometric	S03-A02F
internet	W01-C01G6E	IR	S03-A02B
key telephone set	W01-C01G3	mass - see <b>Mass spectrometer</b> monochromator	S03-E10A S03-A02A1
loudspeaker	W01-C01G2A	optical absorption	S03-A02A1
menu-driven telephone	W01-C01G8A	optical absorption optical computerised tompgraphy	
multifunction telephone	W01-C01G8	optical, cuvettes	S03-E04X
Multimedia Message Service	W01-C01G6B	optical, gaseous phase	S03-E04A5G
push to talk over packet network	W01-C01G6H	optical, liquid phase	S03-E04A5L
screen text telephone system	W01-C01G6	optical, inquid phase optical, on-line measurements	S03-E04J
SMS / text	W01-C01G6A	optical, solid phase	S03-E04A5S
video telephone	W01-C01G4	optical, using FFT	S03-E04T
pecies identification by audio ana	ysis	Raman	S03-A02B
,	W04-V04A7	Raman, materials investigation	S03-E04D1
pecific absorption ratio (SAR)	V V UT= V UT/1/	specular reflectivity, optical	S03-E04B1B
measurement, mobile phone	W01-C01A4	testing optical spectrometers	S03-E04P
measurement, mobile phone	W01-C01A4	transmission, optical	S03-E04B1A
	W01-C01K	ultraviolet	S03-E04A5E
		visible	S03-E04A5E

X-ray	S03-E06D	Speed control	
Spectrophotometry - see Spectrome		auxiliary non-electric power-type	T06-B09A
testing	S03-A02	disk (recording equipment)	T03-F02A1
Spectroscopy (see also Spectromete	rv)	tape (recording equipment)	T03-E03A
admittance	S03-E02C5	without auxiliary power	T06-B09A
DLTS	S03-E02C5	Speed measurement	
optical - see Optical testing	S03-E04	calibration	S02-G07A
Spectrum analyser	S01-D03C1	compensation	S02-G07C
Specular reflectivity for materials	301 20001	electrically/magnetically	S02-G01B
investigation	S03-E04B1B	mechanicallly optical	S02-G01X
_		testing	S02-G01A S02-G07E
Speech amplifier for telephone set	W01-C01C1	using doppler methods	S02-G07L
Speech analysis/recognition		using timing	S04-C03C2
applications	W04-V04A	vehicle (external)	T07-A01A1
comparing with reference determining emotional status of	W04-V04A8	Speed measuring devices construct	ional details
speaker	W04-V04A4	Speed medaling devices constitue	
determining gender of speaker	W04-V04A3C		S02-G09
determining presence of speech/s		Speed of sound, measuring	S02-E01
identifying speaker	W04-V04A3A	Speed regulation, electric machines	- see
methods	W04-V01	Electric machines regulation/cont	rol
speech-to-text system	W04-V04A6	Speed sensitive switch	V03-C06C
voice activated control, equipmer		Speedometer	S02-G01
voice activated control, telephone		SPFC	X16-C01C
	W04-V04A5		
Speech processing (digital)		Spin drier	X27-D02
coding systems -see <b>Speech sign</b>		Spinning	X25-T02
and the Com	W04-V05G	control, yarn	T06-D03B
correlation filtering	W04-V05C W04-V05A	Spin torque oscillator	U23-A05
noise reduction	W04-V05E	Spintronics	
pitch changing	W04-V05L1	devices	U12-B01B
rate conversion	W04-V05J5	magnetic recording read heads	T03-A03C3
telephone	W01-C01C7	oscillators	U23-A05
Speech signal coding		Splices, optical fibre	V07-G10B
CELP	W04-V05G3A	Spools for recording tape	
comfort noise	W04-V05G6	general	T03-E01A
dynamic	W04-V05G8	tape cassette component	T03-H01B7
excitation codebook	W04-V05G3A		T03-N03
involving simulation	W04-V05G1	Sports	P36-A
predictive coding	W04-V05G3	hall out of placed store	W04-X01 W04-X01C1C
sample rate conversion simulation coding	W04-V05J5 W04-V05G1	ball out-of-play detector bowling alley pin-setter	W04-X01C1C
transform coding	W04-V05G5	computerised sports equipment	T01-J30D
VSELP	W04-V05G3A	counting/timing	W04-X01C1A
Speech synthesis		equipment per se	P36-A08A
applications	W04-V04C		W04-X01E
methods	W04-V02	firearms for hunting/sport	P36-A05
novel circuitry	W04-V04E		P36-A07
text-to-speech	W04-V04C1		P36-A08A
Speech therapy, medical	S05-A09		W04-X01E
Speed			W04-X01K5E W04-X01K7C
checker, using timing	S04-C03C2	fitness training equipment	P36-A06
control	T06-B09	naicss daming equipment	W04-X01A5
control, electric	T06-B09B	goal-line technology, football (soc	
measurement	S02-G01	<i>y</i>	W04-X01C1
tachogenerator	V06-M06C		W04-X01K1J
Speed changing, tape	T03-E04	grounds, stadia	P36-A08C
<u>-</u>			W04-X01F
		locators/guiding systems	W04-X01D

performance monitors	W04-X01A1	ice hockey	P36-A01
rehabilitation equipment	W04-X01A1	ice nockey	W04-X01K1N
scoring	W04-X01C3	jogging	P36-A03
simulators	W04-X01A3	, 33 3	W04-X01K3A
training equipment	P85-A01N	laser-simulated shooting	P36-A04
	W04-X01A		W04-X01K4E
Sports and leisure activities	P36-A	martial arts	P36-A04
	W04-X01K		W04-X01K4A
air sports	P36-A03	motor racing	P36-A03
·	W04-X01K3N		W04-X01K3G
American football	P36-A01	paintball	P36-A04
	W04-X01K1R	a a sa a la catina a	W04-X01K4E P36-A03
angling	P36-A07	parachuting	W04-X01K3N
	W04-X01K7A	parascending	P36-A03
athletics	P36-A03	parascending	W04-X01K3N
avala ava	W04-X01K3A	pool (indoor game)	P36-A01
archery	P36-A05 W04-X01K5A	poor (mader game)	W04-X01K1E
ball-based play	P36-A01	power boat racing	P36-A03
ball-based play	W04-X01K1		W04-X01K3L
badminton	P36-A01	racquet sports	P36-A01
Baariinteri	W04-X01K1P		W04-X01K1P
baseball	P36-A01	rugby	P36-A01
	W04-X01K1A		W04-X01K1R
basketball	P36-A01	running	P36-A03
	W04-X01K1C		W04-X01K3A
beach volleyball	P36-A01	sailing	P36-A03
	W04-X01K1V	an a cluster	W04-X01K3L
billiards	P36-A01	snooker	P36-A01 W04-X01K1E
	W04-X01K1E	shooting	P36-A05
boxing	P36-A04	Shooting	W04-X01K5E
alassa i a a a a a la a atia a	W04-X01K4A	shuttlecock-based play	P36-A01
clay pigeon shooting	P36-A05 W04-X01K5E	Shakiroson Sassa piaj	W04-X01K1P
combat-based sports	P36-A04	surfing	P36-A03
compat based sports	W04-X01K4		W04-X01K3L
cricket	P36-A01	swimming	P36-A03
	W04-X01K1G		W04-X01K3J
curling	P36-A01	table tennis	P36-A01
	W04-X01K1		W04-X01K1T
	W04-X01K3P	tennis	P36-A01
cycling	P36-A03	yallayball	W04-X01K1P P36-A01
	W04-X01K3C	volleyball	W04-X01K1V
darts	P36-A05	water skiing	P36-A03
(constant	W04-X01K5C	water skiing	W04-X01K3L
fencing	P36-A04	wind surfing	P36-A03
fishing	W04-X01K4C P36-A07	Jan 3	W04-X01K3L
nsming	W04-X01K7A	wrestling	P36-A04
golf	P36-A01	_	W04-X01K4G
90	W04-X01K1L	Sports equipment	P36-A08A
gliding	P36-A03	The state of the s	W04-X01E
3 3	W04-X01K3N		
hang gliding	P36-A03	Sports grounds/facilities	P36-A08C
	W04-X01K3N		W04-X01F
hockey	P36-A01	Sportswear (excludes sport shoes)	P21-D
	W04-X01K1N		P36-A08A
horse racing and riding	P36-A03	sport shoes	P22-F03
le constitue de	W04-X01K3E	swimming aids	P21-D
hunting	P36-A07 W04-X01K7C		P21-N
	VVU4-/\U I N/C		

swimming gloves	P21-D	SQUID	U14-F02B
	P21-H	DC	S01-E01A1
boxing/golf gloves	P21-D	for measuring magnetic variables	S01-E01A
	P21-H	RF	S01-E01A3
Spot welding, resistance	X24-C09	SQWFET - see Field effect transistor	, with
Spray head	P42-A	heterostructure, single quantum v	well
multiple nozzles or jet	P42-A03		U12-D02D2
novel nozzle or spray head	P42-A	SRAM - see RAM, static	
	P42-T01A	SSD (solid-state drive)	T01-H01B3
variable characteristics	P42-A05	Stability control, electric power syst	
Spray boom	P42-A03C	Stability Control, electric power sys	
Spray booth	P42-T20		X12-H01A5
Spraying	P42-A	Stacked capacitor - see Capacitor	V01-B03C3A
electrostatic	X25-K01	Stacked capacitor DRAM - see RAM	-
other	X25-K09	dynamic, with stacked capacitor	U14-A03B4
vehicle control	Q15-B09 T06-D18	Stacking, faults measurement for se	miconductor
	100-010		U11-F01A2
Spread-spectrum communication		Stacks of objects, counting	T05-A02
systems	W02-K05	Stage lighting	X26-K
antijamming carrier-based impulse communic	W02-K05A5	Stairs	
carrier-based impulse communic	W02-K05A9C		Q45-E
carrier-free impulse communicati		Stamp mill	P41-A03L
K05A9A	VV02	Stamping	
CDMA	W02-K05A7	compact disks	T03-B01D1
combined frequency hopping			T03-B01E3G
and CDMA system	W02-K05A8	engraving systems punching / stamping	X25-X10 X25-A02D
direct sequence	W02-K05A7		
frequency hopping	W02-K05A6	Stamping, stamps hand held	P75-B P75-B01
hybrid increased reliability	W02-K05A8 W02-K05A1	ink	P75-B03
pseudo noise code details	W02-K05A1 W02-K05B5	machines	P75-B02
secrecy	W02-K05A5	Stand/trestle/support	Q68-A03
synchronising	W02-K05B7		
ultrawideband (UWB) and		Standard cells, integrated circuit	U13-C04D
time-hopping systems	W02-K05A9	Standard conversion circuit (video)	14/0.4 NIOF A
Spread-spectrum energy dispersal	for	general	W04-N05A W04-F01H3
RFI reduction (EMC viewpoint)	W02-H01G3E	recording equipment TV receiver	W03-A11A
Spreader for liquid coating	P42-B05		WOOMIN
Spreadsheet	T01-J11G	Standby power supply battery back up	U24-J01
•		capacitor back up	U24-J02
Spring balances	S02-F01A	combined battery / capacitor	U24-J04
Spring for clock or watch	S04-A03	computer	T01-L01
Sprinklers, fire fighting	P35-C01C3 P35-C03		U24-J
	X25-X05	diesel-generator	X12-H02A
Sputtering	7120 7100	high power	X12-H02
applying magnetic films to substr	rate V02-H02B	low power power converter back up	U24-J U24-J03
apparatus - see <b>Processing tube</b>		rotary, motor-generator	X12-H02C
<b>3</b>	V05-F08D1A	static converter-type	U24-J
cathodic	X25-A04	21	X12-H02B
deposition apparatus, semicondu		telephony	U24-J
discount Control	U11-C09A		W01-C07B
deposition, conductive layer,	U11-C05C2	Stands, for recording equipment	T03-L05A
semiconductor manufacture magnetic films in record carrier m		Stapling paper in copier	S06-K05A
magnetic minis in record carrier in	T03-A02A3A	Stapling, industrial	X25-X
magnetron sputtering	V05-F05C3A	Star	-
	V05-F08D1A	data networks	W01-A06B3
Squelch, for radio receiver	W02-G03B1	Star coupler, optical	V07-G11
•	ļ	otal coupler, optical	v0/-011

Starting electric machine         V06-NDS V13-H01A         stoken fired boilers         Q72-808 vasetheated steam boilers         Q72-808 vasetheated steam boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated boilers         Q72-808 vasetheated steam boilers         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-807 vaset rubes         Q72-807 vaset rubes         Q72-808 vasetheate boilers         Q72-808 vasetheate boilers         Q72-707 vaset rubes         Q72-802 vaset quades<				
State machine         X13-H01A         waste heat boilers         Q72-807           Static balancing         S02-J05         water-tube boilers         Q72-802           Static converter         X25-S         Clean room         X25-S           Clean room         U11-C1581         Computer         X25-S           In clean room         U11-C1581         Steam(applications)         S05-A09           Semiconductor wafer charging prevention during manufacture         U11-C10         Steam(applications)         S25-S01         balk, medical         X25-S02-A07           Static cercles bicycle         P36-A06         W04-X01A5A         V27-U14         A072-U14         A072-U14           Static induction thyristor - see Flyd effect transistor         U12-D02C         Static induction transistor - see Flyd effect transistor         V12-D018S         Static induction transistor - see Flyd effect transistor         V12-D02C         Steam turbine power plant         X11-A01C           Static Induction transistor - see Flyd effect transistor         V12-D02C         Steam turbine power plant         X11-A01C           Static UPS         U24-J         V2-M02C         V2-M02C         V2-M02C           Static UPS         V24-M02C         V2-M02C         V2-M02C         V2-M02C         V2-M02C         V2-M02C         V2-M02C         V2	Starter, star-delta	X13-H01A		
State machine         U21-C0384 Static coloreters         Mater-tube boilers         G72-B02 valve         G22-107 valve         G22-108 valve         G22-108 delaning         G22-108 P48-B01C         G22-108 G22-101 valve         G22-108 G22-101 G22-101 G22-101 G22-101 G22-101 G22-101 G22-101 G22-101 G22-101 G22-101 G22-102 G22-102 G22-102 G22-103	Starting electric machine	V06-N05		
Static balancing         S02.J05         valve wentilating shaft         Q72.T07           Static converter- see Converter         S02.J05         Static converter- see Converter         Static converter- see Converter         Static converter- see Converter         Static celectricity prevention         X25-S         Static celectricity prevention         X25-SO         Static celectricity prevention         X25-SO         Static celectricity prevention         X25-SO         Static celectricity prevention         X25-SO         Static celectricity prevention during manufacture         V11-C10         Static celectricity prevention during manufacture         V22-D03         Static celectricity prevention         X27-D03         X28-D01         X27-D03         X27-D03         X27-D03         X27-D03         X28		X13-H01A		
Static labalancing         S02-J05         wentilating shaft water tubes         Q72-T07           Static converter- see Converter         X25-S01 computer         X25-S01 computer         X25-S01 computer         X25-S01 computer         X25-W02 cleaning         X25-W01 cleaning         X25-W02 cleaning         X25-W02 cleaning         X25-W02 cleaning         X25-W02 cleaning         X25-W02 cleaning         X25-W02 cleaning         X25-W02 cleaning         X25-W02 cleaning         X25-W02 cleaning <th>State machine</th> <th>U21-C03B4</th> <th></th> <th></th>	State machine	U21-C03B4		
Static converter- see Converter   Static electricity prevention   V25-S   Clean room   V25-S   Clean room   V25-S   Dath, medical   S05-A09   Doiler   V25-S   Dath, medical   S05-A09   Doiler   V25-S   Dath, medical   V25-W02   Doiler   V25-W02   Doiler   V25-W02   Doiler   V25-W02   Dath, medical   V25-W02	Static halancing	S02-105		
Static electricity prevention clean room         X25-S01 (11-C15B1 computer         Steam (applications)         Sto 5-A09 boiler         X25-W02 cleaning         P43-B017 cleaning         P43-B017 cleaning         P3-B017 cl	<del>-</del>	302 303		
Celear room				Q/2-104
boiler   X25-W1				S05 A00
for magnetic record carrier in clean room in clean room U11-C15B x25-S01 in clean room U11-C15B x25-S01 semiconductor wafer charging prevention during manufacture U11-C10 year control during manufacture U11-C10 year control during manufacture U11-C10 year control during manufacture U11-C10 year control during manufacture U11-C10 year control during manufacture U11-C10 year control during manufacture U11-C10 year control during manufacture U11-C10 year year year year year year year year			· ·	
In clean room   W11-C15B   X25-S01   Semiconductor wafer charging prevention during manufacture   U11-C10   Static exercise bicycle   P36-A06   W04-X01A5A   W04-X01A5A   Static induction   U12-D01B5   Static induction transistor - see Field effect   U12-D01B5   Static induction   U12-D01B5   Static inductio				
semiconductor wafer charging prevention during manufacture U11-C10  Static exercise bicycle	9		o.eag	
Semiconductor wafer charging prevention during manufacture U11-C10	in cican room		Industrial	Q72-U40
prevention during manufacture U11-C10  Static exercise bicycle P36-A06 W04-X01A5A  Static induction thyristor - see Thyristor, static induction transistor - see Field effect transistor  Static induction transistor - see Field effect transistor  U12-D02C  Static memory U12-D02C  Static memory U14-J D02C  Static upspecial T01-H01B3B coptical T01-H01B3C Static UPS U24-J X12-H02B  Static UPS U24-J X12-H01A2D  Static vAR compensation X12-H01A2D  Static vAR compensation X12-H01A2D  Static lan allysis by computer T01-J03  Statistical analysis by computer X11-A08  statistical analysis by computer X11-A08  Statistical metering data networks telephone exchanges W01-C02A1A  stationery, 072-T01  casing, boiler - Q72-T05  chimney Q72-T101  chimney Q72-T102  chimney Q72-T02  fire tubes Q72-T04  fire tubes Q72-T04  fire tubes Q72-T04  fire tubes Q72-T07  frame, boiler - Q72-T07  repair Q72-T01  header Q72-T01  header Q72-T01  nozle Q72-T03  repair Q72-T04  support, boiler - Q72-T05  repair Q72-T07  repair Q72-T07  repair Q72-T08  support, boiler - Q72-T09  repair Q72-T07  repair Q72-T07  repair Q72-T07  repair Q72-T08  support, boiler - Q72-T09  repair Q72-T09  repair Q72-T07  repair Q72-T07  repair Q72-T08  support, boiler - Q72-T09  repair Q72-T07  repair Q72-T07  repair Q72-T07  repair Q72-T08  support, boiler - Q72-T09  repair Q72-T09  repair Q72-T09  repair Q72-T07  repair Q72-T08  support, boiler Q72-B04  flictic ded combustion boilers Q72-B04	semiconductor wafer charging		iron	X27-D03
Static induction thyristor - see Thyristor, static induction transistor - see Field effect transistor   U12-D0185		U11-C10		Q72-U16
Static induction thyristor - see Thyristor, static induction         W04-X01A5A         vehicle         Q72-U03           Static induction         U12-D01B5         Steam turbine power plant         X11-A           Static induction transistor         U12-D02C         Steam turbine power plant         X11-A01C           blades         X11-A01C         blades         X11-A01C           Static memory         T01-H01B3B         carbon capture arrangement         X11-A08           astic UPS         U24-J         control         X11-A01C           Static VAR compensation         X12-H01AD         control         X11-A01C           Statistical analysis by computer         X27-A02C         filters, chimney-smoke         X11-A01C           Statistical metering         At 1-A02D         environmental protection         X11-A09           data networks         W01-A06A3         generation         X11-A09           statistical metering         W04-M07A         generators, steam         X11-A09           data networks         W01-C02A1A         generators, steam         X11-A09           flue gas desulphurisation         X11-A01C         generators, steam         X11-A01A           casing, boiler -         Q72-T05         manufacture         X11-A01A           chimney	Static exercise bicycle	P36-A06	turbine, ship	
Static induction thyristor - see Thyristor, static induction induction U12-D0185  Static induction transistor - see Field effect transistor  U12-D02C  Static memory  magnetic T01-H0183R carbon footprint reduction X11-A08 casings X11-A011C conveyors, coal X11-A018 carbon footprint reduction X11-A08 casings X11-A011C conveyors, coal X11-A011C conveyors, co		W04-X01A5A	1.1	
Induction         U12-D0185         Static induction transistor - see Field effect transistor         Static induction transistor - see Field effect transistor         Static induction transistor - see Field effect transistor         Static memory         X11-A01A1 carbon capture arrangement carbon footprint reduction         X11-A08 carbon capture arrangement carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A08 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 carbon footprint reduction         X11-A01 A01 carbon footprint reduction         X11-A01 A01 carbon footprint reduction <th>Static induction thyristor - see Thyris</th> <th>stor, static</th> <th>venicle</th> <th></th>	Static induction thyristor - see Thyris	stor, static	venicle	
Static induction transistor - see Field effect transistor    VI12-D02C				
Static memory				
U12-D02C		a enect		
Static memory         Carbon footprint reduction         X11-A08           magnetic optical         T01-H01B3B optical         casings         X11-A01C x11-A01 x11-A01C control           Static UPS         U24-J X12-H01A2D         control         X11-A01C conveyors, coal         X11-A01C conveyors, coal         X11-A01C conveyors, coal         X11-A01C conveyors, coal         X11-A01C cooling         X11-A01C conveyors, coal         X11-A01         X11-A01         X11-A01         X11-A01         X11-A01         X11-A01         X11-A01         X11-A01		U12 D02C		
magnetic optical         T01-H01B3B T01-H01B3C control         casings control         X11-A01C control         X11-A10 conveyors, coal         X11-A01 conveyors, coal conveyors, coal         X11-A01 conveyors, coal conveyors, cal conveyors, cal conveyors, cal conveyors, cal conveyors, cal conveyors, cal convey in convey coal convey developing convey and convey developing convey developing convey developing convey developing convey developing convey developing convey developing convey developing convey developing convey developing control convey developing convey developing convey developing control convey developing		012-D02C		
static UPS  Static VAR compensation  Static VAR compensation  Statistical analysis by computer  Statistical metering  data networks  telephone exchanges  tolor, boiler- chimney  compressor  drum  dr		T04 1104 D2D		
Static UPS    U24-J   X12-H012B   Cooling   X11-A01C   Cooling   X11-A01C   Cooling   X11-A01C   Cooling   Cooling   X11-A01C   Cooling   X11-A01C   Cooling   Cooling   Cooling   X11-A01C   Cooling   Cooling   X11-A01C   Cooling   Cooling   X11-A01S   Cooling   Cooling   Cooling   X11-A01S   Cooling   X11	9		8	
Static VAR compensation X12-H01A2D  Stationery, personal - see Personal article	•		conveyors, coal	X11-A09
Static VAR compensation X12-H01A2D  Stationery, personal - see Personal article statistical analysis by computer  Statistical metering data networks telephone exchanges  W01-A06A3 telephone exchanges  W01-C02A1A  Stator  V06-M07A  Stator  V06-M07A  Steam generation casing, boiler - chimney compressor drum Gr22-T01 fire tubes fire tubes fire tubes fluid circulation frame, boiler - header head	Static UPS		cooling	X11-A01C
Stationery, personal - see Personal article statistical analysis by computer  Statistical analysis by computer  Statistical metering data networks telephone exchanges  W01-A06A3 telephone exchanges  W01-C02A1A  Stator  V06-M07A  Steam generation Casing, boiler - chimney Compressor Control W06-C01A1 Generators, steam X11-A09 Manufacture M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture Materials M11-A01 Moanufacture			electric power generation, appli	cation
statistical analysis by computer  Statistical metering  data networks telephone exchanges  W01-A06A3 telephone exchanges  W01-C02A1A  Stator  V06-M07A  Steam generation  Casing, boiler - chimney Compressor drum fire tubes fire tubes fire tubes fire rubes fire ackedanger flue gas desulphurisation for ship Control W06-C01A1 generators, steam X11-A09 layout X11-A01 X manufacture M11-A01 X materials M11-A01 X manufacture M11-A01 X manufacture M11-A01 X materials M11-A01 X manufacture	Static VAR compensation	X12-H01A2D		
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Statistical matering         Initial control         for ship control         Q24-E02C1 w06-C01A1 w06-C01A1 w06-C01A1 generators, steam         W06-C01A1 w11-A09 generators, steam         X11-A09 k11-A09 manufacture         X11-A09 manufacture         X11-A01X materials         X11-A01X materials         X11-A01A2 manufacture         X11-A01A2 manufacture         X11-A01A2 manufacture         X11-A01A2 manufacture         X11-A01X materials         X11-A01A2 manufacture         X		X27-A02C		
Statistical meteringcontrolW06-C01A1data networksW01-A06A3generators, steamX11-A09telephone exchangesW01-C02A1AmanufactureX11-A01StatorV06-M07AmaterialsX11-A01A2Steam generationQ72monitoringX11-A10casing, boiler - chimneyQ72-T11 compressorQ72-T11 protection, overspeedX11-A10BcompressorQ72-T01rotorsX11-A01AdrumQ72-T01rotorsX11-A01Bfire boxQ72-T02sealsX11-A01Bfire tubesQ72-T04shutting downX11-A10BfludsQ72-T04startingX11-A01Bfluid circulationQ72-T07statorsX11-A01Bframe, boiler - headerQ72-T05steam turbine generator, applicationheat exchangerQ72-T05testingX11-A01heat exchangerQ72-T07testingX11-A01heating methodQ72-AturbinesX11-A01insulationQ72-T07testingX11-A01maintenanceQ72-GturbinesX11-A01nozzleQ72-T07waste gas scrubbingX11-A08pumpQ72-T07waste gas scrubbingX11-A01Xtypes of boilersQ72-B01Steam turbine testingQ52fire-tube boilersQ72-B01fire-tube boilersQ72-B01fluidized bed combustion boilersQ72-B04	statistical analysis by computer	T01-J03		
data networks W01-A06A3 telephone exchanges W01-C02A1A  Stator V06-M07A  Steam generation Q72 monitoring X11-A09 casing, boiler - Q72-T05 chimney Q72-T11 compressor Q72-T01 firebox Q72-T02 fire tubes Q72-T04 flues Q72-T04 flues Q72-T05 flues Q72-T07 header Q72-T05 header Q72-T01 heat exchanger Q72-T01 heat exchanger Q72-T01 heating method Q72-A insulation Q72-T0 monitoring X11-A102 mountings X11-A10C protection, overspeed X11-A10B regulation by flow control X11-A10B seals X11-A018 shutting down X11-A10B stators X11-A018 stators X11-A018 stators X11-A018 stators X11-A018 stators X11-A018 steam turbine generator, application  Lesting X11-A10  steam turbine generator, application  Turbogenerator, application X11-A10A valve control X11-A10A valve control X11-A10A valve control X11-A018 steam turbine testing Q52 repair Q72-G support, boiler Q72-B01 support, boiler Q72-B01 fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B01 fluidized bed combustion boilers Q72-B04  Steel - see Metallurgy  Steam turbine testing Steel - see Metallurgy	Statistical metering			
telephone exchanges  W01-C02A1A  Stator  V06-M07A  Transparent	data networks	W01-A06A3		
Stator         V06-M07A         manufacture materials         X11-A01A2 materials         X11-A01A2 materials         X11-A01A2 x11-A01C monitoring         X11-A01A2 x11-A01C monitoring         X11-A01C x11-A01C mountings         X11-A01C x11-A01C mountings         X11-A01C x11-A01C protection, overspeed         X11-A01C x11-A01B regulation by flow control         X11-A01B x11-A01B regulation by flow control         X11-A01A2 x11-A01B regulation by flow control         X11-A01A2 x11-A01B regulation by flow control         X11-A01A2 x11-A01B regulation by flow control         X11-A01A2 x11-A01B regulation by flow control         X11-A01A2 x11-A01A x11-A01A regulation by flow control         X11-A01A2 x11-A01A regulation by flow control         X11-A01A2 x11-A01A regulation by flow control         X11-A01A x11-A01A regulation by flow control         X11-A01A x11-A01A regulation by flow control         X11-A01A x11-A01A regulation protection, overspeed x11-A01A regulation by flow control         X11-A01A x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01A regulation protection, overspeed x11-A01B regulation protection, overspeed x11-A01B regulation protection, overspeed x11-A01B r				
Steam generation Q72 monitoring X11-A10C casing, boiler - Q72-T05 mountings X11-A10C chimney Q72-T11 protection, overspeed X11-A10B regulation by flow control X11-A10B regulation by flow control X11-A10A firebox Q72-T02 seals X11-A01A fire tubes Q72-T04 shutting down X11-A10B flues Q72-T04 stators X11-A01B fluid circulation Q72-T07 stators X11-A01B frame, boiler - Q72-T05 header Q72-T01 heating method Q72-T01 heating method Q72-A tinsulation Q72-T10 mountings X11-A10B regulation by flow control X11-A10A ration by flow control X11-A01B stators X11-A01B statoring with the stators X11-A01B stators X11-A01B stators X11-A01B stators X11-A01B stators X11-A01B regulation by flow control X11-A01B statoring down X11-A10B statoring with the statory X11-A01B stators X11-A	, e		manufacture	X11-A01X
casing, boiler - Q72-T05 chimney Q72-T11 chimney Q72-T11 compressor Q72-T07 drum Q72-T01 firebox Q72-T02 fire tubes Q72-T04 flues Q72-T04 flues Q72-T04 flues Q72-T04 flues Q72-T07 frame, boiler - Q72-T05 header Q72-T05 heating method Q72-heating method Q72-A insulation Q72-T10 maintenance Q72-G nozzle Q72-T07 repair Q72-T07 repair Q72-T07 support, boiler - Q72-B fluidized bed combustion boilers Q72-B01 fluidized bed combustion boilers Q72-B01 frame, boiler - Q72-B fluidized bed combustion boilers Q72-B01 fluidized bed combustion boilers Q72-B04  mountings X11-A01C protection, overspeed X11-A10B regulation by flow control X11-A10A seals X11-A01A seals X11-A01B stators X11-A01B s			materials	
chimney Q72-T11 compressor Q72-T07 drum Q72-T01 firebox Q72-T02 fire tubes Q72-T04 flues Guid circulation Grame, boiler - header Heat exchanger heating method insulation maintenance Q72-T01 heating method insulation protection, overspeed X11-A10B regulation by flow control X11-A10A rotors X11-A01B seals X11-A01B starting X11-A10B Starting X11-A01B starting X11-A0B starting X11-A01B start			S .	
compressor drum Q72-T01 firebox Q72-T02 fire tubes Q72-T04 flues Q72-T04 fluid circulation frame, boiler - header Q72-T05 heating method insulation Maintenance Q72-T07 repair support, boiler - types of boilers fire-tube boilers fire-tube boilers fire-tube boilers firebox Q72-T01 frebox Q72-T02 godding flow control X11-A10A rotors X11-A01A seals X11-A01B starting X11-A10B stators X11-A10B stators X11-A01B stators x11-A0B stators x11-A01B stators				
drum Q72-T01 firebox Q72-T02 fire tubes fire tubes Q72-T04 flues Q72-T04 fluid circulation Q72-T07 frame, boiler - header Q72-T01 heat exchanger Q72-T09 heating method Q72-T0 insulation Q72-T10 maintenance Q72-G pump Q72-T07 repair Q72-T05 types of boilers G12-B01 fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04 fire tubes Q72-T02 Q72-T04 seals X11-A01A seals X11-A01B statring withing down X11-A10B stators X11-A01B stators X11-A01B statring withing down X11-A10B statring x11-A10B stators X11-A01B statring withing down X11-A10B stators X11-A01B statring withing down X11-A01B statring withing down X11-A10B statring withing down X11-A10B stators X11-A01B statring withing down X11-A10B stators X11-A01B stat				
firebox Q72-T02 fire tubes Q72-T04 fire tubes Q72-T04 flues Q72-T04 fluid circulation Q72-T07 frame, boiler - header Q72-T05 header Q72-T01 heat exchanger Q72-T09 heating method Q72-A insulation Q72-T10 maintenance Q72-G nozzle Q72-T07 repair Q72-T07 repair Q72-T05 fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  seals X11-A01B shutting down X11-A10B starting X11-A10B starting X11-A01B starting X11-A01B starting X11-A01B starting X11-A10B starting X11-A01B starting xX11-A01B starting xX11-A01B starting xX11-A01B starting xX11-A01B starting down X11-A01B starting xX11-A01B	•		=	
fire tubes Q72-T04 flues Q72-T04 fluid circulation Q72-T07 frame, boiler - Q72-T05 header Q72-T01 heat exchanger Q72-T09 heating method Q72-A insulation Q72-T10 maintenance Q72-G nozzle Q72-T07 repair Q72-T07 fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  shutting down X11-A10B starting X11-A01B				
flues Q72-T04 fluid circulation Q72-T07 frame, boiler - Q72-T05 header Q72-T01 heat exchanger Q72-T09 heating method Q72-A insulation Q72-T10 maintenance Q72-G nozzle Q72-T07 repair Q72-G support, boiler - Q72-B fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  starting X11-A10B stators X11-A01B starting X11-A01B starting X11-A01B stators X11-A01B starting X11-A01B				
frame, boiler - Q72-T05 header Q72-T01 heat exchanger Q72-T09 heating method Q72-A turbines X11-A01 insulation Q72-T10 maintenance Q72-G nozzle Q72-T07 repair Q72-T05 steam turbine generator, application X11-U01A testing X11-A10 turbines X11-A01 turbogenerator, application X11-A01 turbines X11-A01 valve control X11-A10A waste gas scrubbing X11-A08  Steam turbine testing Q52 S02-J01E X11-A01X  Steal - see Metallurgy  Steel - see Metallurgy			5	
header Q72-T01 heat exchanger Q72-T09 heating method Q72-A turbines X11-A01 insulation Q72-T10 turbogenerator, application X11-U01A maintenance Q72-G valve control X11-A0A nozzle Q72-T07 waste gas scrubbing X11-A08 pump Q72-T07 repair Q72-G support, boiler - Q72-T05 types of boilers Q72-B fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  X11-U01A testing X11-U01A X11-A01 valve control X11-A01A X11-A08 Steam turbine testing Q52 S02-J01E X11-A01X  Steel - see Metallurgy	fluid circulation	Q72-T07	stators	X11-A01B
heat exchanger Q72-T09 heating method Q72-A insulation Q72-T10 maintenance Q72-G nozzle Q72-T07 repair Q72-G support, boiler - types of boilers fire-tube boilers fluidized bed combustion boilers Q72-B04  heat exchanger Q72-T09 testing X11-A10 turbines X11-D01A valve control X11-A10A valve control V11-A10A valve control V11-A0A valve control V11-A10A valve control V	frame, boiler -		steam turbine generator, applica	
heating method Q72-A turbines X11-A01 insulation Q72-T10 turbogenerator, application X11-U01A waste gas scrubbing X11-A10A waste gas scrubbing X11-A08 pump Q72-T07 prepair Q72-G support, boiler - Q72-T05 types of boilers Q72-B01 fluidized bed combustion boilers Q72-B04  heating method Q72-A turbines X11-A01 X11-U01A valve control waste gas scrubbing X11-A08  Steam turbine testing Q52 S02-J01E X11-A01X  Steel - see Metallurgy				
insulation Q72-T10 turbogenerator, application X11-U01A waintenance Q72-G valve control X11-A10A valve control X11-A10A waste gas scrubbing X11-A08 Q72-T07 valve control X11-A08 Q72-T07 waste gas scrubbing X11-A08 Q52 S02-J01E support, boiler - Q72-T05 types of boilers Q72-B01 fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04			9	
maintenance Q72-G valve control X11-A10A vaste gas scrubbing X11-A08  pump Q72-T07 waste gas scrubbing X11-A08  Steam turbine testing Q52 S02-J01E Support, boiler - Q72-T05 types of boilers Q72-B fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  Table Control Walve control W11-A00A Steam turbine testing Q52 S02-J01E X11-A01X Steel - see Metallurgy				
nozzle Q72-T07 waste gas scrubbing X11-A08 pump Q72-T07 repair Q72-G support, boiler - Q72-T05 types of boilers Q72-B fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  X11-A08  Steam turbine testing Q52 S02-J01E X11-A01X  Steel - see Metallurgy				
pump Q72-T07 repair Q72-G support, boiler - Q72-T05 types of boilers Q72-B fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  Steam turbine testing Q52 S02-J01E X11-A01X  Steel - see Metallurgy				
repair Q72-G S02-J01E support, boiler - Q72-T05 types of boilers Q72-B01 fluidized bed combustion boilers Q72-B04  S02-J01E S02-J01E S11-A01X			9	
support, boiler - Q72-T05 types of boilers Q72-B fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  Steel - see Metallurgy	·		Steam turbine testing	
types of boilers Q72-B fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04  Steel - see Metallurgy				
fire-tube boilers Q72-B01 fluidized bed combustion boilers Q72-B04		Q72-B	Steel oo Met-II	V11-401V
	fire-tube boilers		Steel - see Metallurgy	
	fluidized bed combustion boiler	rs Q72-B04 Q72-B06		

Q72-B06

pulverized fuel boilers

Steering - see also Vehicle steering		Stereoscopic video camera	W04-M01L
electric vehicle, power steering	X21-A09	Sterilisation, domestic	X27-D10
motor vehicle, automatic steering	Q18-B07	mixed mode cleaning/sterilising	X27-D10 X27-D07
	X22-C05B	by use of transducers	V06-V04T
motor vehicle, four-wheel steering		Sterilisation, industrial	
	X22-C05A1	ultrasonic sterilisation	X25-H09A
motor vehicle, power steering	Q18-B06	by use of transducers	V06-V04T
tantin a famorabiala	X22-C05A	Sterilisation, medical	S05-G01
testing, for vehicle vehicle, mechanical	S02-J02A Q18-B	by heat, radiation, electricity	S05-G01B
vehicle, mechanical vehicle, steer-by-wire	X22-C05A3	by mechanical cleaning	S05-G01A
Steganography (data concealment)		by use of chemicals	S05-G01A
= = = = =	VVOT-AUSES	by use of transducers	V06-V04T
Stepping motor hybrid	V06-M05C	equipment maintenance	P34-G
permanent magnet	V06-M05B	mechanical aspects	P34-A
variable reluctance	V06-M05A	Stethoscope	
Stereolithography	X25-A08C1	acoustic	S03-E08G
•	723-A00C1	medical	S05-D01H
Stereophonic analog radio systems - see Stereo	nhonic	Still-picture	
(analog) broadcast systems	W02-E	electronic / digital camera	W04-M01B1
broadcast radio receiver demodu		processing, in facsimile or analog system	ous S06-K99D
	W03-B02C3	recording on video recording	300-K77D
general demodulator	U23-P05	equipment	W04-E20C5
digital radio systems	W02-D02	Still-picture display for TV receiver	
	W02-D05C	• • •	VV03-A13C
sound systems	W04-R01C	Stimulable phosphor medical imaging use	S05-D02A5C
TV receiver demodulator	W03-A03C1 W03-A12B1	medical imaging use	S06-K99X
TV systems - see <b>Television syste</b>		radiation image storage screen	V05-M01C1
		sheet for imaging	S03-E06B3
Stereophonic (analog) broadcast sy ARI	w02-E01B5	3 3	S03-E06H5C
radio	W02-E01B3	Stirling engine	X25-X08
RBDS/RDS	W02-E01B	STM - see Scanning Tunnelling Mici	roscope
TV sound	W02-F06B	Stock management	X25-F09
TV sound, SAP	W02-F06B5	<u> </u>	
Stereophonic decoder		Stone crusher	P41-A01 P41-V22
radio receiver	W03-B02C3	a	
radio receiver, novel decoder	W03-B02C3C	Stopwatch	S04-C03
TV receiver	W03-A03C1	Storage area network	T01-N02A2D
	W03-A12B1	Storage array	T01-H01B7
Stereophonic digital radio	14/00 500	Storage container, electronic comp	onent
broadcasting	W02-D02 W02-D05C	(general)	V04-X01A
a		Storage devices - see Digital static	stores
Stereophonic TV receiver	W03-A12B W03-A12B5		U14-A
audio aspects decoder	W03-A12B1	Storage heater, electric	X27-E01A4
		control	X27-E01A4
Stereoscopic computer display	T04-H06	Storage management	
Stereoscopic image creation	W04-N05C9	(control programs)	T01-F05E
Stereoscopic television system		(industrial stock control)	X25-F09
broadcast industrial	W02-F03B1	Storage rack, record carriers	T03-L01A
medical	W02-F03B3 S05-D	Storage systems	T01-J10C2
Medical	W02-F03B9	automated warehousing	X25-F07
Stereoscopic TV receiver		by type	T01-H03
autostereoscopic	W03-A12A	DASD interface	T01-C01A
filter-based spectacles	W03-A08E7C	disk	T01-H01B1
	W03-A12A	dynamic	T01-H01B1
shutter-based spectacles	W03-A08E7E	holograms	T01-H01B2
	W03-A12A	optical RAID	T01-H01B2 T01-H01B1A
	ļ	KAID	IUI-HUIBIA

shelves in warehouse	P27-A01	Studio lighting, photography	S06-B09
static	T01-H01B3	Stylus, recording	
vehicle mounted	Q14-F	capacitive	T03-C01
Storage tank image filing	X25-X T01-J05B2A	gramophone	V06-V04A3 W04-A02
Storage, information retrieval, data		Sub-critical reactor	X14-A09
processing	T01-J05B	Submerged-arc welding	X24-B05
Data and directory structure image archiving	T01-J05B2B T01-J05B2A	Subscriber equipment, telephone - s Telephone subscriber equipment	
Storage, semiconductor wafer	U11-F02A1	Subscriber services (telephone)	W01-C02B
Store and forward exchange		alarm call systems	W01-C02B8
data network	W01-A06G2	alarm monitoring	W01-C02B7B
facsimile	S06-K07C2B		W01-C05A
Stored program control telephone	exchange		W05-B05G
	W01-B02A1	automated directory enquiries automatic call distribution centre	W01-C02B7E W01-C02G3A
Stores (see also ROMs, RAMs)		call answering (centralised)	W01-C02G3A W01-C02B4
associative	T01-H03B	call barring	W01-C02B2G
	U14-A05	call diversion	W01-C02B2E
cache interleaved	T01-H03A T01-H03C	call forwarding	W01-C02B2L
semi-permanent	U14-A06	call holding	W01-C02B4A
Strain gauges	S02-A10F	call transfer caller ID transmission	W01-C02B2M W01-C02B3C
for pressure measurement	S02-F04B1	caller ID withholding	W01-C02B3E
using electrical/magnetic method	S02-A02	camp-on and call back	W01-C02B3A
	S02-A10F	centralised answering	W01-C02B4
using optical method	S02-A03 S02-A10F	centralised autodial	W01-C02B5
to measure deformation	S02-A10F	checking entitlement and ID conference call systems	W01-C02B6A W01-C02B1
to measure force	S02-F01C	denying access to services	W01-C02B1
Strained layer prodn., semiconduct	or devices	devices external to exchange	W01-C02B7
	U11-C03J7	graded service	W01-C02B6
Stranded conductors	X12-D02X	multimedia messaging service music on hold	W01-C02B7F W01-C02B4A
Straw (drinking -)	P27-B03	paging	W01-C02B7A
Streak tube	V05-D03E	Presence-Enhanced Contacts	W01-C02B2N
Streaming current detector	S03-E03C	reply dialling	W01-C02B5A
Streaming content		short messaging service successive ringing of extensions	W01-C02B7D W01-C02B2C
audio	T01-N01D1A	time-dependent call handling	W01-C02B2J
	W02-C06	voice mail	W01-C02B7C
	W02-K03	Subscription television	W02-F05A3
video	T01-N01D1B W02-F07M	access control	W02-F10N3
	W02-K03	archival storage of content primari	
Stress measuring, mechanical (see a		submitted by user ancilliary receiver equipment	W02-F10F W03-A16C
Force measurement)	S02-F01	billing arrangements	W03-A10C W02-F10N5
String musical instruments	P86-A03	billing according to user-determine	
played by plucking strings played using a bow	P86-A03E P86-A03C	of commercial message provisio F10N5A	on W02-
Strip handling	X25-F02	pay-per-view/billing	W02-F10A
control	T06-D08A	cocrocy	W02-F10N5 W02-F05A1
	X25-F02	secrecy security	W02-F10N
Strobe lamp control	X26-C01A	servers	W02-F10K
Stroke generator for VDU CRT displ	ay	storage systems	W02-F10K
-	T04-H01A1	two-way working	W02-F10
Stroke width pattern recognition	T04-D01	video-on-demand	W02-F10A1
Strongbox, for valuables	T05-L05A	video/audio descrambling system video/audio scrambling system	W02-F05A1B
Stud arc welding	X24-B05	video/addio scramoling system	W02-F10N1
Stud art welding	724-DUJ	1	

Substation for electric train/tram	X13-E03	connector, low power	V04-A10
	X23-A03	data ana araban	X12-D06
Substrate		data processing	T01-E05C
capacitive record carrier	T03-C01	magnet - see <b>Superconducting r</b>	X12-C05A
high grade ceramics, for IC packa		magnetic record carrier	T03-A01E
	U11-D01A	magnetic record carrier	T03-A06K
magnetic record carrier	U14-H03F T03-A01B1A	Superconducting circuits	U14-F02C
magneto-optical record carrier	T03-A01B1A	for analogue-digital converter	U14-F02C
manufacture, for hybrid circuits	U14-H04B	for digital-analogue converter	U14-F02C
multilayer ceramic	U14-H03F1	logic	U14-F02C
multilayer ceramic, manufacture	U14-H04F1	3 -	U21-C01F
multilayer ceramic, materials/struc	tures	Superconducting coil	X12-C05
	U14-H03F1	cooling	X12-C02A3
multilayer ceramic, with passive		cooling, cryostat	X12-C02A3A
components	U14-H03B2	energy storage	X12-C05
multilayer, for IC packages	U14-H03F		X12-H06
optical record carrier semiconductor device packaging	T03-B01A		X16-L
		manufacture	X12-C01D4
Substrate processing, isolation of IC	=	short circuit current limiter	X12-C05
	U11-C08		X13-C03B1
Substrate, semiconductor		Superconducting devices	U14-F02B
doping	U11-C02	cooling for	U11-D02C
	U11-C02J	electrode formation	U14-F02B U11-C05F6
inorganic insulating layer	U11-C05B	electrode formation	U14-F02B
inorganic insulating layer, non-silie		manufacture	U11-C18B9
semiconductor substrate large surface area deposition	U11-C05B8 U11-C01C	a.ra.adtare	U14-F02B
layer deposition	U11-C01	Superconductive FET	U12-D02A9
layer formation	U11-C05	using metal alloys	U14-F02B
organic insulating layer formation			U14-F02H
processing	U11-C	Superconducting electric machine	X11-H05
structures for layer deposition	U11-C01J8	Superconducting magnet	
thick/thin film material	U11-A05B	cooling	X12-C02A3
Successive approximation A-D conv	erter	cooling, cryostat	X12-C02A3A
	U21-A03B1	high power	X12-C05A
Successive ringing of telephone ext	ensions	low power	V02-E02X1
Successive iniging of telephone ext	W01-C02B2C	magnetic levitation, train	X23-A01A4
		manufacture	X12-C01D4
Suggester system, interactive broad head-end/server	wo2-F10Q3	Superconducting material	U14-F01
receiver/subscriber	W03-A18A5C	-1	X12-D06B
		electric screening	V04-U01A X12-D06B
Sulphur lamp	X26-A01B	electromagnetic screening	V04-U01A
Sunbed/lamp	S05-A03A	creed of hagnesie servering	X12-D06B
	X26	magnetic screening	V04-U01A
medical use	X27-A02A2 S05-A03A		X12-D06B
		metal alloy	U14-F01A5
Sundial	S04-A09		X12-D06B1
Super-resolution optics for recording		metal alloy, manufacture	U14-F01A1
magneto-optical recording	T03-D01C1E	. Madella a	X12-D06B1A
optical recording	T03-B02B6	nitrides	U14-F01B X12-D06B2
Super-resolution record carrier	T03-B01D4	organic	U14-F01B7
Supercomputer	T01-M06C	oxide material	U14-F01B5
Superconducting			X12-D06B2
antenna	W02-B08Q5	oxide material, manufacture	U14-F01B1
coil - see Superconducting coil	X12-C05	·	X12-D06B2A
connector, high power	X12-D06	Superconducting quantum interfer	ometer
	X12-G02X		U14-F02B
			5 <b>52</b> D

Superconducting thin film	Superconducting thick film	U14-F02A	IR, UV, laser	S05-B01
Disport	-	U14-H02	keyhole	S05-B05
deposition, CVD	Superconducting thin film	U14-F02A	location of instruments	S05-B04A
Minter   M			monitoring patient	S05-B04
Superconducting transmission line material material X12-D06A manufacture material X12-D06B manufacture x12-D06B manufacture x12-D06B material X12-D06B         simulation and education systems S05-B0 S05-B02 storage, for surgical apparatus p31-B S05-B02 storage, for surgical apparatus p31-B will ultrasonic using mechanical or electrical equipment p31-B s05-B03           Superconductor computer T01-M06E         W02-A08J         Superdittice, semiconductor layer deposition with turburs with with company with telephone keyboard switching element would (RF)           Surface area for porous				
Superconducting transmission line material material material material material x12-0064 manufacture material x12-0068         simulation and education systems 505-80 SO-802 storage, for surgical apparatus 205-802 storage, for surgical apparatus 205-802 using mechanical or electrical equipment 205-803 superconductor computer 701-M06E         W02-A08J         Superconductor computer 701-M06E         Superdiatice, semiconductor 101-C0136 structure 701-M06E         Supermarket trolley coin lock 105-H05A1 Supphy line noise suppression W02-H03         Supermarket trolley coin lock 105-H05A1 Supphy line noise suppression W02-H03         Suppression of interference at source 202-B04 measurement apparatus 801-J09 suppression of noise in radio receivers W02-G03B Surface acoustic wave device electrode formation 111-C05F6 electrode formation 111-C05F6 sonar work (see Resonator, electromechanical) actuators 1014-G actuators 1014-G actuators 1014-G actuators 1014-G actuators 1014-G actuators 1014-G actuators 1014-G actuators 1014-G work 1014-G actuators 1014-G work 1014-G actuators 1014-G work 1014-G actuators 1014-G work 1014-G actuators 1014-G work 1014-G actuators 1014-G work 1014-G	deposition, sputter	U14-F02A		
Superconductor   Number   Nu	·	X12-D06A	= · · · · · · · · · · · · · · · · · · ·	
Superconducting waveguide components				
Superconducting waveguide components         W02-A08J         SU-BOSADBJ         SUPPORTITION (SD-BOSA)				
Superconductor computer				
Superconductor computer	Superconducting waveguide compo		using mechanical or electrical equ	
Super conductor computer         101-Mode super deposition a tructure         Surround sound system         9 eneral year deposition structure         W02-R0162 TV system aspects         W02-R0163 TV receiver aspects         W02-R0163 TV receiver aspects         W03-R01C5 TV system aspects         W02-R0163 TV receiver aspects         W03-R01C5 TV system aspects         W02-R0163 TV receiver aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W02-R0163 TV receiver aspects         W03-R01C5 TV system aspects         W02-R0163 TV receiver aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01R0 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspects         W03-R01C5 TV system aspe		W02-A08J		
Supermarket volley coin lock   Visual variety	Superconductor computer	T01-M06E		303-003
Supermarket trolley coin lock 105-H05A1  Support	Superlattice, semiconductor			W04 D04 CE
Supermarket trolley coin lock         T05-H05A1         TV receiver aspects         W03-A1283           Supply line noise suppression         W02-H03         Support         Tof-H05A1         Supermarket trolley coin lock         TV receiver aspects         W03-A1283           Support         W02-B07A measurement apparatus         S01-J09         Surrescalar computer         S02-B11 open-water open-water open-water open-water open-water solded photographic         S02-B10 open-water open-water open-tographic         S02-B10 open-tographic         S02-B10 open-tographic         S02-B10 open-tographic         S02-B10 open-tographic         S03-B10 open-tographic		U11-C01J6		
Supermarket trolley coin lock         T05-H05A1         Superscalar computer         T01-M02C3           Supplot for fixed aerial measurement apparatus         W02-B07A measurement apparatus         S01-J09 photographic         502-B04 photographic         502-	structure	U12-E01B2		
Supply line noise suppression         W02-H03         Support         Surveying open-water         S02-B11 open-water         S02-B04 photographic         S02-B04 sold photographic         S02-B01 sold sold photographic         S02-B01 sold sold photographic         S02-B01 sold sold photographic         S02-B01 sold sold photographic         S02-B01 sold sold photographic         S02-B01 sold sold photographic         S02-B01 sold photographic         S02-B01 sold photographic         S02-B01 sold photogr	Supermarket trolley coin lock	T05-H05A1	'	
Support for fixed aerial measurement apparatus Suppression of interference at source Suppression of interference at source W02-H01 Suppression of noise in radio receivers W02-B07A photographic Surface acoustic wave device electrode formation U11-C05F6 lelectrode formation U11-C05F6 oscillator using U13-A01A1 resonators (see Resonator, electromechanical) oscillator using oscillator using oscillator using versionators (see Resonator, electromechanical) oscillator using oscillator using oscillator using oscillator using versionators (see Resonator, electromechanical) oscillator using oscillator u		W02-H03	_	
Suppression of interference at source   W02-B01			, ,	
Suppression of interference at source   W02-H01		W02 B07A		
Suppression of interference at source         W02-H01         Surpossion of noise in radio receivers         W02-G03B         Surface acoustic wave device electrode formation         U14-G         Surface acoustic wave device electrode formation         U14-G         Surface formation         W06-A05H3 testing         S02-B10         S00-B10         S00-B10         S00-B10         S00-B10         S00-B10         S00-B10         S00-B02X testing         S02-B10         S00-B02X testing         S02-B10         S00-B02X testing         S02-B10         S00-B02X testing         S00-B02X testing         S00-B02X testing         S00-B02X testing         S00-B02X testing         S01-B02X testing         S01-B02X testing         S02-B10         S00-B02X testing         S02-B10         S00-B02X testing         S00-B02X testing         S01-B02X testing         S01-B02X testing         S02-B02X testing         S02-B02X testing         S02-B02X testing         S02-B02X testing         S02-B02X testing         S02-B02X testing         S01-B02X testing			•	
Supression of noise in radio receivers W02-G03B  Surface acoustic wave device electrode formation U11-C05F6 U14-G W04-AC5F6 U14-G W11-C1889 U14-G W14-G  • •			S02-B04	
Surface acoustic wave device electrode formation U11-C05F6 U14-G U14-G U11-C1889 U14-G Oscillator using U23-A01A1 resonators (see Resonator, electromechanical) actuators V06-M06D Surface area of porous materials Surface conduction cathode - see cold cathode Surface mounting capacitors resistors V01-A02D semiconductor package U11-D01A3 Surface tension measurement Surface tension measurement Surface area of yorous materials Surface tension measurement Surface area of yorous materials Surface mounting capacitors resistors V01-A02D semiconductor package U11-D01A3 Surface tension measurement Surface tension dealure Surface tension measurement				
testing	Suppression of noise in radio receiv	rers W02-G03B		
Susceptibility measurement   S01-E02X	Surface acoustic wave device	U14-G		
manufacture U11-C18B9 U14-G SVC X12-H01A2D SVC X12-H01A2D TSC X12-H01A2D thyristor-controlled reactor X12-H01A2D Surface area of porous materials S03-F06B Swimming (sport and leisure) P36-A03 W04-X01K3J Surface flatness measurements for semiconductor wafer U11-F01A3 Surface mounting capacitors V01-B03C5 resistors V01-B03C5 resistors V01-A02D Semiconductor package U11-D01A3 Swimming pool alarm W05-B07J1 Swimming trunks P21-D Swirf flowmeters S02-C01A9 Sourface tension measurement S03-F04 Switch W11-D01A3 Sourface tension measurement S03-F04 Switch W11-D01A3 Sourface tension measurement S03-F04 Switch Silicon carbide X13-C03A2 SF6 X13-C03A2 SF6 X13-C03A2 SP6 X13-C03A3 silicon carbide X13-C03A2 SP6 X13-C03A3 silicon carbide X13-C03A3 Spark gap X12-F01A Material Spark gap X13-C03A1 Superconducting X13-C03A Superco	electrode formation	U11-C05F6	<u> </u>	
oscillator using U23-A01A1 TCR X12-H01A2D TSC X12-H		-		
oscillator using resonators (see Resonator, electromechanical) v06-V01E1 actuators v06-M06D	manufacture		testing, for vehicle	S02-J02A
resonators (see Resonator, electromechanical) V06-V01E1 actuators V06-M06D TSC TSC X12-H01A2D thyristor-controlled reactor X12-H01A2D thyristor-switched capacitor X12-H01A2D thyristor-switched capacitor X12-H01A2D thyristor-switched capacitor X12-H01A2D Surface area of porous materials S03-F06B Surface conduction cathode - see cold cathode  Surface flatness measurements for semiconductor wafer U11-F01A3 Swimming (sport and leisure) P36-A03 W04-X01K3J W04-X01K3J Swimming pool X25-X06 water treatment X25-H03 swimming pool alarm W05-B07J1 Swimming pool alarm W05-B07J1 Swimming trunks P21-D Swimming trunks P21-D Swirl flowmeters S02-C01A9 Sourface tension measurement S03-F04 Swirl flowmeters S02-C01A9 Sourface tension measurement S03-F04 Switch alarm, general switch W05-B10A contactless - see Proximity switch U21-B02C contacts type - see Switch with contacts V03-C SF6 X13-C03A1 fire alarm W05-B02D spark gap X12-F01A gas discharge tube V05-A03 X13-A04H proximity (electronic) - see Proximity switch U21-B02C optical w02-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01B8E Surgery Cleaning and maintenance of surgical apparatus P31-G		-	SVC	X12-H01A2D
electromechanical) actuators V06-V01E1 V06-M06D thyristor-controlled reactor X12-H01A2D thyristor-switched capacitor X12-H01A2D thyristor-switched capacitor X12-H01A2D thyristor-switched capacitor X12-H01A2D thyristor-switched capacitor X12-H01A2D Surface area of porous materials S03-F06B Swimming (sport and leisure) P36-A03 W04-X01K3J Surface conduction cathode - see cold cathode W04-X01K3J Surface flatness measurements for semiconductor wafer U11-F01A3 Swimming pool alarm X25-H03 water treatment X25-H03 water treatment X25-H03 swimming pool alarm W05-B07J1 Swirl flowmeters S02-C01A9 Swirl flowmeters S02-C01A9 Swirl flowmeters S02-C01A9 So2-G02X Surface tension measurement S03-F04 Switch alarm, general switch W05-B10A contactless - see Proximity switch U21-B02C contacts type - see Switch with contacts voll-alarm W05-B02D contacts type - see Switch with contacts fire alarm w05-B02D yaristor X13-C03A1 fire alarm gas discharge tube V05-A03 X13-C03A1 superconducting X13-C03A1 gas discharge tube V05-A03 X13-A04H proximity (electronic) - see Proximity telephone line W01-C08A yaristor X12-H01A2D thyristor-controlled reactor X12-H01A2D thyristor-switched capacitor X12-H01A2D w04-X01K3J W04-X01K3J		U23-A01A1	TCR	X12-H01A2D
actuators V06-M06D  Surface area of porous materials S03-F06B  Surface conduction cathode - see cold cathode  Surface flatness measurements for semiconductor wafer U11-F01A3  Surface mounting capacitors V01-B03C5 resistors V01-A02D semiconductor package U11-D01A3  Surgae arrester gas discharge tube V05-A05 X13-C03A spark gap X12-F01A Silicon carbide X13-C03A1 spark gap X12-F01A superconducting telephone line W01-C08A varistor X12-M04 X13-C03A  Surge protection X12-H01A2D thyristor-switched capacitor X12-H01A2D W04-X01K3J  Swimming (sport and leisure) P36-A03 W04-X01K3J  Swimming pool X25-X06 water treatment X25-H03 water treatment A25-H03 water t	•	1/07/1/04/54		X12-H01A2D
Surface area of porous materials S03-F06B Surface conduction cathode - see cold cathode Surface flatness measurements for semiconductor wafer U11-F01A3 Surface mounting capacitors V01-B03C5 resistors V01-A02D semiconductor package U110-D01A3 Surface tension measurement S03-F04 Surge arrester gas discharge tube V05-A05 X13-C03A silicon carbide Spark gap X12-F01A superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 superconducting X13-C03A1 telephone line W01-C08A varistor X12-A X13-C03A Surge protection S05-B cleaning and maintenance of surgical apparatus P31-G	,		,	
Surface conduction cathode - see cold cathode  Surface flatness measurements for semiconductor wafer  Surface mounting			-	X12-H01A2D
Surface flatness measurements for semiconductor wafer U11-F01A3  Surface mounting  capacitors V01-B03C5 resistors V01-A02D semiconductor package U11-D01A3  Surface tension measurement S03-F04  Surge arrester gas discharge tube V05-A05 X13-C03A silicon carbide Spark gap X12-F01A superconducting telephone line W01-C08A varistor X13-C03A  Surge protection X13-C03  Swimming pool x25-X06 water treatment X25-H03 swimming pool alarm W05-B07J1  Swimming trunks P21-D  Swimning trunks P21-D  Swimning trunks P21-D  Swirt flowmeters S02-C01A9 S02-C01A9  Switch  Sonactless - see Proximity switch U21-B02C contacts type - see Switch with contacts  V03-C Sonacts type - see Switch with contacts  Fire alarm S05-BOD gas discharge tube V05-A03  X13-A04H  Surge protection X13-C03A  Surgery S05-B  Cleaning and maintenance of surgical apparatus P31-G  Swingery S05-B  vehicle application waveguide (RF)  W02-A04A			Swimming (sport and leisure)	
semiconductor waferU11-F01A3water treatment swimming pool alarmX25-H03 swimming pool alarmSurface mounting capacitors resistors semiconductor packageV01-B03C5 V01-A02D semiconductor packageSwimming trunks Swirl flowmetersP21-DSurface tension measurementS03-F04Swirl flowmeters\$02-C01A9 \$02-G02XSurge arrester gas discharge tubeV05-A05 X13-C03A Silicon carbide spark gapX13-C03A2 X13-C03A1 X13-C03ASwitchSilicon carbide spark gap varistorX13-C03A1 X13-C03A1 X13-C03A1fire alarm gas discharge tubeV05-A03 X13-C03Asuperconducting varistorX13-C03B1 X13-C03Aproximity (electronic) - see Proximity switchV02-C04A6 telephone cradle (mechanical)Surge protectionX13-C03telephone keyboard switching elementSurgery cleaning and maintenance of surgical apparatus P31-GV05-A0AA X13-G03	Surface conduction cathode - see co	old cathode		W04-X01K3J
Surface mounting capacitors V01-B03C5 resistors V01-A02D semiconductor package U11-D01A3  Surface tension measurement S03-F04  Surge arrester gas discharge tube V05-A05 SF6 X13-C03A4 silicon carbide X13-C03A2 spark gap X12-F01A superconducting telephone line W01-C08A varistor X13-C03A Surge protection X13-C03  Switch  Surge arrester alarm, general switch W05-B10A contactless - see Proximity switch U21-B02C contacts type - see Switch with contacts  Y03-C contacts type - see Switch with contacts  Y03-C SF6 X13-C03A1 spark gap X12-F01A gas discharge tube V05-A03 X13-A04H superconducting X13-C03A1 superconducting X13-C03B1 telephone line W01-C08A varistor X12-A coptical W02-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01B8E Surgery S05-B vehicle application X22-N waveguide (RF) W02-A04A			= =	
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resistors semiconductor package U11-D01A3  Surface tension measurement S03-F04  Surge arrester gas discharge tube V05-A05 metal oxide X13-C03A2 silicon carbide X13-C03A1 spark gap X12-F01A superconducting X13-C03A1 superconducting telephone line W01-C08A varistor X12-A varistor X13-C03  Switch  alarm, general switch W05-B10A contactless - see Proximity switch U21-B02C contacts type - see Switch with contacts  if re alarm W05-B02D gas discharge tube V05-A03	Surface mounting		31	W05-B07J1
Surface tension measurement  Surge arrester gas discharge tube  V05-A05 X13-C03A metal oxide SF6 X13-C03A2 silicon carbide spark gap X12-F01A superconducting telephone line varistor  X13-C03A  Surface tension measurement  S03-F04  Switch alarm, general switch Contactless - see Proximity switch U21-B02C contacts type - see Switch with contacts  V03-C X13-A  X13-C03A1 fire alarm W05-B02D gas discharge tube V05-A03 X13-C03A  gas discharge tube V05-A03 X13-A04H gas discharge tube V05-A03 X13-A04H proximity (electronic) - see Proximity switch U21-B02C optical y002-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01A telephone keyboard switching element W01-C01B8E V22-N vehicle application waveguide (RF) W02-A04A	capacitors	V01-B03C5	Swimming trunks	P21-D
Surface tension measurement  Surge arrester  gas discharge tube  V05-A05  X13-C03A  metal oxide  SF6  X13-C03A2  spark gap  X12-F01A  superconducting telephone line varistor  X13-C03A  Surge protection  Switch  alarm, general switch Contactless - see Proximity switch U21-B02C  contacts type - see Switch with contacts  V03-C  X13-A  Surge protection  X13-C03A1  fire alarm y05-B02D  gas discharge tube V05-A03 X13-A04H  gas discharge tube V05-A03 X13-A04H  proximity (electronic) - see Proximity  switch U21-B02C  optical proximity (electronic) - see Proximity  telephone cradle (mechanical) W01-C01A  telephone keyboard switching element W01-C01B8E  vehicle application W02-A04A  R31-G		V01-A02D	Swirl flowmeters	S02-C01A9
Surge arrester gas discharge tube  V05-A05 X13-C03A  metal oxide SF6 X13-C03A2 spark gap X12-F01A superconducting telephone line varistor  X13-C03A  Surge protection  Surgery cleaning and maintenance of surgical apparatus P31-G  Avasca discharge tube V05-A05 contactless - see Proximity switch U21-B02C contacts type - see Switch with contacts V03-C contacts type - see Switch with contacts  W05-B02C contacts type - see Switch with contacts  W05-B02C contacts type - see Switch with contacts  Fire alarm gas discharge tube V05-A03 X13-A04H gas discharge tube V05-B02D gas discharge tube V05-A03 X13-A04H sproximity (electronic) - see Proximity switch U21-B02C optical V02-C04A6 telephone cradle (mechanical) V01-C01B8E Vehicle application W01-C01B8E Vehicle application W02-A04A	semiconductor package	U11-D01A3		S02-G02X
gas discharge tube	Surface tension measurement	S03-F04	Switch	
gas discharge tube	Surge arrester		alarm, general switch	W05-B10A
metal oxide X13-C03A2 SF6 X13-C03A3 silicon carbide X13-C03A1 spark gap X12-F01A superconducting X13-C03A1 superconducting X13-C03B1 telephone line W01-C08A varistor X12-A Surge protection X13-C03 Surgery S05-B cleaning and maintenance of surgical apparatus P31-G		V05-A05	contactless - see Proximity switch	1U21-B02C
SF6 X13-C03A3 silicon carbide X13-C03A1 spark gap X12-F01A superconducting X13-C03A1 superconducting X13-C03B1 telephone line W01-C08A varistor X12-A x13-C03A  Surge protection X13-C03 Surgery S05-B cleaning and maintenance of surgical apparatus P31-G  X13-C03A  fire alarm W05-B02D gas discharge tube V05-A03 X13-A04H spar discharge tube V05-A03 X13-C03 X13-C03A  proximity (electronic) - see Proximity switch U21-B02C optical W02-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01B8E vehicle application X22-N waveguide (RF) W02-A04A		X13-C03A	contacts type - see <b>Switch with co</b>	ntacts
silicon carbide X13-C03A1 spark gap X12-F01A x13-C03A  superconducting X13-C03B1 telephone line W01-C08A varistor X12-A X13-C03A  Surge protection X13-C03  Surgery S05-B cleaning and maintenance of surgical apparatus P31-G  Silicon carbide X13-C03A1 fire alarm W05-B02D gas discharge tube V05-A03 X13-A04H spark gap V15-A03 X13-C03A x13-C03A proximity (electronic) - see Proximity switch U21-B02C optical W02-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01B8E vehicle application X22-N waveguide (RF) W02-A04A	metal oxide			
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X13-C03A superconducting X13-C03B1 telephone line W01-C08A varistor X12-A Varistor X13-C03A  Surge protection X13-C03  Surgery S05-B cleaning and maintenance of surgical apparatus P31-G  X13-C03A  proximity (electronic) - see Proximity switch Optical W02-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01B8E vehicle application X22-N waveguide (RF) W02-A04A				
superconducting X13-C03B1 telephone line W01-C08A varistor X12-A Varistor X13-C03A  Surge protection X13-C03  Surgery S05-B cleaning and maintenance of surgical apparatus P31-G  proximity (electronic) - see Proximity w02-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01B8E vehicle application X22-N waveguide (RF) W02-A04A	spark gap		gas discharge tube	
telephone line W01-C08A varistor X12-A varistor X13-C03A  Surge protection X13-C03  Surgery S05-B cleaning and maintenance of surgical apparatus P31-G  W01-C04A6 telephone cradle (mechanical) W01-C01A telephone keyboard switching element W01-C01B8E vehicle application X22-N waveguide (RF) W02-A04A				
varistor X12-A optical W02-C04A6 X13-C03A telephone cradle (mechanical) W01-C01A  Surge protection X13-C03 Surgery S05-B vehicle application X22-N cleaning and maintenance of surgical apparatus P31-G  varistor X12-A telephone cradle (mechanical) W01-C01A  telephone keyboard switching element W01-C01B8E  wehicle application X22-N waveguide (RF) W02-A04A			•	-
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Surge protection X13-C03 telephone keyboard switching element  W01-C01B8E  W01-C01B8E  vehicle application X22-N waveguide (RF) W02-A04A	varistor			
Surgery S05-B vehicle application W22-N vehicle application waveguide (RF) W01-C01B8E X22-N W02-A04A				
cleaning and maintenance of surgical apparatus P31-G  vehicle application waveguide (RF)  Vehicle application W02-A04A	Surge protection	X13-C03	telephone keyboard switching ele	
cleaning and maintenance of surgical apparatus waveguide (RF) W02-A04A P31-G			vehicle application	
P31-G	cleaning and maintenance of surg			
cryosurgery S05-B06				
	cryosurgery	SU5-BU6		

Switch with contacts		rocker	V03-C04
acceleration	V03-C06C		V03-C04 V03-C02
bimetallic	V03-C06B1	rotary	X13-A04C
	V03-C06C	seat switches	V03-B01E
centrifugal			
chain	V03-C03	selector	V03-E
contact thermometer	V03-C06B9	shape memory alloy	V03-C06B1
	V03-C09	shock switch	V03-C06C
contactor	X13-A04G	slide	V03-C01B
contactor, air gap	X13-A04G5A		X13-A04B1
contactor, electromagnetic	X13-A04G1	snap-action	V03-B03A
contactor, gas-insulated	X13-A04G5B		X13-A04A
contactor, vacuum	X13-A04G5C	speed	V03-C06C
cooling	V03-B06	switch-fuse	X13-B01
cord	V03-C03	testing	S01-G10
direction	V03-C06C		V03-C07
door switches	V03-B01D	thermal, fluid expansion/contr	raction V03-C06B9
door sensing edge	V03-B01C	thermal, solid	
electric field	V03-C06A	expansion/contraction/defle	ection V03-C06B1
explosion switch	V03-C09	thermostat, liquid expansion	V03-C06B9
explosively-actuated	X13-A04X	thermostat, solid expansion/d	eflection
float	V03-C06X	·	V03-C06B1
floor mat	V03-B01D	thyratrons	X13-A04H
flow	V03-C06D	tilt	V03-C06C
foot pedal	V03-B01B	time	V03-C08
fuse-switch	X13-B01	time-delay	V03-B03
gas-filled tubes	X13-A04H	unic delay	X13-A04A
humidity	V03-C06X	toggle	V03-C02B
inclination	V03-C06C	toggie	X13-A04C2
inertia	V03-C06C	tumbler	V03-C04
joystick	V03-C03A	tumblei	X13-A04D
keyboard	V03-C03A V03-C01A2	turn-knob	V03-C02A
knife switch	V03-C01A2 V03-C02B	vacuum tubes	X13-A04H
knob	V03-C02B V03-C02A	vibration	V03-C06C
KHOD	X13-A04C1		
level	V03-C06X	Switch with contacts, applicatio	
		alarms	V03-U15
lever	V03-C02B X13-A04C2	audio equipment	V03-U09
limit	V03-B01A	avionics	V03-U03B
			X13-U03
liquid contact	V03-C09		W06-C01C1
lockable	V03-C05	broadcasting	V03-U05
e C 11	X13-A04D	cameras	V03-U12
magnetic field	V03-C06A	control	V03-U16
manufacture	V03-C07	domestic	V03-U01
mat switches	V03-B01D	doors	V03-U18
membrane, single	V03-C01A1A	games	V03-U08
membrane, multiple	V03-C01A2A		V03-U17
MEMS switch	V03-C10	industrial	V03-U07
mercury contact thermometer	V03-C06B9		X13-U06
	V03-C09	information equipment	V03-U04
microswitch	V03-C10	instrumentation	V03-U13
micromachining for manufacture	V03-C07A	land vehicles	V03-U03A
nanoswitch	V03-C10A		X13-U01
NEMS switch	V03-C10A		X22-N
orientation	V03-C06C	lighting	V03-U11
position	V03-C06C	machine tools	V03-U06
pressure	V03-C06D	medical	V03-U10
programme	V03-C08	military	V03-U03D
pull switch	V03-C03	cary	X13-U05
pushbutton	V03-C01A	monitoring	V03-U16
•	X13-A04B2	personal	V03-U02
pushbutton, multiple	V03-C01A2	railways	X13-U02
pushbutton, single	V03-C01A1	Tallways	V03-U03E
reed switch	V03-C06A		VUJ-UUJL
	ı.		

robotics shipping	r supply	U24-E02B2
shipping V03-U03C x13-U04 signalling sports V03-U05 your telecommunication V03-U05 toys V03-U08 vehicles V03-U08 vehicles V03-U09 windows V03-U18 windows V03-U18 windows V03-U18 windows V03-U18 witch with contacts, details actuators V03-B02 casings antistatic arrangements V03-B04 arc control V03-B06B cooling X13-A03C casings V03-B04A cubicle type earth-pins earth-plates earthing dampers, vibration V03-B06 fluses, for switches V03-B04 minterlocking v03-B05 interlocking v03-B05 interlocking v03-B06 words v03-B05 interlocking v03-B09 latching V03-B09 latching V03-B09 latching V03-B09 locking V03-B09 manufacture words v03-B09 manufacture words v03-B09 mechanisms v03-B09 menufacture words v03-B09 mechanisms v03-B09 wiring voice setsing v03-C07 synchrodyne receivable testing v03-C07 Synchrodyne receivab	circuit	
signalling sports V03-U15 sports V03-U08 telecommunication V03-U08 telecommunication V03-U05 toys V03-U08 V03-U08 V03-U08 V03-U08 V03-U08 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U09 V03-U08 V03-U09 V03-U08 V03-U09 V03-U08 V03-U09 V03-U08 V03-U09 V03-U08 V03-U09 V03-U08 V03-U09 V03-U08 V03-U08 Cabinets cabinets cabinets cabinets cacings V03-U04 Cabinets Cooling V03-U04 Cabinets Cooling V03-U04 Cabinets Cooling V03-U04 Cabinets Cooling V03-U04 Cabinets Cooling V03-U04 Cabinets Cooling V03-U04 Cabinets Cabine		U24-G02B
sports         V03-U08 telecommunication         V03-U05 toys         V03-U05 toys         Switched reluctance           vehicles         V03-U03 vehicles         X22-N         Switched resistance           video equipment windows         V03-U09 vehicles         Switched resistance           video equipment windows         V03-U18 vehicles         Switched resistance           video equipment windows         V03-U18 vehicles         Switched resistance           video equipment windows         V03-U18 vehicles         Switched resistance           video equipment windows         V03-U18 vehicles         Switched resistance           video equipment windows         V03-U18 vehicles         Switched resistance           video equipment windows         V03-B02 vehicles         cabinets           ictruits         casings         cabinets           actuators         V03-B04 vehicles         cooling           corruits         cooling         Carangement           casings         Casings         Carangement           cooling         V03-B04 vehicles         cooling           colicle type         earth-plates           casings         Carangement           colicle type         earth-plates           coling         V03-B02 vehicles         fuse		U24-G04C1
telecommunication toys toys (V3-U05 toys (V3-U08 toys (V3-U08 vehicles (V3-U03 U3) X22-N (V3-U09 windows (V3-U18 tok) with contacts, details actuators (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B04 arc control (V3-B05 arc contracts - see Contacts (V3-B04 arc contracts - see Contacts (V3-B04 arc contracts - see Contacts (V3-B04 arc contracts - see Contacts (V3-B04 arc contracts - see Contacts (V3-B04 arc contracts - see Contacts (V3-B04 arc contracts - see Contacts (V3-B05 arc contracts - see Contacts (V3-B06 arc contracts - see Contacts (V3-B09 arc contracts - see Contacts (V3-B09 arc contracts - see Contacts (V3-B09 arc contracts - see Contacts (V3-B04 arc contracts - see Contacts (V3-B05 arc contracts - see Contacts (V3-B04 arc contracts - see Contact		U25-A01
wehicles V03-U08 V03-U08 V03-U08 V03-U09 V03-U		U25-A01
were included equipment volument volume	e motor	V06-M03
X22-N Windows V03-U09 Windows V03-U18 Windows V03-U18 Windows V03-B02 Windows W03-B04 W13-A03B W13-A03C W13-A03C W13-A03X W13-A03X W13-A03X W13-A03X W13-A03X W13-A03B W13-A03B W13-A03X W13-A03X W13-A03X W13-A03X W13-A03B W13-A03B W13-A03B W13-A03X W13-A03X W13-A03B W13-A03C W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W13-B06A W13-B09 W		X11-H01
Switchgear windows  Ch with contacts, details cituators  W03-B02 windows  W03-B04 windows  W03-B04 windows  W03-B06B wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B04 wintistatic arrangements  W03-B05 wintistatic arrangements  W03-B06A wintistatic arrangements  W03-B06A wintistatic arrangements  W03-B06A wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic arrangements  W03-B06 wintistatic  withing applied wintistatic arrangements  wintistatic arrangements  W03-B06 wintistatic  withing and wintis  withing ampliffier  withing and wintis  withing ampliffier  withing and wintis  withing angular  withing and wintis  withing and wintis  withing ampliffier  withing and wintis  withing and win		V01-A03C9
ch with contacts, details ictuators	network	VUI-AU3C9
ch with contacts, details ictuators intistatic arrangements ntististic arrange		
cabinets casings casings crouters (V03-B04 casings cooling (V03-B06B cooling (V03-B06B cooling (V03-B06B X13-A03C (V03-B04A cubicle type earth-pins earth-pins earth-plates earthing (V03-B06 (V		X13-E08
Antistatic arrangements V03-B04 cooling crounts v03-B04 cooling CT arrangement v03-B04 cooling CT arrangement v03-B04 cooling CT arrangement v03-B04 cubicle type earth-pins ear		X13-E04A
antistatic arrangements v03-B04 arc control v03-B06B v03-B04A v03-B04A v03-B04A v03-B04A v03-B04A v03-B04A v03-B04A v03-B04A v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B06 v03-B07 v03-B08 v03-B04 v03-B08 v03-B04 v03-B08 v03-B04 v03-B08 v03-B04 v03-B05 v03-B05 v03-B06 v03-B05 v03-B06 v03-B07 v03-B09 v03-B08 v03-B09 vo3-B09 v		X13-E02
cooling casings contacts - see Contacts cooling contacts - see Contacts cooling frameworks fuse arth-plates earth-plates of puards framevorae maintenace maintenace maintenace maintena		X13-E02
X13-A03C CT arrangement cubicle type earth-plates earth-plates earthing frameworks fuse arrangement guards interlocks maintenance microprocessors x13-A03B Illumination v03-B05 mosaic diagrams wooks v03-B05 mosaic diagrams wooks v03-B05 mosaic diagrams wooks v03-B06A panels x13-A03C pole manufacture wooking v03-B06A v03-B06A vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking v03-B06 vooking vooking vooking vooking v03-B06 vooking vo		X13-E04A
contacts - see Contacts  contacts - see Contacts  cooling	X13-E09	
x13-A03X contacts - see Contacts x13-A cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03B cooling x13-A03C cooling x13-A04F cooling x13-A04F cooling x13-A04F cooling x13-A04F cooling x13-A04F cooling x13-A04F cooling x13-A03A c	3	X13-E04
contacts - see Contacts		X13-E03B
x13-A cooling V03-B06 dampers, vibration V03-B09 drives V03-B02 drives V03-B04 drives V03-B05 drives V03-B05 drives V03-B05 drives V03-B05 drives V03-B05 drives V03-B05 drives V03-B05 drives V03-B05 drives V03-B05 drives V03-B06 dr		X13-E04
frameworks fuse arrangement v03-B06 drives v03-B02 drives v03-B02 drives v03-B04 drives v03-B04 drives v03-B04 drives v03-B04 drives v03-B04 drives v03-B04 drives v03-B04 drives v03-B04 drives v03-B04 drives v03-B05 drives v03-B05 drives v03-B05 drives v03-B05 drives v03-B05 drives v03-B05 drives v03-B06 drives v03-B06 drives v03-B09		X13-E04
dampers, vibration  Volable  V		X13-E04
drives V03-B02 guards interlocks maintenance was, for switches V03-B04 maintenance manufacture mousings V03-B04 microprocessors X13-A03X mimic diagrams monitoring mosaic diagrams monitoring mosaic diagrams v03-B05 mosaic diagrams monitoring please optical fibre sense optical fibre sense optical fibre sense monitoring wo3-B04 repair safety arrangement repair safety arrangement wo3-B09 please withous switchboard switchboards switchboards switchboards switchboards witchyards testing modular construction wo3-B02 wo3-B04 venting arc gase wiring safety arrangements wo3-B09 wiring safety arrangements wo3-B09 wiring safety arrangements wo3-B09 wiring safety arrangements wo3-B09 wiring safety arrangements wo3-B09 wiring safety arrangements wo3-B04 wenting arc gase wiring safety arrangements wo3-B04 wenting arc gase wiring safety arrangements wo3-B04 seals wo3-B04 seals wo3-B04 seals wo3-B04 seals wo3-B04 seals wo3-B04 seals wo3-B05 seals wo3-B05 switching seals wo3-B05 switching seals wo3-B05 switching seals wo3-B05 switching seals wo3-B05 switching seals wo3-B05 switching seals wo3-B05 switching seals wo3-B05 switching seals swi		X13-E01
x13-A03B interlocks maintenance manufacture microprocessors x13-A03X mimic diagrams monitoring mosaic diagrams nameplates optical fibre sense ocking v03-B04 y03-B05 y03-B06 y03-B09 y03-B04 y03-B04 y03-B05 y03-B04 y03-B05 y	its	X13-E04
parthing V03-B04 maintenance manufacture microprocessors v03-B04 microprocessors v03-B05 monitoring v03-B05 monitoring v03-B06 manufacture v03-B05 monitoring v03-B06 monitoring v03-B06 monitoring v03-B06 monitoring v03-B06 monitoring v03-B06 monitoring v03-B06 monitoring v03-B06 monitoring v03-B06 monitoring v03-B06 monitoring v03-B07 monitoring v03-B09		X13-E04
ruses, for switches rousings  V03-B04 rousings  V03-B04 rousings  V03-B04 rousings  V03-B05 rousings  V03-B05 rousings  V03-B05 rousings  V03-B05 rousings  V03-B05 rousings  V03-B05 rousings  V03-B05 rousings  Rousing  V03-B05 rousing  V03-B06A rousing  V03-B06A rousing  V03-B06A rousing  V03-B06A rousing  V03-B06A rousing  V03-B06A rousing  V03-B09 rocking  V03-B05 rocking  V03-B05 rocking  V03-B05 rocking  V03-B05 rocking  V03-B05 rocking  V03-B05 rocking  V03-B05 rocking  V03-B05 rocking  V03-B05 rocking  V03-B04 rocking rocking  V03-B05 rocking  V03-B04 rocking  V03-B04 rocking  V03-B04 rocking  V03-B04 rocking  V03-B04 rocking  V03-B04 rocking  V03-B05 rocking  V03-B04 rocking  V03-B05 rocking  V03-B04 V03-B05 rocking  V03-B04 V03-B05 V03-B04 V03-B05 rocking  V03-B05 V03-B06 V03-B0		X13-E04
mousings V03-B04A X13-A03X mimic diagrams mimic diagrams mimic diagrams monitoring v03-B05 mosaic diagrams nterlocking V03-B06A v03-B09 atching V03-B06A y13-A03C pole mounted uportication v03-B09 y13-A03C y13-A03C y13-A03C y13-A03B y13-A03B y13-A03B y13-A03B y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04F y13-A03B y13-A04B y13-A03B y13-A04B y13-A03B y13-A		X13-E08
Illumination V03-B05 monitoring mosaic diagrams monitoring mosaic diagrams nameplates optical fibre sense process v03-B09 panels v13-A03C pole mounted uportication v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B05 process v03-B02 process v03-B02 process v03-B02 process v03-B02 process v03-B02 process v03-B02 process v03-B02 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B09 process v03-B04 process v03-B04 process v03-B04 process v03-B04 process v03-B04 process v03-B04 process v03-B04 process v03-B04 process v03-B04 process v03-B04 process v03-B05 pr		X13-E08
Illumination V03-B05 molitoring mosaic diagrams nameplates v03-B05 v03-B06A v03-B09 v03-B06A v03-B09 v03-B06A v03-B09 v03-B06A v03-B09 v03-B09 v03-B06A v03-B09 v03-B06A v13-A03C v03-B09 v03-		X13-E08B
ndicators nterlocking knobs knobs knobs atching v03-B06A v03-B06A v03-B06A v03-B06A v03-B06A v03-B06A v03-B06A v03-B06A v03-B06A v03-B09 v03-B09 v03-B09 v03-B09 v03-B09 v03-B09 v03-B09 v03-B09 v03-B09 v03-C07 v03-C07 v03-C07 v03-B09 v03-B05 v03-B05 v03-B05 v03-B09 venting arc gase viring v03-B04 venting arc gase viring Switching data transmissio A06G2 electronic - see I Switching regulato Symbols v03-B05 v03-B05 v03-B05 v03-B05 v03-B05 v03-B04 Switching amplifier Switching regulato Synchrodyne receiv		X13-E01
nterlocking v03-B06A nameplates optical fibre sense atching v03-B06A y03-B06A panels panels pole mounted u PT arrangement ocking v03-B06A y03-B06A y03-B06A your pole mounted u PT arrangement ocking v03-B06A your pole mounted u PT arrangement repair safety arrangem SF6 based shutters substations, tran supervisory desk switchboards switchboards switchboards switchboards switchboards switchboards witchboards switchboards switchgands testing v03-B09 your pole would repair substations, tran supervisory desk switchboards switchboards switchgands testing v03-B01 transformer substations, tran supervisory desk switchboards switchboards switchgands testing v03-B04 yenting arc gase wiring safety arrangements v03-B04 your pole would be presented by v03-B04 your pole would be presented by v03-B04 your pole would be presented by v03-B04 your pole would be presented by v03-B04 your pole would be presented by v03-B05 your pole would be presented by v03-B05 your pole would be presented by v03-B06 your pole would by v0		X13-E08
crobs atching V03-B09 v03-B06A v13-A03C pole mounted upole	;	X13-E01
atching V03-B06A X13-A03C pole mounted upole		X13-E02 X13-E08A
x13-A03C pole mounted upon pole pole mounted upon pole pole pole pole pole pole pole pole	1015	X13-E00A X13-E01
evers ocking v03-B09 V03-B06A x13-A03C ubrication v03-B09 v03-B09 v03-B09 safety arrangement safety arrangement safety arrangement safety arrangement v03-C07 x13-A04F voa-B05 switchboards switchboards switchboards switchyards testing v03-B02 x13-A03B voa-B01 v03-C07 x13-A04F venting arc gase wiring safety arrangement v03-B09 voa-B09	nite	X13-E01
vocking V03-B06A X13-A03C safety arrangem SF6 based shutters substations, tran supervisory desk switchboards switchboards switchboards switchyards testing volumentaring parts V03-B09 X13-A04F venting arc gase wiring safety arrangements V03-B04 A06G2 electronic - see I spending seeting vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangements vol3-B05 Synchrodyne receing safety arrangement safety arrangem		X13-E03
x13-A03C safety arrangem SF6 based shutters substations, tran supervisory desk switchboards switchboards switchyards testing working parts v03-B09 wiring arc gase safety arrangements v03-B04 seals v03-B04 seating v03-B05 witching amplifies symbols v03-B05 switching amplifies safety arrangements v03-B05 switching amplifies safety arrangements v03-B05 switching safety arrangements v03-B04 v03-B04 seating v03-B05 seating v03-B05 switching amplifies safety arrangements v03-B05 switching amplifies safety arrangements v03-B05 switching regulato specific voice in the part of the par	)	X13-E04 X13-E08
ubrication V03-B09 SF6 based shutters substations, tran supervisory desk switchboards switchboards switchyards testing v03-B05 V03-B05 V03-B07 V03-B07 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B09 V03-B04 V03-B04 V03-B04 V03-B04 V03-B04 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 V03-B05 Synchrodyne receiv	onte	X13-E04
manufacture V03-C07 micromachining for manufacture V03-C07A markings V03-B05 mechanisms V03-B02 modular construction V03-C07 monitoring V03-C07 monitoring V03-C07 monitoring V03-C07 monitoring V03-B09 modular construction V03-B10 monitoring V03-C07 monitoring V03-C07 monitoring V03-B09 modular construction V03-B10 monitoring V03-C07 monitoring V03-B09 modular construction V03-B10 monitoring V03-B09 modular construction V03-B10 monitoring V03-B09 modular construction V03-B10 monitoring V03-B09 modular construction V03-B10 monitoring V03-B09 modular construction V03-B10 modular construction	71115	X13-E04 X13-E03C
x13-A04F substations, tran supervisory desk switchboards switchyards testing  modular construction woshering yosherating parts yoshedis safety arrangements seals yoshedis samples woshedis sesting yoshedis substations, tran substations, tran substations, tran supervisory desk supervisory desk switchboards switchyards testing which switching awitchyards testing testing yoshedis switchyards testing which samples switchyards testing testing yoshedis switchyards testing which samples switchyards testing testing yoshedis switchyards testing testing switchyards testing switchyards testing testing switchyards testing testing switchyards testing testing testing testing testing switchyards testing testing testing testing testing testing switchyards testing testing testing testing testing testing testing switchyards testing		X13-E04
micromachining for manufacture V03-C07A supervisory desk switchboards switchboards switchyards testing modular construction monitoring V03-C07 transformer subspectating parts V03-B09 wiring X13-A03A venting arc gase wiring X13-A03A safety arrangements V03-B09 data transmission A06G2 electronic - see I spansor action arrangements V03-B05 symbols v03-C07 synchrodyne receivisory desk switchboards switchboards switchyards testing witching testing switchyards testing switchyards testing switchyards testing testing switchyards	sformers	X13-E04 X13-E03
markings V03-B05 switchboards switchyards testing modular construction V03-B10 transformer subspectating parts V03-B09 wiring X13-A03A venting arc gase wiring X13-A03A safety arrangements V03-B09 data transmission A06G2 electronic - see I strap-action arrangements V03-B05 sesting V03-C07 switching regulato Symbols esting V03-C07 Synchrodyne receiv		X13-E03
mechanisms  NO3-B02 X13-A03B  modular construction  monitoring  NO3-B10  NO3-C07  X13-A04F  NO3-B09  X13-A03A  NO3-B09  X13-A03A  NO3-B09  X13-A03A  Switching  data transmissio A06G2 electronic - see I snap-action arrangements  NO3-B05  Switching amplifier  NO3-B05  Switching amplifier  Switching amplifier  Switching amplifier  Switching amplifier  Switching regulato  Switching amplifier  Switching regulato  Switching regulato	•	X13-E01
X13-A03B testing  modular construction V03-B10  monitoring V3-C07		X13-E01
modular construction monitoring  v03-B10  v03-C07  x13-A04F  venting arc gase viring  x13-A03A  vuring  x13-A03A  vuring  x13-A03A  vuring  x13-A03A  vuring  Switching data transmissio A06G2 electronic - see I  x13-A04A  vuring  Switching data transmissio A06G2 electronic - see I  x13-A04A  x13-A04A  ymbols esting  v03-B05  Switching amplifier  Switching regulato  Switching regulato  Switching regulato  Synchrodyne receiv		S01-G10
monitoring V03-C07 X13-A04F venting arc gase viring X13-A03A poushbuttons vafety arrangements voa-B09 venting arc gase viring X13-A03A Switching data transmissio A06G2 electronic - see I snap-action arrangements V03-B03A X13-A04A Symbols venting arc gase viring  Switching data transmissio A06G2 electronic - see I Switching amplifier Switching regulato Symbols esting V03-C07 Synchrodyne receiv		X13-E08
X13-A04F venting arc gase wiring  X13-A04F venting arc gase wiring  X13-A03A Switching  data transmissio  A06G2 electronic - see I  Symbols esting  X13-A04F venting arc gase wiring  Switching  A06G2 electronic - see I  Switching amplifier  A06G2 Switching amplifier  Switching amplifier  Switching amplifier  Switching amplifier  Symbols  Symbols  Synchrodyne receiv	tations	X13-E03
perating parts  V03-B09 X13-A03A Suitching data transmissio A06G2 electronic - see I snap-action arrangements  V03-B04 X13-A04A Symbols esting  V03-B05 Switching data transmissio A06G2 electronic - see I Switching amplifier Switching amplifier Switching regulato Switching regulato Switching regulato		X13-E03 X13-E09
X13-A03A  Suitching data transmissio A06G2 electronic - see I snap-action arrangements  Symbols esting  X13-A03A  V03-B09  data transmissio A06G2 electronic - see I Switching  Switching  Switching  Avisable  Avisable Av	-	X13-E04A
bushbuttons V03-B09 data transmission A06G2 seals V03-B04A electronic - see I smap-action arrangements V03-B03A X13-A04A symbols vosted V03-B05 Switching amplifier Symbols V03-B05 Synchrodyne receivable vosted V03-C07 Synchrodyne receivation arrangements V03-B05 Synchrodyne receivable vosted V03-B05 Synchrodyne vosted V03-B05		7.10 LU-7A
safety arrangements V03-B04 A06G2 seals V03-B04A electronic - see I snap-action arrangements V03-B03A X13-A04A X13-A04A symbols V03-B05 Switching amplifier symbols V03-C07 Synchrodyne receiv		1 14404
seals V03-B04A electronic - see I V03-B03A X13-A04A Switching amplifier Symbols V03-B05 V03-C07 Synchrodyne receivable.	າ, store and fc	orward W01-
snap-action arrangements V03-B03A X13-A04A Switching amplified Symbols V03-B05 Switching regulator Synchrodyne received Synchrodyne rec	-1	!a.b.!
X13-A04A Symbols V03-B05 Switching amplified Symbols V03-C07 Synchrodyne received Synchrodyne Synchrodyn S		itcning U21-B
symbols V03-B05 <b>Switching regulato</b> esting V03-C07 <b>Synchrodyne recei</b>	•	U24-G02E
esting V03-C07 Synchrodyne receiv	r	U24-E02B2
		3= : <b>20232</b>
X13-A04F broadcast	er.	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
time-delay arrangements V03-B03 communications	rocoiver	W03-B01A
X13-A04A TV	receiver	W02-G03A8 W03-A01B6
vibration damper V03-B09		VVUS-AUTBO

## P34-A02 **Synchronisation** Syringe, medical clock synchronisation in computer T01-K S05-J clock synchronisation (general) U22-H extraction from spectrum W01-A04B2 facsimile scanning system S06-D04A W01-A04 general data transmission general data transmission, with special signals W01-A04A general data transmission, without special signals W01-A04B general digital synchronisation U22-H integrated circuit U13-E04 jitter detection W01-A01C T01-F02C1 of processing task, computing phase/frequency U21-D processing task, computing T01-F02C1 television receiver W03-A06 time division multiplex W02-K02A Synchronising generator X12-H01B2A with network Synchronising, TV receiver detecting presence of signals W03-A06A1 extracting synchronising information W03-A06A recognising type of signals W03-A06A5 separation of vertical / horizontal information W03-A06C synchronising signal distribution W03-A06E **Synchronism-loss protection** X13-C01X Synchronous machine (see also Electric machine) brushless exciter X11-D03A S04-B06 clock or watch application cylindrical rotor X11-D02 hybrid V06-M01C X11-D05 interior permanent magnet V06-M01A1 X11-G01 linear machine X11-H02B non-linear machine X11-D rectifier U24-D04G rotary exciter X11-D03 salient-pole rotor X11-D01 X11-D04 static exciter V06-M01A with permanent magnet X11-G without permanent magnet V06-M01B X11-D **Synchros** V06-M06A **Synchrotron** V05-E03A X14-G02 generator V05-E03A X14-G02 Synchrotron orbital radiation Synthesiser systems for musical instruments W04-U03C Synthesiser, frequency - see Frequency synthesis Synthetic aperture radar W06-A04J Synthetic aperture sonar W06-A05J

Т		Tape cassette	
-		adaptor for different-size cassette	
TAB - see Tape automated bonding		cassette per se	T03-H01B
Table	P25-A	construction (of cassette per se)	T03-H01B3
main components of tables drawers	P25-A02 P25-A02C	container library systems	T03-L01A3 T03-Q01
legs and underframe	P25-A02C P25-A02B	loading with tape during manufac	
table top	P25-A02A	H01B8A	
types of tables	P25-A01	magnetic	T03-H01B
bedside table	P25-A01B	magneto-optical	T03-H01B
	P25-C01C	manufacture (of cassette per se)	T03-H01B8
billiard table	P25-A01X	optical	T03-H01B T03-H01B5
desk dining/breakfast table	P25-A01A P25-A01D	protective tape cover storage rack	T03-H01E3
game table	P25-A01X	tape travel indicator	T03-H01B9
garden table	P25-A01C		T03-J05A
ironing table	P25-A01X	Tape drive for computer data storage	e T03-A08E
sewing table	P25-A01X	Tape library storage systems	T03-Q01
table tennis table	P25-A01X	Tape operating mode control gener	
Table lamp	X26-E02	Tape recorder	ai 103-203
Table linen	P27-B03	audio - see Audio tape recorder	W04-B12
Table of contents recording indexing	ng	computer storage tape drive	T03-A08E
audio/video	W04-H01C	digital audio (DAT)	W04-B12G
general	T03-J01C	digital video	W04-B10G
user-recordable (UTOC)	T03-J01C1	video - see <b>Video tape recorder</b>	W04-B10
user-recordable (UTOC), audio vi	w04-H01C1	Tape travel	
Table medical	S05-D02E	measuring	T03-J05
Table, medical X-ray	S05-D02E S05-D02A6	Taper measurement	S02-A10D1
Table tennis	P36-A01	using optical measurements	S02-A03
Table terms	W04-X01K1T		S02-A10D1
Tablassass		Target position determination by ra	
Tableware	P27-B03	Target-seeking missile system	W07-A01C
Tachogenerator	V06-M06C	Tariff metering apparatus	S02-K08B
Tachograph vehicle	T05-G01 X22-E05	TASI	W02-K06
Tachometer		Task interaction	T01-F02C
vehicle	S02-B12A X22-E05	Task transfer	T01-F02A1
Tagging	7,22 E03	Taxi meter	T05-G01
packages	X25-F03A3C		X22-E05
RFID	T04-K03B		X22-P05
	W06-A04B5	TCR static VAR compensator	X12-H01A2D
RF details	W02-G05	TDD	W02-K02C
Tampon (feminine intimate care)	P32-A60	TDM - see Time division multiplex	W02-K02
Tandem solar cells	U12-A02A4C	TDM data transmission	W01-A03C
	X15-A02B	TDMA data transmission (general)	W01-A03C1
Таре	COO 4 04 4	TDMA data network access	W01-A06F1G
measure paper, punch or reader	S02-A01A T04-A01	TDMA satellite communication	W02-C03B1D
• • •			W02-K02D
Tape automated bonding carrier tapes	U11-E01B U11-D03A1B	Tea maker	X27-B01
TAB packages, for semiconductor		Teaching	P85-A
., is packages, ici ceimeenaacie.	U11-D01A1		W04-W
	U11-D01A3	arithmetic	P85-A01E
Tape carrier		biology braille	P85-A01G P85-A01C
capacitor	V01-B04E	chemistry	P85-A01G
electrolytic capacitor	V01-B01G	dentistry	P85-A01G
resistor	V01-A04J	game playing	P85-A01P
semiconductor device	U11-D03A1	languages	P85-A01L

	DOE 401E	DADD (a call to average a cover	
mathematics	P85-A01E	PAPR (peak to average power	M/02 C04D1
medicine	P85-A01G P85-A01J	ratio control)	W02-G04B1 W02-C03D
music	P85-A01G	point-to-point radio system	W02-C03D W02-C02A
physics physical education (PE)	P85-A01N	radiating cable system radio diversity	W02-C02A W02-C03A
reading or writing	P85-A01C	radio diversity	W02-G03A
science	P85-A01G	radio receiver	W02-G03 W02-C03B
spatial awareness	P85-A01A	radio repeater	W02-C03B W02-G05C
sport	P85-A01N	radio repeater	W02-G03C
veterinary medicine	P85-A01G	radio system	W02-G03
·		radio transcerver	W02-G01
Teaching using	P85-A	RFI suppression	W02-H01
models for demonstration	P85-A05	S/N ratio measurement	S01-D08B
	W04-W07C	satellite radio system	W02-C03B1
question and answer apparatus	DOE A07	SDMA	W02-K10
and systems	P85-A07 W04-W01	spread spectrum system	W02-K05
simulations	P85-A01P	SSB	W02-G04C
Simulations	W04-W07A	standby system (general)	W02-G08
		telephone - see <b>Telephone</b> , et se	qW01-C
Teddy bear (toy)	P36-E05	time-hopping systems	W02-K05A9
	W04-X03E5	tropospheric scatter system	W02-C03X
<b>TEGFET</b> - see Field effect transistor,	with	trunked radio	W02-C03C3G
heterostructure	U12-D02D2	ultrasonic system	W02-C07A
Telecine	S06-B05	ultrawideband (UWB)	W02-K05A9
	W04-M02	wide area network	W01-A06B5B
Telecommunications		Telecontrol - see Remote control	W05-D08C
bandwidth reduction (general)	W02-G04A	Telecontrol/telemetry, applications	
CDMA	W02-K05A7	Agriculture/livestock	W05-D07N
cellular radio	W02-C03C1	building control	W05-D07N
communications receiver	W02-G03	earth drilling and well logging	W05-D07H
connector - see Connector	V04-M30G	factory automation	W05-D07B
data network	W01-A06	home automation	W05-D07A
data transmission	W01-A	home bus system	W01-A06B1
direct-sequence SS	W02-K05A7	neme zacejetem	W01-A06B5A
EMC testing	S01-G08C		W05-D07A
equipment construction (general)	W02-G06	office automation	W05-D07E
frequency division multiplex	W02-K02	power generation and distribution	
frequency hopping spread spectru	ım	utility meter	W05-D07G
	W02-K05A6	vehicles	W05-D07D
frequency synthesizer, direct (DDS	) U23-F01	Telefax - see Facsimile	S06-K99D
frequency synthesizer, indirect (PL	L)		W05-A04C
	U23-D01B	Telegraphs, order	
hybrid FDM-TDM	W02-K07A	Telemetry	W05-D08E
hybrid spread spectrum	W02-K05A8	address allocation for sensors	W05-D02J
inductive loop system	W02-C02B	analogue	W05-D08A
ISDN	W01-C05B7	data network-based	W05-D06F
land mobile	W02-C03C	.1 1202 1 011 2	W01-A06
leaky cable system	W02-C02A	earth drilling and well logging	W05-D07H
LINCOMPEX	W02-G04B1	error correction	W05-D05
line system	W02-C01	general	W05-D08E
local area network	W01-A06B5A	hydraulic signal transmission	W05-D06M
meteor scatter system mobile radio	W02-C03X W02-C03C	mechanical signal transmission	W05-D06M W05-D06M1
mutichannel access mobile radio	W02-C03C3	mud pulse multiplex	W05-D06W1
near-field system	W02-C03C3 W02-C02	optical signal fibre transmission	W05-D02
noise measurement	S01-D08B	optical signal free-space transmiss	
noise suppression (at source)	W02-H	optical signal free-space transmiss	W05-D06A3
optical system	W02-C04	pneumatic signal transmission	W05-D06A3
orthogonal frequency division mul		radio signal transmission	W05-D06A1A
oranogonal nequency division mul	W02-K07C	radio telephone transmission	W05-D06G1A
orthogonal multiplexing	W02-K07E	remote electric meter reading	S01-B01
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selection aspects W05-D07F selection aspects W05-D07F selection aspects W05-D02J sensor address allocation W05-D08L signal format W05-D08L signal format W05-D08L security aspects W05-D08L security aspects W05-D08L telephone line signal transmission W01-C0583F transponder-based W05-D08G transponder-based W05-D08G ultrasonic signal transmission W05-D06A1 transponder-based W05-D08G ultrasonic signal transmission W05-D06A5 wireless sensor network W05-D06A5 wireless sensor network W05-D06A5 wireless sensor network W05-D06A5 alarms, centralised signalling W01-C05BA alarms, centralised signalling W01-C05BA alarms, centralised signalling W01-C05BA alarms, centralised signalling W01-C05BA connecting via radio or inductive links W01-B05 current supplies W01-C05BA distribution frame W01-B05A1A W02-C03C1A w02-C03C1A fourth generation telephone system W01-C08 general equipment/circuits W01-C08 indirect selection W01-B05 indirect selection	remote meter reading (general)			
selection aspects W05-D02 sensor network W05-D04 wof-5-D08E signal format W05-D08E signal format W05-D08B security aspects wof-5-D08E selephone line signal transmission w01-C0583F telephone line signal transmission W01-C0583F wireless sensor network W05-D06B1 transmission medium W05-D08 wof-5-D06B1 transmission medium W05-D08 wof-5-D06B1 transmission wof-5-D08B1 wireless sensor network W05-D08B1 wireless sensor network W05-D08B1 wireless sensor network W05-D08B1 wireless sensor network W05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w05-D08B2 wireless sensor network w06-D08B2 wireless sensor network w06-D08B2 wireless sensor network w06-D08B2 wireless sensor network w06-D08B2 wireless sensor	remote utility load measurement	X12-H04A		W01-D
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wireless sensor network W05-D06F1 W05-D08E  Telemotor (fluid-pressure actuator) C57-A  Telephone acoustic coupler alarms, centralised signalling W01-C058A W05-B08G anti-eavesdropping arrangements W01-C08A W05-B08G anti-eavesdropping arrangements W01-C08H application of telephone systems and apparatus w01-D02 cable installations W01-D02 cable installations W01-D03 call handling (subscriber equipment)  cellular system W01-B05A1A W02-C03C1A connecting via radio or inductive links W01-B05 current supplies W01-C07B direct mode radiotelephone system W01-B05A1D direct selection W01-B01 distribution frame W01-B05 current supplies w01-C08E exchange - see Telephone exchange echo cancelling w01-C08E fifth generation telephone system W01-C08E fifth generation telephone system W01-C08E inductive link systems w01-B05A1A W02-C03C1A inductive link systems w01-B05B instant messaging centres w01-C016F interconnection between switching centres w01-C03E7 key telephone system w01-C03E7 key telephone system w01-C03E7 key telephone system w01-C03E7 key telephone system w01-C03E7 key telephone system w01-C03E7 key telephone system w01-C03E5C				
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concentrator W01-B03A connecting via radio or inductive links W01-B05 current supplies W01-C07B direct mode radiotelephone system W01-B05A1D direct selection W01-B01 distribution frame W01-B20 echo cancelling W01-C08E equaliser w01-C02E facsimile, linked with S06-K07C8 fifth generation telephone system W01-B05A1A W02-C03C1L fourth generation telephone system W01-B05A1A W02-C03C1A w02-C03C1L gindirect selection W01-B05 inductive link systems w01-B05B instant messaging w01-C03 canter switching centres w01-C03 system w01-C03 system w01-C03B7 key telephone system W01-C02G5C	centralised answering		ringing (exchange equipment)	
connecting via radio or inductive links w01-C07B direct mode radiotelephone system w01-D05 with selection w1-B05A1D direct selection w01-B01 distribution frame w01-B20 echo cancelling w01-C08E equaliser w01-C08E exchange - see Telephone exchange w01-C08E fifth generation telephone system w01-B05A1A w02-C03C1L fourth generation telephone system w01-B05A1A w02-C03C1L general equipment/circuits w01-C08 indirect selection w01-B05B interconnection between switching centres w01-C03 interconnection without centralised switching w01-C05B7 key telephone system	<u> </u>		via sia s (sub socile su s suis se sot)	
current supplies w01-C07B direct mode radiotelephone system w01- B05A1D direct selection w01-B01 distribution frame w01-B20 echo cancelling w01-C08E equaliser w01-C02E exchange - see Telephone exchange w01-C02 facsimile, linked with S0-K07C8 fifth generation telephone system w01- B05A1A  w02-C03C1A w02-C03C1L fourth generation telephone system w01- B05A1A  w02-C03C1A general equipment/circuits w01-C08 indirect selection w01-B02 inductive link systems w01- instant messaging w01-C03 interconnection between switching centres w01-C03 interconnection without centralised switching w01-C05B7 key telephone system w01- B05A1A  w01-C03 interconnection without centralised switching w01-C02G5C  w01-C02D signalling (general) w01-C02 SLIC w01-C02 SLIC w01-C02D1 subscriber equipment - see Telephone subscriber equipment subscriber equipment subscriber equipment subscriber equipment telecontrol signal transmission w01-C05B3F w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G w05-D06G v05-D06G w05-D06G w05-D06G w05-D06G w05-D06G v05-D06G w05-D06G w05-D06G v05-D06G w05-D06G v05-D06G w05-D06G v05-D06G w05-D06G v05-D06G	connecting via radio or inductive li	nks W01-B05		
direct mode radiotelephone system W01-B05A1D direct selection W01-B01 distribution frame W01-B20 echo cancelling W01-C08E equaliser W01-C08E exchange - see Telephone exchange				
BISSAID direct selection distribution frame echo cancelling equaliser exchange - see Telephone exchange exchange indirect selection by 2-C03C1A general equipment/circuits indirect selection inductive link systems instant messaging interconnection between switching centres interconnection without centralised switching ISDN aspects (see also ISDN) w01-C025B7 SLIC W01-C025L Subscriber equipment - see Telephone subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C02D1 subscriber equipment - see Telephone w001-C05B3  W01-C05B3  W01-C086 telephone line type telephone system W01-Elephone system W01-C08G1 w01-C08G telephone interface circuit telecontrol signal transmission W01-C08G telephone wont-coad	direct mode radiotelephone system	m W01-		
distribution frame w01-B20 echo cancelling w01-C08E equaliser w01-C08E equaliser w01-C02E exchange - see Telephone exchange w01-C02 facsimile, linked with S06-K07C8 fifth generation telephone system w01-B05A1A w02-C03C1L fourth generation telephone system w01-B05A1A w02-C03C1L general equipment/circuits w01-C08 indirect selection w101-B05B instant messaging w01-C03 interconnection between switching centres w01-C03 interconnection without centralised switching switching centres w01-C03 interconnection without centralised switching switching w01-C03E key telephone system w01-C02G5C subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment subscriber equipment - see Telephone subscriber equipment - see Telephone wont-coopsal wont-coopsal characterior in telecontrol signal transmission w01-C05B3E telemetry signal transmission w01-C08G w05-D08C telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G w05-D08C telemetry signal transmission w01-C05B3E telemetry signal transmission w01-C05B3E w05-D08G w05-D08C telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08G telemetry signal transmission w01-C08				
distribution frame echo cancelling w01-C08E equaliser w01-C08E exchange - see Telephone exchange w01-C02  facsimile, linked with S06-K07C8 fifth generation telephone system w01-B05A1A w02-C03C1L fourth generation telephone system w01-B05A1A  general equipment/circuits w01-C08 indirect selection instant messaging interconnection between switching centres witching switching switching switching switching switching switching switching switching switching subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment - see Telephone subscriber equipment subscriber line interface circuit w01-C05B3E w05-D06G w05-D08C w05-D06G w05-D08C w05-D06G w05-D08C w05-D06G w05-D08E telemetry signal transmission w01-C08G w05-D08E telemetry signal transmission w01-C08G w05-D08E telemetry signal transmission w01-C08G w05-D08E telemetry signal transmission w01-C05B3F w01-C08C w05-D06G w05-D08E telemetry signal transmission w01-C08C w05-D08C w05-D06G w05-D08E telemetry signal transmission w01-C08C w01-C				
echo cancelling equaliser exchange - see Telephone exchange			subscriber equipment - see <b>Teleph</b>	
equaliser exchange - see Telephone exchange  W01-C02 facsimile, linked with S06-K07C8 fifth generation telephone system W01-B05A1A W02-C03C1L fourth generation telephone system W01-B05A1A  W02-C03C1L fourth generation telephone system W01-B05A1A  W02-C03C1L general equipment/circuits W01-C08 inductive link systems instant messaging centres w01-B05 interconnection between switching centres w01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C025C				
facsimile, linked with S06-K07C8 fifth generation telephone system W01-B05A1A W02-C03C1A W02-C03C1L fourth generation telephone system W01-B05A1A B05A1A  W02-C03C1A W02-C03C1A W02-C03C1H general equipment/circuits W01-C08 indirect selection wother link systems wo1-B05B interconnection between switching centres wo1-c03 interconnection without centralised switching wo1-C03 interconnection without centralised switching wo1-C04 ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C02G5C  W05-D06G W05-D06G W05-D08E telemetry signal transmission W01-C05B3F W05-D06G W05-D06G W05-D08E telemetry signal transmission W01-C05B3F W05-D06G Test elemetry signal transmission W01-C08G telemetry signal transmission W01-C08G W05-D06G W05-D06G W05-D06G Test elemetry signal transmission W01-C08G Test elemetry signal transmission W01-C08G W05-D06G W05-D06G W05-D06G Test elemetry signal transmission W01-C08G W05-D06G W05-D06G Test elemetry signal transmission W01-C08G Test elemetry signal transmission W01-C08G W05-D06G W05-D06G Test elemetry signal transmission W01-C08G W05-D06G W05-D06G Test elemetry signal transmission W01-C08G Test elemetry				W01-C02D1
facsimile, linked with  fifth generation telephone system  W01-B05A1A  W02-C03C1A  W02-C03C1L  fourth generation telephone system  W01-B05A1A  W02-C03C1L  fourth generation telephone system  W01-B05-D06G  W05-D06G  W05-D06G  W05-D06G  W05-D06G  W05-D06G  W05-D06G  W05-D06G  W05-D06G  W05-D06G  W05-D08C  telemetry signal transmission  W01-C08G  telephone line type  telephone line type  test equipment, general  W01-C08C  third generation telephone system  W01-B05A1A  W02-C03C1A  W02-C03C1A  W02-C03C1A  W02-C03C1A  W02-C03C1A  W02-C03C1A  W02-C03C1A  V02-C03C1A  W02-C03C1A  V02-C03C1A  V02-C03C1A  V02-C03C1A  V01-C08C  third generation telephone system  W01-C06G3  vehicle telephone  Virtual private network  voice-over-IP telephone system  wired telephone system  wired telephone system  wired telephone system  wired telephone system  wired telephone system  wired telephone system  wired prevention  W01-C08F1C	exchange - see Telephone exchai		telecontrol signal transmission	W01-C05B3E
fifth generation telephone system W01-B05A1A W02-C03C1L fourth generation telephone system W01-B05A1A  Fourth generation telephone system W01-B05A1A  W02-C03C1L w02-C03C1A w02-C03C1A w02-C03C1H w02-C03C1H w02-C03C1H w02-C03C1H w02-C03C1H w02-C03C1H indirect selection w1-B05B instant messaging w01-C01G6F interconnection between switching centres w01-C03 wiretap prevention without centralised switching w01-C04 lSDN aspects (see also ISDN) w01-C05B7 key telephone system w01-C02G5C  W01-B05A1A w02-C03C1A w02-C03C1A w02-C03C1A w02-C03C1A w02-C03C1B telephone line type w01-C08G test equipment, general w01-C08C third generation telephone system w01-C08C third generation telephone system w01-C08C third generation telephone system w01-C08G test equipment, general w01-C08C third generation telephone system w01-C08C third generation telephone system w01-C08G test equipment, general w01-C08C third generation telephone system w01-C08G toll-free calling vehicle telephone wiretap private network voice-over-IP telephone system wiretap prevention w01-C08F1C	faccionila limboral with			W05-D06G
W02-C03C1L fourth generation telephone system W01- B05A1A  W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1H general equipment/circuits W01-C08 indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C03C1A W02-C03C1A W02-C03C1A W01-C08C telephone line type W01-C08C telephone line type W01-C08C telephone line type W01-C08C toll-free calling W01-C06G3 vehicle telephone X22-K11 W01-C01D3B virtual private network W01-C03A voice-over-IP telephone system W01-C05B4C wiretap prevention W01-C08F1C	•			W05-D08C
W02-C03C1L fourth generation telephone system W01- B05A1A  W02-C03C1A W02-C03C1H general equipment/circuits W01-C08 indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C02G5C  W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1A W02-C03C1G third generation telephone system W01-B05A1A W02-C03C1A W01-C04 W01-C04 W01-C05B7 W01-C05B7 W01-C05B7 W01-C05B7	mui generation telephone system		telemetry signal transmission	
fourth generation telephone system W01-B05A1A  W02-C03C1A W02-C03C1H  general equipment/circuits W01-C08 indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C03C1A W02-C03C1A W02-C03C1A W02-C03C1G toll-free calling w01-C06G3 wehicle telephone wired telephone system w01-C05B4C wired telephone system w01-C08F1C wiretap prevention W01-C08F1C				
W02-C03C1A W02-C03C1H general equipment/circuits W01-C08 indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C02G5C  W02-C03C1A W02-C03C1A W02-C03C1G toll-free calling w01-C06G3 vehicle telephone W01-C06G3 vehicle telephone virtual private network wired telephone system W01-C05B4C wiretap prevention W01-C08F1C	fourth generation telephone system			
W02-C03C1A W02-C03C1H general equipment/circuits W01-C08 indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C02G5C  w02-C03C1A W02-C03C1A W02-C03C1G toll-free calling W01-C06G3 vehicle telephone  X22-K11 W01-C01D3B virtual private network W01-C03A voice-over-IP telephone system W01-C05B4C wired telephone system (general) W01-C08G1 wiretap prevention W01-C08F1C				
W02-C03C1H general equipment/circuits W01-C08 indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C02G5C  W02-C03C1A W02-C03C1G W01-C06G3 vehicle telephone X22-K11 W01-C01D3B vehicle telephone wireta network W01-C03A voice-over-IP telephone system W01-C05B4C wiretap prevention W01-C08G1 wiretap prevention W01-C08F1C	2007.1.7.1	W02-C03C1A		
general equipment/circuits W01-C08 indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C02G5C  W02-C03C1A W02-C03C1G W02-C03C1G W01-C06G3 vehicle telephone X22-K11 W01-C01D3B vehicle telephone yeticle telephone system W01-C03A voice-over-IP telephone system W01-C05B4C wired telephone system (general) W01-C08F1C				
indirect selection W01-B02 inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C02G5C  wol-G03 toll-free calling W01-C06G3 vehicle telephone X22-K11 W01-C01D3B vehicle telephone System W01-C01D3B vehicle telephone System W01-C03A voice-over-IP telephone system W01-C05B4C wired telephone system (general) W01-C08F1C	general equipment/circuits			
inductive link systems W01-B05B instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C02G5C  vehicle telephone X22-K11 W01-C01D3B virtual private network w01-C03A voice-over-IP telephone system W01-C08G1 wiretap prevention W01-C08F1C		W01-B02	tall free calling	
instant messaging W01-C01G6F interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C02G5C  W01-C01D3B W01-C01D3B virtual private network W01-C03A voice-over-IP telephone system W01-C05B4C wired telephone system W01-C05B4C wiretap prevention W01-C08G1	inductive link systems	W01-B05B		
interconnection between switching centres W01-C03 interconnection without centralised switching W01-C04 ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C02G5C virtual private network voice-over-IP telephone system W01-C05B4C wired telephone system (general) W01-C08F1C	instant messaging		verlicle telepriorie	
interconnection without centralised switching W01-C05B7 key telephone system W01-C05B7 key telephone system W01-C02G5C  voice-over-IP telephone system W01-C05B4C wired telephone system (general) W01-C08G1 wiretap prevention W01-C08F1C		9	virtual private network	
interconnection without centralised wired telephone system (general) W01-C08G1 wiretap prevention W01-C08F1C W01-C08F1C wiretap prevention W01-C08F1C				
ISDN aspects (see also ISDN) W01-C05B7 key telephone system W01-C02G5C wiretap prevention W01-C08F1C				
key telephone system W01-C02G5C	9			
			Is Is	
keypoard (subscriber equipment) WUT-CUTB8				
	keyboard (subscriber equipment)	AAO I-CO IRS		

Telephone exchange		reverse charging	W01-C06G5
ACD console	W01-C02C1	time control and indication	W01-C06C
attendant desk	W01-C02C	toll free calling	W01-C06G3
automatic call distribution centre	W01-C02G3A	9	
automatic exchanges	W01-C02	Telephone metering, subscriber-bas	
call answering (centralized)	W01-C02B4		W01-C01J
call centre	W01-C02G3B	Telephone subscriber equipment	W01-C01
call centre console	W01-C02C1	accessory ringer	W01-C01F1E
call holding	W01-C02B4A	acoustic coupler	W01-C05B3A
call forwarding	W01-C02B2L	acoustic feedback reduction	W01-C01C3E
call transfer	W01-C02B2M	ADSL interface	W01-C01L3
caller identification	W01-B03C	ambient noise level reduction	W01-C01C3C
central office type exchange	W01-C02G1	answering machine	W01-C01C5
centralized call answering	W01-C02B4	answering machine with dynamic	
centralized storage of user profile		recording	W01-C01C5A
centrex type	W01-C02G	answering machine with static reco	
characterised by exchange type	W01-C02G	ğ	W01-C01C5B
clock signal distribution	W01-B02X	anti-sidetone arrangements	W01-C01C3
common control logic	W01-B02A	application software ('apps')	W01-C01Q3E
concentrator	W01-B03A	audio DSP, non-speech	W01-C01Q6C
consoles	W01-C02C	audio DSP, speech	W01-C01C7
control of exchange	W01-C02A7	audio transducer	W01-C01M
distributed control systems	W01-B02X	autodialler	W01-C01B1
distribution	W01-B03A	automatic answering	W01-C01C5
exchange interface with external n	etwork	battery saving	W01-C01E5B
3	W01-C02D	, ,	W01-C01Q7
intelligent network	W01-C02A7A	Bluetooth® interface	W01-A07H2A
interactive voice response (IVR)	W01-C02B9		W01-C01R
ISDN exchange (see also <b>ISDN</b> )	W01-C05B7B	biometric ID-based security	W01-C01Q8C
least cost routing (LCR)	W01-C02A7		S05-D01C5A
location-based service	W01-C02B7L	built-in alarm clock	S04-B05
metering of calls - see Telephone	metering		W01-C01P9
	W01-C06	built-in audio player/recorder	W01-C01P6A
monitoring	W01-C02A		W04-G01B8
music on hold	W01-C02B4A	built-in broadcast radio receiver	W01-C01P6E
	W01-C05B5A		W03-B
Multimedia messaging service	W01-C02B7F	built-in broadcast TV receiver	W01-C01P6G
novel switching element	W01-B02		W03-A
PABX	W01-C02G5A	built-in digital camera	W01-C01P6C
PBX	W01-C02G5B		W04-M01B1
private exchange	W01-C02G5	built-in electronic ticket	W01-C01P9
personalized ringtone transfer	W01-C02B7H	built-in entertainment device	W01-C01P6
reception of ringing signal	W01-C02D5	built-in flashlight	W01-C01P9
reply dialling	W01-C02B5A		X26-E01
satellite exchanges, connection to		built-in game player	W01-C01P6L
Short messaging service	W01-C02B7D		W04-X02
SLIC	W01-C02D1	built-in medical monitor	W01-C01P8
space switching	W01-B02		S05-D01
stored program control (SPC)	W01-B02A1	built-in navigational receiver	W01-C01P7
subexchanges, connection to	W01-B03A		W06-A
subscriber line interface circuit	W01-C02D1	built-in PDA	T01-M06A1A
subscriber line testing	W01-C02A5	1 11 1 1	W01-C01P2
testing switch aspects of exchange		built-in video recorder	W01-C01P6J
time switching	W01-B07	11.1 119	W04-P01C8
transmission of ringing signal	W01-C02D3	call handling	W01-C01F8
user profile, centralized storage	W01-C02B7G	call handling, based on Caller ID	W01-C01F8A
Telephone metering, exchange-bas	ed	call handling, based on profile, e.g	
(W01-C02A7 also assigned)		Presence-Enhanced Contacts pr	
billing	W01-C06E		W01-C01F8C
least cost routing	W01-C06A	call screening	W01-C01F5
prepaid telephone services	W01-C06H	calling subscriber number display	
reduced rate charging	W01-C06G1	car telephone	W01-C01D3B W01-C01A3
	Ţ	casing	WUI-CUIA3

Telephone subscriber equipment (c	ontinued)	fourth generation (4G) mobile pho	one
cellular telephone	W01-C01D3	то и и домения ( то, и остория	W01-C01D3G
charging from battery	W01-C01E5C	gain control	W01-C01C1C
charging from generator	W01-C01E5D	· ·	
anarging nam ganarara	X16-G02C	GPRS phone	W01-C01G6G
charging from mains	W01-C01E5A		S06-K07C2A
charging wirelessly	W01-C01E5E	graphics and display processing	W01-C01Q6 W01-C01B1B
anarging in electry	X16-G03	hands free dialling	
comfort noise generator	W01-C01C7A	hands free kit, mobile phone	W01-C01G2C
conference telephone	W01-C01G5	hands free loudspeaker telephone	
confidential data protection	W01-C01Q8E	handset construction	V06-V04B1
construction	W01-C01A		W01-C01A3
construction, built into clothing	W01-C01A3G	haptic transducer systems	W01-C01G8E
construction, built into clothing	X27-A02B1	haptic signal processing	W01-C01Q6E
constructional details, casing/hand		headset	V06-V04A4
constructional details, casing/ham	W01-C01A3		V06-V04B
constructional details, internal	W01-C01A3 W01-C01A1		W01-C02G2C
control aspects (general)	W01-C01Q	hygiene arrangements	V06-V02J
control of transmit-receive gain	W01-C01C3A		V06-V04B1
cordless telephone	W01-C01C3A W01-C01D1		W01-C01A9
cover	W01-C01A6	i-mode handset	W01-C01D3C
cradle switch (mechanical)	W01-C01A0		W01-C01G6E
data protection	W01-C01Q8E	ID security, cellular telephone	W01-C01D3D
data protection  data streaming facility	W01-C01G6G	ID security, cordless telephone	W01-C01D1D
dialling by barcode reading	T04-A03B1	idle state determination	W01-C01Q7A
dialiling by barcode reading	W01-C01B1C	instant messaging	W01-C01G6F
dialling by voice recognition	W01-C01B1C W01-C01B1B	integrated with answering machin	
dialiling by voice recognition	W04-V04A	integrated with facsimile	W01-C01P4
dialling format detection (e.g. DP/		integrated with modem	W01-C01P5
dialiling format detection (e.g. Dr /	W01-C01B7	integrated with other equipment	W01-C01P
dialling information display	W01-C01B7 W01-C01B3	integrated with PDA	W01-C01P2
dialling module external to teleph		intercom	W01-C01G1
dialiling module external to teleph	W01-C01B1D	interfacing systems	W01-C01R
dialling pulse generator	W01-C01B1D W01-C01B2A	internal mounting of components	
dialling restricted by access code		ISDN (see also <b>ISDN</b> )	W01-C05B7A
dialling restricted by access code		ISDN subscriber end interface	W01-C01L1
dialing restricted by mechanical r	W01-C01B5D	key telephone set	W01-C01G3
dialling restricted by voice recogn		keyboard	V03-C01A2
didning restricted by voice recogn	W01-C01B5B		W01-C01B8
	W04-V04A	keyboard circuitry/coding	W01-C01B8M
dialling restricted to certain numb		keyboard construction	W01-C01B8C
araming recursion to contain marrie	W01-C01B5C	keyboard illumination	W01-C01B8G
dialling tone (e.g. MF) generator	W01-C01B2C	keyboard layout	W01-C01B8A
digital speech processing	W01-C01C7	keyboard switching element	W01-C01B8E
display, back lighting	W01-C01A2A	LCR, subscriber apparatus	W01-C01B4
display, back lighting	X26-U04A1	line holding arrangements	W01-C01N
display, calling subscriber numbe		line interface arrangements	W01-C01L
display, constructional aspects	W01-C01A2	loudspeaker type	W01-C01G2A
display, dialling	W01-C01B3	manufacture	W01-C01V
display, edge lighting	W01-C01A2A	memory storage	W01-C01Q2
alsplay, eage lighting	X26-U04A2	memory storage, internal	W01-C01Q2A
display, multiple display aspects	W01-C01A2C	memory storage, external	W01-C01Q2C
display, user interface	W01-C01B3	1	T01-H01B3A
dual band mobile phone	W01-C01D3J	menu-driven telephone	W01-C01G8A
email facility	W01-C0G6C	metering of calls	W01-C01J
external speaker mount	W01-C01A7	MMS telephone	W01-C01G6B
facsimile external switching interfa		multimedia apparatus	W01-C01P1
ideanine external switching interio	W01-C01H	Multimedia Message Service facili	ty W01-
	S06-K07C2A	C01G6B	W01 C010/
feedback control, haptic systems	W01-C01Q6E	multimedia signal processing	W01-C01Q6
fingerprint sensor	W01-C01Q5X	muting circuit, audio	W01-C01C1D
fixed location radio telephone	W01-C01Q3X W01-C01D4	muting ringer	W01-C01F1B

ephone subscriber equipment (c	ontinued)	transducer (earphone)	V06-V01
non-contact charging	W01-C01E5E		S05-D01C5
0 0	X16-G03		V06-V04B
operating system	W01-C01Q3C		W01-C01M
packet handling facility	W01-C01G6G	transducer (microphone)	V06-V01
personal handy phone (PHS)	W01-C01D1E		V06-V04A2
portable cell phone	W01-C01D3C		V06-V04B
power saving	W01-C01Q7		W01-C01M
power supply	W01-C01E	transducer (ringing)	W01-C01F1
program control aspects	W01-C01Q3	transducer testing	V06-V03B
protection of confidential data	W01-C01Q8E		V06-V04B1
pushbutton telephone set	W01-C01G3		W01-C01M
push to talk over packet network	W01-C01G6H	UMTS mobile phone	W01-C01D3
radiation protectn., construction for	or W01-C01A4	video telephone	W01-C01G4
recycling	W01-C01W	voice activated control	W01-C01Q
relative position input	W01-C01B8L		W04-V
repertory dialling	W01-C01B1	voice dialling	W01-C01B1
reply dialler	W01-C01B1E	WAP phone	W01-C01D3
ring tone/tune downloading	W01-C01F1P		W01-C01G
restricted dialling	W01-C01B5	wireless charging	W01-C01E5
ringer muting	W01-C01F1B		X16-G03
ringer timed disconnection	W01-C01F1C	WLL installation	W01-C01D4
ringer transducer	W01-C01F1A	Telephone systems (including comb	oination
ringer volume setting	W01-C01F1B	with other systems)	W01-C05
ringing, general	W01-C01F1	advertising	W01-C05B5
ringing, mechanical	W01-C01F1F		W05-E03G
ringing, optical	W01-C01F1G	alarm systems	W01-C05A
satellite	W01-C01D3E	,	W05-B05G
secure dialling	W01-C01B5	computer-telephony integration (	CTI) W01-
security based on biometric ID	W01-C01Q8C	C05B4A	•
•	S05-D01C5A	cordless call point system (e.g. CT	2) W01-
sensing acceleration of handset	W01-C01Q5G	B05A1B	·
sensing external devices	W01-C01Q5C		W02-C03C3
sensing orientation of handset	W01-C01Q5G	cordless subscriber system	W01-C01D1
sensing other users in vicinity	W01-C01Q5B	data streaming (via telephone syst	tem)
sensing proximity of user	W01-C01Q5A		W01-C05B3
sensing rotation of handset	W01-C01Q5G	dictation systems	W01-C05B5
short dialing	W01-C01B1A	direct mode radio	W01-B05A1
sixth generation (6G) mobile phor	ne W02-	entertainment systems	W01-C05B5
C03C1M		ENUM	W01-C05B4
smartphone	W01-C01G8S	facsimile	W01-C05B1
SMS telephone	W01-C01G6A	facsimile-modem	W01-C05B3
software updating / modification	W01-C01Q3A	fixed radio access	W01-B05A1
sound hood	W01-C01A7	information systems	W01-C05B5
speech amplifier	W01-C01C1	internet access	W01-C05B4
speech amplifier for earphone	W01-C01C1B	key	W01-C02G
speech amplifier for loudspeaker	W01-C01C1B	marketing	W01-C05B5
speech amplifier for microphone	W01-C01C1A	mobile commerce	W01-C05B6
splitter, e.g. POTS / ISDN	W01-C01L5	modem	W01-C05B3
standby arrangements	W01-C01Q7	moving picture systems	W01-C05B1
subscriber calling devices	W01-C01B	multimedia system	W01-C05B2
subscriber ISDN equipment	W01-C05B7A	PCMIA card	W01-C05B3
switching interface	W01-C03B7A	pushbutton	W01-C03B3
telephone cable	W01-C01X	push to talk over packet network	W01-C02G
testing	W01-C01K	radio (mobile)	W01-C03B2
•	W01-C01K W01-C01G6A	radio (mobile)	W02-C03C
taxt maccaging talanhana		recording and storage systems	W01-C05B5
		remote monitoring	W01-C05B3
third generation (3G) mobile phor			
third generation (3G) mobile phor C01D3G		remote monitoring	
third generation (3G) mobile phor C01D3G	W01-C01Q8A	remote monitoring	W05-D06G
third generation (3G) mobile phor C01D3G theft alarm	W01-C01Q8A W05-B01		W05-D06G W05-D08E
text messaging telephone third generation (3G) mobile phor C01D3G theft alarm timed disconnection of ringer	W01-C01Q8A	satellite screen text systems	W05-D06G

still picture systems	W01-C05B1C	different-view transmission	
telecontrol	W01-C05B3E	(interactive TV)	W02-F10A1G
	W05-D06G	digitally assisted (DATV)	W02-F06C8
	W05-D08C	digital video broadcasting	W02-F07M1
telegraphic systems	W01-C05B3	emergency broadcasts	W02-F05D
telemetry	W01-C05B3F	equipment testing	W02-F04A5
•	W05-D06G	Eureka-95	W02-F06C3
	W05-D08E	fractal coding	W02-F07M
video systems	W01-C05B1E		W04-P01A8
video telephone systems	W01-C05B1E	ghost control reference (GCR)	W02-F05C
, ,	W02-F08B	high definition	W02-F06C
voice mail	W01-C02B7C	hybrid coding	W02-F07E
	W01-C05B5E	increased definition	W02-F06C8
voice over data modem	W01-C05B3G	industrial (ITV)	W02-F01
voice over IP (VoIP) telephony	W01-C05B4C	interactive - see Interactive broad	lcast
· -		and entertainment system	W02-F10A
Telephony connector - see Connect		jamming signal insertion (general)	W02-F05A1A
Telescope	S02-B09	jamming signal insertion, interactiv	
optical elements for	P81-A50A	broadcasting	W02-F10N1
Teletext		letterbox	W02-F06C8
transmission system	W02-F05B5	logging station output	W02-F04C
TV receiver details	W03-A10	MAC (and variants)	W02-F06C1
Television		NICAM	W02-F06B1
advertising	W05-E03C	non-broadcasting digital	W02 1 00D1
camera - see <b>Video camera</b>	W04-M01	video transmission	W02-F07M5
Camera - See Video Camera	VV04-IVI0 I	NTSC	W02-F02
commerce		PAL	W02-F02
receiver end	W03-A16C5J	pay-per-view	W02-F10A
system	W02-F10J	pay per view	W02-F10N7
receiver - see TV receiver	W03-A	PCM	W02-F07
set-top box	W03-A16E	predictive coding	W02-F07M
signal processing - see <b>Video sig</b>		predictive coding	W04-P01A5
processing	W04-P	SAP	
processing special effects - see TV special ef	fects	SAP satellite (DBS)	W02-F06B5
special effects - see <b>TV special ef</b>	fects W04-N05C	satellite (DBS)	W02-F06B5 W02-F06A
special effects - see <b>TV special ef</b> standards conversion	<b>fects</b> W04-N05C W04-N05A	satellite (DBS) scrambling system (general)	W02-F06B5
special effects - see <b>TV special ef</b> standards conversion studio equipment	<b>'fects</b> W04-N05C W04-N05A W04-N01	satellite (DBS) scrambling system (general) scrambling system, interactive	W02-F06B5 W02-F06A W02-F05A1A
special effects - see <b>TV special ef</b> standards conversion studio equipment synchronisation signal generator	<b>'fects</b> W04-N05C W04-N05A W04-N01 W04-M05	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1
special effects - see <b>TV special ef</b> standards conversion studio equipment	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B
special effects - see <b>TV special ef</b> standards conversion studio equipment synchronisation signal generator	<b>'fects</b> W04-N05C W04-N05A W04-N01 W04-M05	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F02
special effects - see <b>TV special ef</b> standards conversion studio equipment synchronisation signal generator	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general)	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F02 W02-F05A1
special effects - see <b>TV special ef</b> standards conversion studio equipment synchronisation signal generator telecine	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F02 W02-F05A1 nessages
special effects - see <b>TV special ef</b> standards conversion studio equipment synchronisation signal generator telecine <b>Television system</b>	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial research	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q
special effects - see TV special effects - see	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04A1
special effects - see TV special effects - see	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C
special effects - see TV special effects - see TV special effects - see TV special effects and a studio equipment synchronisation signal generator telecine  Television system archival storage of content primal submitted by user audience research system	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F06B
special effects - see TV special effects - see TV special effects - see TV special effects and are studio equipment synchronisation signal generator telecine  Television system  archival storage of content primal submitted by user audience research system bandwidth reduction	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B
special effects - see TV special effects - see TV special effects - see TV special effects and a studio equipment synchronisation signal generator telecine  Television system  archival storage of content primal submitted by user audience research system bandwidth reduction bilingual sound	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F07M
special effects - see TV special effects - see TV special effects - see TV special effects and a studio equipment synchronisation signal generator telecine  Television system  archival storage of content primal submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F07M W04-P01A7
special effects - see TV special effects - see TV special effects - see TV special effects and a studio equipment synchronisation signal generator telecine  Television system  archival storage of content primal submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general)	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F04B W02-F03B W02-F07M W04-P01A7 W02-F05A3
special effects - see TV special effects and studio equipment synchronisation signal generator telecine  Television system archival storage of content primal submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A W02-F05B1	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Inter	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system     archival storage of content primal submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A W02-F06C8	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general)	W02-F06B5 W02-F06A W02-F05A1A W02-F10N1 W02-F05B W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system     archival storage of content primal submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F06C8 W02-F01	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Inte	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F04B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive system W02-F10
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system archival storage of content primal submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F01 W02-F01 W02-F07 W02-F07 W02-F06C8 W02-F07 W02-F07 W02-F07 W02-F07	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interactive - see Interactive - see Interactive - subscription, interactive - see Interact	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive system W02-F10 W02-F06B3
special effects - see TV special effects - see TV special effects - see TV special effects and are submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour	W04-N05C W04-N05A W04-N01 W04-N05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F06B5 W04-C05B1A W01-C05B1A W02-F06C8 W02-F01 W02-F07 W02-F07 W02-F07 W02-F07 W02-F07	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interactive - see	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04A1 W02-F04C W02-F04B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive system W02-F10
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primate submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission	W04-N05C W04-N05A W04-N01 W04-N05 S06-B05 W04-M02 W02-F rily W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F06C8 W02-F01 W02-F07 W02-F07 W02-F07	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interproadcast and entertainment surround sound teletext testing	W02-F06B5 W02-F06A W02-F05A1A W02-F05B1 W02-F05B2 W02-F05A1 messages W02-F10Q2 W02-F04A1 W02-F04C2 W02-F06B3 W02-F07M2 W04-F01A7 W02-F05A3 ractive system W02-F10 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primate submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission	W04-N05C W04-N05A W04-N01 W04-N05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F06B5 W04-M02 W02-F06B1 W02-F05B1 W02-F06C8 W02-F01 W02-F07 W02-F07 W02-F07 W02-F07	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial r signal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interactive - see	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F05B W02-F02 W02-F05A1 nessages W02-F10Q W02-F04C W02-F04C W02-F04B W02-F04B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive system W02-F10 W02-F06B3 W02-F05B5 W02-F05B5 W02-F05B5
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primate submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission checking	W04-N05C W04-N05A W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F06C8 W02-F01 W02-F07 W02-F07 W02-F07 W02-F07 W02-F02 M02-F03C	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interproadcast and entertainment surround sound teletext testing transform coding	W02-F06B5 W02-F06A W02-F05A1A W02-F05B1 W02-F05B2 W02-F05A1 messages W02-F10Q2 W02-F04A1 W02-F04C2 W02-F06B3 W02-F07M2 W04-P01A7 W02-F05A3 ractive system W02-F06B3 W02-F06B3 W02-F05B5 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primate submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission checking  compatible high definition	W04-N05C W04-N05A W04-N01 W04-N05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F06B5 W04-C05B1A W01-C05B1A W02-F01 W02-F01 W02-F07 W02-F07 W02-F07 W02-F07 W02-F07 W02-F08	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interproadcast and entertainment is surround sound teletext testing transform coding two-channel sound	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F03B W02-F05A3 ractive system W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F06B3 W02-F07M W04-P01A3 W02-F07M
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primare submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission checking  compatible high definition conference	W04-N05C W04-N05A W04-N01 W04-N05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F01 W02-F07 W02-F07 W02-F02 M02-F03C W02-F03C W02-F08A	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interproadcast and entertainment surround sound teletext testing transform coding two-channel sound two-way	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive system W02-F10 W02-F06B3 W02-F05B5 W02-F04A W02-F05B5 W02-F07M W04-P01A3 W02-F07M W04-P01A3 W02-F06B5 W02-F06B5 W02-F06B5
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primare submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission checking  compatible high definition conference descrambling system (general)	W04-N05C W04-N05A W04-N01 W04-N05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F01 W02-F07 W02-F07 W02-F02 M02-F03C W02-F03C W02-F08A	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interpretation broadcast and entertainment surround sound teletext testing transform coding two-channel sound two-way URL transmission system	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F03B W02-F05A3 rractive system W02-F06B3 W02-F05A3 rractive System W02-F06B3 W02-F05B5 W02-F05B5 W02-F04A W02-F06B3 W02-F07M W04-P01A3 W02-F06B5 W02-F07M W04-P01A3 W02-F06B5 W02-F08B5 W02-F08B5
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primare submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission checking  compatible high definition conference descrambling system (general) descrambling system, interactive	W04-N05C W04-N05A W04-N01 W04-M05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F06C8 W02-F01 W02-F02 W02-F04C5 W02-F04C5 W02-F06C8 W02-F08A W02-F08A W02-F08A	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound stereoscopic subsampling  subscription (general) subscription, interactive - see Interproadcast and entertainment surround sound teletext testing transform coding  two-channel sound two-way URL transmission system verifying schedule adherence	W02-F06B5 W02-F06A W02-F05A1A W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F07M W04-P01A7 W02-F05A3 ractive system W02-F06B3 W02-F05B5 W02-F05B5 W02-F04A W02-F06B3 W02-F07M W04-P01A3 W02-F06B5 W02-F07M W04-P01A3 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5
special effects - see TV special effects and ards conversion studio equipment synchronisation signal generator telecine  Television system  archival storage of content primare submitted by user audience research system bandwidth reduction bilingual sound cable - see CATV CAPTAIN  clean PAL closed circuit coding colour commercial message transmission checking  compatible high definition conference descrambling system (general) descrambling system, interactive	W04-N05C W04-N05A W04-N01 W04-N05 S06-B05 W04-M02 W02-F rilly W02-F10F W02-F04B W02-F07 W02-F06B5 W02-F03A W01-C05B1A W02-F05B1 W02-F06C8 W02-F01 W02-F02 M02-F02 M02-F04C5 W02-F03C W02-F08A W02-F08A W02-F08A W02-F08A W02-F08A W02-F08A W02-F10N1	satellite (DBS) scrambling system (general) scrambling system, interactive broadcasting screen text SECAM secrecy (general) selective insertion of commercial resignal testing station output monitoring stereophonic sound stereoscopic subsampling subscription (general) subscription, interactive - see Interpretation broadcast and entertainment surround sound teletext testing transform coding two-channel sound two-way URL transmission system	W02-F06B5 W02-F06A W02-F05A1A  W02-F10N1 W02-F05B W02-F02 W02-F05A1 messages W02-F10Q W02-F04A1 W02-F04C W02-F06B W02-F03B W02-F07M W04-P01A7 W02-F05A3 ractive system W02-F10 W02-F05B5 W02-F05B5 W02-F04A W02-F05B5 W02-F04A W02-F06B3 W02-F05B5 W02-F04A W02-F05B5 W02-F04A W02-F05B5 W02-F04A W02-F05B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5 W02-F06B5

video-on-demand	W02-F10A1	strip, coaxial cable	V04-B03
videotex	W02-F05B9	, , , , , , , , , , , , , , , , , , ,	V04-M03
Telex	W01-A07B	strip, flat cable	V04-B02
Telex	W01-A07B W01-C05B3D		V04-M04
_	VV01-C03D3D	strip, printed circuit	V04-B01
Temperature	000 504		V04-M05
air-measurement	S03-D04	fixed capacitor	V01-B03D5
body, measurement, medical	S05-D01E	resistor	V01-A01C5
display of	S03-B01K	Terrestrial radio relay systems	W02-C03B2
Temperature control	T06-B13	= =	
auxiliary heater-type	T06-B13B2	Terrestrial repeaters	W02-C03B2B
electric temperature sensing-type	T06-B13B1		W02-G05C
electrical-type	T06-B13B	Test	
radiation temperature sensing-ty	pe T06-B13B9	data transmission, error	
without auxiliary power	T06-B13A	detection/correction	W01-A01B1
Temperature measurement - see al	so	data transmission, error	
Thermometer		detection/prevention	W01-A01C
for semiconductor manufacture (	annealing,	Test circuits, on chip	U11-F01D2
deposition)	U11-F01A4	wafer test pad layout, IC testing	U11-D03C1A
infrared	S03-A03		U11-F01D2
using acoustic effect	S03-B01X	Test apparatus, for radio equipmen	t S01-G08B
using chemical indicator	S03-B01X	noise generators	S01-G08B1
using colour change of liquid crys	stal S03-B01X	noise-measuring receiver	S01-G08B3
using fibre optics	S03-B01G	screening arrangements for	S01-G08B5
using photoluminescence quenc	ning	signal generators	S01-G08B1
	S03-B01G	Test probe	S01-H03
Tennis	P36-A01	single probe	S01-H03B
	W04-X01K1P		301-1103D
Tents	Q46-B15	Testing	1104 40054
		A-D converters	U21-A03F1
Tensile testing - see Mechanical str	engtn	adhesives aerial	S03-F08 W02-B08A
testing		aerodynamic	S02-J07
Tension control, web	T06-D08B	1	S01-G09
	X25-F02	aging aircraft/space vehicles	W06-B05
Tension measurement		amplifiers	U24-G05C
general measurement	S02-F01	analogue circuit modules	S01-G01C3
special purpose measurement	S02-F03A	analogue circuits	S01-G01C
Terahertz		analogue ICs	S01-G01C1
dimensional measurements	S02-A05A1	apparatus	S02-J
physical or chemical property		assembled PCB	S01-G01B3
measurements	S03-E05		V04-R06D
imaging	S03-E05E	ATE (automatic test equipment)	T01-G02A2A
Terminal		automatic telephone exchanges	W01-C02A1
binding post	V04-B05	automatic, digital computing	T01-G02A2A
block	V04-B05	bare PCB	S01-G01B1
block, clip-on for rail/strip mount	ing V04-B05A		V04-R06A
block, coaxial cable	V04-B03	battery	S01-G06
	V04-M03		X16-H
block, flat cable	V04-B02	bearings (general)	Q62-M
	V04-M04	bearings of machine	S02-J03A
block, printed circuit	V04-B01	brakes	S02-F03B
	V04-M05	braking, vehicle	S02-J02B
board	V04-B05	built in, digital computer	T01-G02A2B
end pieces, multiconductor cable		built-in self test, for integrated circ	
manufacture, high power inductiv			U11-F01D2
	X12-C01D5	cables (with fault location)	S01-G05
manufacture, low power inductive	e device	cables (without fault location)	S01-G12F
	V02-H06	calorimeters	S03-B02
printed circuit	V04-B01	capacitors	S01-G12C
	\	1	V01-B04C1
strip	V04-M05 V04-B05	checking electrical continuity	S01-G04C1

Testing (continued)		insulator	S01-G13
circuit breakers	S01-G10	integrated circuits	S01-G01
circuit breakers	X13-B08	j s	S01-G01A1
circuit breakers, moulded case	X13-D08	integrated circuits, packaged dev	ice, die
coil	S01-G12E5		U11-F01C3
COII	V02-H09	integrated circuits, wafer level	U11-F01D
	X12-C01D3	lasers	V08-A06
coins or valuable papers	T05-J	LCD	S02-J04A3A
contacts	V03-A08		U14-K01A8
contacts	X13-A01	lenses and lens systems	S02-J04A5
control system, general	T06-A08	level indicating	S02-C07
current leakage	S01-G04A5	light guide	S02-J04A1
data communications equipment		line transmission systems	W02-C01D
data network apparatus	W01-A06A2A	liquid crystals	S02-J04A3
data networks	W01-A06A	logic analyser	S01-G01A5
differential of machine	S02-J03A	logic circuits	U21-C03D1
diffraction grating	S02-J03A S02-J04A9	low power inductive device	S01-G12E
digital circuits	S01-G01A	·	V02-H08
digital circuits	S01-G01A3	machine parts	S02-J03
digital logic circuits	S01-G01A1	machines	S02-J
dimension, angle, area, etc. meas		magnetic heads	T03-A04A5
difficultion, angle, area, etc. meas	S02-A07	magnetic record carriers	T03-A02C5
elasticity of structures	S02-A07	memories	U14-D03
electric faults, testing for	S01-G	military equipment	W07-H
electric machines	S01-G07	modules, cards	S01-G01A3
Ciccure macrimes	V06-M11M	motors, electric	V06-M11M
	X11-J08M		X11-J08M
electric properties	S01-G	moulded case circuit breakers	X13-D08
electric train/tram system	X23-A05	noise generators, electrical	S01-G08B1
electrical instruments	S01-H01		
electrolytic capacitors	S01-G12C	non-destructive	S03-F11
orden ory are capacitors	V01-B01G7C	optical amplifiers	S02-J04A1C
EM compatability	S01-G08C	optical apparatus	S02-J04A
energy efficiency/quality	S01-G	optical communication	W02-C04C1
engines	S02-J01	optical disk	T03-B01D1
eye	S05-D05		T03-B01E7
flowmeters	S02-C07	optical fibre	S02-J04A1A
fluid pressure actuators	Q57-X		V07-J
for fluid tightness	S02-J06	optical instruments	S03-A05A
for leaks	S02-J06	optical recording heads	T03-B02B8E
fuses	X13-D01C	optical test equipment- materials	
gain	W02-B08A1	investigation	S03-E04P
gas turbine engine	S02-J01C	passive electric components	S01-G12
gas turbine engine for aircraft	S02-J01C1	performance testing	S02-J
gears of machine	S02-J03A	PCB	S01-G01B
generators, electric	X11-J08M		V04-R06
geophones	S03-C10	phase lock loop	U23-D01E
geophysics devices	S03-C10	power supply fault	S01-G
headphones	V06-V03B	pressure measurement	S02-F04F
•	V06-V04A4	prisms	S02-J04A9
high power inductive device	S01-G12E	probes, contacts at wafer level	U11-F01D1
5 1	X12-C01D3	probes, for IC packaged device	U11-F01C1
HV networks	S01-H02	radio antennas	S01-G08A5
hybrid circuits	U11-F01F		W02-B08A
-	U14-H04B	radio equipment	S01-G08
hydrodynamic	S02-J07	radio receivers	S01-G08A3
IC engine of aircraft	S02-J01A1	radio repeaters	S01-G08A1
IC engines	S02-J01A		W02-C05B
indicating and recording apparato			W02-G05C
inductive components	S01-G12E	radio transmitters	S01-G08A1
·	V02-H08	reactor, HF	S01-G12E5
	X12-C01D3		V02-F01
			V02-H08

Testing (continued)		transformer, power supply	S01-G12E1
reactor, power	S01-G12E5		V02-G01A
reactor, power	X12-C01D3		V02-H08
	X12-C01D3 X12-C01F	transformers	S01-G12E1
reactor newer supply	S01-G12E5	transmission of machine	S02-J03A
reactor, power supply	V02-G01C	transmission of vehicle	S02-J02X
	V02-G01C V02-H08	transmission systems (general)	W02-C05
recording equipment (dynamic)	T03-K07	TV receiver	W02-F04A5C
recording equipment (dynamic)		TV repeater	W02-F04A5B
ualananith aantasta	W04-J07	TV studio equipment	W02-F04A5A
relays with contacts	V03-D06B	resistors TV transmitter	W02-F04A5B
	S01-G12A	vehicle	S02-J02
	V01-A04H1	vehicle braking	S02-J02B
resonators, electromechanical	V06-V01E	vehicle crash dummy	S02-J02F1
and a MC a factor was a set	V06-V03B	vehicle crash/impact	S02-J02F
scientific instruments	S03-H03A	vehicle electrical system	S02-J02E
medical apparatus	S05-Y01	vernere erectrical system	X22-A05
semiconductor circuits, at wafer le			X22-X06
	U11-F01D	vehicle steering	S02-J02A
semiconductor circuits, using elec		vehicle transmission	S02-J02X
microscope	U11-F01D3	vehicle tyre performance	S02-J02A
semiconductor device packages	U11-F01E	vehicle wheels	S02-J02A
semiconductor devices	S01-G02B	video camera	W04-M01D2J
semiconductors, film parameters	U11-F01B	volume and mass flow measureme	
ship	W06-C05	VSWR	W02-B08A1
shock absorbers of vehicle	S02-J02A	weighing apparatus	S02-D07
short circuit	S01-G04A1 S01-G08B1	wires (with fault location)	S01-G05
signal generators, electrical signal testing	W02-F04A1	wires (without fault location)	S01-G12F
		· · · · · · · · · · · · · · · · · · ·	T01-G02
special purpose measurement of	S02-F03X	Testing digital computers  ATE (automatic test equipment)	T01-G02 T01-G02A2A
speed/acceleration measurement		built in	T01-G02A2A
static stores	U14-D03	by comparison	T01-G02A2B
steam turbine	S02-J01E	Defective hardware location	T01-G02A2C
Steam tarbine	X11-A10	diagnostics	T01-G08
structures	S02-J	alagnostics	T01-G08A
structures by applying shock	S02-J08	environment monitoring	T01-G11B
structures by vibration	S02-J08	fan monitoring	T01-G11F
switches with contacts	S01-G10	fault simulation	T01-G07
	V03-C07	hardware	T01-G02
	X13-A04F	hardware, on IC	T01-G02A1
switchgear	X13-E08	logic simulation	T01-G
telephone equipment (general)	W01-C08C	logic simulation, compiled code	T01-G06A
telephone exchange	W01-C02A1	logic simulation, hardware acceler	ator T01-G06C
telephone selection equipment	W01-B08	logic simulation, table driven	T01-G06B
telephone subscriber equip.	W01-C01K	marginal	T01-G02B
telephone subscriber line	W01-C02A5	measuring non-processing parame	etersT01-G11
telephone transducer	V06-V01	power monitoring	T01-G11A
	V06-V03B	shock, vibration	T01-G04
	V06-V04B1	system/field	T01-G02A2
	W01-C01M	test program	T01-G02A2D
television systems	W02-F04A	test sequence generation	T01-G07A
thermometers	S03-B01H1	user stress monitoring	T01-G11C
time division multiplex systems	W02-K02B5B	Testing dynamic recording equipme	ent T03-K07
transducers	S02-K07		W04-J07
transducers, acoustoelectric	V06-V03B	Testing semiconductor	
transformer, hf	S01-G12E1	active semiconductor material pro	nerties
	V02-F02	delive defined inductor material pro	U11-F01A
	V02-H08	device	U11-F01C
transformer, power	S01-G12E1	device, at wafer/die level	S01-G02B1
	X12-C01D3	device, completed(encapsulated)	
	X12-C01E	Tetrode, vacuum tubes	V05-B01A5
		retrode, vacuum tubes	VUD-DUTAD

Text character generator for TV rece	iver	switches with contacts	V03-C06B
	W03-A10C	Thermal analysis	
Textile		calorimetry	S03-E01C
analysis	S03-E14G	differential	S03-E01E
,	X25-T04D	distillation	S03-E01A
dyeing		emissivity determination	S03-E01E
embroidery machine	X25-T04C	flaw detection	S03-E01B3
control	T06-D03D	psychrometry	S03-E01B
fabric manufacture, control	T06-D03C	pyrolysis	S03-E01A
knitting machine	X25-T04B2	sintering	S03-E01A
printing	X25-T04D	thermal cycling-see also <b>Fatigue</b>	
sewing machine	X25-T04C	thermal cycling-see also Fatigue	S03-E01B1
textile loom	X25-T04B1	thermal fatigue-see also <b>Fatigue</b>	
textile loom, control	T06-D03C	thermal latigue-see also <b>ratigue</b>	-
	X25-T04B1		S03-E01B1
weaving	X25-T04B1	Thermal cell	X16-A03A
yarn manufacture, control	T06-D03B	Thermal conductivity measuremen	t S03-E01A
	X25-T04A	Thermal cutoffs	
Theater			X13-D12
general systems	W04-X03G1	Thermal flowmeter	S02-C01B7
lighting	X26-K	circuitry	S02-C01B7C
		deiice per se	S02-C01B7A
Theft alarms	W05-B01	Thermal fuses	X13-D12
audio/video recording equipment	W04-J01C		
Theft prevention		Thermal imager	W04-M01E1
cable markings	X12-D03C2	Thermal noise reduction (radio rec	eiver)W02-G03B3
Theme park equipment	W04-X03G3	Thermal power	X15-G02
Theodolites	S02-B05	Thermal printer	
Therapy, medical	S05-A	ink for	S06-H02A
	S05-A04	printhead for computer printer	S06-H03
applying current		using thermal paper	S06-H01
aromatherapy	S05-A09	using thermal ribbon	S06-H02
cardiac massage	S05-A05A	using thermal transfer sheet	S06-H02
cooling	S05-A05B	_	
electromagnetic	S05-A03E2	Thermal properties	CO2 FO1 A
heat	S05-A05B	change of state or phase	S03-E01A
homeopathy	S05-A09	coefficient of expansion	S03-E01A
Infrared	S05-A03A1	dew-point	S03-E01B
IR, UV, laser, light	S05-A03A	emissivity	S03-E01E
laser	S05-A03A2	explosibility	S03-E01B
magnetic	S05-A03E1	flash-point	S03-E01B
optical	S05-A03	humidity	S03-E01B
other radiation	S05-A03X	measuring	S03-E01
pacemakers and defibrillators	S05-A01	specific heat	S03-E01C
physical	S05-A05E	thermal conductivity	S03-E01A
relaxation	S05-A09	Thermal protection	U24-F07
respiratory massage	S05-A05A	·	X12-C02
speech	S05-A09	Thermal protectors	X13-D12
ultraviolet	S05-A03A3	for spacecraft	Q25-S06C
using electric fields	S05-A03B	'	Q23-300C
using magnetic fields	S05-A03E	Thermionic	
using microwaves	S05-A03D	electron tube - see Thermionic tu	
using ultrasound	S05-A03C	generator	V05-K
using visible light	S05-A03A9	Thermionic cathode	
using X-rays	S05-A03F	analysing/processing tube	V05-F04A1
Thermal		CRT CRT	V05-D05C1
computer printer	S06-H	electron tube (classical)	V05-B01B1
cutoffs	X13-D12	heater (general)	V05-M02
fuses	X13-D12 X13-D12	manufacture	V05-L01A1
	S06-G01	solid type (general)	V05-M02
ink-jet computer printer			
paper, for printer	S06-H01 S03-C04A	Thermionic generator	V05-K
prospecting	X13-D12		
protectors	V12-D17	I	

Thermionic tube	V05-B01	Thermometer	S03-B01
anode	V05-B01B5	alcohol	S03-B01D
cathode	V05-B01B1	calibration	S03-B01H3
characterised by type	V05-B01A	casings	S03-B01X
cooling	V05-B01B6	compensation	S03-B01H5
diode	V05-B01A1	contraction type	S03-B01D
grid	V05-B01B3	differentiating	S03-B01D
heater element	V05-B01B1A	expansion type	S03-B01D
lead-in conductors	V05-B01B7	fibre optic	S03-B01G
manufacture - see Discharge tub	e manufacture	for aggressive environments	S03-B01E1
	V05-L05B1	for special purposes	S03-B01E
pentode	V05-B01A7	infrared	S03-A03
testing	S01-G02A	integrating	S03-B01D
tetrode	V05-B01A5	linear resistance	S03-B01B
triode	V05-B01A3	liquid crystal	S03-B01X
tube details	V05-B01B	max-min type	S03-B01D
vessel	V05-B01B7	mercury	S03-B01D
Thermistor	V01-A02A	optical	S03-B01G
characterised by intended function	nV01-A02A7	Seebeck effect	S03-B01A
characterised by temp. depender	nce V01-A02A5	testing	S03-B01H1
circuit temp. compensation	V01-A02A7X	thermistor	S03-B01F
cold conductor	V01-A02A7B		V01-A02A7A
current limiter	V01-A02A7B	thermo-electric	S03-B01A
degaussing current control	V01-A02A7C	thermocouple	S03-B01A
	V02-D	using acoustic effect	S03-B01X
	W03-A08A4C	using chemical indicator	S03-B01X
for temperature measurement	S03-B01F	using colour change if liquid crysta	
manufacture - see <b>Resistor manu</b>		using crystal resonator frequency	
	V01-A04K1	using photoluminescence quench	
motor starting	V01-A02A7C	using semiconductor pn junction	
	V06-N05	using thermal noise of resistor/cor	S03-B01C
	X13-H01A		
negative temp. coefft. (NTC)	V01-A02A5A	Thermometer code (conversion)	U21-A05A1
novel composition	V01-A02A1	Thermophotovoltaic, energy convei	rters U12-A02A9
positive temp. coefft. (PTC)	V01-A02A5B		X15-A02E
self-regulating heater	V01-A02A7D	Thermopiles - see Thermoelectric de	evices,
th consequents of	X25-B	for power generating	U14-E05A1
thermometer	V01-A02A7A	Thermoplastic electrographic layer	SOA FOLY
time-dependent current control	V01-A02A7C	i ile i ilopiastic electrographic layer	S06-E07
Thermistor thermometer	S03-B01F		
Thermocouple	S03-B01A	Thermostat	V03-C06B
	U14-E05A3	bimetallic	V03-C06B1
Thermoelectric battery	X15-D	liquid expansion solid expansion/deflection	V03-C06B9
constructional details	X15-W	<u>'</u>	V03-C06B1
control, monitoring & testing	X15-V	Thermovoltaic element	X15-D
Thermoelectric device	U14-E05	constructional details	X15-W
memberecure device	X15-D	control, monitoring & testing	X15-V
characterised by material	U14-E05B	Thick film	U14-H02
for cooling	U14-E05A2	conductive pastes	U11-A05
101 cooming	X27-F02B1	manufacture	U14-H04A
for heating	X25-B02F	manufacture, screen printing	U14-H04A1
manufacture	U14-E05C	screen print solders	U11-A05A
power generating-type	U14-E05A1	substrate materials, for semicondu	
hama gama amig sypa	X15-D	manufacture	U11-A05B
temperature sensors	U14-E05A3	superconducting - see <b>Supercond</b>	•
thermocouples	U14-E05A3	thick film	U14-F02A
Thermomagnetic device	U14-E02		U14-H02
•		Thick film materials, for semiconduc	tor
Thermography	S03-E01E	manufacture	
			U11-A05
		Thickness measurement	S02-A10B
		1	• • •

del Clare	COO 440D4	T1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	LI40 D00
thickness of sheet or coating	S02-A10B1	Thin/thick film devices	U12-B03
using electrical/magnetic method		capacitors	U12-B03B
	S02-A10B		U12-C02
using mechanical method	S02-A01	resistors	U12-B03B
e e la dist	S02-A10B	1 11	U12-C03
using optical method	S02-A03	solar cell	U12-B03B
	S02-A10B		X15-A02A
using sound or ultrasound	S02-A05B	transistors	U12-B03A
	S02-A10B	Three-dimensional chip	
Thieves, scaring	W05-B01D1	interconnection	U11-D03C3B
Thieves, trapping	W05-B01D1	wiring	U11-D03C3B
Thin film		Three-dimensional display for TV re	ceiver
dielectric films, materials	U11-A05		W03-A08
insulating layers, materials	U11-A05		W03-A00
magnetic recording heads	T03-A03E		
resistor (discrete)	V01-A02C3A	Three-dimensional integration, con	
	V01-A02C3A	isolation	U11-C08C
Thin film circuits	114.4.1104.0	Three-dimensional printed circuit b	oard
amplifiers	U14-H01C	manufacture (see also PCB manu	facture)
filters	U14-H01C		V04-R05E
for electroluminescent displays	U14-H01A	Threshold extension FM radio recei	ver
( 100	U14-J02		W02-G03B7
for LCDs	U14-H01A		
1.00	U14-K01A2	Threshold value indicating	S02-K04G
general lithography aspects	U14-H01F	Thumbnail indexing, image	S02-K04G
interconnections	U14-H01D	recording	W04-H01C5
light guides 	V07-F01A5	Thyratron switch	X13-A04H
line image sensors	U14-H01B		
memory arrays	U14-H01A	Thyristors	U12-D01B
transducers	U14-H01B	bidirectional '	U12-D01B2
transparent conductive layers	U14-H01E	cooling	U11-D02A
transparent conductive materials	U14-H01E1	field controlled	U12-D01B1
	U14-H01E2	forward blocking	U12-D01B4
	U14-H01E3	gate turn-off	U12-D01B3
transparent conductive structures		manufacture	U11-C18B2
	U14-H01E5	packages for	U11-D01B1
two-dimensional arrays	U14-H01A	reverse blocking	U12-D01B4
Thin film devices		static induction thyristor	U12-D01B5
solar cell	U12-A02A2	terminals for	U11-D03A5
	U12-B03B	Ticket issuing	T05-C01
	X15-A02A	Tide indication in clock or watch	S04-A02B
Thin film magnetic head	T03-A03E	Tide energy (power generation)	X15-C02
Thin film packaging	U14-H01D	blade details	X11-B01
	01111012	control, monitoring, testing	X11-B01 X15-C03
Thin film transistor	LI11 COFFE	tide energy plant type	X15-C02A
electrode formation	U11-C05F5	barrage	X15-C02A2
manufacture	U11-C18A1	tidal lagoon	X15-C02A3
structure	U12-B03A	tidal itgeen tidal stream system	X15-C02A1
deposition	U11-C05B	turbine arrangement	X15-C02B
	U11-C05A	· ·	
Thin film, semiconductor		TIG welding	X24-B06
deposition	U11-C01	Till, cash	T05-L01A
	U11-C01J2	Tilt control, semiconductor lithogra	<b>phy</b> U11-C04C3
Thin film, superconducting - see		Tilt correction, optical disk	T03-B02A4
Superconducting, thin film	U14-F02A	• •	
Thin layer chromatography	S03-E09C3	Tilt switch	V03-C06C
Thin magnetic film	V02-B	Timber industry	X25-X01
	VU2-В U14-A01A1		
bubble memory			
head	V02-B02 T03-A03E		
recording medium	T03-A01A		
recording medium	103-A01A		

Time		Tire inflator, on-board vehicle	X22-X09
indication, mechanical	S04-A02	compressor	X25-L03B
indication, mechanical indication, using colour change	S04-A02 S04-C07	•	
measurement, of activities or ever		Tire pressure measurement	S02-F04C1A
medationic, or deliving or ever	S04-C03C2	testing, for vehicle	S02-J02A
measurement, of electric pulse	S04-C03C1	vehicle on-board measurement	X22-E02B X22-X06X
recording	S04-E		
signal transmission for clock or wa		Tissue sample analysis	S03-E14H6
3	S04-B06	medical	S05-C09
switch	S04-C01	Titration	S03-E09D
	V03-C08	coulometric	S03-E03A
Time code recording	T03-J01A	Toaster	X27-B02
3	W04-H01A	Tobacco	
Time compression or expansion		chewing tobacco	P15-A02
in communications	W02-G04A1	cigarette paper and tube	P15-T02
		filter tip/mouthpiece	P15-T01
Time-delay switch	V03-B03 X13-A04A	hookah	P15-T03
		humidor	P15-T99
Time division multiplex	W02-K02	matchbox	P15-T99
calling signals	W02-K02B1	non-consumable tobacco	P15-A02
data transmission	W01-A03C	packaging	P15-T04
data transmission, TDMA	W01-A03C1	pipe/ pipe cleaner	P15-T03
framing monitoring	W02-K02A1 W02-K02B5	tobacco for pipes, cigars and ciga	
multi-channel access	W02-R02B3		P15-A01
multiframe	W02-C03C3L W02-K02A1	tobacco planting/harvesting	P15-L01
pulse stuffing	W02-K02A3	tobacco processing	P15-L05
selection for multiplex systems	W01-B07	tobooo processing control	X25-P03
statistical multiplexing	W02-K02E	tobacco processing - control tobacco seasoning	T06-D02 P15-T03
synchronizing	W02-K02A	tobacco seasoning tobacco smoking paraphernalia	P15-T03
time division duplex	W02-K02C	tobacco water/paste	P15-A03
· •		·	
Time programming, recording equ	ipment	TOC (table of contents) recording in	ndexing
Time programming, recording equi	ipment W04-E04C	TOC (table of contents) recording in audio/video	ndexing W04-H01C
Time programming, recording equi	<b>ipment</b> W04-E04C W04-E04C5	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC)	ndexing W04-H01C W04-H01C1
Time programming, recording equitions by off-air signals determining recording priority	ipment W04-E04C	TOC (table of contents) recording in audio/video	ndexing W04-H01C
Time programming, recording equi	ipment W04-E04C W04-E04C5 W04-E04C7A	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)	mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1
by off-air signals determining recording priority from programming codes	w04-E04C W04-E04C5 W04-E04C7A W04-E04C1	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC) Toe-in test on vehicle wheels	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A
by off-air signals determining recording priority from programming codes from record carriers with learning function	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A
by off-air signals determining recording priority from programming codes from record carriers with learning function	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch	Modexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet baby chamber pot	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet baby chamber pot electrical details	Modexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2 X27-X01 X27-L
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general)	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video signal (general)	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08 T03-A06H W04-F02B W04-P01N	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08 T03-A06H W04-F02B W04-P01N S04-C	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08 T03-A06H W04-F02B W04-P01N S04-C S06-B02C5	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details	MO4-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08 T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08 T03-A06H W04-F02B W04-P01N S04-C S06-B02C5	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor  Token actuated mechanism, vending	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Ing T05-H02B
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02A	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02A S04-C02	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor  Token actuated mechanism, vending	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Ing T05-H02B
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock Timing	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C02	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor  Token actuated mechanism, vending to the content of	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Rg T05-H02B W01-A06F1E T05-D02 T07-A03E
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock  Timing activity, operation, event	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C03 S04-C03C2	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor  Token actuated mechanism, vending to the content of	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 ng T05-H02B W01-A06F1E T05-D02
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock  Timing activity, operation, event chain, for clock or watch	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C03 S04-C03C2 S04-B03	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor  Token actuated mechanism, vending to the content of	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Rg T05-H02B W01-A06F1E T05-D02 T07-A03E
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock  Timing activity, operation, event chain, for clock or watch electronic signals, pulse duration	W04-E04C W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C03 S04-C03C2 S04-B03 S04-C03C1	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor  Token actuated mechanism, vending Token pass data network access  Toll system, vehicle  Tomography medical, general	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Rg T05-H02B W01-A06F1E T05-D02 T07-A03E
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock  Timing  activity, operation, event chain, for clock or watch electronic signals, pulse duration methods and equipment	W04-E04C W04-E04C5 W04-E04C5 W04-E04C1 W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C02 S04-C03 S04-C03C2 S04-B03 S04-C03A	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC)  Toe-in test on vehicle wheels  Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details  Tokamak reactor  Token actuated mechanism, vending Token pass data network access  Toll system, vehicle  Tomography  medical, general  NMR, for medical purposes	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 ag T05-H02B W01-A06F1E T05-D02 T07-A03E X22-X07
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock  Timing activity, operation, event chain, for clock or watch electronic signals, pulse duration methods and equipment  Timetable	W04-E04C W04-E04C5 W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C03 S04-C03C2 S04-B03 S04-C03C1 S04-C03A P85-A50A	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC) Toe-in test on vehicle wheels Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details Tokamak reactor Token actuated mechanism, vending Token pass data network access Toll system, vehicle  Tomography  medical, general NMR, for medical purposes optical coherence	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Rg T05-H02B W01-A06F1E T05-D02 T07-A03E X22-X07  S05-D S05-D02B S03-E04C3
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal  Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock  Timing  activity, operation, event chain, for clock or watch electronic signals, pulse duration methods and equipment	W04-E04C W04-E04C5 W04-E04C5 W04-E04C1 W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C02 S04-C03 S04-C03C2 S04-B03 S04-C03A	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC) Toe-in test on vehicle wheels Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details Tokamak reactor Token actuated mechanism, vending Token pass data network access Toll system, vehicle  Tomography  medical, general NMR, for medical purposes optical coherence optical computerised	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Ang T05-H02B W01-A06F1E T05-D02 T07-A03E X22-X07  S05-D S05-D02B S03-E04C3 S03-E04C3
by off-air signals determining recording priority from programming codes from record carriers with learning function  Time shifting, video signal Time switch  Timebase error correction magnetic recording (general) video recording video signal (general)  Timer actuation, in photography hour glass type per se with alarm  Timer clock  Timing activity, operation, event chain, for clock or watch electronic signals, pulse duration methods and equipment  Timetable	W04-E04C W04-E04C5 W04-E04C5 W04-E04C7A W04-E04C1 W04-E04C1 W04-E04C7 W04-P01N S04-C01 V03-C08  T03-A06H W04-F02B W04-P01N S04-C S06-B02C5 S04-C09 S04-C02 S04-C02 S04-C02 S04-C03 S04-C03C2 S04-B03 S04-C03C1 S04-C03A P85-A50A	TOC (table of contents) recording in audio/video audio/video, recordable (UTOC) general general, recordable (UTOC) Toe-in test on vehicle wheels Toggle switch  Toilet  baby chamber pot electrical details for aircraft for railway train for ship for vehicle non-electrical details Tokamak reactor Token actuated mechanism, vending Token pass data network access Toll system, vehicle  Tomography  medical, general NMR, for medical purposes optical coherence	Mdexing W04-H01C W04-H01C1 T03-J01C T03-J01C1 S02-J02A V03-C02B X13-A04C2  X27-X01 X27-L Q25-B01C1 Q21-J04 Q24-B01C1 Q14-L P28-B04 X14-A03 Rg T05-H02B W01-A06F1E T05-D02 T07-A03E X22-X07  S05-D S05-D02B S03-E04C3

Tone arms	W04-A03	Towel	P27-B02
Tone control	U25-F	Town plan	P85-A50E
	W03-C05A	Toys	P36-E
combined with gain control	U24-C05D		W04-X03E
Tone generation, musical instrume	nts	animated toy	W04-X03E6
	W04-U	doll	P36-E05
control	W04-U03		W04-X03E5
electromechanical	W04-U02C	gyroscope toy manufacture	W04-X03E6 P36-E
electronic	W04-U01	manufacture	P36-M
Toner, electrophotographic	S06-E04		W04-X03E
fixing	S06-E06	model vehicle	P36-E01
level detector liquid	S06-K07B1 S06-E04B1		W04-X03E1
liquid liquid, application of	S06-E04B	outdoor	P36-E07
recycling	S06-K04B		W04-X03E2
removal	S06-K06C	packaging remote control	Q34-T P36-E
solid	S06-E04A1	Terriote control	W04-X03E8
solid, application of	S06-E04C	ride-on vehicle	P36-E07
supply	S06-E04C		W04-X03E1
Tool	X25-A03		W04-X03E2
abrading	X25-A03C2	robot	P36-E05
building construction burnishing	Q45-D X25-A03C3	stuffed	W04-X03E6
chainsaw	X25-X03C3	stuπea	P36-E05 W04-X03E5
clock or watch making	S04-D	virtual pet	W04-X03E6
control (see also T06-D07 and X2	5-A03	Track accessing servo	1101710020
codes)	T06-D06	general	T03-G02B1
	X25-A03F	magnetic head	T03-A05B1
drilling	X25-A03B	magneto-optical head	T03-D01D3A
grinding handheld	X25-A03C2 X25-A03D	optical head	T03-B02A3C
honing	X25-A03D X25-A03C2	Track aligning, recording/reprodu	ıcing
lapping	X25-A03C2	heads (general)	T03-G02C
milling	X25-A03C1	Track following servo	
mining	X25-D02B	general	T03-G02C1
polishing	X25-A03C3	magnetic head	T03-A05A1C
turning	X25-A03A	magneto-optical head optical head	T03-D01D5A T03-B02A3D
Toothbrush - see Personal Hygiene		'	
Torch light	X26-E01A	Track selecting, recording/reprod	_
based on LED	X26-E01A1		T03-G02B
Torpedo guidance systems	W07-A01	Trackball for computer input	T04-F02B5
Torque		Tracking	
control .	T06-B12	antenna	W02-B06C
measuring	S02-F02 S02-F03B	electronic imaging magnetic head	W06-A02C1 T03-A05A1C
special purpose measurement motor	V06-M06	magnetic head magneto-optical head	T03-A03ATC
motor	X11-H09	optical head	T03-B02A3D
wrench	S02-F03B	target seeking (radar)	T03-B02A3D
	X25-A03D	video camera	W04-M01D2C
Touch pad	T04-F02A5	Track pad, for computer input	T04-F02B2
Touch switch	U21-B02C	Traction motor	
Touchscreen		control, train/tram	X23-A02A
computer input	T04-F02A2	electric vehicle	X21-A07
constructional details (computer i		electric vehicle, control	X21-A04
touchscreen)	T04-F02C	train/tram	X23-A01A1
digital camera/camcorder	W04-M01D3E	Traffic	T07.005
mobile phone	W01-C01B8H	adverse weather warning	T07-G05
printer/copier/facsimile touch sensors	S06-K07A1 U21-B02C	classifying vehicle type	T07-A01D
100011 00110010	52.1 5520	1	

congestion warning	T07-G01	Train	
3 3	X22-E11	- see Railway	Q21
control	T07-C	- see Electric railway	X23
identifying individual vehicles	T07-A03	Training equipment	
measuring speed of	T07-A01A	aircraft	W06-B04
modelling of traffic system	T07-M	medical procedures	S05-P
monitoring flow of	T07-A01	military	W07-D
monitoring vehicle position	T07-A05	musical	W04-U07
displaying information to contr	oller	parachute	Q25-X03
	T07-A05B	radar operator	W06-A04E3A
displaying information to drive		ship	W06-C04
displaying information to passe		sports	P85-A01N
	T07-A05D	'	W04-X01A
for scheduled vehicle	T07-A05S	Training simulator	
for unscheduled vehicle	T07-A05U	aircraft	W06-B04
parking control	T07-F	astronaut	Q25-X04
power generation from traffic flow		driving	W04-W07A
road condition warning	T07-G02	anving	X22-X
signals	T07-B	general	W04-W07A
system administration	T07-M	medical	S05-P
toll charging	T07-A03E	saisai	W04-W07A
	X22-X07	military	W07-D05
	T05-C03	power distribution/transmission sy	
Traffic control and monitoring (rad	<b>ar)</b> T07-A01	'	X12-H05
		radar operator	W04-W07A
	T07-C	·	W06-A04E3A
	W06-A04H7	ship	W06-C04
Traffic lights	T07-B05A	sports	W04-X01A3
	X26	vehicle	X22-X
Traffic signal control		virtual reality-based - see <b>Virtual r</b>	reality
adverse weather condition monit	orina		W04-W07A
	T07-G05		W04-W07E
	T07-C01	Trajectories, analysis	S02-H
circuitry	107-001		
circuitry detector arrangements	T07-C01		
circuitry detector arrangements override system		Trampoline	P36-A08A
detector arrangements	T07-C03	Trampoline Transceivers (radio)	P36-A08A W02-G02
detector arrangements override system switch	T07-C03 T07-C07 T07-C03	Trampoline Transceivers (radio) answer-back pager	P36-A08A W02-G02 W02-G02A3
detector arrangements override system switch Traffic signals	T07-C03 T07-C07 T07-C03 T07-B	Trampoline Transceivers (radio) answer-back pager base station	P36-A08A W02-G02 W02-G02A3 W02-G02B
detector arrangements override system switch <b>Traffic signals</b> alarms for	T07-C03 T07-C07 T07-C03 T07-B T07-C05	Trampoline Transceivers (radio) answer-back pager base station construction	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H
detector arrangements override system switch  Traffic signals alarms for ancillary signalling	T07-C03 T07-C07 T07-C03 T07-B	Trampoline Transceivers (radio) answer-back pager base station construction control	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C
detector arrangements override system switch <b>Traffic signals</b> alarms for	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02K
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02K W02-G02A5B
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02K W02-G02A5B W02-G02A1
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02C W02-G02K W02-G02A5B W02-G02A1 W02-G02C
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01 T07-B01B	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type)	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02K W02-G02K W02-G02A5B W02-G02A1 W02-G02C W02-G02A2
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01 T07-B01B T07-B01B	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02K W02-G02A5B W02-G02A1 W02-G02C W02-G02C
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01 T07-B01B T07-B01B	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02K W02-G02A5B W02-G02A1 W02-G02C W02-G02C W02-G02C
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01 T07-B01B T07-B01B T07-B05E T07-B05A5	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk)	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02K W02-G02A5B W02-G02A51 W02-G02C W02-G02C W02-G02A2 W02-G02A1 W02-G02A1
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01B T07-B01A	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02K W02-G02A5B W02-G02A1 W02-G02C W02-G02A2 W02-G02A1 W02-G02A3
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02K W02-G02A5B W02-G02A51 W02-G02C W02-G02C W02-G02A2 W02-G02A1 W02-G02A1
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01A T07-C05 T07-B05G	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02C W02-G02C W02-G02A5B W02-G02C W02-G02C W02-G02A1 W02-G02A1 W02-G02A3 W02-G02A3 W02-G02A3
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system	T07-C03 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01B T07-B05A5 T07-B01C T07-B01B T07-B01B T07-B01C T07-B01B T07-B01B T07-B01A T07-C05 T07-B05G T07-C07	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing time-division-duplex (TDD)	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02C W02-G02C W02-G02A5B W02-G02C W02-G02C W02-G02A1 W02-G02A3 W02-G02A3 W02-G02A3 W02-G02A3 W02-G02A5B
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01B T07-B01C T07-B01B T07-B01A T07-C05 T07-B05A	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02A5B W02-G02A1 W02-G02C5 W02-G02A1 W02-G02A5B W02-G02A5B W02-G02A5B W02-G02C5 W02-G02A5B W02-G02A5B W02-G02A5B
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01B T07-B05A5 T07-B05A5 T07-B05A5 T07-B05A5 T07-B05A	Trampoline Transceivers (radio)  answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing time-division-duplex (TDD)  transmit-receive switching voice-operated switching (VOX)	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02A5B W02-G02A1 W02-G02C W02-G02A2 W02-G02A2 W02-G02A3 W02-G02A5A W02-G02A5B W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary reflectors	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01A T07-C05 T07-B05G T07-C07 T07-B05A1 T07-B05A1 T07-B05B1	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing time-division-duplex (TDD)  Transducer	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02K W02-G02A5B W02-G02A1 W02-G02C5 W02-G02A1 W02-G02A3 W02-G02A3 W02-G02A3 W02-G02A3 W02-G02A5B W02-G02A5B W02-G02A5B
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary reflectors signal lamp failure monitoring	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05A5 T07-B01B T07-B01B T07-B01A T07-C05 T07-B05A T07-C05 T07-B05A T07-C05 T07-B05A	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing time-division-duplex (TDD)  transmit-receive switching voice-operated switching (VOX)  Transducer AC bridge application	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02A5B W02-G02A1 W02-G02C5 W02-G02A2 W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5C
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary reflectors signal lamp failure monitoring signal type	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05A5 T07-B01B T07-B01B T07-B01A T07-C05 T07-B05A T07-C05 T07-B05A1 T07-B05A1 T07-B05B T07-B05B T07-B05B T07-C05 T07-B05B T07-B05A1 T07-B05B T07-C05 T07-B05B	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing time-division-duplex (TDD)  transmit-receive switching voice-operated switching (VOX)  Transducer AC bridge application acoustoelectric - see Acoustoelect	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02C W02-G02C W02-G02C W02-G02A1 W02-G02C5 W02-G02A1 W02-G02A3 W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary reflectors signal lamp failure monitoring signal type traffic intersection control	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-C05 T07-B05G T07-C05 T07-B05A	Trampoline Transceivers (radio) answer-back pager base station construction control digital architecture duplex hand-held walkie-talkie interfacing mobile radio (vehicle type) monitoring portable PTT (push-to-talk) selective calling testing time-division-duplex (TDD)  transmit-receive switching voice-operated switching (VOX)  Transducer  AC bridge application acoustoelectric - see Acoustoelect transducer	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02A1 W02-G02A1 W02-G02C5 W02-G02A1 W02-G02A5B W02-G02A5B W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5C S01-F01A extric V06-V
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary reflectors signal lamp failure monitoring signal type	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05A5 T07-B01B T07-B01B T07-B01A T07-C05 T07-B05A T07-C05 T07-B05A1 T07-B05A1 T07-B05B T07-B05B T07-B05B T07-C05 T07-B05B T07-B05A1 T07-B05B T07-C05 T07-B05B	Trampoline Transceivers (radio)     answer-back pager     base station     construction     control     digital architecture     duplex     hand-held walkie-talkie     interfacing     mobile radio (vehicle type)     monitoring     portable     PTT (push-to-talk)     selective calling     testing     time-division-duplex (TDD)  transmit-receive switching     voice-operated switching (VOX)  Transducer     AC bridge application     acoustoelectric - see Acoustoelect     transducer     actuators - see Actuator	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02A1 W02-G02A1 W02-G02C5 W02-G02A2 W02-G02A5B W02-G02A5B W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5C S01-F01A extric V06-V V06-M06
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary reflectors signal lamp failure monitoring signal type traffic intersection control	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-C05 T07-B05G T07-C05 T07-B05A	Trampoline Transceivers (radio)     answer-back pager     base station     construction     control     digital architecture     duplex     hand-held walkie-talkie     interfacing     mobile radio (vehicle type)     monitoring     portable     PTT (push-to-talk)     selective calling     testing     time-division-duplex (TDD)  transmit-receive switching     voice-operated switching (VOX)  Transducer     AC bridge application     acoustoelectric - see Acoustoelectransducer     actuators - see Actuator     ambient variation compensation	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02K W02-G02A1 W02-G02C3 W02-G02A1 W02-G02C5 W02-G02A3 W02-G02A3 W02-G02C5 W02-G02A3 W02-G02C5 S01-F01A Ctric V06-V
detector arrangements override system switch  Traffic signals alarms for ancillary signalling constructional details control details filters fittings fixed display indicating elapsed time lamp holders lenses light source monitoring movable display over-ride control system pedestrian crossing systems portable, temporary reflectors signal lamp failure monitoring signal type traffic intersection control	T07-C03 T07-C07 T07-C07 T07-C03 T07-B T07-C05 T07-B07 T07-B01C T07-C T07-B01B T07-B01B T07-B05E T07-B05A5 T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-B01B T07-C05 T07-B05G T07-C05 T07-B05A	Trampoline Transceivers (radio)     answer-back pager     base station     construction     control     digital architecture     duplex     hand-held walkie-talkie     interfacing     mobile radio (vehicle type)     monitoring     portable     PTT (push-to-talk)     selective calling     testing     time-division-duplex (TDD)  transmit-receive switching     voice-operated switching (VOX)  Transducer     AC bridge application     acoustoelectric - see Acoustoelect     transducer     actuators - see Actuator	P36-A08A W02-G02 W02-G02A3 W02-G02B W02-G02H W02-G02C W02-G02K W02-G02A1 W02-G02A1 W02-G02C5 W02-G02A2 W02-G02A5B W02-G02A5B W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5A W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B W02-G02A5B

bone conduction type	V06-V01P	smart sensor	V06-V01Q
Bluetooth transducer	V06-V01M	_	V06-V04G
capacitive measurement	S02-K03A1C	smart transducer	V06-V01Q
characteristics compensation/cor	rection S02-	tachodynamo	S02-K03A1A
K02A			V06-M06C
casings	V06-V02E	telephone (microphone & loudsp	
circuits	V06-V02S		W01-C01M
communication - see Acoustoele		temperature compensation	S02-K02B1
transducer	V06-V01	testing, monitoring	V06-V03B
	V06-V04B	thin film	U14-H01B
compensation	S02-K02	transferring/converting sensor ou	itput S02-K03
DC or AC bridge application	S01-F01A	ultrasonic,	
demonstrating model	V06-V02X	communication type	V06-V01N
	W04-W07C		V06-V04B
electrical or magnetic	S02-K03A	ultrasonic, general	V06-V01N
electroacoustic - see Acoustoele		ultrasonic, motors (non-piezoelec	
transducer	V06-V		V06-M06R
electrodynamic	S02-K03A1A	ultrasonic, motors (piezoelectric)	
electromagnetic	V06-V01	ultrasonic, resonator	V06-V01E
fibre-optic	S02-K03B1		V06-V01N
Hall effect	S02-K03A5E	ultrasonic, sensor	V06-V01N
	U12-B01A		V06-V04G
housings	V06-V02E	using magnetic effects	S02-K03A5
inductive	S02-K03A2C	variable resistor, measurement	V01-A03D3
intelligent	V06-V01Q	wireless transducer	V06-V01M
linearising characteristic	S02-K02A	Transducers, applications	
LVDT	S02-K03A2C	alarm	V06-V04N
	V02-G01B	audio/video	V06-V04A
magneto-optical	S02-K03A5F	communication equipment	V06-V04B
magnetoresistive	S02-K03A5A	computer	V06-V04M
magnetostrictive	S02-K03A5C	display	V06-V04Q
	V06-V01D	domestic	V06-V04S
manufacture	V06-V03A	filter, delay lines	V06-V04D
micromachining	V06-V03A7	hands-free kit	V06-V04A4
mark-up language (smart transdu	ıcer) V06-V01Q	headphone, earphone	V06-V04A4
materials	V06-V02R	hearing aid	V06-V04A4
materials manufacture	V06-V03A9		V06-V04K
Matteucci effect	S02-K03A5X	industrial	V06-V04L
microsensor	V06-V01K1	instrumentation	V06-V04G
	V06-V04G	loudspeaker	V06-V04A1
monitoring, testing	V06-V03B	manipulator	V06-V04L
nanosensor	V06-V01K2	measurement microphone	V06-V04G3
	V06-V04G	medical	V06-V04K
noise reduction	S02-K02D	microphone	V06-V04A2
optical	S02-K03B	military	V06-V04J
		PA system	V06-V04A5
piezoelectric (general)	S02-K03X	personal article	V06-V04P
	V06-V01B	pick-ups	V06-V04A3
piezoelectric,		purification	V06-V04T
medical	V06-V01B	radio communication	V06-V04B2
	V06-V04K	resonant sensor	V06-V04G2
piezoresistive	S02-K03A2A	robotics	V06-V04L
pressure compensation	S02-K02B3	sensor	V06-V04G
protection	S02-K02C	signalling	V06-V04N
resistive	S02-K03A2A	sonar	V06-V04G1
resonators - see <b>Resonator</b>	V06-V01E	sport	V06-V04R
sanitary devices	V06-V02J	sterilisation	V06-V04T
semiconductor, manufacture	U11-C18C	telephone handset	V06-V04B1
shielding elements		toys, games	V06-V04R
as part of transducer housing	V06-V02E	transformer	V06-V04F
as part of cabinet	V06-V02F	vehicle (land, sea or air)	V06-V04H
		veterinary	V06-V04K
		•	

mounting, HF

V02-F03A

vibrators (mechanical work)	V06-V04C	mounting, power supply	V02-G02A
TransferJet™ digital interface	W01-A07H2N	non-linear	V02-G01A2
Transferred electron devices	U12-B02A	piezoelectric	V06-V01B
	012-002A	piezoelectric,	
Transformer	1/00 500	multilayer	V06-V01B1
audio	V02-F02	piezoelectric,	
broad-band	V02-F02	Rosen type	V06-V01B2
casing, HF	V02-F03A	potential	V02-G01B
casing, power supply	V02-G02A	power (see <b>Power transformer</b> )	X12-C01E
coil connection, HF	V02-F03B	power supply	V02-G01A
coil connection, power supply	V02-G02B	power supply, coil/winding	V02-G02B
coil/winding insulator, HF	V02-F03B1	power supply, core	V02-G02A2
coil/winding insulator, power sup		power, coil/winding	X12-C01B2
coil/winding manufacture, HF coil/winding manufacture, power	V02-H01B	power, core	X12-C01A
con/winding manufacture, power	V02-H01B		X12-C01E
acil/winding UE	V02-F03B	ratio arm bridge	S01-F01
coil/winding, HF coil/winding, power supply	V02-F03B V02-G02B	screen, HF	V02-F03X
constructional details, HF	V02-G02B V02-F03	screen, power supply	V02-G02X
constructional details, power sup		shield, HF	V02-F03X
control using current collector, H		shield, power supply	V02-G02X V02-F03X
control using current collector, p		terminal, HF	V02-F03X V02-G02X
supply	V02-G02C	terminal, power supply	S01-G12E1
control using movable coil/windi		testing variable, HF	V02-F02G
control using movable con/windi	V02-F03C2	variable, nr variable, power supply	V02-F02G V02-G01A1
control using movable coil/windi		welding	X12-C01E
power supply	V02-G02C2	weiding	X12-C01L X24-G
control using movable core, HF	V02-F03C2		7,24 0
control using movable core, pow		Transistors	1104 60404
σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ	V02-G02C2	bipolar, amplifiers (discrete)	U24-G04B1
control using movable shield, HF	V02-F03C2	bipolar, doping	U11-C02J5
control using movable shield, po		bipolar, electrode manufacture bipolar, heterojunction	U11-C05F2 U12-D01A2
	V02-G02C2	bipolar, hot electron	U12-D01A2
control using tappings on coil/wi	nding, HF	bipolar, not electron bipolar, in analogue integrated ci	
	V02-F03C1	form - see Analogue integrated co	
control using tappings on coil/wi		circuits, bipolar	U13-B01
power supply	V02-G02C1	bipolar, in digital integrated circu	
control, HF	V02-F03C	- see Digital integrated circuit	
control, power supply	V02-G02C	3	U13-C01
cooling, HF	V02-F03A1	bipolar, lateral/vertical collector	U12-D01A9
cooling, power supply	V02-G02A1	bipolar, manufacture	U11-C18A2
core manufacture	V02-H03A	bipolar, MOS gated	U12-D01A1
core, HF	V02-F03A2	bipolar, switching	U21-B01A
core, power supply	V02-G02A2	bipolar, testing	U11-F01C5
current/voltage measurement	S01-D01D1A V02-G01B		U12-D01A
	X12-C01G	bipolar, with polysilicon emitter,	
distribution (see also <b>Power tran</b>		electrode manufacture	U11-C05F2A
distribution (see also I ower train	X12-C01E	bipolar, with SOI substrate	U12-D01A5
flyback, TV	V02-F02A	bipolar, with tunnelling mechanis	
Hyback, TV	W03-A07C	Darlington	U12-D01A
	W03-A08A1C	high power, terminals for	U11-D03A5
helical-scan recording signal trar		hot electron	U12-D02J
	T03-A05D3A	manufacture	U11-C18A
	V02-F02D	medium/low power, terminals for	
HF	V02-F02	packages for	U11-D01B3
instrument	S01-D01D1A	planar doped barrier	U12-D02J
	V02-G01B	thin film, manufacture	U11-C18A1
	X12-C01G	thin/thick film (inorganic) unipolar, manufacture	U12-B03A
line output,TV	V02-F02A	unipolar, manufacture unipolar, with tunelling mechanis	U11-C18A3 m U12-D02J2
•	W03-A07C	-	
	W03-A08A1C	Transit time diodes	U12-C01E
mounting HF	V02-F03Δ		

klystron V05-C01C interference reduction W02-C01CC lead-in filters V05-C02B3A level setting W02-C01B1 level setting W02-C01B1 magnetic control V05-C02A7 redundancy network W02-C01DC repeater W02-C01ECC repeater W02-C01ECCC	
beam shaver cathode circuitry v05-C02A3 circuitry v05-C03C cooling cooling v05-C02B5 coupling window in vessel delay devices v05-C02B1C delay devices v05-C02C3 distributed coupling v05-C02C3 distributed elements v05-C02C4 electrically-tunable resonator spyrotron harmonic suppression klystron lead-in filters v05-C02B3 lead-ins magnetic control manufacture - see Discharge tube manufacture mechanically-tunable resonator w05-C02C1 multiple resonator w05-C02C1 mechanically-tunable resonator v05-C02C1 mechanically-tunable resonator v05-C02C3 mechanically-tunable resonator v05-C02C3 mechanically-tunable resonator v05-C02C3 mechanically-tunable resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 mechanically-tunable resonator v05-C02C3 mechanically-tunable resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 mechanically-tunable resonator v05-C02C1 multiple resonator v05-C02C3 m	X12-D
cathode circuitry V05-C02A3 circuitry V05-C03C control of tube operation V05-C03C cooling V05-C02B5 coupling window in vessel V05-C02B1C delay devices V05-C02C3 distributed coupling V05-C02C5 electrically-tunable resonator electrodes electron guns V05-C02CA5 parameter for thermionic cathode V05-C02CA7 manufacture - see Discharge tube manufacture v05-C02CA7 mechanically-tunable resonator w05-C02CA7 mechani	
circuitry v05-C03 control of tube operation v05-C02B5 coupling window in vessel v05-C02B1C delay devices v05-C02C3 distributed coupling v05-C02C5 distributed elements v05-C02C1 electrically-tunable resonator v05-C02C1C electrodes v05-C02A7 gyrotron v05-C01D harmonic suppression v05-C02C7 heater for thermionic cathode v05-C02CA3 klystron lead-in filters v05-C02B3 magnetic control v05-C02B3 magnetic control v05-C02CA7 manufacture - see Discharge tube manufacture v05-C02C1C multiple resonator v05-C02C1B power supplies v05-C03A resonators RFI suppression by distributed element design v05-C02B3A rangers in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C3 RFI suppression by lead-in filter v05-C02C3 RFI suppression by lead-in filter v05-C02C3 RFI suppression by lead-in filter v05-C02C3 RFI suppression by lead-in filter v05-C02B3A Transmission system (communication communication w02-C01E control w02-C01E control w02-C01E control w02-C01E echo canceller echo canceller echo canceller echo canceller echo canceller echo reduction w02-C01E indicating fault location w02-C01E indicating fault location w02-C01E interference reduction in cable interference reduction level setting w02-C01E standby system w02-C01E standby s	X12-G
control of tube operation cooling v05-C02B5 coupling window in vessel v05-C02B1C delay devices v05-C02C3 distributed coupling v05-C02C5 distributed elements v05-C02C electrically-tunable resonator v05-C02C1 electrodes electron guns v05-C02A5 electron guns v05-C02A5 gyrotron v05-C01D harmonic suppression v05-C02C7 header for thermionic cathode klystron lead-in filters v05-C02B3 magnetic control v05-C02B3 manufacture - see Discharge tube manufacture v05-C02C1 multiple resonator v05-C02C1 multiple resonator v05-C02C1 multiple resonator v05-C02C1 RFI suppression by distributed element design v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter v05-C02C1 RFI suppression by lead-in filter	W02-A
cooling vidow in vessel v05-C02B1C coupling window in vessel v05-C02B1C delay devices v05-C02C3 distributed coupling v05-C02C5 distributed elements v05-C02C electrically-tunable resonator v05-C02C1 electrodes v05-C02A7 electron guns v05-C02A7 gyrotron v05-C01D harmonic suppression v05-C02C7 heater for thermionic cathode v05-C02A3A klystron v05-C01C lead-in filters v05-C02B3 magnetic control v05-C02B3 magnetic control v05-C02B3 magnetic control v05-C02B3 magnetic control v05-C02C1C multiple resonator v05-C02C1C multiple resonator v05-C02C1 multiple resonator v05-C02C1 RFI suppression by lead-in filter v05-C02C7 RFI suppression by lead-in filter v05-C02C3 control v02-C01C3 control v02-C01C3 control v02-C01C4 echo canceller v02-C01C6 echo reduction w02-C01C6 echo reduction w02-C01C6 echo reduction w02-C01C6 echo reduction w02-C01C6 enhoration v02-C01C6 enhorati	
coupling window in vessel delay devices V05-C02C3 distributed coupling V05-C02C5 distributed delements V05-C02C electrically-tunable resonator V05-C02C1 electrodes V05-C02A electron guns V05-C02A electron guns V05-C02A gyrotron V05-C01D harmonic suppression V05-C01D harmonic suppression V05-C01C lead-in filters V05-C02B3A lead-ins V05-C02B3A lead-ins V05-C02B3 magnetic control V05-C02B3 magnetic control V05-C02C1C multiple resonator V05-C02C1 multiple resonator V05-C02C1 multiple resonator V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A Transmission system (communications)  **Control W02-C01B3** **Control W02-C01C** **echo canceller W02-C01C** **echo canceller W02-C01E** **Equalising W02-C01B** **impedance matching W02-C01D** **indicating fault location W02-C01D** **interference reduction induced current interference reduction induced current int	14/00 004 40
delay devices V05-C02C3 distributed coupling V05-C02C5 distributed elements V05-C02C electrically-tunable resonator V05-C02C1C electrodes electron guns V05-C02A5 electron guns V05-C02A5 gyrotron V05-C01D harmonic suppression V05-C02C1C lead-in filters V05-C02B3 lead-ins V05-C02B3 magnetic control V05-C02B3 magnetic control V05-C02A7 manufacture - see Discharge tube manufacture V05-C02C1C multiple resonator V05-C02C1E mechanically-tunable resonator V05-C02C1E mechanically-tunable resonator V05-C02C1E mechanically-tunable resonator V05-C02C1E mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1E mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1C multiple resonator V05-C02C1C multiple resonator V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A  Transmission of vehicle testing S02-J02X  Transmission system (communications)	
distributed coupling V05-C02C5 distributed elements V05-C02C1 electrically-tunable resonator V05-C02C1C electrodes V05-C02A4 electron guns V05-C02A5 focussing, magnetic control V05-C02A7A gyrotron V05-C01D harmonic suppression V05-C02C7 heater for thermionic cathode klystron V05-C01C lead-in filters V05-C02B3A lead-ins W05-C02B3A magnetic control V05-C02B3A magnetic control V05-C02B3A magnetic control V05-C02A7 manufacture - see Discharge tube manufacture V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A Transmission system (communications)	
distributed elements V05-C02C electrically-tunable resonator V05-C02C1C electrodes V05-C02A electron guns V05-C02A5 focussing, magnetic control V05-C02A7A gyrotron V05-C01D harmonic suppression V05-C02C7 heater for thermionic cathode V05-C02A3A klystron V05-C01C lead-in filters V05-C02B3 magnetic control V05-C02B3 magnetic control V05-C02B3 magnetic control V05-C02A7 manufacture - see Discharge tube manufacture V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1 multiple resonator V05-C02C1 RFI suppression by distributed element design V05-C02C3 RFI suppression by lead-in filter V05-C02B3A	
electrically-tunable resonator V05-C02C1C electrodes V05-C02A electron guns V05-C02A5 focussing, magnetic control V05-C02A7A gyrotron V05-C01D harmonic suppression V05-C02C7 heater for thermionic cathode klystron lead-in filters V05-C02B3A lead-ins V05-C02B3A lead-ins V05-C02B3 magnetic control V05-C02A7 manufacture - see Discharge tube manufacture V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1 multiple resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A Transmission of vehicle testing S02-J02X Transmission system (communications)	
electrodes electron guns focussing, magnetic control gyrotron harmonic suppression heater for thermionic cathode klystron lead-in filters lead-ins magnetic control manufacture - see Discharge tube manufacture mechanically-tunable resonator multiple resonator multiple resonator multiple resonator RFI suppression by distributed element design RFI suppression by lead-in filter  v05-C02B3  v05-C02B3 v05-C02C1 multiple resonator RFI suppression by lead-in filter  v05-C02C1 RFI suppression by lead-in filter  v05-C02B3  v05-C02B3 equalising hybrid w02-C01E impedance matching w02-C01D induced current interference reduction in cable interference reduction in cable interference reduction w02-C01C interference reduction in cable interf	
electron guns V05-C02A5 focussing, magnetic control V05-C02A7A gyrotron V05-C01D harmonic suppression V05-C02C7 heater for thermionic cathode klystron V05-C01C lead-in filters V05-C02B3A lead-ins V05-C02B3 magnetic control manufacture - see <b>Discharge tube manufacture</b> V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1 RFI suppression by distributed element design V05-C02B3A  RFI suppression by lead-in filter V05-C02B3A	
focussing, magnetic control gyrotron harmonic suppression heater for thermionic cathode klystron lead-in filters lead-ins magnetic control manufacture - see Discharge tube manufacture mechanically-tunable resonator multiple resonator power supplies resonators RFI suppression by distributed element design V05-C02A7 RFI suppression by lead-in filter V05-C02B3A  Inyolid W02-C01E impedance matching w02-C01E indicating fault location w02-C01C interference reduction in cable w02-C01C interference reduction w02-C01C interference reduction in cable w02-C01C interference reduction w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01C interference reduction in cable w02-C01D interference reduction in cable w02-C01D interference reduction in cable w02-C01D interference reduction in cable w02-C01D interference r	
gyrotron V05-C01D harmonic suppression V05-C02C7 heater for thermionic cathode V05-C02A3A klystron V05-C01C lead-in filters V05-C02B3A lead-ins V05-C02B3 magnetic control V05-C02A7 manufacture - see <b>Discharge tube manufacture</b> V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1B power supplies V05-C03A resonators V05-C02C1 RFI suppression by distributed element design V05-C02B3A  RFI suppression by lead-in filter V05-C02B3A  Indicating fault location W02-C01D induced current interference reduction in cable w02-C01C interference reduction W02-C01C interference reduction w02-C01C interference reduction W02-C01D induced current interference reduction in cable w02-C01C interference reduction w02-C01C interference reduction w02-C01D induced current interference reduction in cable interference reduction in cable w02-C01C interference reduction w02-C01C interference reduction w02-C01D induced current interference reduction in cable interference reduction in cable w02-C01C interference reduction w02-C01C interference reduction w02-C01C interference reduction w02-C01C interference reduction w02-C01D induced current interference reduction in cable interference reduction in cable w02-C01C interference reduction w02-C01C interference reduction w02-C01D induced current interference reduction in cable w02-C01C interference reduction w02-C01C interference reduction w02-C01C interference reduction w02-C01C interference reduction in cable w1 in terference reduction in cable w1 in terference reduction w1 in cable w1 in terference reduction w1 in cable w1 in terference reduction w1 in cable w1 in terference reduction w1 in cable w1 in terference reduction w1 in cable w1 in terference reduction w1 in cable w	
harmonic suppression V05-C02C7 heater for thermionic cathode V05-C02A3A klystron V05-C01C lead-in filters V05-C02B3A lead-ins V05-C02B3 magnetic control V05-C02A7 manufacture - see <b>Discharge tube manufacture</b> V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1B power supplies V05-C03A resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A  Induced current interference reduction in cable w02-C01C2 interference reduction W02-C01C3 interference reduction W02-C01C3 interference reduction w02-C01E3	
heater for thermionic cathode klystron V05-C01C lead-in filters V05-C02B3A lead-ins V05-C02B3 magnetic control v05-C02A7 manufacture - see Discharge tube manufacture V05-L05C mechanically-tunable resonator v05-C02C1C multiple resonator v05-C02C1B power supplies v05-C03A resonators V05-C02C1 RFI suppression by distributed element design V05-C02B3A in cable w02-C01CC interference reduction W02-C01CC interference reduction W02-C01CC interference reduction W02-C01BC interference reduction W02-C	
klystron V05-C01C lead-in filters V05-C02B3A lead-ins V05-C02B3 magnetic control V05-C02A7 manufacture - see <b>Discharge tube manufacture</b> V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1B power supplies V05-C03A resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A  Intrable W02-C01C interference reduction W02-C01C interference reduction W02-C01E interference reduction W02-C01E interference reduction W02-C01B interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction was interference reduction w	
lead-in filters V05-C02B3A level setting W02-C01B3 magnetic control V05-C02A7 manufacture - see Discharge tube manufacture V05-L05C mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1B power supplies V05-C03A resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A level setting W02-C01B3 monitoring W02-C01D redundancy network W02-C01D strain detector standby system W02-C01D strain detector S02-F01 testing waveguide (RF) W02-A01 Transmission of machine testing S02-J03A Transmission of vehicle testing S02-J02X Transmission system (communications)	W02-C01C3A
lead-ins V05-C02B3 magnetic control V05-C02A7 manufacture - see Discharge tube manufacture	
magnetic control V05-C02A7 manufacture - see Discharge tube manufacture	
manufacture - see Discharge tube manufacture	W02-C01D
wos-L05C mechanically-tunable resonator v05-C02C1C multiple resonator v05-C02C1B power supplies v05-C03A resonators v05-C02C1 RFI suppression by distributed element design v05-C02C7 RFI suppression by lead-in filter v05-C02B3A  resonators v05-C02C7 RFI suppression by lead-in filter v05-C02B3A  resonators v05-C02C7 RFI suppression by lead-in filter v05-C02B3A  resonators v05-C02C7 RFI suppression by lead-in filter v05-C02B3A  resonators v05-C02C7 RFI suppression by lead-in filter v05-C02B3A  resonators v05-C02C7 RFI suppression by lead-in filter v05-C02B3A  resonators v05-C02C1 Transmission of wehicle testing s02-J02X Transmission system (communications)	W02-C01D3
mechanically-tunable resonator V05-C02C1C multiple resonator V05-C02C1B power supplies V05-C03A resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A  mechanically-tunable resonator V05-C02C1C strain detector S02-F01 testing waveguide (RF) W02-C01D waveguide (RF) Transmission of machine testing S02-J03A Transmission of vehicle testing S02-J02X Transmission system (communications)	W02-C01E
multiple resonator V05-C02C1B power supplies V05-C03A resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A  multiple resonator V05-C02C1B testing waveguide (RF) W02-A01  Transmission of machine testing S02-J03A  Transmission of vehicle testing S02-J02X  Transmission system (communications)	W02-C01D3
power supplies V05-C03A waveguide (RF) W02-A01 resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A waveguide (RF) W02-A01 Transmission of machine testing S02-J03A Transmission of vehicle testing S02-J02X Transmission system (communications)	S02-F01
resonators V05-C02C1 RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A  Transmission of machine testing S02-J03A  Transmission of vehicle testing S02-J02X  Transmission system (communications)	W02-C01D
RFI suppression by distributed element design V05-C02C7 RFI suppression by lead-in filter V05-C02B3A  Transmission of machine testing S02-J03A  Transmission of vehicle testing S02-J02X  Transmission system (communications)	W02-A01
design V05-C02C7  RFI suppression by lead-in filter V05-C02B3A  Transmission of vehicle testing S02-J02X  Transmission system (communications)	S02-J03A
	S02-J02X
	ns)
	•
screens V05-C02A9 inductive loop W02-C02B	
seals for vessels V05-C02B1A line W02-C01	
single resonator V05-C02C1A monitoring W02-C05	
slow wave structures V05-C02C3A near-field W02-C02	
tube details V05-C01A1 PCM (general) W02-C06	
tunable resonator V05-C02C1C radiating/leaky cable W02-C02A	
vessel V05-C02B1 radio W02-C03	
Transmission telemetry/telecontrol W05-D	
creatic system. See Electric Petrol	
distribution/ transmission system X12 11	W02-C01A3
facsimile signal S06-K07C X12-H03E	
rademino digital	W02-C01A1
5 1	W02 C01/41
distribution/transmission system X12-H  link setting in facsimile  S06-K07C4  Transmitter  digital data (general)  W01-A07C	14/04 4070
optical communications woz-co-A	W02-C04A1
monitoring facsimile signal S06-K07C6 radio – see <b>Radio transmitter</b> W02-G01	W02-G01
secret, in facsimile S06-K07C7 Transmitting mechanical vibrations P43-A05	P43-A05
vehicle Q13  X22-G01  Transparent conductive film	
general X12-D02Δ1	X12-D02A1
Transmission and distribution system	U14-K01A1B
electric - see Electric power  Transparent conductive materialsU14-H01E1	
distribution/transmission system X12-H	U14-H01E2
high power - see Electric power	U14-H01E3
distribution/transmission system X12-H  Transparent conductive structures U14-H01F4	U14-H01E4
IOW DOWER II/4-H	U14-H01E5
Transmission control, cable/line system Transplanting, medical S05-X	

W02-C01B1

_		1	
Transponder	T04-K03B	Triode vacuum tube	V05-B01A3
identifying vehicle	T07-A03A	Triodes, dielectric	U12-B
	W06-A04B1	Triple-balanced mixer	
interrogation system	W02-G05B	(frequency changing)	U23-J01C5G
radar jamming	W02-G05X	Trolley	Q22-A
	W06-A04E1A	hospital, for patients	S05-G02A
telecontrol/telemetry application	W05-D08G	shopping, coin or token actuated shopping, electric propulsion	105-Н X25-F05A
transponder per se	T04-K03B W02-G05A	shopping, point-of-sale aspects	T05-L
Transport, semiconductor wafers	U11-F02A1	Trolley bus	X21-A01H
•		Trusses- see Buildings, general med	
Transportation container, electronic component (general)	: V04-X01A	construction and structural element	
interrogation systems	T05-G02B1A	TSC static VAR compensator	X12-H01A2D
Transversal filter	100 0025171	•	
analogue	U25-A02	Tube element, electric heating	X25-B01D
digital	U22-G01A3	Tube, analysing - see Analysing tube	
Trapping thieves	W05-B01D1	Tube, cathode ray - see Cathode ray	tube
Trash disposal		and CRT	
industrial/large scale	X25-W01	Tube, discharge - see Discharge tub	
domestic	X27-K	Tube, processing - see Processing to	<b>lbe</b> V05-F05
general	P43-E	Tube, vacuum - see Vacuum tube	
general, by burning	P43-E01	classical vacuum	V05-B01
general, by burying or dumping general, by treating or converting	P43-E03	cold cathode complete novel tube	V05-B03 V05-D04A
	1 43-L03	electron beam	V05-D04A V05-D
Travelling wave motors	V06-M06D1	electron microscope	V05-F01A1
tubes	V05-K00B1	for data storage	V05-D04
Travelling-wave tube (TWT)	V05-C01B	for phase shifting	V05-D04
application to amplifiers	U24-G04D	for processing	V05-F05
Treadmill for exercising	P36-A06	for recording	V05-F08C3
rreadilini for exercising	W04-X01A5C	gas-filled gas-filled, details	V05-A V05-A07
Treating contaminated ground for		image display	V05-D01
reclamation	P43-J	image pick-up, details	V05-D02B
Treating solid waste for disposal	P43-E05	imaging	V05-F08A
Tree	1 10 200	ion beam	V05-E05
exchanges, data	W01-A06B4	ion diffraction	V05-F01 V05-F08B
networks	W01-A06B4	measurement object processing, examining	V05-F06B V05-F
timber industry	X25-X01	particle separator	V05-J01
Tree house	P36-E07	particle spectrometer	V05-J01
	Q46-B99	photoelectric discharge	V05-G
Trellis coding error detection/corre	ction	plasma .	V05-A01
	U21-A06C3	pressure measuring secondary emission	V05-K03 V05-K
Trench capacitor DRAM (see also RA	AMs.	spectrometer	V05-K V05-L05J
dynamic)	U14-A03B4	thermionic	V05-L05B1
Trench gate FET - see Field effect		transit-time	V05-C
transistor, trench gate	U12-D02A9	travelling wave	V05-C01B
Tri-dimensional integration (see als	0	tube details	V05-D04B
Integrated circuit structures)	U13-D05	vacuum	V05-B V05-D03B1
Tri-state logic	U21-C02C	with non-light input X-ray	V05-D03B1 V05-E01
Triac - see Thyristors, bidirectional	U12-D01B2	gas filling	V05-E01 V05-F04E
Trial software	T01-J50	Tumble drier	X27-D02
Trimming		Tumbler mill	P41-A03E
hybrid circuits	U14-H04G	Tumbler switch	V03-C04
integrated circuits	U13-C06	i uniblei switch	X13-A04D
thin/thick film components	U14-H04A4		
		•	

Tuner	İ	TV	
broadcast receiver -see <b>Broadcas</b>	t radio	advertising	W05-E03C
receiver	W03-B01	audience research	W02-F04B
communications receiver -see Rac	dio	broadcast systems - see <b>Televisio</b>	n systemsW02-F
communications receiver	W02-G03A	cable - see <b>CATV</b>	W02-F03A
television receiver -see <b>TV tuner</b>	W03-A01	camera - see Video camera	W04-M01
Tungsten lamp	X26-B01A	projection - see Projection TV	W04-Q01
Tuning		receiver - see TV receiver	W03-A
aerial	W02-B08E	recording signal processing - see	
band selection	U25-H	recording signal processing	W04-F
continuous	U25-G	signal mixing	W04-N05B1
discontinuous	U25-H	signal processing - see <b>Video sign</b>	wo4-P
display for broadcast radio receive	er W03-B01C	<pre>processing signal switching</pre>	W04-R05B5
display for TV receiver	W03-A01C	special effects - see <b>TV special eff</b>	
MEMS-based	U25-G01	special effects - see 14 special eff	W04-N05C
remote control of (general)	U25-K	standards conversion	W04-N05A
varactor-based	U25-G03	studio equipment	W04-N
Tunnel current device	V05-F01A5	systems - see <b>Television systems</b>	
Tunnel diodes	U12-C01G	transmitter	W02-G01
data recording	T03-C05	TV camera - see Video camera	W04-M01
data recording	V05-F08C3		VVO4-IVIO I
microscope (see also Atomic For		TV commerce	MO2 A4/CE I
and Scanning Tunnelling		receiver end	W03-A16C5J W02-F10J
Microscopes)	V05-F01A5	system	
Tunnel, road		TV CRT display	W03-A08A
ventilation system	X25-U05	beam current limiting	W03-A08A8A
Tunnel, underground/underwater s		beam index control	W03-A08A5E
ruillei, ulidergroulid/uliderwater s		blanking arrangements	W03-A08A7 e W03-
	Q42-B	blanking in response to scan failur A08A7A	e vv03-
Tunnelling hot electron unipolar tra	nsistor	blanking part of screen	W03-A08A7C
	U12-D02J2	cathode drive circuits	W03-A08A8
Turbidimeter - see Nephelometer		centering picture on screen	W03-A08A1E
Turbine		convergence	W03-A08A5
	Q25-C02B	convergence, automatic	W03-A08A5C
for aircraft propulsion for ship propulsion	Q24-E02B	convergence, coils	W03-A08A5A
ior strip propulsion	Q24-E02B	deflection circuitry	W03-A08A1
gas	Q52-A	deflection signal generator/contro	IW03-A08A1A
microturbine plant	X11-C15	deflection yoke	V05-D06B1A
environmental protection	X11-C08		W03-A08A1B
monitoring, operation and cont	rol X11-C10	degaussing circuitry	W03-A08A4C
microturbine generator, applica		degaussing coil	W03-A08A4A
steam	Q52-A01S	distortion correction	W03-A08A1D
	X11-A01	dynamic focussing	W03-A08A3A W03-A08A3C
water	X11-B01	focus potentiometer focussing coil	W03-A08A3C
wind	Q54-G	fractal scanning	W03-A08A1J
	X15-B01A	height control	W03-A08A1F
wind, microturbine	X15-B01A3	limiting excess beam current	W03-A08A8A
Turbo coding error detection/corre		linearity correction	W03-A08A1D
data transmission	W01-A01B2E	magnets for convergence	W03-A08A5A
general	U21-A06C2	matrix drive circuitry	W03-A08A8C
		non-raster scanning	W03-A08A1J
Turning	X25-A03A	non-uniform speed deflection	W03-A08A1G
control	T06-D06	optical aspects	W03-A08A
	X25-A03A		W03-A08E
	X25-A03F	progressive scanning	W03-A08A1H
Turnstile	T05-D01X	projection - see <b>Projection TV</b>	W03-A08A
Turntables, phonograph	W04-A02	P - 16 11	W04-Q01A
- F		radiated field suppression	W03-A08A6
		tube drive circuitry	W03-A08A8
		velocity modulation	W03-A08A1G

width control	W03-A08A1F	cordless headphones	W03-A15
receiver	W03-A	•	W03-G05C5A
ABL	W03-A04D1	CRT display - see <b>TV CRT display</b>	W03-A08A
7.52	W03-A08A8A	decoder, digital signals	W03-A11D
ACC	W03-A05C1	decoder, stereophonic	W03-A12B1
AFC	W03-A02A	decoder, subscription	W03-A16C3
AGC	W03-A03A	decoder, teletext	W03-A10A
ambient lighting-based		demodulator, colour signal	W03-A05D
brightness/contrast control	W03-A04D5	demodulator, sound	W03-A03C1
ancilliary equipment connection (g	eneral)	demodulator, video	W03-A03C5
, , , ,	W03-A18C	digital architecture	W03-A11K
ancilliary equipment, cable and sat	ellite	digital broadcast receiver	W03-A11G
	W03-A16	discharge protection circuits	U24-F
audience research equipment	W03-A18R		W03-A07C
audio amplifiers	W03-A15A	display arrangements - see <b>TV rec</b>	
audio systems	W03-A15	display	W03-A08
automatic chroma control	W03-A05C1	DSP aspects	W03-A11K
auxiliary equipment connection	W03-A18C	dual-standard	W03-A11
available functions display	W03-A18A9	dual-tuner	W03-A01D
band scanning	W03-A02B	DMB receiver	W01-C01D3C
battery power supply	W03-A07A		W01-C01P6G
brightness control	W03-A04D		W03-A11G5
cabinet	W03-A09A1	DVB receiver	W03-A11G
cable tuner - see TV receiver tune	r W03-A01A5	EHT power supply (CRT)	W03-A07C
cable TV receiver	W03-A16C1		W03-A08A1C
calibration	W03-A18A2	emergency broadcast detection	W03-A18A5J
car-mounted	W03-A	EPG	W03-A13J
	W03-G08	equalizing	W03-A04G
	X22-J13	error correction, teletext decoder	
channel number display	W03-A01C	error correction, TV decoder	W03-A11D1
channel number storage	W03-A02B1	fast teletext facility	W03-A11M5
channel number storage, channel		Freesat	W03-A16A
listing-based	W03-A02B1C	Freeview	W03-A11G
channel number storage, location-		freeze-frame display	W03-A13C
	W03-A02B1E	ghost cancelling	W03-A04G
channel number storage, program		ghost control signal extraction	W03-A04G W03-A10J
guide-based	W03-A02B1C	high definition	
	W03-A16C5E	high definition IF AGC	W03-A11 W03-A03A5
channel number storage, receivab			
stations-based	W03-A02B1A	IF amplifier IF filter	W03-A03B5 W03-A03B1
channel number storage, user con			
	W03-A02B1G	integrated with telephone	W01-C01P6G
	W03-A02B3	interactive aspects	W03-A16C5
child-lock system	W03-A18A7	interfacing hardware internal construction	W03-A18C1 W03-A09A5
closed caption system	W03-A10G		
	W03-A05C7	LCD LED display	W03-A08B
colour killer circuit	W03-A05C3	loudspeaker (per se)	W03-A08C V06-V04A1
colour signal processing - see TV r		loudspeaker (per se)	
colour signal processing	W03-A05	loudonoskor analogura	W03-A15C V06-V02F
commercial message detection	W03-A18A5G	loudspeaker enclosure	V06-V02F V06-V04A1
commercial message storage	W03-A16G		W03-A15C
colour synchronisation	W03-A05A	luminance-chrominance separatio	
connection to external HiFi system		mains power supply	W03-A07A
	W03-A18C	manufacture	W03-A07A W03-A19A
1.1 0	W03-A09A	memory - general	W03-A17A
		memory - general	
constructional details, tuner	W03-A01B8	momony docodor/standards sans	rorcion
constructional details, tuner contrast control	W03-A04D	memory - decoder/standards conv	
constructional details, tuner contrast control control (general)	W03-A04D W03-A18A	•	W03-A11M1
contrast control control (general) control, remote - see <b>TV receiver r</b>	W03-A04D W03-A18A remote	memory - teletext	W03-A11M1 W03-A11M5
constructional details, tuner contrast control control (general) control, remote - see <b>TV receiver r</b> <b>control</b>	W03-A04D W03-A18A remote W03-A02C	memory - teletext memory - PIP, OSD, etc.	W03-A11M1 W03-A11M5 W03-A11M3
constructional details, tuner contrast control control (general) control, remote - see <b>TV receiver r</b>	W03-A04D W03-A18A remote	memory - teletext	W03-A11M1 W03-A11M5 W03-A11M3

monitoring with external equipm	ent	teletext, character sets and fonts	W03-A10C5
monitoring with external equipm	W02-F04A5C	teletext decoder	W03-A10A
	W03-A18A1	teletext decoder	W03-A10A1
motion detection (signal)	W03-A11C	teletext memory	W03-A11M5
mounting brackets for walls	W03-A09C	teletext memory teletext, text-to-speech conversion	
multi-standard	W03-A11	teretext, text to specer conversion	W04-V04C1
multiple-tuner	W03-A11	testing	W03-A18A
•		3	
noise reduction (video)	W03-A04H	testing with external equipment	W03-A18A1
on-screen display (OSD)	W03-A13G	time programming	W03-A18A5
on-screen display of channel nun		timed disconnection	W03-A07A1
	W03-A13G	tone control	W03-A15A
packaging	W03-A19G	transcoder	W03-A11A1
parental control system	W03-A18A7	tuner - see TV receiver tuner	W03-A01
peripheral connection system	W03-A18C	tuning display	W03-A01C
picture signal motion detector	W03-A11C	upscaling	W03-A11A5
picture-in-picture	W03-A13B	user identification	W03-A18A6
power supplies	W03-A07	V-chip	W03-A18A7
production line testing	W03-A18A1	viewer identifying	W03-A18A6
programme guide	W03-A13J	viewer locating	W03-A18A3
proximity warning (viewer)	W03-A18A3	viewing distance monitoring	W03-A18A3
recycling	W03-A19C	virtual keyboard for remote	***************************************
remote control - see <b>TV receiver</b>		control	W03-A02C5A
control		vision detector	
	W03-A02C		W03-A03C5 W03-A15A
RF AGC	W03-A03A3	volume control	
satellite equipment (general)	W03-A16A	VPS control of receiver	W03-A10J
satellite tuner - see TV receiver t			W03-A18A
SCART socket	W03-A18C	white balance control	W03-A05C5
self-checking systems	W03-A18A2	zapping	W03-A02B3
self testing and monitoring	W03-A18A2	zoom display	W03-A13E1
separate audio programme (SAP	) decoder	TV receiver audio system	W03-A15
	W03-A12B1A	audio amplifier	W03-A15A
set-top box	W03-A16E	cordless headphones	W03-A15
shipping carton	W03-A19G	cordiess neadphones	W03-G05C5A
software updating	W03-A18A8A	loudspeaker (per se)	V06-V04A1
sound detector	W03-A03C1	loudspeaker (per se)	W03-A15C
standard recognition/switching	W03-A11B	louden coker and course	V06-V02F
standards conversion circuits	W03-A11A	loudspeaker enclosures	
standby power supply	W03-A07A1		V06-V04A1
stands and supports	W03-A09C		W03-A15C
stereophonic	W03-A12B	remote control unit audio link	W03-A02C5E
stereophonic amplifiers	W03-A12B5		W03-A15
stereopriorite amplifiers	W03-A15A	surround sound	W03-A12B3
atana and and a days day		tone control	W03-A15A
stereophonic decoder	W03-A03C1	volume control	W03-A15A
	W03-A12B1	TV receiver color signal processing	W03-A05
stereophonic loudspeaker syster		adaptive luminance-chrominance	******
	W03-A15C	separation	W03-A05B7
stereoscopic	W03-A12A	colour burst separation	W03-A05A3
still-picture display	W03-A13C		W03-A05A3
subscription equipment	W03-A16C	colour subcarrier recovery	
subtitle display system	W03-A10G	colour synchronisation	W03-A05A
subtitle memory	W03-A11M5	control circuit details	W03-A05C
suround sound system	W03-A12B3	cross colour suppression	W03-A05B5
synchronizing	W03-A06	DC restoration/clamping	W03-A04C
synchronizing signal distribution	W03-A06E		W03-A05X
synchronizing signal extraction	W03-A06A	display interface circuit	W03-A08S
synchronizing signal extraction		dithering	W03-A05X
synchronizing signal presence de		hanging dots interference suppres	ssion W03-A05B5
avachronizing sizzal assay (i.e. /	W03-A06A1	hue/intensity control	W03-A05C7
synchronizing signal separation (		luminance-chrominance separatio	
synchronizing signal type discrim			W03-A05B
	W03-A06A5	matrix circuit	W03-A05E
synthesizer tuning control	W03-A02A		
teletext	W03-A10	TV receiver display	W03-A08
teletext character generator	W03-A10C	analogous video display	W03-A21

aspect ratio control based on stan	dard	TV receiver standard recognition	W03-A11B
recognition	W03-A11B1A	automatically switching receiver c	
autostereoscopic	W03-A12A	automatically emicining receiver e	W03-A11B1
colour filter	W03-A08E1	controlling scanning format or dis	
CRT - see TV CRT display	W03-A08A	area	W03-A11B1A
3D glasses, anaglyph	W03-A08E7E	novel standard recognition circuit	
3 . 371	W03-A12A	TV receiver tuner	W03-A01
3D glasses, shutter type	W03-A08E7C	AFC	W03-A02A
	W03-A12A	AGC, IF	W03-A03A5
EDID (extended display identificat	ion	AGC, RF	W03-A03A3
data)	W03-A08S1	AGC, novel control characteristic	
electro-optical scanning	W03-A08F	band scanning	W03-A02B
electroluminescent	W03-A08J	cable tuner	W03-A01A5
filters (optical)	W03-A08E	channel number storage	W03-A02B1
head-mounted	W03-A08E7A	channel number storage, channel	
interfacing	W03-A08S	listing-based	W03-A02B1C
interfacing, digital display	W03-A08S1	channel number storage,	
interfacing, matrix drive details	W03-A08S5	location-based	W03-A02B1E
laser	W03-A08F1	channel number storage, progran	
LCD	W03-A08B	guide-based	W03-A02B1C
LCD, drive circuitry	W03-A08B1	channel number storage, receivab	ole
LCD, module aspects	W03-A08B1	stations-based	W03-A02B1A
LED lens	W03-A08C W03-A08E3	channel number storage, user cor	
mirror	W03-A08E5		W03-A02B1G
novel standard recognition circuit		construction	W03-A01B8
optical aspects	W03-A11B3 W03-A08E	DBS	W03-A01A1
optomechanical scanning	W03-A08F	direct conversion	W03-A01B6A
OSD	W03-A13G	diversity circuitry	W02-C03A
picture-in-picture	W03-A13B	h a m a dun a	W03-A01B9 W03-A01B6A
plasma	W03-A08D	homodyne input filters	W03-A01B1
polarising filter	W03-A08E1	local oscillator	W03-A01B7
privacy arrangements	W03-A08L	low-IF configuration	W03-A01B6C
projection (see also Projection te	levision)	mixer	W03-A01B5
	W03-A08	mixer, image rejection	W03-A01B5A
	W04-Q01	RF amplifier	W03-A01B3
stereoscopic	W03-A12A	satellite tuner	W03-A01A1
tuning indication	W03-A01C	synchrodyne	W03-A01B9
video display (analogous to TV)	W03-A21	synthesizer tuning	W03-A02A
♥ receiver remote control	W03-A02C	tuned circuits	W03-A01B1
remote control system	W03-A02C5	zero-IF configuration	W03-A01B6A
remote control system involving		TV receiver video signal processing	W03-A04
on-screen display	W03-A02C5A	aperture correction	W03-A04B1
remote control system with		bandwidth control	W03-A04B
additional features	W03-A02C5E	brightness control	W03-A04D
GUI aspects	W03-A02C5A	clamping circuits	W03-A04C
image recognition-based control	W03-A02C5J	colour - see TV receiver colour si	gnal
receiver-end circuitry	W03-A02C5G	processing	W03-A05
remote unit	W03-A02C1	contrast control	W03-A04D
remote unit audio link	W03-A02C5E	display interface circuit	W03-A08S
	W03-A15 W03-G05A5	equalizing	W03-A04G
remote unit location system	W03-A02C5C	gamma control	W03-A04A
remote unit, circuitry	W03-A02C3C W03-A02C1A	ghost cancelling	W03-A04G
remote unit, circuity	W03-A02C1A W03-A02C1C	ghost control signal extraction	W03-A04G
virtual keyboard for remote	1100 A02010	late la cala Carotta o	W03-A10J
control	W03-A02C5A	high definition	W03-A11
voice recognition-based control	W03-A02C5L	movement detection	W03-A11C W03-A04H
2 22 222 3 24004 30.14101	W04-V04A5	noise reduction	W03-A04H W03-A04B1
		peaking standard recognition/switching	W03-A04B1
		= = = = = = = = = = = = = = = = = = = =	AAOD-WIID
		TV signal motion detector	\A/O4 DO4 ^ 4 ^
		coding, hybrid	W04-P01A4A

coding, MPEG	W04-P01A4A	U	
coding, predictive	W04-P01A5A		
coding, transform	W04-P01A5A	Ultrasonic	
general	W04-P01A1	actuator, non-piezoelectric	V06-M06R
receiver	W03-A11C	actuator, piezoelectric	V06-M06D1
video recording	W04-F01F1	antitheft alarms	W05-B01C1B
TV special effects	W04-N05C	burglar alarms	W05-B01C1A
advertising image substitution	W04-N05C5E	cleaning	P43-B07C
3 191111	W05-E03C		X25-H09A
chroma keying	W04-N05C5A		V06-V01N
highlighting	W04-N05C9	P. P. I	V06-V04C
image generation	W04-N05C1	contrast media, medical	S05-D03C
image manipulation	W04-N05C3	delay lines	\ (0 / \ (0 4 \ )
industrial application	W04-N05G5	(electromechanical)	V06-V01N
picture inlay/overlay	W04-N05C5	danait	V06-V04D2
shading	W04-N05C9	density measurement	S03-E08C S05-D03
soft focus	W04-N05C9	diagnosis, medical diameter measurement	S02-A05B
subtitle generator	W04-N05C1A	diameter measurement	S02-A03B S02-A10A
TV studio application	W04-N05G1	equipment details	S03-E08X
zooming	W04-N05C3A	flaw detection	S03-E08A
TV standard recognition circuit		imaging	S03-E08E
TV receiver	W03-A11B5	intruder alarms	W05-B01C1A
video recording	W04-F01H1	massager for medical use	S05-A05
TV studio equipment		measurement of fluid speed	S02-G02X
general equipment	W04-N01	medical diagnostic image proce	
mixing desk	W04-N05B1		S05-D03E
manig desk	W04-N05G1	medical therapy	S05-A03C
switching	W04-N05B5	medical, non-transducer details	S05-D03B
g	W04-N05G1	medical, transducer array	S05-D03A2
video processing equipment (ge		medical, transducers	S05-D03A
N05G1	•	medical, ultrasonic transducer de	etails
video processing equipment test	ing W02-		S05-D03A1
F04A5A	5	microscope	S03-E08G
	W04-N05G1	motor, non-piezoelectric	V06-M06R
Twisted pair data network	W01-A06C2B	motor, piezoelectric	V06-M06D1
		piezoelectric transducer,	
Twisting	X25-F02	medical use	V06-V01B
control, yarn	X25-T04A T06-D03B		V06-V04K
control, yann	X25-T04A	probe	S03-E08X
		signal transmission, telemetry/te	
Two dimensional arrays, thin film	U14-H01A		W05-D06A5
Two-part connector - see Connector	r, two-part	sonar	W06-A05
Two-way television system	W02-F08	sound transmission	W02-C07
conference system	W02-F08A	sound transmission communicat	
video telephone	W02-F08B	speed and ranging systems for v	
TWT	V05-C01B	coldoring	W06-A05A X24-A02X
tube details	V05-C01B1	soldering	X24-A02X V04-R04A4
		surgery	S05-B02
Tyndall scattering	S03-E04C	transducer per se	V06-V01N
Typewriter	P75-A	vibrators	V06-V01N
casing, framework	P75-A01	1.5.5.510	V06-V01N V06-V04C
computer printer	S06-F02	welding	X24-D08A
cooling arrangements	P75-A06	Ultraviolet detector fire alarm	W05-B02B5
drive arrangements	P75-A05		
inking arrangements	P75-A04	Ultraviolet erasable ROMs	U14-A06C
keyboard arrangements	P75-A02 P75-A03	Ultraviolet lamp	X26-Q03
media conveying self contained	S06-K99B	Ultra Wide Band (UWB) communic	ation
sen contained	JUU-N17D		W02-K05A9
		carrier-based impulse radio syste	
		K05A9C	VV UZ-

carrier-free impulse radio system	W02-K05A9A
UWB data interface link	W01-A07H2K
UWB data network link	W01-A06C4K
Umbrella	
electrical details	X27-A02
manufacture umbrella stand	P24-M P25-X
non-electrical details	P24-A02
	124-702
system aspects	W01-B05A1A
system aspects	W02-C03C1A
	W02-C03C1G
telephone set	W01-C01D3G
Undersampling	U21-A03F6C
Under-voltage protection	X13-C01C
Underfloor heating, electric	X27-E01A3
control	X27-E01A3
Uninterruptible power supply - see	Standby
power supply	
Universal motor	V06-M02
	X11-F
Universal remote control	
AV equipment	W03-G05A1A
general	W05-D08L
Unlicensed radio network	W02-C03H
Unload/load ramp for hard	
disk drive	T03-A05G
	T03-A08A1C
Unsolicited advertising protection	T01-N02B1C
UPS - see Standby power supply	
Upscaling (video signals)	
recording/playback	W04-F01H3C
TV receiver	W03-A11A5
Urine analysis	S03-E14H9
medical	S05-C02
User configurable arrays - see Logic	
integrated circuits	U13-C04C
User interface	S06-K07A1
printing device	
USIM	W01-C01D3D W01-C01D3G
Hallandelland alama	
Utility failure alarm	W05-B08J
Utility meter	CO1 DO2
digital electricity meters electric	S01-B03 S01-B
Ciccurc	X12-H04
electric, applications	S01-B
•	X12-H04U
electric, applications for network	S01-B
control	X12-H04U2
electric, applications for network protection	S01-B X12-H04U1
protection	X12-110401 X13-C01X
	X13-C04A
Internet/Intranet-based	T01
	Y12 H0//B

X12-H04B

remote reading, electric S01-B01 X12-H04A remote reading, general S02-K08A tamper protection, electric meter S01-B05 X12-H04

## Utility metering - see Utility meter

## UTOC (user table of contents) recording indexing

audio/video W04-H01C1 general T03-J01C1

**UV - see Ultraviolet** 

UV lamp X26-Q03

UV spectroscopy - see Spectrometry coil V05-D01B3

**UWB** 

Ultrawideband (UWB)

and time-hopping systems W02-K05A9

UWB and impulse radio interface link

W01-A07H2K

UWB and impulse radio network link

W01-A06C4K

V		Vacuum tube switch	X13-A04H
_	MO2 CO2AE	Valuable papers	
V-BLAST hybrid diversity systems	W02-C03A5	sorting or delivering	T05-K02
Vacuum		testing	T05-J
apparatus, semiconductor manuf		Valve	Q66-F
	U11-C09Q	check	Q66-P01
gauges tube	S02-F04D1 V05-B	diaphragm	Q66-C
		electromagnetic - see <b>Electromag</b>	<b>jnetic</b>
Vacuum circuit breaker	X13-B02A	valve	X25-L01A
Vacuum cleaner	X27-D04	electrohydraulic valve	X25-L01
accessory	X27-D04A	gate/sliding	Q66-B
accessory, nozzles	X27-D04A	lift	Q66-A
accessory, paper bag	X27-D04A	mixer/multiway	Q66-E
accessory, tools	X27-D04A	pipelines	X25-Y02
accessory, constructional details of		rotary	Q66-D Q66-P03
centrally-operated	X27-D09 X27-D04	safety/equalising vent	Q66-P03
constructional details control	X27-D04 X27-D04B1		
control, motor	V06-N	Vanadium redox battery	X16-C
control, motor	X27-D04B1	Vapour deposition	
dual-cyclone type	X27-D04D1 X27-D04C	conductive layer formation	U11-C05C2
multi-cyclone type	X27-D04C	of magnetic films in carrier manufa	
motor	V06-M		T03-A02A3B
	X27-D04B	Vapour phase epitaxy	U11-C01A1
Vacuum evaporation, applying mag	netic	VAR compensation/control	X12-H01A2
films to substrate	T03-A02A3	distribution line side	X12-H01A2A
iiiiis to substrate	V02-H02A	load side	X12-H01A2B
Vacuum flask	X27-B	series capacitor	X12-H01A2C
		shunt reactor	X12-H01A2C
Vacuum fluorescent display	V05-D01C	static	X12-H01A2D
Vacuum lock, discharge tubes		thyristor-controlled reactor	X12-H01A2D
analysing/processing tube	V05-F04D3	thyristor-switched capacitor	X12-H01A2B
sample/specimen introduction (g		transmission line side	X12-H01A2A
	V05-M05D1	TSC	X12-H01A2D
Vacuum measurement	S02-F04D1	Variable capacitor, mechanical	V01-B02A
calibration	S02-F04F	dielectric details	V01-B02A3
testing	S02-F04F	electrode details	V01-B02A1
Vacuum tube		external connections	V01-B02A1C
anode	V05-B01B5	housing	V01-B02A4
cathode	V05-B01B1	manufacture - see <b>Capacitor man</b>	
cold cathode - see Cold cathode	tube V05-B03	mounting kit	V01-B04A6 V01-B02A4
complete novel tube	V05-B01B8	multi-section	V01-B02A4
control grid	V05-B01B3A	rotor, moving electrode	V01-B02A31
cooling	V05-B01B6	stator	V01-B02A1A
diode	V05-B01A1	substrate	V01-B02A1B
forced air cooling	V05-B01B6A	surface-mounted	V01-B02A5E
grids	V05-B01B3	terminals	V01-B02A1C
heater element	V05-B01B1A	transducer	V01-B02A5C
lead-in conductors	V05-B01B7	trimmer capacitor	V01-B02A5B
liquid cooling	V05-B01B6B	tuning capacitors	V01-B02A5A
manufacture - see <b>Discharge tub</b>		Variable capacitor, non-mechanical	
microfabricated - see Microfabric	V05-L05B1	electret	V01-B02B
cold cathode device	U12-B03D	ferroelectric	V01-B02B9
com canione nevice	V05-B05	manufacture - see Capacitor man	
pentode	V05-B03		V01-B04A6
tetrode	V05-B01A7	transducer	V01-B02B3
thermionic	V05-B01A3	varicap diode	U12-C02B
tube details	V05-B01B	1325/2 32 3.0	V01-B02B1
vapour cooling	V05-B01B		<del></del>
vessel	V05-B01B0C		

V05-B01B7

vessel

Variable length code converter	U21-A05A2A	Vehicle	
Variable ratio divider (counter circuits)		3-D course control	T06-B01X
•	U21-D05B2	3-D position control	T06-B01X
for PLL frequency synthesiser	U21-D05B2	ABS	X22-C02C3
ion i Le nequency synthesiser	U23-D01B1	accelerating indicator light	X22-B02A1
		acceleration sensor	S02-G03
Variable resistor	V01-A03		X21-A06B
actuator mechanism	V01-A03F		X22-X06B
casing	V01-A03A1	accessory	Q14
characterised by adjustment type	V01-A03D	16	X22-J
control knob for	V01-A03F	accessory malfunction display	X22-E10
dust cover	V01-A03A1	accident data recorder	X22-E12
electrodes	V01-A03B	active noise control	W04-V07
film track	V01-A03C1		X22-A03X
front panel control	V01-A03D1 V01-A03D5A		X22-A12
helical potentiometer helical resistance track	V01-A03D3A V01-A03C7A		X22-X08
housing	V01-A03C/A V01-A03A1	advertising	W05-E03M
joystick mechanical drive	V01-A03A1 V01-A03F	aerial	W02-B
linear adjustment	V01-A03D6		X22-X02A
linear resistance track	V01-A03D0 V01-A03C5	aerial, body/roof-mounted	W02-B08F1B
manual control	V01-A03C3 V01-A03D1		X22-X02A1
manufacture - see <b>Resistor manu</b>		aerial, glass-mounted	W02-B08F1A
mandiacture - see <b>Resistor mand</b>	V01-A04K6		X22-X02A3
measurement transducer	V01-A03D3	agricultural type	Q19-G
mounting details	V01-A03A5		X22-P09
preset potentiometer	V01-A03D2		X25-N01A
remote indication of potentiometer		agricultural implement/ implemen	
romote marcation or peterment	V01-A03X		X22-X11
rotary resistance track	V01-A03C7	air bag	Q14-C02
rotational adjustment	V01-A03D5		X22-J07
slide-type potentiometer	V01-A03D6	dashboard mounted airbag	Q14-C02C3
slider electrode	V01-A03B5	for protecting driver	Q14-C02A1
surface mounting	V01-A03D4	for protecting front passenger	Q14-C02A2 Q14-C02A3
terminals	V01-A03B1	for protecting rear passengers inflatable knee bolster	Q14-C02C1
trimmer potentiometer	V01-A03D2	roof mounted airbag	Q14-C02C1
wiper electrode	V01-A03B5	side/curtain airbag	Q14-C02C4
wire resistance track	V01-A03C3	steering wheel mounted airbag	
Varistor	V01-A02B	air conditioner	X22-J02E
combined with capacitor	V01-A02B	air conditioner, mechanical	Q14-M
	V01-B03C8	air-fuel ratio control	X22-A03A2A
manufacture - see <b>Resistor manu</b>	facture	air treatment arrangements	X22-J02E3
	V01-A04K2	alcohol fuel-type engine	Q51-D07
novel composition	V01-A02B1	, , , , , , , , , , , , , , , , , , , ,	X22-A20E
stack, for power antisurge applica	tion	alternator	X11-D
	X13-C03A		X22-F02
VCO, pulse generation	U22-A04A9	alternator control	X13-H02
VCR PLUS	W04-B10C		X22-F02
VCR PLU3		altitude control	T06-B01B
	W04-E04C1	ambient pressure measurement	X22-A05A1
VDRs	V01-A02B	ambulance	X22-P10
VDU control	T04-H	anti-lock brake system	X22-C02C3
Vector computation	T01-J04C	anti-skid brake system	X22-C02C3
•		anti-slip brake regulation	X22-C02C1
Vector excited linear predictive spe	=	anti-theft supply cut-off switch	X22-F09
	W04-V05G3A	anticollision aid	X22-E13
Vegetable peeler			X22-J05
electrical peeler	X27-B04	anticollision optical system	W06-A06H1A
mechanical peeler	P28-A01		W06-A06H1K
			X22-J05C

nicle (continued)		breathalyser	S03-E14H9
anticollision radar system	W06-A04H1A		S05-C09
amaomorom radar ojetem	W06-A04H1K		X22-E04
	X22-J05A	bumper	Q17-A12
anticollision sonar system	W06-A05H1A	bushing, cable installation	X22-X01B2
	W06-A05H1K	by-wire control	X22-A03W
	X22-J05B		X22-W
anticollision systems (external)	T07-E	cabin furniture	Q14-T
antihijack	X22-X03	cable installation	X22-X01B
antistatic arrangement	X22-X	car pool	X22-U
antitheft device	Q14-H	car telephone mounting	X22-X02B
	W05-B01	carburettor	Q51-H01A
	X22-X03		X22-A02C
assembly line	Q16-D01	car wash	Q16-A01
assembly line	X22-X20A	cai wasii	X25-H09C
		and and a section of the	
ACDI II	X25-X14	cathodic protection	X22-X
ASR braking control	X22-C02C1		X25-R06
attitude control	T06-B01B	CD player mounting	X22-X02B
audible reversing warning	X22-B03A	central locking	Q14-H01
automatic brake initiation	X22-C02D		X22-D01
automatic hill stop brake	X22-C02D2	chassis	Q19-A01
automatic steering	Q18-B07	cigarette lighter	X22-J06
adtornatic steering	T06-B01A	clamp, cable installation	X22-X01B1
	T07-D	climate control	X22-X01B1
	X22-C05B	clothing	X22-J11C
automatic transmission	Q13-A01A	clutch	Q13-A03
	X22-G01C		Q63-B
auxiliary supply	X22-F03		X22-G01
battery	X16-B	collision imminence alarm	X22-E13
•	X22-F01	commercial type	X22-P05
battery charging	X16-G02	common rail fuel injection	Q51-H01B1
Sattory snarging	X22-F01A	common ram raor mjocarom	X22-A02A3
battery charging indicator	S01-G06A	communications network (genera	
battery charging indicator			
	X16-H01	complete engine management	X22-A03F
	X22-E03	connector	V04-M30C
battery charging off-board unit	X16-G		X22-A01A
	X22-F01A2		X22-X01A
battery charging using jumper ca	ables X16-G02	construction type	X22-P07
	X22-F01A1	container refrigeration	X22-P05
battery circuit/power supply disa	bling		X22-X04
circuit/switch	X22-F09		X27-F
battery measurements	X21-A06C	control pedals' position sensor	X22-X06L
battery measurements	X21-A06D	counting (external)	T07-A01C
hattan valtaga ragulatar			
battery voltage regulator	X13-H02	courtesy light	X22-B03B
	X16-G02C	crash sensor	X22-X06B
	X22-F02	cruising speed control	X22-A03B1
bed	Q14-B	cruising speed control by using b	
body-mounted aerial	X22-X02A1	cruising speed control by using t	hrottle
boot	X22-X05	control	X22-A03B1A
	Q17-A02	cruising speed control using tran	smission
brake-by-wire	X22-C02C7	3 1	X22-G03A
brake light	X22-B02A	cup holder	Q14-F01
brake-related instrumentation	X22-B02A X22-E02A	curtain	Q14-101 Q14-D
		Curtain	
brake safety	X22-C02D1A	CVT	X22-J09
braking system/control	Q18-A	CVT	Q13-A01C
	X22-C02		X22-G01
braking for collision prevention	X22-C02D1	cycle carrier	Q14-F02
braking for theft prevention	X22-C02D3	damper	Q12-B02
braking force controller	X22-C02C	electric springs/dampers	X22-M01C
braking force controller			
braking indicator	X22-B02A	magnetic damper	Q63-E02E

Vahisla (santinuad)	ı	angina activa naisa cantral/augur	aasian
Vehicle (continued) mechanical damper	Q12-B02A	engine active noise control/suppr (see also W04-V codes)	ession X22-A03X
mechanical damper	X22-M01A	(see also vvo4-v codes)	X22-A03X X22-A12
fluid damper	Q12-B02B	engine air filter	Q51-H05F
torsion damper	Q12-B02C	engine an inter	X22-A06
rubber damper	Q12-B02D	engine air flow sensor	X22-A05D
rubber damper	Q63-E02D	engine braking	Q51-J07
dashboard instrumentation	Q17-A11	engine braking	X22-A09
	X22-E	engine by-wire control	X22-A03W
de-odoriser	X22-J02E	engine cam control	Q51-E05
design and simulation	Q16-D09	engine cam control	X22-A03G
9	X22-X20E	engine catalytic converter	Q51-J02B
diagnostics	X22-X06N		X22-A07
diagnostics, engine	X22-A05N	engine catalytic converter heater	X22-A07
diesel fuel type engine	Q51-D03	engine control	X22-A03
,, ,	X22-A20C	engine cooling	Q17-E02
differential	Q13-A09		Q51-G
differential control	X22-G05		X22-A10
disabled people-aid	Q14-I	engine cooling fan	X22-A10
	S05-K	engine cooling pump	X22-A10
	X22-X	engine crankshaft angle/position :	sensor
discharge lamp, headlamp/headl	ght X22-B01A1		X22-A05C
	X26-A	engine EGR valve	X22-A07
distance sensor, parking/anti-colli		engine exhaust gas cleaning	Q51-J02
	S02-B01		X22-A07
	X21-A06F	engine exhaust valve	Q17-E09
	X22-J05		Q51-E01
Programme I and I also	X22-X06F		X22-A11
distance to obstacle alarm	X22-E13	engine external heating for startin	
distributor	V04-L09	engine fuel flow sensor	X22-A05D
d	X22-A01C1	engine gas flow sensor	X22-A05D
door	Q17-A06	engine gas sensor	S03-E03
door look light	X22-X05 X22-B09	anaina alawalua	X22-A05B X22-A01E3
door lock light door pocket	Q14-F01	engine glow plug engine ignition switch (see also V(	
door switch	X22-D02	codes)	X22-A08
drive-by-wire	X22-A03W	engine immobiliser	X22-A08C
drive by wife	X22-A03B2	engine inlet valve	Q51-E
driver/passenger alertness alarm		engine imet tante	X22-A11
driver/passenger behaviour moni		engine inlet/outlet valves' control	
3	X22-E04D	engine intake air heater	X22-A15
driver information radar	W06-A	engine keyless starting	X22-A08A
	X22-E11	engine knock detector	S02-F04D3A
driver protection alarm	W05-B07E	9	X22-A05A2
driving instruction simulator	W04-W07A	engine lambda sensor	X22-A05B
	X22-X	engine lubricating	Q51-F
drowsiness detector	X22-E04A		X22-A09
drunkenness detection	X22-E04A	dry sump	Q51-F01A
electric connector	V04-M30C	engine management by fuzzy con	
	X22-X01A	engine manufacture	Q51-M
electric motor/IC engine prime m		engine measurements	X22-A05
	X21-A01D	engine multi-fuel proportion meas	
	X22-P04		X22-A05H
electronic components (general)	X22-X10		X22-A20A
electronic stability control (ESR)	X22-C02C5	engine negative pressure measure	
electronic throttle control	X22-A03B2	and a material state of	X22-A05A3
emergency services type	Q19-H	engine noise detection	X22-A05A6
and an annual second Barbar	X22-P10	engine noise reduction/damping	Q17-N
emergency signal light	X22-B03E	ongino oporation indicator	X22-A12
engine	Q17-E Q51	engine operation indicator	X22-E01 X22-A03D
	X22-A	engine power/torque control engine pressure sensor	X22-A03D X22-A05A4
	//4Z-M	engine pressure sensor engine related diagnostics	X22-A05A4 X22-A05N
	ļ	engine related diagnostics	AZZ-AUJIN

icle (continued)	NOE D	fuel injection	Q51-H01
engine remote starting (see also \		fuel injection control	X22-A02
codes)	X22-A08A	fuel injection control	X22-A03
engine rotation sensor	X22-A05C	fuel injection quantity control	X22-A03
engine rpm counter	X22-A05C	fuel injection timing control	X22-A03
engine secondary air control	X22-A03L	fuel injection valve	X22-A02
engine sensor	X22-A05	fuel level instrumentation	X22-E01
engine speed sensor	X22-A05C	fuel level sensing	X22-A05
engine starter	X22-A08	fuel pressure regulator	X22-A02
engine starter gear	X22-A08	fuel pressure regulation	X22-A03
engine starting relay (see also V03	3-D codes) X22-A08	fuel pump	Q51-H01 X22-A02
engine starting solenoid (see also		fuel pump control	X22-A03
V02-E02 codes)	X22-A08	fuel purging	X22-A02
engine supercharger	Q51-H05A	fuel purging control	X22-A03
	X22-A14	fuel supply control	X22-A03
engine swirl control	Q51-H05E	fuel system	Q51-H01
angine anni aaniaa	X22-A03I		X22-A02
engine TDC position sensor	X22-A05C	fuel system carburettor	Q51-H01
engine temperature instrumentati		raer eyetem ear a aretter	X22-A02
engine temperature manameman	X22-E01B	fuel system filter	Q51-H01
engine temperature sensor	X22-A05F3	idei system men	X22-A02
		fuel avetem beeter	X22-A02
engine thermostat (see also V03-0	X22-A10	fuel system heater fuel treatment system	X22-A02 X22-A02
and a describe a difference			
engine throttle position sensor	X22-A05E	fuel vapour recovery system	X22-A02
engine torque sensor	X22-A05G	furniture (cabin)	Q14-T
engine turbocharger	Q51-H05A	fuse box	X22-X01
	X22-A14	fuzzy control	T01-J16
engine vacuum sensor	X22-A05A3		X22-A03
engine vibration control	X22-A03X		X22-Q
engine vibration sensor	X22-A05A6	gas turbine propulsion unit	Q52-A
exhaust	Q17-E09		X22-P03
	Q51-J		X22-X
exhaust braking	Q51-J07	gas turbine type	Q52-A01
3	X22-A09	3	X22-P03
exhaust braking control	X22-A03B5	gear	Q13-A24
exhaust gas recirculation	Q17-E09	gear	Q64-C
extradist gas recirculation	Q51-J02E		X22-G01
control	X22-A03A2C	glass-mounted aerial	X22-X02
exhaust temp sensor	X22-A05F1	grommet, cable installation	X12-G04
external combustion type	Q52-A01		X22-X01
	X22-P03	guidance by computer	T01-J07[
filter-clogging instrumentation	X22-E01A	guidance systems	T07-D
fire engine	Q19-H02	hand brake	Q18-A01
	X22-P10		X22-C02
flat cable arrangement for steerin	g wheel	hazard light	X22-B02
	V04-N	head-up display	X22-E07
	X22-C05C	headlamp	X22-B01
	X22-X01B	•	X26-U07
flywheel energy storage	X22-A09	headlamp bulb	X22-B01
.,g,g	Q13-A04		X26-A
fold-down tray	Q14-F01		X26-B
footrest	Q14-P	discharge lamp	X22-B01
four-wheel drive system	Q13-A11	incandescent bulb	X22-B01
Tour-wheel arive system			
farm ruh a al avere de e	X22-G05	LED	X22-B01
four-wheel steering	Q18-B09		X26-H
	X22-C05A1		X26-U07
fuel additive system	Q51-H01G	headlamp control	X22-B01
	X22-A02F	headlamp position control	X22-B01
fuel consumption instrumentation	X22-E01A		X26-L
fuel contamination instrumentatio	nX22-E01A	headlamp, fixture	X22-B01
	V22 4024E	•	X26-D
fuel direct injection	X22-A02A5		ハムローレ

hiala (aamtiuwad)	I	tanatatan matahan kananan asa	V22 A01 A1
<b>hicle (continued)</b> headlamp, washer	X22-B01C	ignition, without energy storage illuminated display for other drive	X22-A01A1 ers X22-B05
neadiamp, wasner	X22-J01C X22-J01	image recording (external)	T07-A03C
heating	X22-J01C	immobilizer	X21-X03
heating horn	X22-302C X22-B03H		X21-X03 X22-J13
		in-car entertainment system in-car office equipment	X22-J13 X22-J12
HVAC	Q14-M		
1 1 1 1	X22-J02	incandescent lamp, headlamp/he	
hybrid	Q19-Q		X22-B01A3
	X21-A01D		X26-B
	X22-P04	indicator lamp	X22-B02D
hybrid-electric	Q19-Q01	inertia sensor, air bag	S02-G03
	X22-P04A		X22-X06B
hybrid-mechanical	Q19-Q05	inertia sensor, seat belt	S02-G03
	X22-P04E		X22-X06B
IC engine	Q17-E	information recording (external)	T07-A03
	X22-A		T07-A03C
IC engine malfunction display	X22-E10	instrumentation	Q17-A11
IC engine pollution control	Q51-J		X22-E
3 1	X22-A03J	integrated engine/transmission co	ontrol
IC engine temperature control	X22-A03H	19 1 11 1 9 11 1 11 1	X22-A03F
IC engine testing	S02-J01A		X22-G03
identification (external)	T07-A03	interior light	X22-B03B
identification (external)	T07-A03C	keyless entry	X22-D03B X22-D01A2
idling an and control	X22-A03B3	lane crossing/deviation alarm	X22-D01A2 X22-E13
idling speed control ignition		lane crossing/deviation alarm	
	X22-A01	lane deviation measuring or sensi	
ignition advancing, using knock o		I	X22-X06G
2. 202	X22-A01B1	lane sensor	X22-E13
ignition cable	X12-D03	license plate	Q14-R
	X22-A01A		X22-J14
ignition circuit breaker	X22-A01C2	illumination	X22-B05
ignition circuit maker	X22-A01C2	light fixture	X22-B02B
ignition coil	V02-G01	light switch (general)	X22-B09
	X22-A01A	lighting	X22-B
ignition coil/spark plug combinat	ions X22-		X26
A01E1G		load weighing system	X22-X06K
ignition glow plug	X22-A01E3	lock	Q14-H01
ignition noise redn/spark plug co	mbination		X22-D01
	X22-A01E1J	loudspeaker mounting	V06-V02F
ignition pick-up device	X22-A01C3	· -	V06-V04A1
ignition plasma plug	X22-A01E		V06-V04H
ignition retarding, using knock de	etection		X22-X02B
9	X22-A01B1	luggage rack	Q14-F02
ignition system	X22-A01A	main light bulb	X22-B01A
ignition testing	S02-J01A	main right balls	X26-A
ightion testing	X22-A01D		X26-B
ignition timing control	X22-A01B	main light, fixture	X22-B01B
ignition timing control		main light, fixture	
ignition timing testing	S02-J01A	and the form of the second	X26-D
	X22-A01D	maintenance	Q16-A
ignition, advancing	X22-A01B2		X22-X16
ignition, automatic disablement	X22-A01A5	maintenance-need display	X22-E10
ignition, noise reduction circuit	X22-A01A9	manual transmission	Q13-A01M
ignition, retarding	X22-A01B3		X22-G01E
ignition, RF suppression	X22-A01A9	manufacturing plant	Q16-D
ignition, safety	X22-A01A7		X22-X20A
ignition, using capacitive energy:	storage		X25-X14
	X22-A01A9	measurement, distance to obstac	leS02-B01
ignition, using dynamo-electric go	enerator		X22-X06F
- ,	X22-A01A1	mileage indicator	X22-E05
ignition, using glow plug heating		military type	Q19-D
			W07-X01
	orage		
ignition, using inductive energy s			
	X22-A01A2	milometer	X22-P06 X22-E05

nicle (continued) mirror	Q14-E	parking brake	Q18-A01 Q18-A07
mirror	X22-J04		X22-C02
:		and in a sid lidea a set on	
mirror demister	X22-J02A	parking-aid lidar system	W06-A0
	X25-B01C1C		W06-A0
mirror position control	X22-J04		X22-J05
model vehicle for commercial or		parking-aid radar system	W06-A04
industrial use	W04-X03E1M		W06-A04
moisture sensor	S03-E		X22-J05
	S03-F09	parking-aid sonar system	W06-A05
	X22-X06E		W06-A0!
motor cooling arrangement	Q17-E02		X22-J05
motor mounting arrangement	Q17-E01	parking gear arrangement	Q13-A24
motor lubricating arrangement	Q17-E03	passenger compartment noise red	luction
mudguard	Q14-K	h	Q17-N
multi-fuel type engine	Q51-D05		W04-V07
	X22-A20A		X22-X08
multiplex control system	W02-K	passenger display	X22-J15
	W05-D02	passenger protection	Q14-C
	X22-K03	pusseriger protection	X22-J07
for electric vehicle	X21-K		X22-J11
multiplex control system using co	mputer	pedal position adjustment	X22-X12
, , ,	T01-J07D1B	perfume dispenser	X22-X12
	W02-K	·	Q19-H01
	W05-D02	police	X22-P10
	W05-D07D	and the second and a second the second about a second	
	X22-K03	police radar surveillance detector	
navigation aid	S02-B08	m e l e	X22-E08
navigation ala	W06-A	pollution reduction	Q17-E09
	X22-E06		Q51-J02
navigation by dead reckoning	S02-B08		X22-A03
navigation by dead reckoning	X22-E06A		X22-A07
navigation techniques	S02-B08	position monitoring (external)	T07-A05
navigation techniques	X22-E06	position monitoring (internal)	X21-A06
navigation using CBC	S02-B08C	power measurement	S02-F03I
navigation using GPS		power steering	Q18-B06
	W06-A03A5C X22-E06B		X22-C05
navigation using readelds become		power train	Q13-A
navigation using roadside beacor			X22-G
	X22-E06C	chainrings	Q13-A17
navigational systems	T07-A05C	chains	Q13-A18
	S02-B08	clutch	Q13-A03
	X22-E06	control	Q13-B
noise cancellation	Q17-N		X22-G03
	W04-V07	cooling	Q13-A22
	X22-X08		X22-G07
non-engine related fuzzy control	X22-Q	cranks	Q13-A15
non-engine related measurement		differential	Q13-A09
odometer	S02-B12A	drive shaft	Q13-A07
	X22-E05	flywheel	Q13-A04
off-board battery charger	X16-G01	four-wheel drive	Q13-A11
	X22-F01A2		X22-G05
oil contamination instrumentation		gearbox	Q13-A24
oil level instrumentation	X22-E01C	gearing	Q13-A24
oil pressure instrumentation	X22-E01C	lubrication	Q13-A22
on-board tyre inflator	X22-X09		X22-G07
optical anticollision system	W06-A06H1A	mountings	Q13-A26
,	W06-A06H1K	pedals	Q13-A20
	X22-J05C	power take off (PTO)	Q13-A10
optical parking aids	W06-A06H1A	power take on (1 10)	X22-G
	X22-J05C	sprockets	Q13-A17
parking aid	X22-J05	retarder	Q13-A17
		retarder	Q13-A05

Valida (	ı	and the language of the state of	V22 A01F1F
Vehicle (continued)	V21 A02C	spark plug manufacture	X22-A01E1E
thermal management	X21-A02C	speech recognition and synthesis	VV04-V X22-L
torque converter	Q13-A02 X22-A03D	speed control using drive-by-wire	
power/torque control presence detection	T07-A01B		
presence detection for traffic sign		speed control using electronic thr	
presence detection for trainc sign	T07-C03A		X22-A03B2
radio/cassette player mounting	W03-B	speed control using servomotor	
radio/cassette player mounting	W04-L05A		X22-A03B2
	X22-X02B	speed indicator	X22-E05
rain sensor	S03-D02B1	speed measurement (external)	T07-A01A1
Talli Selisoi	X22-X06E	speed measurement (internal)	X21-A06A
rearview mirror	Q14-E	stabiliser	Q14-C07
rearview militor	X22-J04	stands	Q14-J
recreation type	Q19-F		X22-J20
recreation type	X22-P08	starting motor (see also X11)	X22-A04
recycling	Q16-R	steps	Q14-I
recycling	X25-W04		X22-J19
registering or indicating	T05-G01	steering	Q18-B
remote starting of accessory	X22-J10		X22-C05
remote starting of accessory	X22-D01A1	automatic steering	Q18-B07
rental, hiring, sharing	X22-D01A1 X22-U		X22-C05B
reversing light	X22-B02R	four-wheel steering	Q18-B09
road friction sensor	X22-X06C		X22-C05A1
road toll device	T07-A03E	power assisted	Q18-B06
roud ton device	X22-X07	ata a da a callona	X22-C05A
running boards	Q14-I	steering column steering rack	Q18-B01D
	X22-J19		Q18-B02
salvaging	Q16-R	steering wheel	Q18-B01A
sanitation	Q14-L	steering angle sensor	X22-X06H
seat	Q14-A	steering-mounted controls	X22-C05C X22-C05C
	P26-A01F	steering-mounted display steering-mounted switch	X22-C05C X22-C05C
	X22-J03A	steering-mounted switch steering-related instrumentation	X22-E02D
seat air conditioner	X22-J03A5	stop-start control	X22-L02D X22-A03E
seat belt	Q14-C01	sun roof	Q17-A08
	X22-J03B	34111001	X22-J08
seat belt, buckle	P23-A06	sun screen	X22-J09
seat belt automatic release	X22-J03B1	sun visor	Q14-D
seat belt inertia sensor	S02-G03	Cu., 1,65.	X22-J08
	X22-X06B	supercharger	Q51-H05A
seat belt retraction	X22-J03B1		X22-A14
seat cooling	X22-J03A5	supercharging control	X22-A03C
seat heating	X22-J03A1	superstructure	Q17-A02
seat heater control	X22-J03A1	suspension	Q12
seat occupation sensor	S03-C06	·	X22-M01
	X22-X06D	covers	Q12-B16
seat position control	X22-J03A	dampers (see also <b>Vehicle dan</b>	nper)
seat with integral massaging devi			Q12-B02
sensors	X22-X06	linkages	Q12-B07
engine based	X22-A05	lubrication	Q12-B15
external mountings	X22-J05M	mountings/brackets	Q12-B06
service-need display	X22-E10	protection	Q12-B16
servicing	Q16-A02	springs	Q12-B01
oid o /toil liabt	X22-X16	suspension control	X22-M03
side/tail light	X22-B02X		Q12-B09
signalling	X22-B	switch	X22-N
slip sensor	X21-A06A	tachograph	T05-G01
slowing indicator light	X22-B02A1 X15-A02C		X22-E05
solar cell panel		tachometer	S02-B12A
cpark plus	X22-F03		X22-E05
spark plug spark plug electrode	X22-A01E1 X22-A01E1A		
spark plug electrode spark plug insulator	X22-A01E1A X22-A01E1C		
spark plag insulator	ALL MOILIC		

Vehicle (continued)	1	window winder control	X22-H01
taximeter	T05-C03	window winder motor	V06-M
	T05-G01		X22-H02
	X22-E05	window with light transmission co	ntrol
telecontrol	W05-D07D	3	X22-X05
telephone	W01-C01D3B	windscreen	Q17-A07
·	X22-K11	windscreen demister	X22-J02A
testing	S02-J02		X25-B01C1C
	X22-X20C	windscreen wipers	Q14-N
theft alarm	W05-B01		X22-J01
	X22-D03A	windscreen wipers control	X22-J01
theft monitoring	X22-D03C	windscreen wipers motor	V06-M
toy	W04-X03E1		X22-J01
toll system	T05-D02	wing mirror	Q14-E
	T07-A03E		X22-J04
	X22-X07	wiring harness	V04-V02
tow bar	Q11-C01		X12-D03M
towing gear	Q11-C02		X22-X01B
traction control braking	X22-C02C1	yaw sensor	X22-X06J
traction control by engine power regulation	X22-A03D1	Vehicle aerial mounting	W02-B07D
traction control using transmissic		aircraft	W02-B07D
regulation	X22-G03B		W02-B08F5
traffic management radar	W06-A	1 1 1 1 1	W06-B01B7
trume management radar	X22-E11	land vehicle	W02-B07D
transmission control	Q13-B		W02-B08F1
	X22-G03	missile	X22-X02A W02-B07D
transmission control using comp		missie	W02-B07D W02-B08F
J07D1A			W07-A03A
	X22-G03	ship	W07-A03A W02-B07D
transmission, hydrostatic	Q13-A01X	31110	W02-B07B
transmission NVH control	Q17-N		W06-C01B7
	X22-G03N	spacecraft	W02-B07D
transmission-related instrumenta			W02-B08F7
transmission systems - see <b>Powe</b>			W06-B03C
	Q13	Vehicle, anti-collision system	T07-E01
	X22-G	on-board aspect	X22-J05
transmission, torque converter	Q13-A02	roadside aspect	T07-E01
trim	Q17-A10	Vehicle (land) connector	V04-M30C
turbocharger	Q51-H05A X22-A14	Venicle (land) connector	X22-X01A
turbocharging control	X22-A14 X22-A03C	V-ki-liti	
turbocharging control	X22-A03C X22-B02D	Vehicle communication systems	X21-K
turning indicator	X22-B02B X22-B02A	CAN bus DSRC	X22-K03 W01-A06C4E
TV camera for all-round view	W02-F01E	DSRC	X21-K05
Treamera for an realia flew	W04-M	inter-vehicle (V2V, C-V2V)	X21-K05
	X22-E09A	inter-vernicle (VZV, C-VZV)	X22-K05
tyre	Q11-B	intra-vehicle	X22-K03 X22-K03
vehicle specific clothing	Q14-C16	platooning	X22-K05
warning light	X22-B02X	vehicle to cloud (V2C)	X21-K02
	X26-U07	,	X22-K02
waste heat recovery	X22-A17	vehicle to device (V2D, C-V2D)	X22-K03
weighing	S02-D02C	vehicle to grid (V2G)	X21-K03
wheel	Q11-A	vehicle to network (V2N)	X21-K02
wheel slip sensor	S02-G		X22-K02
	X22-X06A	vehicle to offboard/infrastructure	(V2I) X21-K08
wheel speed sensor	S02-G01		X22-K08
	X22-X06A	vehicle to pedestrian (V2P, C-V2P	
wheels-related instrumentation	X22-E02B		X22-K06
windshield	Q17-A07	Vehicle control system	T01-J07D
window	Q17-A07	geographical information systems	T01-J07D3A
windowwindor	X22-X05	guidance	T01-J07D3
window winder	X22-H		

multiplex control system	T01-J07D1B X22-K03	toe-in tests (see also <b>Alignment c</b>	<b>hecking</b> ) S02-J02A
transmission	T01-J07D1A X22-G03	transmission	S02-J02X S02-J03A
vehicle microprocessor system	T01-J07D1	tyre performance	S02-J02A
Vehicle damper - see Vehicle suspe	nsion	using crash dummy	S02-J02F1
	Q12	vehicle diagnostics	X22-X06N
	X22-M	Vehicle, transporting special loads	
Vohiela position	7,22 101	loading/unloading arrangements	
<b>Vehicle, position</b> driver information display	T07-A05C	transporting prefabricated buildin	
driver information display	X22-E06	transporting money/valuables	Q15-B02
indication using roadside beacons		transporting reels	Q15-B03
marcanon domig readerae sedeem	X22-E06C	transporting animals/meat	Q15-B04
updating driver display	X22-E06F	transporting refrigerated goods	Q15-B05
. 3 . ,	T07-A05C	transporting bottles	X27-F Q15-B06
Vehicle safety systems	Q14-C	transporting bottles transporting vehicles	Q15-B06 Q15-B07
active head restraint	X22-J03A3A	tanker vehicles	Q15-B08
airbag	Q14-C02	spraying vehicles	Q15-B09
3	X22-J07	with living accommodation	Q15-B10
automated emergency signalling	X22-J11A	transporting mixed concrete	Q15-B11
collapsible steering column	Q18-B01D5	transporting long loads	Q15-B12
fire extinguisher	X22-J11	transporting persons	Q15-B13
flip-up roll-over bar	Q14-C06	on-board weighing	Q15-C
	X22-J11	load securing equipment	Q15-D
inflatable occupant restraint	Q14-C02	transporting tanks/cylinders	Q15-B30
curtain airbag	X22-J07 Q14-C02C2	Vehicle-type	X22-P
dashboard mounted airbag	Q14-C02C2	agricultural	Q19-G
for protecting driver	Q14-C02C3		X22-P09
for protecting front seat passen			X25-N01A
p. c. se g c c c a p c c c	Q14-C02A2	air - see <b>Aircraft</b>	Q25-P
for protecting rear seat passeng	jers	air cushion vehicle	W06-B Q17-A15
	Q14-C02A3	all custilon vehicle	Q24-P10
inflatable knee bolster	Q14-C02C1	ambulance	Q19-H03
protective clothing	Q14-C16	anno anamos	X22-P10
roof mounted airbag	Q14-C02C4	amphibious	Q19-R01
side airbag	Q14-C02C2	·	X22-P12
steering wheel mounted airbag	X22-J11	autonomous	
passenger safety system pedestrian protection system	Q14-C15	motor vehicle	Q19-L
pedestrian protection system	X22-J11B		X22-P15
portable warning triangle	T07-X	electric vehicle	X21-A01L
,	X22-B03E	bicycle	Q19-A X22-P01
seat belt pretensioner	X22-J03B1	bus/coach	Q19-C01
vehicle specific clothing	Q14-C16	bus/coacii	X22-P05A
warning of approaching emergen		caravan/trailer tent	Q19-F01
	X22-E14		X22-P08
Vehicle shock absorber - see Vehicle	e suspension	camper van/motorhome	Q19-F02
	Q12-B02		X22-P08
	X22-M	commercial	Q19-C
Vehicle testing	X22-X20C		X22-P05
braking	S02-J02B	commercial van	X22-P05X
crash/impact testing	S02-J02F	construction	Q19-E
electrical system	S02-J02E		X22-P07 X25-D01
electric vehicle	X21-X20		X25-D01 X25-U
engine	S02-J01A	driverless	Q19-L
engine diagnostics	X22-A05N	motor vehicle	X22-P15
steering	S02-J02A	electric vehicle	X21-A01L
suspension	S02-J02A		-
toe-in/camber setting	Q12-B04		

electric motor/IC engine prime m	overs	tank - military	Q19-D
	Q19-Q		W07-X01
	X21-A01D		X22-P06
alantialla di ancono <b>Flancia</b>	X22-P04	taxi	Q19-C03
electrically-driven - see <b>Electric p</b>	Q19-P	tow truels	X22-P05C X22-P05X
	X21-A01F	tow truck towed trailer	Q19-J
emergency services	Q19-H	towed trailer	X22-P11
enlergency services	X22-P10	tracked vehicle	Q17-A14
external combustion	X22-P03	tracked vernere	Q19-X
fire engine	Q19-H02	tricycle	Q19-A
S	X22-P10	,	X22-P01
fore car	Q14-G	Velocity modulation in TV CRT disp	lav
forklift truck	Q19-C06	того по дана по по того и по р	W03-A08A1G
	X22-P05F		
	X25-F05A	Velocity of light measurement	S03-A09
forklift truck, electric	X21-A01B	Vending machine	T05-H
gas turbine	Q52-A	beverage	T05-H06
hearse	X22-P03 Q19-C07	cigarette, confectionery	T05-H04
HEV	Q19-Q01	constructional details	T05-H08A
TILV	X21-A01D	control systems	T05-H08C
	X22-P04A	reverse vending with cooking facilities	T05-H02E T05-H04A
hybrid	Q19-Q	with cooking facilities with refrigeration facilities	T05-H04B
.,,	X21-A01D	· ·	103-11040
	X22-P04	Vending machine mechanism	TOF 1100A
mechanical	Q19-A05	actuated by banknote	T05-H02A T05-H02C5A
	X22-P04E	actuated by magnetic card actuated by optical card	T05-H02C5A
lorry/ truck	Q19-C02	actuated by optical card actuated by record carrier, card	T05-H02C3B
	X22-P05B	actuated by record carrier, card	T05-H02C5C
marine - see <b>Ship</b>	Q24-P	coin actuated	T05-H01
419.	W06-C	token actuated	T05-H02B
military	Q19-D W07-X01	Venetian blind	X27-T
	X22-P06	Ventilating, semiconductor packag	
moped	Q19-B		
Тореа	X22-P02	Ventilation fan	X27-E01B1
motorcycle	Q19-B	Ventilation, electric machines	V06-M13
,	X22-P02		X11-J06
PHEV	X21-A01D	Ventilator	X27-E01B1
	X22-P04A	for medical use	S05-G02E
plug-in hybrid electric vehicle	X21-A01D	for motor vehicle cabin	Q14-M
	X22-P04A		X22-J02D
police	Q19-H01	with medication	S05-M04
and the first	X22-P10	Vermin/insect extermination, repul	
quad bike	Q19-F X22-P02	or trapping	X25-X02
racing car	Q19-F03	arable insecticide spraying	X25-N01
recreation	Q17-F	domestic insecticide spraying	X27-X
recreation	X21-A01R	non-domestic use	X25-X02 P14-B01
	X22-P08	non-electric trap/decoy scarecrow	P14-B01
refuse collection vehicle	Q19-C04		1 14-001
	X22-P05R	Version Management	TO1 FOFF
road cleaning vehicle	Q19-C05	for software	T01-F05F
	X22-P05H	during development	T01-J20B2
robotic	X25-F05A	Vertical magnetic recording	TO2 402D
sidecar	Q14-G	magnetic head	T03-A03D
snowmobile	Q17-F04	record carrier per se	T03-A01D
of the second state of	X22-P08	Vertical MOSFET - see Field effect t	ransistor
soft-top; cabriolet	Q19-S		U12-D02A9
space - see <b>Space vehicle</b>	Q25-S W06-B03	Vessel, discharge tube (general)	
	**************************************	conductive coatings	V05-M05F
	ļ	S S	

manufacture - see <b>Discharge tub</b> e	e manufacture	Video	
manadatare see Pistilarge table	V05-L03	blanking signal generators	W04-M05
optical coatings	V05-M05F	camera - see <b>Video camera</b>	W04-M01
windows	V05-M05E	compact disk player	W04-C10A3
		conference equipment and syster	
Vessels, for measuring volume	S02-C05	germen ernes equipment and eyeter	W02-F08A
Vessels, plasma display		digital versatile disk player/record	
conductive coating	V05-A01D1C		W04-C10A2
internal spacing elements	V05-A01D3		W04-C10A3
optical coatings	V05-A01D1E	file server	W02-F10A
seals for	V05-A01D1A		W02-F10K
Veterinary	S05-V		W04-K05A
tools and instruments	P32-A20	games	T01-J30B
transducers (application)	V06-V04K		W04-X02C
Vias, semiconductor device interco	nnection	generators	W04-M
manufacture	U11-C05G2C	magnetic disk recorder/player	W04-B14
Vibrating alerting device		magnetic recording heads	T03-A03
general	W05-A01A1	magneto-optical disk player	W04-D20A
9	W05-A01A1	on-demand (VoD) system	W02-F10A1
pager	W05-A01A1	optical disk player	W04-C10A3
telephone set	W01-C01FIF	pattern generators	W04-M07
•		quality measurement	W02-F04A1
Vibrating tube densimeter	S03-F01X	recording of X-ray	S03-E06H5D
Vibration		recording of X-ray, medical	S05-D02A5B
control	T06-B12	signal processing (general) - see <b>'</b>	Video
control for semiconductor lithogra		signal processing	W04-P
	U11-C04C5	signal processing for recording - s	
damping for aircraft	Q25-N	Video recording signal proce	-
damping for electric vehicle	Q17-N	signal processing in TV receiver	W03-A04
	Q19-P	switching equipment	W04-N05B5
	X21-N	tape recorder - see <b>Video tape re</b>	
damping for instruments	S01-J09		W04-B10
damping for ship	Q24-N	telephone set	W01-C01G4
damping for train	Q21-N		W02-F08B3
damping for recording equipmen		telephone system	W01-C05B1E
damping for vehicle engine	Q17-N		W02-F08B1
	X22-A12	Video camera	W04-M01
damping for vehicle passenger	V00 V00	acceleration transducer	W04-M01D2X
compartment	X22-X08		W04-M01D7
detectors for measurement	S02-E02	aperture control	W04-M01D5C
engine vibration control	X22-A03X	aperture correction	W04-M01D6
generator circuits (small scale	V04 V02C		W04-P01E5
electromechanical)	V06-V02S V06-V04C	audio aspects	W04-M01M
generator, general	P43-A01	automatic focus control	W04-M01D5D
generator, industrial scale	X25-L05	back-light compensation	W04-M01D5B
generator, modstrial scale	V06-V04C	battery charging	W04-M01P5A
measurement methods	S02-E01		X16-G
motors, vibration wave type	V06-M06D1	battery power supply	W04-M01P5
sensors, electromagnetic	V 00-IVI00D I	1 150	X16
induction type	V06-V01A	beam splitter	W04-M01C5
madellon type	V06-V04G	calibration (ACD)	W04-M01D2J
sensors, piezoelectric	V06-V01B	camera-recorder (VTR)	W04-B10
consors, prozociocuro	V06-V01B	corning coos (see table see to )	W04-M01K
testing of structures	S02-J08	carrying case (portable camera)	W04-M01G5
vehicle transmission NVH control	X22-G03N	character/subtitle generators	W04-M01D4
		colour registration control	W04-M01D9
Vibrator, electromechanical	V04 V02C	colour separation filter condition monitoring	W04-M01C3A W04-M01D2J
circuits (small scale)	V06-V02S	condition monitoring constructional details	W04-M01D2J
industrial scale	V06-V04C X25-L05	control circuits	W04-M01D
small scale	V06-V04C	cond of circuits	V V O-T-IVIO I D
Siliali Scale	V 00-V 04C		

ded comments and a second	MO4 MO4 D7	Lancaca differentia a Companyation	VA/O.4 NAO1.C1.C
dark current compensation	W04-M01B7	lens positioning for zooming	W04-M01C1C
	W04-M01D6A	lens system	W04-M01C1
data da dalla la ca	W04-P01H1	lens, variable power	W04-M01C1E
detachable lens	W04-M01C1D	light beam projector indicating fie	
dithering imager for enhanced res		view	W04-M01D2C
	W04-M01B8A	light metering	W04-M01D2A
document imaging arrangement	W04-M01J	light source	W04-M01H
electronic shutter	W04-M01B5A	light source control	W04-M01D5H
	W04-M01D5C		W04-M01H
electronic still picture	W04-M01B1	liquid crystal lens (variable power)	
electronic zooming	W04-M01D5E	mechanical scanning	W04-M01E5
	W04-M01D6	mechanical scanning in single dire	
100	W04-N05C3	t e la companya de la	W04-M01E5A
exposure condition evaluation	W04-M01D5A	mechanical scanning with main- a	
exposure control	W04-M01D5	sub-scanning	W04-M01E5C
external optics	W04-M01C6	medical imaging (non-visible radia	
external optics for video telephone			S05-D
contact	W01-C01G4		W04-M01F
	W02-F08B3	mirror	W04-M01C5
	W04-M01C6	monitoring camera condition	W04-M01D2J
eye-gaze direction determination	W04-M01D2G	motion compensation	W04-M01D7
face/facial expression detection	W04-M01D2F	motor drive for focussing	W04-M01C1B
filter, optical	W04-M01C3	motor drive for zooming	W04-M01C1C
fixed mounting for camera	W04-M01G7A	movable mounting for camera	W04-M01G7C
fixed pattern noise suppression	W04-M01B7	multiple camera systems	W04-M01V
	W04-M01D6	neutral density filter	W04-M01C3D
0 1	W04-P01H1	nuclear imaging	W04-M01F3
flash	W04-M01H5	operator controls	W04-M01D1
flash control	W04-M01D5H	operator hand tremor correction	W04-M01D7
	W04-M01H5	optical element compensating mo	otion VVU4-
f	X26-C01A	M01C9	VA/O 4 NAO 4 D 7
focus control	W04-M01D5D	and all then	W04-M01D7
focus detection	W04-M01D2E	optical filter	W04-M01C3
focussing by image sensor	VA/O 4 NAO 4 DO D	optical filter integral with image pi	
movement	W04-M01B8B	device	W04-M01C3E
focussing by lens driving	W04-M01C1B	optical filter removing specific way	
grip	W04-M01G1 W04-M01D2X	antical filter constating colours	W04-M01C3C W04-M01C3A
GPS information recording GUI-based control	W04-M01D1C	optical filter separating colours optical system electronic distortion	
	W04-M01D7	correction	W04-M01D6
hand tremor compensation	W04-M01G1A	correction	W04-N05C3E
housing image processing function control		optical system external to camera	
imaging still pictures	W04-M01J	optical system external to camera	W04-M01C6
interchangeable lens	W04-M01C1D	opto-mechanical scanning - see <b>N</b>	
interfacing	W04-M01D8	scanning	W04-M01E5
interfacing with PC	W04-M01D8	panoramic camera	W04-M01S
interfacing with C	W04-M01B0	polarizing filter	W04-M01S W04-M01C3G
internal constructional details	W04-M01G1B	power supply, battery	W04-M01P5
internal wiring details	W04-M01W	power supply, mains	W04-M01P1
IR	W04-M01E1	range finding	W04-M01D2C
IR-cut filter	W04-M01C3C	registration control (colour)	W04-M01D9
iris	W04-M01C8	remote control	W04-M01D1A
iris control	W04-M01D5C	removable lens	W04-M01C1D
lamp for scene illumination	W04-M01H1	sensing arrangements	W04-M01D2
lens (e.g. microlens array) integral		shake correction	W04-M01D7
image pickup	W04-M01B5	shake sensing (based	
- O - I	W04-M01C1A	on image analysis)	W04-M01D6
lens mounting	W04-M01C1	2	W04-M01D7
···- <del>-</del> ····························	W04-M01G1B		W04-P01A1
lens per se	W04-M01C1A	shake sensor (transducer)	W04-M01D2X
lens positioning for focussing	W04-M01C1B	indicated (damage)	W04-M01D7
[		shoulder mount	W04-M01G7
		shutter	W04-M01C7
	1		

shutter eneration central	W04-M01D5C		W04-Q01A
shutter operation control slide viewing adaptor	S06-B06B	cooling	W04-Q01A W04-Q01H5
slide viewing adaptor	W04-M01J	deformable mirror device (DMD)	
SLR optical system	W04-M01C5	direct retinal projection, general d	
smear correction	W04-M01D6	an eer reamar projection, general a	W04-Q01L
omean contestion	W04-P01H3		W05-E07
solid state	W04-M01B	direct retinal projection, TV receive	
solid state image pick-up element		display	W03-A08E7A
stereoscopic image	W04-M01L	17	W04-Q01L
still picture imaging	W04-M01J	direct retinal projection, virtual rea	lity
subject size measurement from ex	posure	display	W04-Q01L
control data	W04-M01D5X		W04-W07E1A
subject tracking	W04-M01D2C	filter, colour separation	W04-Q01E3A
supports	W04-M01G7	filter, IR-blocking	W04-Q01E3C
synchronising signal generator	W04-M01D2M	focussing	W04-Q01E1A
	W04-M05	head-up display application	W04-Q01K
testing	W02-F04A5	internal construction	W04-Q01H5
	W04-M01D2J	keystone correction	
touchscreen	W04-M01D3E	(image processing)	W04-N05C3E
tracking	W04-M01D2C	1. 1. 1.	W04-Q01J
tripod	W04-M01G7	laser light source	W04-Q01B1
tube arrangements	W04-M01A	LED light source	W04-Q01B2
variable power lens	W04-M01C1E	lens	W04-Q01E1C
vehicle exterior view	X22-E09	light source	W04-Q01B7 W04-Q01B
video signal processing	W04-M01D6 W04-P	light valve type	W04-Q01B W04-Q01B1
viewfinder	W04-P W04-M01D3	light valve type with laser source mirror system	W04-Q01E5
viewfinder viewfinder display	W04-M01D3 W04-M01D3A	mounting	W04-Q01E3 W04-Q01H1
viewfinder display viewfinder display drive circuitry	W04-M01D3C	novel light valve	W04-Q01B5
viewfinder optics	W04-M01C9	optical system	W04-Q01E
Tre Trimina or opina	W04-M01D3	panoramic projection system	W04-Q01P
white balance control	W04-M01D6	power saving, power supply	W04-Q01J7
	W04-P01D1	prisms	W04-Q01E5
wiring details, internal	W04-M01W	remote control	W04-Q01J3
X-ray	W04-M01F1	scanning systems	W04-Q01E7S
zooming and magnification (electr	onic)	screen, non-planar	W04-Q01F5
control	W04-M01D5E	screen, reflective	W04-Q01F3
	W04-M01D6	screen, transmission	W04-Q01F1
	W04-N05C3	screen, volumetric	W04-Q01F5
zooming and magnification (optica		Video quality measurement	W02-F04A1
control	W04-M01D5E	Video recording	
Video disk		magnetic record carriers	T03-A01C8B
magnetic disk per se	T03-A01C1	multiple channel recording	W04-F01P
	T03-A01C8B	multiple viewing angle aspects	W04-E20K
magnetic disk recorder/player	W04-B14	signal processing - see Video reco	ording
magnetic recorder/player in still pi		signal processing	W04-F
camera	W04-B14A	Video recording equipment	
	W04-M01B1A	commercial message recording pr	evention
magneto-optical recorder/player	W04-D20A	3 31	W04-E04C5C
optical recorder/player	W04-C10A3	editing	W04-H05E
Video game	W04-X02C	electronic still picture camera	W04-M01B1
payment freed, e.g. arcade game		hard copy systems	W04-D10
	W04-X02A	hard disk recorder	W04-B14C3
	W04-X02C	indexing	W04-H01
Video Player, general	W04-E30A5	integrated with telephone	W01-C01P6J
Video production equipment	W04-N05G1	magnetic floppy disk	W04-B14A
Video projector	W04-Q01		W04-M01B1A
cabinet	W04-Q01H1	magnetic hard disk	W04-B14C3
cathode ray tube type	W04-Q01A	magneto-optical disk	W04-D20A
construction	W04-Q01H	optical disk	W04-C10A3
convergence control (CRT type)	W03-A08A5C	set-top box video recorder solid state video recorder	W03-A16E1 W04-P01C8
_ , ,,		sond state video recorder	VVU-1-1 U1CO

to a con Video tono vecendos	W04 B10	IDEC 2000	\A/O.4 DO.1 A.2
tape - see Video tape recorder	W04-B10 W04-J07	JPEG 2000	W04-P01A3
testing thumbnail indexing	W04-J07 W04-H01C5	motion compensation, hybrid coding	W04-P01A4C
time code recording	W04-H01A	motion compensation,	VV04-101A4C
VCR/VTR - see <b>Video tape record</b>		predictive coding	W04-P01A5C
VCIV VIIX - 366 VIGEO tape record	W04-B10	motion compensation,	VVOT-101A3C
		transform coding	W04-P01A3J
Video recording signal processing	W04-F	motion detection/estimation,	VV04-101A33
additional picture information pro		hybrid coding	W04-P01A4A
466	W04-F01K	motion detection/estimation,	***********
AGC	W04-F01A5	predictive coding	W04-P01A5A
amplitude compression	W04-F01A5	motion detection/estimation,	
antiduplication using recorded sig	W04-F01L	transform coding	W04-P01A3G
blanking interval signal recording		MPEG	W04-P01A4
clamping	W04-F01A5	multiple video stream	W04-P01A2
ciamping	W04-F01X	novel transform aspects, hybrid co	oding
colour synchronising	W04-F01D3		W04-P01A4E
compression by coding	W04-F01F	novel transform aspects, transforr	n coding
copy marking	W04-F01L3		W04-P01A3A
copy prevention	W04-F01L1	predictive	W04-P01A5
crispening circuits	W04-F01B1	predictive and transform coding	W04-P01A4
demodulation	W04-F01A1A	quantisation, hybrid coding	W04-P01A4G
drop-out compensation	W04-F02A	quantisation, transform coding	W04-P01A3C
dynamic range control	W04-F01A5	reducing artefacts	W04-P01A4L
equalisation	W04-F01B	run length, variable length encod	
error correction	W04-F01F5	hybrid coding	. W04-P01A4J
folding	W04-F01A1	run length, variable length encod	
HDTV signal processing	W04-F01H5	transform coding	W04-P01A3E
head-switching noise reduction	W04-F01E1	scalability arrangements	W04-P01A4S
inversion phenomenon compensa		sub band	W04-P01A7 W04-P01A7
luminance/chrominance separation		subsampling transcoding	W04-P01A7 W04-N05A1
memory circuit applications	W04-F01M	transcoding	W04-N03A1
modulation	W04-F01A1A	transform coding motion detection	
movement detection	W04-F01F1	P01A3G	VVO-4-
movement-responsive compression			
multistandard signal processing noise reduction	W04-F01H W04-F01E	Video signal processing aperture correction	W04-P01E5
peaking circuits	W04-F01B1	clamping	W04-P01K
processing involving memory	W04-F01M	coding - see Video signal coding	
processing specific to colour vide		colour balance/temperature cont	
signal coding	W04-F01F	contour correction	W04-P01E3
signal transformation	W04-F01A1	dynamic range control	W04-P01E8
skew correction	W04-F02B	error concealment	W04-P01F3
standards conversion	W04-F01H3	fixed pattern noise suppression	W04-M01B7
standards recognition	W04-F01H1		W04-M01D6
synchronising signal processing	W04-F01C		W04-P01H1
time-base error correction (TBC)	W04-F02B	frame store (per se)	W04-P01C1
transcoding	W04-F01H3A	frame store circuits	W04-P01C5
\/TD applications (gaperal)			W04-P01E1
VTR applications (general)	W04-B10B	gamma correction	
Video signal coding	W04-B10B	image manipulation	W04-N05C3
	W04-B10B W04-P01A4N	image manipulation imager characteristic correction	W04-N05C3 W04-P01H
Video signal coding		image manipulation imager characteristic correction luminance/chrominance separation	W04-N05C3 W04-P01H on W04-P01L
Video signal coding 3-dimensional transforms coding apparatus DCT	W04-P01A4N W04-P01A W04-P01A3	image manipulation imager characteristic correction luminance/chrominance separation movement detection	W04-N05C3 W04-P01H on W04-P01L W04-P01A1
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors	W04-P01A4N W04-P01A	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors fixed/variable rate conversion,	W04-P01A4N W04-P01A W04-P01A3 W04-P01A6	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction non-visible spectrum imaging	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1 W04-P01B
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors fixed/variable rate conversion, hybrid encoding	W04-P01A4N W04-P01A W04-P01A3	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction non-visible spectrum imaging phase shift compensation	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1 W04-P01B W04-P01E7
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors fixed/variable rate conversion, hybrid encoding fixed/variable rate conversion,	W04-P01A4N W04-P01A W04-P01A3 W04-P01A6	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction non-visible spectrum imaging phase shift compensation recording - see Video recording	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1 W04-P01B W04-P01E7 signal
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors fixed/variable rate conversion, hybrid encoding fixed/variable rate conversion, transform encoding	W04-P01A4N W04-P01A W04-P01A3 W04-P01A6 W04-P01A4F	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction non-visible spectrum imaging phase shift compensation recording - see Video recording processing	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1 W04-P01B W04-P01E7 signal W04-F
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors fixed/variable rate conversion, hybrid encoding fixed/variable rate conversion, transform encoding fractal	W04-P01A4N W04-P01A W04-P01A3 W04-P01A6	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction non-visible spectrum imaging phase shift compensation recording - see Video recording processing time shifting	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1 W04-P01B W04-P01E7 <b>signal</b> W04-F
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors fixed/variable rate conversion, hybrid encoding fixed/variable rate conversion, transform encoding fractal High Efficiency Video Encoding	W04-P01A4N W04-P01A W04-P01A3 W04-P01A6 W04-P01A4F W04-P01A3F W04-P01A8	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction non-visible spectrum imaging phase shift compensation recording - see Video recording processing	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1 W04-P01B W04-P01E7 signal W04-F W04-P01N W04-M01D6
Video signal coding 3-dimensional transforms coding apparatus DCT detecting and correcting errors fixed/variable rate conversion, hybrid encoding fixed/variable rate conversion, transform encoding fractal	W04-P01A4N W04-P01A W04-P01A3 W04-P01A6 W04-P01A4F	image manipulation imager characteristic correction luminance/chrominance separation movement detection noise reduction non-visible spectrum imaging phase shift compensation recording - see Video recording processing time shifting	W04-N05C3 W04-P01H on W04-P01L W04-P01A1 W04-P01F1 W04-P01B W04-P01E7 signal W04-F

TV receiver - see <b>TV receiver</b> v		Video telephone	W02-F08B
<b>signal processing</b> video camera	W03-A04 W04-M01D6	apparatus	W01-C01G4 W02-F08B3
white balance control	W04-P W04-P01D1	system	W01-C05B1E W02-F08B1
/ideo tape recorder	W04-B10	Video-on demand	
antitheft alarm	W04-B10C	receiver aspects	W03-A16C5A
	W04-J01	system aspects	W02-F10A1
camcorder	W04-B10	video-on-request	W02-F10A1E
	W04-M01K	Viewer (slide, film)	S06-B06B
cassette changing	T03-E01B		300-D00D
	W04-B10A	Viewfinder display	S06-B01C
commercial message recordin	g prevention	photographic, camera video camera	W04-M01D3
	W04-B10C		
	W04-E04C5C	Virtual circuit or path	W01-A03B
construction	W04-B10D	virtual machines	T01-M09
control	W04-B10C	Virtual memory	T01-H03A
digital (DVTR)	W04-B10G	Virtual Private Network (VPN)	W01-A06B7G
dual cassette deck	W04-B10K	Virtual reality	W04-W07E
head	T03-A03	acoustic aspects	W04-W07E3
head and tape transport	W04-B10A	computer data processing aspe	
head cleaning	T03-A04B3 W04-B10A	Somparer data processing depo	W04-W07E
helical scan system details - se		computer image generation	T01-J10C4A
scan recording	T03-N02		W04-W07E
scan recording	W04-B10A	display	W04-W07E1
high-speed operation	W04-B10	glove	T04-F02B3
mgn speed operation	W04-E20A	head-mounted display	W04-W07E1A
interfacing	W04-B10C	interactive broadcast network a	spects W02-F10G
jog wheel	W04-J05		W04-W07E
,-9	W04-B10A	mechanical aspects	W04-W07E5
	W04-B10C	tactile aspects	W04-W07E5
modulator	W04-B10C	video aspects	W04-W07E1
	W04-K06	Viscometer	S03-F03
power supplies	W04-B10C	measuring flow rate	S03-F03X
remote control	W04-B10C	moving body in materials	S03-F03A
	W04-E04A	vibratory	S03-F03A
reverse mode operation	W04-B10	Viscosity	
	W04-E20R	control	T06-B07
SCART connector	W04-B10C	measurement (see also <b>Viscom</b>	eter) S03-F03
	W04-K07	Visible signalling	W05-A03
self-testing systems	W04-B10C	personal calling arrangements	W05-A03A
atau atau aran aran aran ar	W04-J07C	signalling arrangements	W05-A03A
signal processing simultaneous play and record	W04-B10B	Visible spectroscopy - see Spectro	
(different sections)	W04-E20M		=
slow-speed operation	W04-E20W	Vision detector for TV receiver	W03-A03C5
slow speed operation	W04-E20C1	Visitor location register (VLR)	W01- E01C1
still-picture operation	W04-B10	Viterbi error correction	W01-A01B2A
oun proture operation	W04-E20C5		U21-A06C1
tape counter	W04-B10C	Vivarium	X27-H01
-	W04-H03	lighting (application)	X26-U99
time-lapse operation	W04-B10	VLR (visitor location register)	W01-E01C1
·	W04-E20C3	_	
variable speed operation	W04-B10	VLSI - see Large scale integration	
	W04-E20	Voice coding - see Speech signal	coding W04-V05G
VCR PLUS® programming	W04-B10C	Voice mail	W01-C02B7C
	W04-E04C1	Voice over IP (VoIP)	
VPS programming	W04-B10C		W01 C01C15
	W04-E04C5	telephone set	W01-C01G6E
		telephone system	W01-C05B4C

Voice packet switching	W02-C06
	W02-K03
Voice recognition/analysis	
applications	W04-V04A
comparing with reference determining emotional status of	W04-V04A8
speaker	W04-V04A4
determining gender of speaker determining presence of speech/v	W04-V04A3C
identifying speaker	W04-V04A3A
methods	W04-V01
speech-to-text system	W04-V04A6
voice activated control, equipment	
voice activated control, telephone	
	W04-V04A5
voice activated control, TV set	W03-A02C5L
	W04-V04A5
Voice synthesis	W04-V04C
applications methods	W04-V04C
Voice-coil motor	
control	V06-M04A V06-N12
VoIP (telephony)	W01-C05B4C
Volleyball	P36-A01
	W04-X01K1V
Voltage	
breakdown testing	S01-G03
capacitive measurement dependent resistors	S01-D01D3 V01-A02B
phase angle, measuring	S01-D04
Voltage measurement	S01-D01
by AC/DC conversion	S01-D01C5
by beam deflection	S01-D01D7
by DC/AC conversion	S01-D01C1A
capacitive voltage transformer	S01-D01D3
CVT	S01-D01D3 S01-D01C1B
digitally effective value	S01-D01C1B
indicating AC waveform zero-cross	
point	S01-D01B5
indicating presence	S01-D01B1
indirect, inductive/magnetic	S01-D01D1
indirect, non-contact peak	S01-D01D S01-D01A3
RMS	S01-D01A3
thresholding	S01-D01B5
using chopper circuit	S01-D01C1A
using current transformer	S01-D01D1A
using electrochromic effect	S01-D01D5
using electron beam probing circu	
using electrostatic fields using Faraday cup	S01-D01D3 S01-D01D3
using Faraday cup using Faraday rotation	S01-D01D5
using optical transformation	S01-D01D5
using particle beam	S01-D01D7
using Pockel's effect	S01-D01D5
Voltage multiplier	U24-D04E
	X12-J04E U24-D01A

control  Voltaic cells	U24-D04E X12-J01A X13-H03B
measuring currents/voltages	S03-E03B
measuring currents/voltages, du effects at electrodes measuring currents/voltages, du	S03-E03B1 le to
effects in electrolyte	S03-E03B2
Volume control	W03-C03C
Volume, capacity measuring	S02-C05
Volumetric video projection	
projection screen	W04-Q01F5
projector	W04-Q01P
Volume read memory	T01-H01B6A
Vortex flowmeters	S02-C01A9
Voting apparatus	T05-F
VPS	
recording equipment control	W04-E04C5A
signal processing in recording e	
	W04-F01K
transmission system TV receiver control	W02-F05C W03-A10J
TV Teceiver control	W03-A18A
VTR control	W04-B10C W04-B10C W04-E04C5A
VSELP voice signal coding	W04-V05G3A
VTR - see Video tape recorder	W04-B10

W		windows	P28-C01
Wafer charging prevention during	ng manufacture	Washing machine - clothes washer	
5 5.	U11-C10		X27-D01A
Wafer handling electrostatic chuck jig protection during transport storage	U11-F02A1 U11-F02A2 U11-F02A2 U11-F02A1A U11-F02A1	component parts casings dispensing system drive arrangement liquid management system providing mechanical energy	X27-D01A3 X27-D01A3C X27-D01A3D X27-D01A3B X27-D01A3E X27-D01A3A
transport	U11-F02A1	vibration damping system water heater	X27-D01A3F X27-D01A3E
Wafer identification, semiconduc	ctor manufacture	control system	X27-D01A3E X27-D01A5 X27-D11
	U11-C15A	machine types	X27-D01A1
Wafer labelling, semiconductor r C15A	manufacture U11-	front loading horizontal axis tilt axis	X27-D01A1B X27-D01A1D
Wafer level package	U11-D01A8	top loading horizontal axis	X27-D01A1C
Wafer scale digital circuit	U13-C06	vertical axis	X27-D01A1A
Wafer scale integration	U13-D05	Washing machine - Dishwasher	X27-D01
Walking robot	X25-F05A	dishwashers	X27-D01B
<del>-</del>		component parts casings	X27-D01B3 X27-D01B3C
Walking aids Walking stick electrical details manufacture non-electrical details	P33-A99  X27-A02E  P24-M  P24-A01	dispensing systems drive arrangements drying systems liquid management systems	X27-D01B3C X27-D01B3D X27-D01B3B X27-D01B3F X27-D01B3E
		racks	X27-D01B3A
Walls - see Buildings, general me construction and structural elements		soil collection & management	
	X27-X	water heaters	X27-D01B3G X27-D01B3E
Wallpaper stripper		control systems	X27-D01B3E X27-D01B5
Walsh transform computer processing for	T01-J04B1 T01-J04B1	eco features	X27-D01B3
WAP telephone handset	W01-C01D3C W01-C01G6E	machine types built-in, wheeled drawer type	X27-D01B1 X27-D01B1A X27-D01B1B
Ward-Leonard set	X13-H01C9	non-electrical dishwasher, e.g. di	
Wardrobe	P25-B	basins	P28-C03
Warehouses (see also Factory Au		Waste	
automatic warehousing goods tracking shelves	X25-F07 X25-F11 P27-A01	bin domestic non-domestic/industrial compactor, domestic	X27-K X25-W01 X27-K
Warehousing, automated/intellig		compactor, industrial	X25-W01
Warping machine control	X25-T02 T06-D03C X25-T02	domestic waste disposal electronic component waste decontamination	X27-K V04-X01G
Wash basin	X27-A02A4	electronic component waste disp	
for aircraft for ship for train for vehicle	Q25-S07A Q24-B01C2 Q21-J04 Q14-L	incinerator, domestic incinerator, industrial industrial waste disposal medical waste management	X27-K X25-W01 X25-W01 S05-W
Washing machine electrical washing machine clothes combined washer/drier	X27-D01 X27-D01 X27-D01A X27-D01C	PCB waste decontamination PCB waste disposal recycling reprocessing/disposal in semicol manufacture	V04-R16 V04-R16 X25-W04 nductor
dish non-electrical washing machine	X27-D01B		U11-C15Q
clothes crockery	P28-C05 P28-C03	waste disposal/recycling during i manufacture	
floors, walls, carpets and upl footwear	nolstery P28-C02 P28-C04	treatment, water/sewage treatment, nuclear	V01-A04R X25-H03 X14-D

treatment, radioactive waste	X14-D	heating - see Water heating	X27-E03
·		meter, remote reading	S02-K08A
Waste fuel combustion power gene		pipelines	X25-Y02
	X15-E	purification, for semiconductor	
constructional details	X15-W	processing	U11-C15B
control, monitoring & testing	X15-V	purification, semiconductor manuf	acture
Waste heat - power generation from	1 -	' '	U11-C15B3
	X15-H	recycling	X25-H03
constructional details	X15-W		X25-W04
control, monitoring & testing	X15-V	sewage treatment	X25-H03
Watch		softener, domestic	X27-X
acoustic time indication	S04-B05	swimming pool cleaning	X25-X06
alarm, in electronic type	S04-B05	turbine	X11-B01
alarm, in mechanical type	S04-A02X	wheel	X11-B01
antimagnetic shielding	S04-A04A1	Water heating	X27-E03
balance	S04-A01	control	X27-E03
battery	S04-B01A	control using mixer taps	X27-E03
buttery	X16	dishwasher	X27-D01B3F
bearings, framework, and calipers		electric	X27-E03A
case	S04-A04	electric, bed	X27-A03
casing, for electrical type	S04-B09		X27-E03A
clock/watch housing	S04-A04A	electric, immersion	X27-E03A
date, local time, or tide indication	S04-A02B	electric, Jacuzzi	X27-E03A1
electrical aspects	S04-B	electric, sauna	X27-E03A1
electrical winding	S04-B01A	electric, shower	X27-E03A1
electro-optic display	S04-B04A	electric, through-flow	X27-E03A
electronic display	S04-B04	electric, Turkish bath	X27-E03A1
escapement	S04-A01	electric, water bed	X27-A03
glass	S04-A04		X27-E03A
hands, dial, or drum	S04-A02A	electric, whirlpool bath	X27-E03A1
illumination, in mechanical type	S04-A02X	gas	X27-E03
locking bar	S04-A03	geothermal energy, using -	X15-G02
mainspring	S04-A01	solar powered	X27-E03
maser, laser oscillator	S04-B02X		X15-A
materials and manufacture	S04-A04B	washing machine (clothes)	X27-D01A3E
mechanical aspects	S04-A	Water-based sports	P36-A03
mechanical construction aspects	S04-A04A	Water profing clask or watch	W04-X01K3
mechanical drive mechanism	S04-A01	Water-proofing clock or watch	S04-A04A2 P36-A03
motor driven	S04-B01B	Water skiing (sport)	W04-X01K3L
musical animation	S04-B05A		VV04-X01K3L
oscillator	S04-B02	Water supply	0.40.504
parts	S04-A S04-B01A	aquaducs	Q42-D01
power supply quartz oscillator	S04-B01A S04-B02B	human/animal consumption	Q42-D
radio transmission setting	S04-B03	pipelines	Q42-D01
radio transmission setting	S04-B06	tanks	Q42-D03 P13-A06
setting, for electrical type	S04-B03	water supply & management	
spring	S04-A03	Watermarking	T01-D02A
tools for manufacturing	S04-D	audio recording	W04-G01L3
watch straps	S04-A04A	broadcast video	W02-F05A1
	P23-C02	interactive broadcasting	W02-F10N1C
watchmaking tools	S04-D	video recording	W04-F01L3
water-proofing	S04-A04A2	Wave analysis sound	W04-V
winding	S04-A03	Wave power	X15-C01
Watchdog monitoring, computing	T01-G05A	blade details	X11-B01
	101 0000	control, monitoring, testing	X15-C03
Water	V2E 1102	near-shore installation	X15-C01B2
aerator	X25-H03	off-shore installation	X15-C01B2
analysis	S03-E14B	on-shore installation	X15-C01B1
consumption meter	S02-C02A	power take-off	X15-C01C
desalination plant	X25-H03	turbine details	X11-B01
dispensing and metering distillation/sterilization	T05-H06 X25-H03		X11-J
aratmation/atermzation	12J-11UJ		

wave energy capture method	X15-C01A	microstrip	W02-A05A2
attenuator	X15-C01A2	notch	W02-A05K4
buoy	X15-C01A1	separating frequencies	W02-A05K7
oscillating water column	X15-C01A3	stripline	W02-A05A2
overtopping device	X15-C01A4	transverse electromagnetic filters	W02-A05A
point absorber	X15-C01A1	waffle-iron	W02-A05B2
surface following	X15-C01A2	YIG	W02-A05E
terminator device	X15-C01A3	Waveguide phase shifter	W02-A06C
Wave soldering	X24-A02C	using ferromagnetic device	W02-A06C2
bath	X24-A02C	using semiconductor device	W02-A06C1
Waveform display	S01-C	Waveguide resonator	W02-A03A
CRT	S01-C01	cavity	W02-A03A3
LCD	S01-C09	coaxial	W02-A03A2
LED	S01-C09	dielectric	W02-A03A5
oscilloscopes	S01-C01	helical	W02-A03A1
other types of waveform display	S01-C09	lecher	W02-A03A2
		microstrip	W02-A03A4
Waveguide	W00 D00	spiral	W02-A03A1
aerial	W02-B02	stripline	W02-A03A4
optical - see Optical waveguides		·	
RF - see Waveguides (RF)	W02-A	Waveguide switch	W02-A04A
Waveguide conductor	W02-A01B	electrical discharge	W02-A04A3
circular	W02-A01B2B	ferromagnetic	W02-A04A1
dielectric	W02-A01B3	mechanical	W02-A04A1
	W02-A01B3	semiconductor	W02-A04A5
elliptic			
flexible .	W02-A01B2C	Waveguide RF	
grooved	W02-A01B2A	absorber	W02-A04B
hollow	W02-A01B2	attenuator	W02-A04C
parabolic	W02-A01B2B	auxiliary device	W02-A01C
ridged	W02-A01B2A	bend	W02-A01C1
several layers	W02-A01B4	circular polarisation	W02-A06B1
wire	W02-A01B1	circulator	W02-A04F
Wayaayida aayalay		coaxial line	W02-A01A2
Waveguide coupler	W02-A02	conductor - see Waveguide cond	
active	W02-A02B	conductor see travegular cond	W02-A01B
balanced/unbalanced	W02-A02A	coplanar line	W02-A01B
coaxial-to-stripline	W02-A02A3		
conjugate	W02-A02B1	corner	W02-A01C1
directional	W02-A02B1A	coupler - see Waveguide coupler	
hybrid ring	W02-A02B1D		W02-A02
magic-T junction	W02-A02B1C	delay line	W02-A03B
waveguide-to-coaxial	W02-A02A1	dielectric	W02-A01B3
waveguide-to-stripline	W02-A02A2	Faraday rotator	W02-A06B3
		filter - see Waveguide filter (elec	tric)
Waveguide filter (electric)	W02-A05		W02-A05
active	W02-A05G	fin line	W02-A01A1
bandpass	W02-A05K2	fixed joint	W02-A01C2
cascaded cavity	W02-A05A1E	hollow	W02-A01B2
	W02-A05B1E	impedance matching	W02-A02C
cascaded coaxial	W02-A05A1E	isolator	W02-A04E
cavity	W02-A05B1	magnetostatic wave device	W02-A04E
coaxial	W02-A05A1		
comb	W02-A05A3	manufacture	W02-A07
combining frequencies	W02-A05K7	materials for transmission line	W02-A01D
coupling (internal)	W02-A05Q	materials in general	W02-A08C
corrugated	W02-A05B2	microstrip	W02-A01A3
=		millimetre wave material	W02-A08C1
evanescent	W02-A05F	mode selector	W02-A06A
ferromagnetic	W02-A05E	movable joint	W02-A01C3
harmonic suppression	W02-A05K6	nonlinear noise reduction device	W02-A06E
highpass	W02-A05K3	phase shifter - see <b>Waveguide ph</b>	
hollow waveguide	W02-A05B	phase sinter see travegalae pir	W02-A06C
interdigital	W02-A05A3	polariser	W02-A06C W02-A06B
internal coupling	W02-A05Q		
lowpass	W02-A05K1	power combiner	W02-A02D
•		•	

power divider resonator - see <b>Waveguide resor</b>		trajectory compensation trigger	Q79-T01H Q79-T01G
	W02-A03A	types of weapons	Q79-A
rotating joint	W02-A01C3	types of weapons - blasting	Q79-A09
several layers	W02-A01B4	types of weapons - cold weapons	Q79-A01
slot line	W02-A01A1	types of weapons - crossbows	Q79-A01C
stripline	W02-A01A3	types of weapons - firearms	Q79-A02
switch - see Waveguide switch	W02-A04A	types of weapons - flamethrowers	
temperature compensation	W02-A08A	types of weapons - hand grenades	Q79-A06
Termination	W02-A04D	types of weapons - launchers	Q79-A04
testing	W02-A07	types of weapons - machine guns	
transmission line	W02-A01	types of weapons - mines/landmin	es Q79-A05
twist	W02-A01C1	types of weapons - missiles	Q79-A06
waveguide component	W02-A	types of weapons - sabres, swords	
window	W02-A01C5		Q79-A01D
wire	W02-A01B1	Weapons, electrically operated	W07-E
Wavelength, optical, measuring	S03-A09	firing	W07-E01
Sights, weapon	W07-B01	laser weapon	W07-E09
Weapon aiming systems	W07-B05	launching systems with electrical propulsion	W07-E05 W07-E05A
Weapon fuze detonation	W07-C03	with plasma propulsion	W07-E05A
Weapon guidance systems	W07-A01		X14-F04
Weapon sights	W07-B01	Weapons, protection	W07-F
Weapons (applications)		detection systems for airports	W06-B02A
civil engineering/construction	Q79-U17		W07-F
military	Q79-U31A	for personnel	W07-F01
self-defence	Q79-U31C	for ships	Q24-M03
sports and leisure	Q79-U30	for weapons or equipment	W07-F03
underwater use	Q79-U45	lidar systems	W06-A06H2
vehicle	Q79-U03	mine sweeping	W07-F05
Weapons, non-electrical	Q79	self defence equipment	W07-F01A
Weapons, non-electrical aiming mechanism	Q79 Q79-T01H	self defence equipment  Wearable power supply	U24-X
		· ·	
aiming mechanism	Q79-T01H	Wearable power supply	
aiming mechanism ammunitions	Q79-T01H Q79-T02	Wearable power supply Weather forecasting	U24-X
aiming mechanism ammunitions ammunitions, bullet/projectile	Q79-T01H Q79-T02 Q79-T02B	Wearable power supply Weather forecasting influencing systems	U24-X S03-D05
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell	Q79-T01H Q79-T02 Q79-T02B Q79-T02A	Wearable power supply Weather forecasting	U24-X S03-D05 X25-X20
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C	Wearable power supply Weather forecasting influencing systems for agricultural purpose	U24-X S03-D05 X25-X20 X25-N01B
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H	Wearable power supply Weather forecasting influencing systems for agricultural purpose	U24-X S03-D05 X25-X20 X25-N01B S03-D05
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems	U24-X S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems prediction systems	U24-X S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05
aiming mechanism ammunitions ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems prediction systems	U24-X S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems prediction systems radar systems satellite	U24-X S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05 W06-A04H2
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems prediction systems radar systems	S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05 W06-A04H2 S03-D05
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems prediction systems radar systems satellite Web-advancing/handling	V24-X  S03-D05  X25-X20  X25-N01B  S03-D05  W06-A06H2  S03-D05  S03-D05  W06-A04H2  S03-D05  X25-F02  T06-D08A
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E Q79-T01B	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control	S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05 W06-A04H2 S03-D05 X25-F02 T06-D08A X25-F02
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E Q79-T01B Q79-T01B	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems prediction systems radar systems satellite Web-advancing/handling control Wefting machine	S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05 W06-A04H2 S03-D05 X25-F02 T06-D08A X25-F02 X25-T04B1
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E Q79-T01B Q79-T Q79-S	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control	S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05 W06-A04H2 S03-D05 X25-F02 T06-D08A X25-F02 X25-T04B1 T06-D03C
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E Q79-T01B Q79-T Q79-S Q79-T01B	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control  Wefting machine control	S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05 W06-A04H2 S03-D05 X25-F02 T06-D08A X25-F02 X25-T04B1 T06-D03C X25-T04B1
aiming mechanism ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E Q79-T01B Q79-T Q79-S Q79-T01B Q79-T Q79-S Q79-T01B Q79-T01B Q79-T	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control  Wefting machine control  Weighing	V24-X  S03-D05  X25-X20  X25-N01B  S03-D05  W06-A06H2  S03-D05  W06-A04H2  S03-D05  X25-F02  T06-D08A  X25-F02  X25-T04B1  T06-D03C  X25-T04B1  S02-D
aiming mechanism ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E Q79-T01B Q79-T Q79-S Q79-T01B Q79-T Q79-S Q79-T01B Q79-T01B Q79-T01B Q79-T01D Q79-T01D	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control  Wefting machine control	\$\text{S03-D05}\$\times \text{X25-X20}\$\times \text{X25-X20}\$\times \text{X25-N01B}\$\text{S03-D05}\$\times \text{W06-A06H2}\$\text{S03-D05}\$\times \text{W06-A04H2}\$\text{S03-D05}\$\times \text{X25-F02}\$\text{T06-D08A}\$\times \text{X25-F02}\$\times \text{X25-T04B1}\$\text{T06-D03C}\$\times \text{X25-T04B1}\$\text{S02-D}\$\text{cations}\$
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01C Q79-T01A Q79-E Q79-T01B Q79-T Q79-S Q79-T01B Q79-T01B Q79-T01B Q79-T01D Q79-T01D Q79-T01D	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing appli	\$\text{S03-D05}\$\times \text{X25-X20}\$\times \text{X25-X20}\$\times \text{X25-N01B}\$\text{S03-D05}\$\times \text{W06-A06H2}\$\text{S03-D05}\$\times \text{W06-A04H2}\$\text{S03-D05}\$\times \text{X25-F02}\$\times \text{X25-F02}\$\times \text{X25-T04B1}\$\text{T06-D03C}\$\times \text{X25-T04B1}\$\text{S02-D}\$\text{cations}\$\text{S02-D01}\$
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance manufacture	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01A Q79-E Q79-T01B Q79-T0 Q79-T01B Q79-T0 Q79-T01B Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01F Q79-G Q79-M	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems satellite Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications - see Weighing apparatus	\$\text{S03-D05}\$ \$\times 25-\times 20\$ \$\times 202-\times 20\$
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01A Q79-E Q79-T01B Q79-T01B Q79-T Q79-S Q79-T01B Q79-T01B Q79-T01B Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01F Q79-G Q79-M ye clothing	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems satellite Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications apparatus - see Weighing apparatus Weighing applications	\$\text{S03-D05}\$ \$\times 25-\times 20\$
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance manufacture protection for personnel/protections	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01B	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems satellite Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications - see Weighing apparatus	\$\text{S03-D05}\$ \$\times 25-\times 20\$
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance manufacture	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01B Q79-T01B Q79-T01B Q79-T Q79-S Q79-T01B Q79-T01B Q79-T01B Q79-T01B Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-H01 pent Q79-H03	Wearable power supply  Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite  Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications - see Weighing apparatus Weighing applications at point-of-sale	\$\text{S03-D05}\$ \$\times \text{S25-X20}\$ \$\times \text{S25-X20}\$ \$\times \text{S25-N01B}\$ \$\text{S03-D05}\$ \$\times \text{S04-A06H2}\$ \$\text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S25-F02}\$ \$\times \text{T06-D08A}\$ \$\times \text{S25-F02}\$ \$\times \text{S25-T04B1}\$ \$\text{S02-D}\$ \$\text{cations}\$ \$\text{S02-D}\$ \$\text{cations}\$ \$\text{S02-D01}\$ \$\text{tus}\$ \$\text{S02-D}\$ \$\text{S02-D02}\$ \$\text{S02-D02D}\$ \$\text{T05-L01E}\$
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance manufacture protection for personnel/protection	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01B Q79-T01B Q79-T01B Q79-T01B Q79-T01B Q79-T01B Q79-T01B Q79-T01B Q79-T01D	Wearable power supply  Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite  Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications - see Weighing apparatus - see Weighing apparatus at point-of-sale batches	\$\text{S03-D05}\$ \$\times \text{S25-X20}\$ \$\times \text{S25-N01B}\$ \$\text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S03-D05}\$ \$\times \text{S25-F02}\$ \$\times \text{S25-F02}\$ \$\times \text{S25-T04B1}\$ \$\text{T06-D03C}\$ \$\times \text{S02-D}\$ \$\text{S02-D01}\$ \$\text{sus} \text{S02-D}\$ \$\text{S02-D02}\$ \$\text{S02-D02}\$ \$\text{S02-D02D}\$ \$\text{T05-L01E}\$ \$\text{S02-D02B}\$
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance manufacture protection for personnel/protection protection for weapons or equipn	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01A Q79-E Q79-T01B Q79-T01B Q79-T01B Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-H01 pent Q79-H03 Q19-D Q79-G	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications - see Weighing apparatus - see Weighing apparatus at point-of-sale batches continuous stream of materials	\$\text{S03-D05}\$ \$\times 25-\times 20\$ \$\times 25-\times 25-\times 25\$ \$\times 25-\times 25-\times 25\$ \$\times
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance manufacture protection for personnel/protection repair safety	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01B Q79-T01B Q79-T01B Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-H01 Dent Q79-H03 Q19-D Q79-G Q79-H01	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems satellite Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications - see Weighing apparatus - see Weighing - see Wei	\$\text{S03-D05}\$ \$\times 25-\times 20\$ \$\times 25-\times 25-\t
aiming mechanism ammunitions ammunitions, bullet/projectile ammunitions, cartridge/shell ammunitions, detonator ammunitions, propellant/primer ammunitions, storage anti-missile armoured vehicle  barrel blade/folding blade bows/bowstrings bullet catcher cross-guard constructional details decommissioning of weapons handle holder/sheath/scabbard magazine maintenance manufacture protection for personnel/protection protection for weapons or equipn	Q79-T01H Q79-T02 Q79-T02B Q79-T02A Q79-T02C Q79-T02C Q79-T02F Q79-H Q79-G03 Q19-D Q79-T01E Q79-T01E Q79-T01B Q79-T01B Q79-T01B Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-T01D Q79-H01 Dent Q79-H03 Q19-D Q79-G Q79-H01	Wearable power supply Weather forecasting influencing systems for agricultural purpose lidar systems  prediction systems radar systems  satellite Web-advancing/handling control  Wefting machine control  Weighing applications - see Weighing applications - see Weighing apparatus - see Weighing apparatus at point-of-sale batches continuous stream of materials	S03-D05 X25-X20 X25-N01B S03-D05 W06-A06H2 S03-D05 S03-D05 W06-A04H2 S03-D05 X25-F02 T06-D08A X25-F02 X25-T04B1 T06-D03C X25-T04B1 S02-D cations S02-D01 tus S02-D S02-D02 S02-D02 T05-L01E S02-D02B S02-D02A S02-D02C

for person	S02-D02X	application (non-electrical welding	
gases	S02-D02C	building, construction industry	P55-U17
granular/powdered material	S02-D02A	electronics	P55-U42
incorporation in vehicles	S02-D02X	industrial	P55-U40
livestock	S02-D02C	jewellery	P55-U50A
materials on conveyor belt	S02-D02A	personal items	P55-U50
pastes	S02-D02C	vehicles	P55-U01
POS	S02-D02D	automatic welding system (non-el	
1 .	T05-L01E	1.1	P55-T02
sheets	S02-D02C	cable	X24-C04
vehicles	S02-D02C	1.1 1.12	X24-D10
wires	S02-D02C	cold welding	X24-D08E
Weighing apparatus	S02-D	connector	X24-E
balances	S02-D01A	cooling system (non-electrical wel	
calibrating, testing and compensa	tion		P55-T20
aspects	S02-D07	control arrangement (non-electric	
details, e.g. bearings, beams	S02-D09	different and beautiful as	P55-T20
elastic material balance	S02-D01B	diffusion bonding	X24-D08G
electrostatic balancing	S02-D01X	electro erosion	X24-F
fluid action balancing	S02-D01X	electrode	X24-B04
for vehicles	Q15-C		X24-C04
indicating/recording devices for	S02-D03		X24-D10
magnetic balancing	S02-D01X	L. J. C.	X24-F02
price indicating	S02-D02D	electrolytic	X24-D09
	T05-L01E	electron beam	V05-F02
strain gauge	S02-D01B		V05-F05A7A
Weighing scale	S02-D02X		V05-F08E3
5 5	X27-A02A	annath a mai a malalia a	X24-D02
Weight lifting	P36-A06	exothermic welding	P55-C99
Weight inting	W04-X01A5	explosive welding	X24-D08X
		flame forge welding	X24-D05 X24-D08X
Weld testing, arc	X24-B09	friction	X24-D08C
Welding		friction stir welding	X24-D08C
arc stabilising	X24-B02A	gas	X24-D05
arc, accessories	X24-B04	gas	P55-C01
arc, arrangements or circuits	X24-B02	generator (see also X11)	X24-G
arc, automatic electrodes or work		goggles	X24-D10
	X24-B03	high frequency (HF) plastic weldin	
arc, built-up	X24-B01	high frequency (HF) non-plastic we	
arc, electrodes	X24-B04	gequeey ( ,e p.ue.ue	X24-D09
arc, generating ignition voltage	X24-B02A	hot pressure welding	X24-D08
arc, goggles	X24-B04	induction heating	X24-D01
arc, magnetic control	X24-B02A	inertia welding	X24-D08C
arc, percussion	X24-B09	laser beam	X24-D03
arc, power supply	U24-D	laser beam, electrical/electronic	
	U24-E	components	X24-D03B
	X12-H01C	laser beam, metal working	X24-D03A
and the street of the street of	X24-B02X	lubrication system (non-electrical	welding)
arc, protective circuit	X24-B02X	•	P55-T20
arc, protective helmet	X24-B04	magnetic pulse	X24-D08E
ara ramata control	X27-A02B1	maintenance (non-electrical weldi	ng) P55-G
arc, remote control	X24-B02X	mask	X24-D10
arc, robot control	T06-D07B X24-B03	monitoring welding	X24-D11
	X25-A03E1	pre-treatment (non-electrical weld	ing) P55-A
	X25-A03F	plasma	X24-D05
arc seam	X24-B01	plastics materials	X24-D04
arc, seam arc, stud	X24-B05		X25-A06
arc, stud arc, submerged	X24-B05	power supply	X12-H01C
arc, submerged arc, testing	X24-B09	protective equipment (non-electri	cal welding)
arc, testing arc, using insulating electrodes	X24-B09		
arc, using insulating electrodes arc, using shielding gas	X24-B07 X24-B06		P55-T20
, <u>-</u> <u>-</u>		repair (non-electrical welding)	P55-G

r	esistance	X24-C	WI	heelchair	
r	esistance butt	X24-C09		electric	S05-G02A
r	esistance, accessories	X24-C04			X21-A01A
r	esistance, control	X24-C01		mechanical	P33-A01
r	esistance, power supply	U24-D			Q22-C02
		U24-E		testing, for vehicle	S02-J02A
		X12-H01C	w	heels, mechanical measurement u	sina
		X24-C01			S02-A01A
	esistance, spot	X24-C09			
	oll welding	X24-D08	W	hirlpool bath	X27-E03A1
S	afety arrangement (non-electrical		WI	histle	P86-E01C5
		P55-T20	w	hite goods	X27
	olid state bonding	X24-D08		in general	X27-X
S	solid state welding	X24-D08		with built-in secondary function	X27-X03
	li f Lli	P55-C02	w	hite noise, generation	U23-F05
	ecycling of welding components			hite space utilization, radio	W02-C03G5
	epair/maintenance obot	P55-G		•	
	od	X25-A03E1 X24-B04	W	ide area networks (WAN, see also	Networks)
ı	ou	X24-D04 X24-C04			
		X24-C04 X24-D10			W01-A06B5B
		X24-F02	Wi	idth measurement	S02-A10B
		P55-D03		using electrical/magnetic method	S02-A02
t	esting of wel	X24-D11			S02-A10B
	ransformer	X12-C01E		using mechanical method	S02-A01
		X24-G			S02-A10
ι	ıltrasonic	X24-D08A		using optical method	S02-A03
٧	vork conveying system (non-electr	rical welding)			S02-A10
		P55-T02C		using sound or ultrasound	S02-A05B
Well	logging	X25-E02			S02-A10
	electromagnetic	S03-C02	Wi	iegand wire, pulse generation	U22-A02X
	neasuring arrangements	X25-E02A	Wi	ien bridge	S01-F01
	nud pulse telemetry	W05-D06M1	w	IG welding	X24-B06
r	non-seismic measurements	S03-C07A		IMPS	T01-J12
C	pptical	S03-C04			
S	eismic	S03-C01C5	Wi	inch	X25-F05
t	ransmission details	W05-D07H		control	T06-D08E
		W05-D08E			X25-F05
		X25-E02A1	Wi	ind-driven advertising signs	P85-E01E
	ısing nuclear radiation	S03-C03	Wi	ind instrument	P86-A01A
	production	X25-E03	Wi	ind power (electric)	X15-B
C	control	T06-D12		blade design/material	X15-B01C
Wet	separation of solids			blade support/damping	X15-B01C
f	rom liquids	P41-E03C		control	X15-B05
c	of two or more kinds of solids	P41-E03A		generator	X15-B01B
	tability measurement	S03-F04		interconnection with utility	X12-H01B1
	-			lightning protection system	X15-B09
	atstone bridge	S01-F01		maintenance	X15-B15
	esistance strain gauge	S01-F01A		manufacture	X15-B15
Whe		Q11-A		monitoring, testing, control	X15-B05
	ixle .	Q11-A05		motor	X15-B01
	pearing	Q11-A06		off-shore system	X15-B03
	castor	Q11-A08		on-shore system	X15-B02
	cover	Q11-A07		servicing	X15-B15
	disc wheel nub	Q11-A02		simulation small scale power plant	X15-B05 X15-B04
	nub nanufacture/assembly	Q11-A04 Q11-A28		small scale power plant support structure	X15-B04 X15-B06
	nanulacture/assembly nuts	Q11-A20		support structure support structure, manufacture	X15-B06
	ail-engaging wheel	Q11-A20		testing	X15-B05
	im	Q11-A03		turbine	X15-B03
	poke	Q11-A01		turbine, blade angle control	X15-B09
	raction increasing equipment	Q11-A15		turbine, horizontal-axis	X15-B01A5
	J 1 1		•		

turbine, large scale	X15-B01A1	Wireless headphones	V06-V01M
turbine, microturbine	X15-B01A3		V06-V04A4
turbine, small scale turbine, vane	X15-B01A3 X15-B01A		W03-G05C5A
turbine, varie turbine, vertical-axis	X15-B01A6	Wireless link telemetry/telecontrol	W05-D06A
wind turbine generator, electric		Wireless loudspeakers	V06-V01M
application	X11-U01E	Trinciess iouaspeakers	V06-V04A1
Wind-photovoltaic energy convert	ers		
. 57	U12-A02A9		W03-G05C5C
Wind-vane	S02-H	Wireless microphone	V06-V01M
vviliu-valle	S03-D01		V06-V04A2
Winding	300 201		W04-S05C1
clock or watch	S04-A03	Wireless data network	W01-A06C4
control, yarn	T06-D03B	Wireless transducer,	
<b>, ,</b> -	X25-T01	electromechanical	V06-V01M
for magnetic head	T03-A03J5	Wiring	
yarn	X25-T01	for aircraft	W06-B01C1
Window		for computer equipment	T01-L09
cleaning equipment	P28-C01	for instruments	S01-J05
for building, electrical	X25-U01	for ship	W06-C01C1
for building, mechanical	Q43-A06	for train	X23-A09
for aircraft	Q25-A03A	for vehicle	X22-X01B
for ship	Q24-A03A	harness manufacture	V04-V02
for train	Q21-D16		X12-D07D
for vehicle	Q17-A07	harness, electronic equipment	V04-T01A
electrochromic	X22-X05		X12-D03M
winder, electrical	X22-H	harness, per se	X12-D03M
Window/split screen		loom	V04-V02
icons	T01-J12D	loom, tie	V04-V02
widgets	T01-J12D	machine, general circuit manufact	
windows	T01-J12D		V04-V02
Windows®-based phone	W01-C01G8S	manual, general circuit manufactu	re V04-V02
<del>-</del>	W01 C01 C03	Wiring for integrated circuit	
Wire		3-D interconnections	U11-D03C3B
joining, high power superconduc	X12-G01E1	grounding	U11-D03C1A
joining, low power superconduct		high density	U11-D03C2
joining, low power superconduct	V04-P10	layout	U11-D03C1A
terminating, high power superco		noise reduction	U11-D03C3A
terrimating, mgn power superco	X12-G01E1	opto-electronic	U11-D03C3B
terminating, low power supercor		Wiring harness - see Wiring	
3, 1	V04-P10	Wood	P63
testing (with fault location)	S01-G05	analysis	S03-E14D7
testing (without fault location)	S01-G12F	constructional details	P63-T
waveguide conductor	W02-A01B1	planing	P63-A05
Wire bonding for semiconductor d	evices	recycling/recovery	P63-R
-	U11-E01A	routing	P63-A09
connection details	U11-D03A2	sawing, cutting	P63-A03
wires, metallurgical aspects	U11-D03B1	timber industry	X25-A03 X25-X01
m os, motana great doposite	U11-E01A	turning	P63-A10
Wire dot impact printer for compu		wood drying	X25-G
• •		working	P63-A
Wire drawing	X25-A02E	9	X25-A10
control	T06-D05A	bench	P63-T20
	X25-A02E	control	T06-D16
Wire stripper	V04-P03		-
	X12-G01B	tools	P63-T
Wireless battery charging	X16-G03	Word processing (WP)	T01-J11A
		dictionary	T01-J11A1
		grammar-checking	T01-J11A1
		, J	

Work		X	
measurement of,	S02-F02		
special purpose measurement of	S02-F03B	X-ray	222 524
Working		analysis	S03-E06
cement	X25-A09	cassettes	S03-E06H5
ceramic	X25-A09	contrast media, medical	S05-D02A7 V05-E02
clay	P64-C	control of generators crystallography	S03-E06C
concrete	X25-A09	diagnosis for dentistry	S05-E03
gem stones	P64-E50E	diagnosis, medical	S05-D02A
glass	X25-A05	dose control	V05-E02C5C
plastics	X25-A06	electrophotography	S06-D09
rock	P64-E50A	generators	V05-E01
rubber stone-like materials	X25-A07 P64-E		V05-E03
wood	P63	inspection of airline baggage	W06-B02A5A
wood		measuring, general - see also <b>Nu</b>	
	X25-A10	radiation	S03-G02
Workpiece holding for spraying or	other	medical image analysis	S05-D02A5E
liquid application	P42-T05E	medical imaging, photographic	S03-E06B5
Wound capacitor - see Capacitor	V01-B03C1		S05-D02A5A
WP	T01-J11A	medical imaging, stimulable shee	τ S03-E06B3
	101-311A	phosphor	S05-D02A5C
Wristband	D22 C02	medical imaging, video	S05-D02A5B
general medical	P23-C02 P33-A99	medical imaging, viaco	W04-M01F1
medical	F33-A77	medical therapy	S05-A03F
		medical tomography	S05-D02A1
Writer or reader for smart card	T04-K02	metal detectors	S05-D02A5D
Writing, drawing instruments	P77	medical, generation and protection	on S05-D02A3
constructional details	P77-T	microscopes	S03-E06B1
core materials	P77-B		V05-F01A3
ball point pens	P77-A02	optical (analogous) elements	V05-E08
felt-tip pens	P77-A03	positioning X-ray detector	S05-D02A6B
fountain pens	P77-A01		S03-E06H2
fountain pens manufacture	P77-A01 P77-M	positioning X-ray source	S03-E06H2 S05-D02A6A
fountain pens manufacture pencils	P77-A01 P77-M P77-A04	positioning X-ray source	S03-E06H2 S05-D02A6A S03-E06H4
fountain pens manufacture pencils stylus	P77-A01 P77-M P77-A04 P77-A05		S03-E06H2 S05-D02A6A S03-E06H4 S03-G02B2G
fountain pens manufacture pencils stylus <b>Writing into digital static stores</b>	P77-A01 P77-M P77-A04	positioning X-ray source semiconductor sensors	S03-E06H2 S05-D02A6A S03-E06H4
fountain pens manufacture pencils stylus	P77-A01 P77-M P77-A04 P77-A05	positioning X-ray source	S03-E06H2 S05-D02A6A S03-E06H4 S03-G02B2G
fountain pens manufacture pencils stylus <b>Writing into digital static stores</b>	P77-A01 P77-M P77-A04 P77-A05 U14-A07	positioning X-ray source semiconductor sensors semiconductor sensors (for	S03-E06H2 S05-D02A6A S03-E06H4 S03-G02B2G U12-A03
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube	S03-E06H2 S05-D02A6A S03-E06H4 S03-G02B2G U12-A03 S03-E06H5A V05-E03A X14-G02
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography	S03-E06H2 S05-D02A6A S03-E06H4 S03-G02B2G U12-A03 S03-E06H5A V05-E03A X14-G02 S03-E06B3
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical	S03-E06H2 S05-D02A6A S03-E06H4 S03-G02B2G U12-A03 S03-E06H5A V05-E03A X14-G02 S03-E06B3 S05-D02A1
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical tube	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03 W04-M01F1
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical tube video camera	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical tube video camera  X-ray equipment	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03 W04-M01F1 \$03-E06H5D
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source  semiconductor sensors  semiconductor sensors (for materials investigation) synchrotron tube  tomography tomography, medical tube  video camera  X-ray equipment control	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03 W04-M01F1 \$03-E06H5D
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical tube video camera  X-ray equipment control monitoring excess current	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03 W04-M01F1 \$03-E06H5D \$05-E02 \$05-E02C5A
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical tube video camera  X-ray equipment control monitoring excess current monitoring temperature	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03 W04-M01F1 \$03-E06H5D \$05-E02 \$05-E02C5A \$05-E02C5A
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical tube video camera  X-ray equipment control monitoring excess current monitoring temperature power supply	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03 W04-M01F1 \$03-E06H5D \$05-E02 V05-E02C5A V05-E02C5A
fountain pens manufacture pencils stylus  Writing into digital static stores  WWV time signal receiver	P77-A01 P77-M P77-A04 P77-A05 U14-A07 S04-B06	positioning X-ray source semiconductor sensors semiconductor sensors (for materials investigation) synchrotron tube tomography tomography, medical tube video camera  X-ray equipment control monitoring excess current monitoring temperature	\$03-E06H2 \$05-D02A6A \$03-E06H4 \$03-G02B2G U12-A03 \$03-E06H5A V05-E03A X14-G02 \$03-E06B3 \$05-D02A1 V05-E01 V05-E03 W04-M01F1 \$03-E06H5D \$05-E02 \$05-E02C5A \$05-E02C5A

X-ray fluorescence

non-standard

laser target impact type tube

non-target impact type tube plasma x-ray generator

non-standard generator details

X-ray generator

S03-E06D

V05-E03B

V05-E03

V05-E03

V05-E03 V05-E04

synchrotron	V05-E03A
target impact type tube	X14-G02 V05-E01
X-ray laser	V08-B02
extreme ultraviolet	V08-B02
generator	V05-E03C
X-ray lithography	U11-C04H
exposure apparatus/method for	011-00411
semiconductor manufacture	U11-C04H1
masks	U11-C04H2
	V05-E08
X-ray optics	V05-E08C
passive	V05-E08C
wave effect manipulation	V03-L00A
X-ray spectrometer	602 60262
measuring radiation	S03-G02C3
discharge tube details	V05-F01A6
X-ray tube	
anode cooling	V05-E01B5
anode electrode	V05-E01A
anode electrode material composi	
and and an	V05-E01A1
cathodes	V05-E01C V05-E01H
characterised by type circular electron beam path type to	
circular electron beam path type to	V05-E01H5A
cold cathode emitters	V05-E01173A
cooling system (not specifically for	
cooming system (not specifically for	V05-E01F
electron-optical apparatus	V05-E01D1
employing electron gun	V05-E01H5
fixed anode type	V05-E01H3
flash type tube	V05-E01H7
lead-in conductors	V05-E01E5
liquid metal anode type	V05-E01H9
multiple rotary anode type tube	V05-E01H1A
non-target impact type tube	V05-E03
rotary anode cooling	V05-E01B5
rotary anode system	V05-E01B
rotary anode type tube	V05-E01H1
seals	V05-E01E3
tube cooling	V05-E01B5
X-ray tube windows	V05-E01E1A
X-Y digitiser	T04-E
X-Y plotters	S02-K05
Xenon lamp	X26-A01A
Xerography - see Electrophotograpl	<b>hy</b> S06-E



## Yoke

re	
CRT deflection	V02-F01A V05-D01B
	V05-D06B1A
	W03-A08A1B
high frequency inductor	V02-F01
	V02-F03A2
high frequency transformer	V02-F02
	V02-F03A2
high power device	X12-C01A
high power reactor	X12-C01A
	X12-C01F
high power transformer	X12-C01A
	X12-C01E
low power device, general	V02-C
low power supply reactor	V02-G01C
	V02-G02A2
low power supply transformer	V02-G01A
	V02-G02A2
manufacture	V02-H03
	X12-C01D1

## Ζ

## **Zapping**

laser zapping (fuses, etc.)
U11-C07B
U11-C19B
TV channel changing
W03-A02B3

Zebra \* connection
V04-A07

Zeeman effect
S01-E01C

Zener diode
U12-C01D

ZIF connector
V04-M16

ZigBee

digital interface W01-A0A7H2A network W01-A06C4A

Zinc selenide - see All-BVI compounds Zinc sulphide - see All-BVI compounds

**Zone refining, semiconductor** U11-B02A

# **Appendices**

## **Appendix 1: EPI Subject Matter Coverage**

Patents are included in EPI in two ways, namely:

- 1. Automatic inclusion based on the assigned IPC
- 2. Intellectual selection based on technical content

#### **Automatic inclusion criteria**

Some sections of the IPC relate to subject matter which is always of relevance to EPI. Thus assignment of any IPC from section H, will result in inclusion. Patents bearing certain other IPC subsections are also automatically included, to ensure that all disclosures received by Clarivate can be assigned to at least one part of our overall classification system. Since some of these IPCs relate to technologies which are not inherently electrical, this results in the inclusion in EPI of some inventions of a purely mechanical nature, in the fields of instrumentation and control, for example.

It should be noted that where an IPC is considered to be inappropriate the normal correspondence between IPC and Clarivate classification does not apply. In some cases, this may necessitate the assignment by Clarivate of an additional IPC to enable the invention to be covered by the most suitable class of the General and Mechanical Patents Index, rather than EPI. From 2006 mechanical patents relating to the transportation area have been intellectually selected for inclusion in EPI.

Below is a list of IPC sections and subsections which normally guarantee the inclusion of a patent in EPI. For further details of the relation between IPC and EPI classes please refer to Appendix 4, the concise guide to EPI classification. (For details of the correspondence between IPC and manual codes see Appendix 3).

A61N	G06
G01	G07
G02B6	G08
G02F	G09G
G03G	G10H
G04	G10L
G05B	G11
G05D	G12
G05F	Н

#### Intellectual selection criteria

Patents are included on this basis provided that at least one of the following criteria is satisfied:-

#### a Relevance to an electrical industry

This may involve the product of an industry itself, or manufacturing methods and equipment (whether electrical or not) used in that industry. Examples of such industries include electrical and electronic components, semiconductor device manufacture, data recording, telecommunications, and computers.

### **b** Significant electrical content

Patents included on this basis may relate to any field of technology, provided that any electrical aspect forms a significant part of the invention, and is not just an incidental feature. For example, in the case of a machine tool, the presence of an electric motor or limit switch alone would not normally justify its inclusion. If the incorporation of motor or switch in the tool was the novel aspect then it would be included. In the industrial field, examples of inventions that are covered by EPI on the basis of significant electrical content include conveyors, lifting equipment, food processing, metallurgy, textiles etc.

Note that the electrical content required must normally be a claimed feature of the invention. However, disclosures with considerable electrical content in a detailed description of the invention which is clearly referred to in general terms in the claims would be included.

Note also that the use of existing electrical apparatus or techniques in patents claiming a process or method only would not normally be sufficient for inclusion

#### c Relevance to automotive electrics

Any patent of this type with electrical content - not necessarily claimed - is included in EPI

## d Relevance to domestic electrical equipment

All aspects of domestic electrical equipment are selected, including purely mechanical details such as refrigerator door seals or shelves for electric cookers.

#### e Relevance to other specified subjects

All novel aspects of the following are included:-

Clocks and watches

Electrophotography

Holography

Line printers and electronic typewriters

Steam turbines

#### f Relevance to non-electrical content

From the dates highlighted below, patents coverage has been extended so that general or mechanical aspects of an invention are also selected for inclusion in the Electrical (or Engineering) Patent Index .

From 2006 all mechanical aspects of transportation related patents (vehicles, aircraft, ships, trains) are included.

From 2012 all mechanical aspects of packaging related inventions are included.

From 2015 patents are also selected to highlight general or mechanical aspects of an invention for other technologies.

## **Appendix 2: EPI Manual Coding Criteria**

EPI manual codes are normally assigned in two ways, namely:-

- 1 To highlight the novel aspect of an invention itself
- 2 To indicate significant application

In the first case, codes will usually be assigned based on the content of the patent claims. In the second case, applications may be derived from either the claims or the wider disclosure of the specification.

The following general points should be noted regarding the assignment of EPI codes:-

- A patent may be selected for inclusion in EPI based on its intended use only, the actual novel aspect being outside the scope of EPI codes. For example, the invention may relate to a novel chemical compound of relevance to an electrical or electronic industry, such as a polymer composition intended as a magnetic tape substrate. In such a case, only the application aspect can be conveyed by EPI codes.
- Where an invention has no stated application, is of universal application, or a series of applications is given which are merely standard uses for such a device, manual codes are usually assigned to describe only the invention itself. Examples of this include a common electronic component such as a capacitor, or a battery of a type used in a wide variety of portable devices. However, significant electrical applications which are emphasised, or are one among several non-electrical applications, will be coded.
- 3 EPI manual codes are hierarchical in structure, such that an increase in the number of characters represents a finer subject breakdown. This means that in cases where the precise details of an invention cannot be determined with certainty, or where several code subdivisions are equally applicable, a general manual code may be assigned. A more general code is also assigned if an appropriate sub-division code does not exist. Thus, when formulating a search, users are advised to consider the inclusion of a more general code in addition to finer subdivisions which are known to be relevant.
- In many areas of the EPI coding system, in addition to codes for a product, separate subdivision codes are provided to represent materials used in the product, their manufacture, and manufacture of the product. Where 'materials' and 'manufacture' codes are not available, these topics are coded as the product itself. Note that in general, the manufacture of materials used in a product is not coded as manufacture of the product unless it is one of a number of steps in a process for manufacturing the product as a whole. Thus, manufacture of a polymer material which can be used as a magnetic tape substrate is coded as a tape substrate. Subsequent processing of the material, such as cutting or shaping to form the actual substrate, is coded as substrate manufacture.

As explained in *Appendix 1*, patents are included in EPI either by virtue of patent office-assigned IPC or by an intellectual selection process. Irrespective of the initial route by which the invention is included, the same intellectual criteria are used to assign manual codes. However, it should be noted that the requirements for electrical content differ between EPI classes since, as explained in Appendix 1, some inventions are included because of their assigned IPC being 'guaranteed' for EPI and may not have an electrical aspect. For example, a patent in the field of instrumentation or control, included only on the basis of its IPC, cannot be assigned for an application in X25 (industrial equipment) since the electrical content requirements for that class are not satisfied. Conversely, an invention selected for X25 based on its electrical content can be coded for any significant control or instrumentation content where relevant.

## **Appendix 3: IPC to EPI Manual Code Approximate Concordance**

The following concordance is intended to assist users in determining, for an IPC relating to a technical field of interest, the EPI manual code, or code group, which represents similar subject matter. Where it is thought helpful, some combinations of IPCs which may be used to represent a particular topic have been included. When seeking the EPI code (or codes) corresponding to such a combination, the IPCs will be found in alphanumeric order. This table is intended as a general guide only, to be used as a 'short cut' to finding an approximately equivalent area of the EPI coding system. Where a number of code subdivisions correspond to a particular IPC, only the highest level code is shown for clarity. In addition, it should be remembered that patents bearing IPCs relating to technologies which are not inherently electrical will only be included in EPI if the specification in question has substantial electrical content.

Section A		A24D-003	P15-T01
A01	X25-N	A24D-003/02	P15-M
AUT	X27-A	A24F-001-005, 011	P15-T03
401B		A24F-007	P15-L01
A01B	P11	A24F-015, 017	P15-T04
A01C	P11	A41-43	X27-A02B
A01D	P12		X27-A02B1A
A01D-045/16	P15-L01	A41-47	X27-A02
A01D-090/00-16	Q19-G	A41	P21
A01F	P12	A42	P21
A01G	P13	A43	P22
A01H	P13	A44	P23
A01J	P13		X27-A02B2
	X25-P01C	A45,47	X27-A02A3
A01K	P14	A45B	P24-A
	X25-N02A	A45C	P24-B
A01K-013, 014, 017	P14-A03	A45D	X27-A02A1
A01K-015/02,04	X27-H03		X27-A02A3B
	P14-A01B		P24-C
A01K-021	P14-A05	A45F	P24-D
A01K-025, 027	P14-A04	A46	P24-E
A01K-037	P14-A01	A47	X27-A02A3A
A01K-039/00,06	X27-H02	,	X27-A03
A01K-049	P14-A05	A47,B62B	X27-X01
A01K-061/02	X27-H02	A47,F24C,H05B	X27-C
A01K-063/00	X27-H01	A47B	P25
A01K-067	P14-A05	A47C	P26
A01K-069-099	P14-B02	A47D	P26-F
A01L	P14-A06	A47F	P27-A
	P14-E01A	A47G	P27-B
A01M	X27-X02	A47G-007/04	P25-A01X
101.01	P14-B01	A47H	X27-T
A21-24	X25-P		P27-C
A23,47	X25-P01A	A47J	X27-B
A23L	X25-F03A		P28-A
	X25-P01X	A47J-036/38	X27-B05
A24	X25-P03	A47K-001/00-004/00	X27-A02A4
A24B	P15-L	A47K	P28-B
A24B-003-015	P15-L05	A47L	P28-C
A24C	P15-M		X27-D03
A24D	P15-T		X27-D04
A24D-001	P15-A01	A47L,D06F	X27-D
A24D-001/16	P15-T04	A47L,D06F-053	X27-D06
	· ·	,	

A47L-009,B04C	X27-D04C	A61F	P32
A47L-011,-013	X27-D05		S05-F
· ·		A ( 4 E 000 (4 4 4 )	
A61	S05-G02G	A61F-002/14-16	S05-F05
	S05-X	A61F-002/18	S05-F01
A61,G06F-017	S05-G02G1	A61F-002/24	S05-F04
,	S05-G02G2	A61F-002/28-46,54-66,3	
A (45			
A61B	P31	A61F-005/14	P22-F05
	S05-D	A61F-005/44	S05-F02
	S05-G02B2	A61F-013	P32-A60
A61B,A61G-003	S05-G02B2B	A61G	P33
		AOIG	
A61B,G06F-015	S05-D06		S05-G02
A61B-001	S05-D04	A61G,A61L-002,009	S05-G
A61B-001,G01M-011	V07-N02	A61G-001,005	S05-G02A
A61B-003	S05-D05	A61G-003/00-08	Q19-H03
A61B-003,G03B-005	S06-B01E	A61G-003/00	P26-A01B
A61B-005	S05-D01J	A61G-005	Q22-C02
A61B-005,008	S05-D01		P26-A01B
A61B-005,G01N	S05-C05	A61G-007	S05-G02B
	303-003		
A61B-005,G01N-		A61G-011/00	S05-G02B3A
033,35	S05-C02	A61G-013,015	S05-G02C
	S05-C03	A61G-013/00	P25-A01X
A61B-005/02	S05-D01B	A61G-015/00	P26-A01B
A61B-005/03,16	S05-D01X	A61G-021/00	Q19-C07
A61B-005/04	S05-D01A	A61H	P33
A61B-005/05	S05-D01D1		X27-A02A2
A01B 003/03		A / 411 A / 4N1	
	S05-D02B	A61H,A61N	S05-A
A61B-005/05,12	S05-D01D	A61H,A63B	W04-X01A5
A61B-005/08	S05-D01C1	A61H-001-023,037,	
A61B-005/08,		039	S05-A05
·	COE DOUL		
007/00-04	S05-D01H	A61H-003	S05-K01
A61B-005/08,10,22	S05-D01C	A61H-003,A61	S05-K
A61B-005/10,11,22	S05-D01C5	A61H-005	S05-A07
A61B-005/10,22	S05-D01C5A	A61H-031	S05-A05A
A61B-005/14	S05-D01G	A61H-033-037	S05-A09
A61B-005/14,	S05-C01	A61J	P33
A61B-005/14,20,			S05-M
G01N-033,035	S05-C	A61J-001,007	S05-M03
•		· · · · · · · · · · · · · · · · · · ·	
A61B-005/16	S05-D01F	A61J-007	S05-M01
A61B-005/20,	S05-C09		S05-M02
A61B-006	S05-D02		S05-M04
A61B-006/03	S05-D02A1	A61L	P34
A61B-006/04	S05-D02A6	A61L-002,009	S05-G01
	S05-D02E	A61L-002/02,16	S05-G01A
A61B-006/08-10	S05-D02A3	A61L-002/04-14	S05-G01B
A61B-006/14,A61C	S05-E03	A61M	P34
•			
A61B-006/40	S05-D02A3	A61M-001	S05-H
A61B-006/42,46	S05-D02A5	A61M-001/00-12	S05-H02
A61B-006/51	S05-E03	A61M-001/14-38	S05-H01
A61B-008	S05-D03	A61M-005	S05-J
A61B-017	S05-B01	A61M-005/16	S05-J01A
	S05-B04	A61M-016	S05-G02E
	S05-B05	A61M-019,021	S05-L02
A61B-017,019	S05-B09	A61M-019,021,	
			COE LO1
A61B-017,019,	S05-B	016/01	S05-L01
A61B-017/225	S05-B02	A61M-019-021	S05-L
A61B-017/36-41	S05-B03	A61M-037	S05-J02
A61B-018/02	S05-B06	A61N	P34
A61C	P32	A61N-001/00	S05-A03E2
	S05-E	A61N-001/04-06	S05-A02
A61C-001,003	S05-E01	A61N-001/10-16,40	S05-A03B
A61C-019	S05-E02	A61N-001/18-34,38	S05-A04
A61D	P32	A61N-001/30	S05-A04A
A61D-001	S05-B	A61N-001/36-378	S05-A01
	•		

A / 4 N L O O 4 / O / F O / O	COE 40444		VA/O 4 V/O 4 A
A61N-001/365,368	S05-A01A1		W04-X01A
	S05-A01A5	A63B-071	P36-A01
A61N-001/378	S05-A01C		W04-X01K1
A61N-001/38,39	S05-A01B	A63B-102	P36-A01
A61N-001/40,002, 005	,7S05-A03		W04-X01K1
A61N-002/02-12	S05-A03E1	A63C-001 -017	P36-A03
A61N-005	S05-A03A2		P36-E07
A61N-005/02-04	S05-A03D		W04-X01 K3P
A61N-005/06	S05-A03A9		W04-X03E2
A61N-005/06,08	S05-A03A	A63C-019	P36-A03
A61N-005/10	S05-A03F	A03C-017	P36-A08C
A0111-003/10			
A / 4 N L O O 7	S05-A03X	4/25	W04-X01 F
A61N-007	S05-A03C	A63D	P36-A01
A62B-001	P35-A01		P36-C13
A62B-003	P35-A01	A63D-015/04	P25-A01X
A62B-005	P35-A	A63F-001	P36-C05
A62B-007 - 015	P35-A03E		W04-X02B5
A62B-017	P35-A03C	A63F-003	P36-C01
A62B-018	P35-A03E1		W04-X02B1
	W06-B01C9	A63F-005	P36-C09
A62B-019 -027	P35-A03E	7.001 000	W04-X02E
A62B-029	P35-A03G	A63F-007 -011	P36-C
		A03F-007-011	
A62B-031	P35-A03E		W04-X02
A62B-033	P35-A99	A63F-013	W04-X02C
A62B-035	P35-A03A	A63F,H04H	W02-F10G
A62C	P35-C		W03-A16C5G
	X25-X05	A63G	W04-X03E2
A62C-002	P35-C05		W04-X03G3
A62C-004	P35-C05	A63H	W04-X03E
A62C-005	P35-C01	A63H-003	P36-E05
A62C-008	P35-C99	7 1001.1 000	W04-X03E5
A62C-011 - 025	P35-C01C1	A63H-017-029	P36-E01
		A0311-017-029	
A62C-027	X22-P10	4 (211 020	W04-X03E1
	P35-C01C5	A63H-030	P36-E
	Q19-H02		W04-X03E8
A62C-029	P35-C01C5	A63J	P36-E15
	Q24-P28		P36-F
	W06-C01C9		W04-X03G1
A62C 35/00	P35-C01C3		W04-X03G7
A62D-001	P35-C01A8	A63J, G10H	W04-U08
A62D-003	P35-X	A63K	P36-A03
A62D-005	P35-A03C		P36-A08C
A62D-007 -009	P35-A03E		W04-X01F
A63	P36		W04-X01K3
A03	W04-X		VVO <del>T</del> -701103
A / 2 C 0 4 C 0 / M C 0 7			
A63,G04,G06M,G07	W04-X01C		
A63,G06M,G09F	W04-X01C3		
A63,G07,G08B	W04-X01H		
A63,G09B	W04-W07E		
A63B	P21-D		
A63B-001 -026	P36-A06		
	P85-A01N		
	W04-X01A		
A63B-027 -029	P36-A06		
A63B-031 -035	P36-A03		
, 1002 00 1 000	W04-X01K3J		
A63B-037 -063	P36-A01		
A03B-037 -003			
A/2D O/7	W04-X01K1		
A63B-067	P36-A		
	P36-C		
	W04-X		
A63B-069	P36-A		
	P85-A01N		

Section B		B23H-007	X24-F02
B01D-003/14,B03B,	X25-H09	B23K	P55
B01F,B02,B04B,C	X25-1107 X25-J		X24-D
B01L-009/02	P25-A01X	B23K,B25J	X25-A03E1
B02B	P41-A07A	B23K-001	X24-A01
DOZD	P41-V60A		X24-A02C
B02C	P41-A03		X24-A02E
B02C	P41-V60A	B23K-001,-003	X24-A
B03B	P41-E03		V04-R04A
B03C,B08	X25-H		P55-B
B03C-001	P41-E07	B23K-001/012-015	V04-R04A3J
2030 001	X25-H01	B23K-001/018	P55-B03
B03C-003	X25-H02	B23K-001/20	P55-A
B03C-005,007	X25-H02B	B23K-003	X24-A02A
B03D	P41-E03		P55-A
B03D,B07B	X25-H09	B23K-003/02-03	V04-R04A3L
B04	P41-J		P55-T01
B04C	X27-D04C	B23K-003/06	P55-T02A
B05B	P42-A	B23K-005,-007	X24-D05
2002	X25-K	B23K-005	P55-C01
B05B-005	X25-K01	B23K-005/24	P55-T01
B05C	P42-B	B23K-005/213	P55-A
B05D	P42-E	B23K-007, 020	P55-C
B06,B08B-007	X25-H09	B23K-007/10	P55-T01
B06B	P43-A	B23K-009	X24-B
B06B-001	V06-V04C	B23K-009/02-04	X24-B01
B06L-005	X23-A04	B23K-009/06-09	X24-B02A
B07	P41-K	B23K-009/10	X24-B02X
20.	X25-F06	B23K-009/12	X24-B03
B07B-013,	7.20 . 00	B23K-009/14	X24-B04
B07C-001-5	X25-F06	B23K-009/16	X24-B06
B07C,G07D	T05-K	B23K-009/18-20	X24-B05
B07C-001-5	X25-F06	B23K-010	X24-B06
B08B	P43-B	B23K-011	X24-C
B09	X25-W01	B23K-011/24-26	X24-C01
B09B	P43-E	B23K-013	X24-D01
B21	X25-A02D	B23K-015	X24-D02
B21B	X25-A02B	5001/ 000	V05-F08E3
	P51-A	B23K-020	P55-C02
B21B-009, 033, 037, 03	-	B23K-020/10	X24-D06
B21B-039, 041	P51-T25	5001/ 000 // 0	X24-D08A
B21B-043	P51-T22	B23K-020/12	X24-D07
B21C-001-019	P51-B	B23K-020/24	P55-A
B21C-009, 029	P51-T22	B23K-026	X24-D03
B21C-023-035	P51-C	B23K-035	X24-E
B21C-025	P51-T05	B23K-035/362, 363	P55-D01
B21C-031, 051	P51-T20	B23K-035/40	P55-D03
B21C-033, 045, 047	P51-T25	B23K-037/04, 053, 06	P55-T02C
B21D	X25-A02	B23P-005	P56-B
B21D-L	P52	B23P-006	P56-G
B21F	X25-A02E	B23P-009	P56-A
B21J	X25-A02C	B23P-011, 013, 015, 01	
B22	P53	D22D 04E	P56-X
B22D	X25-A01	B23P-015	P56-U06
B23B-H	P54	DOO	P56-U40
B23B	X25-A03A	B23Q	P56-T
	X25-A03B	B23Q-001	P56-T01
B23C	X25-A03C1	B23Q-003-009, 016	P56-T25
B23C,B24	X25-A03C	B23Q-011, 015, 017, 02	
B23H	X24-F	D33○ 032 03E	P56-T20
B23H-001	X24-F01B	B23Q-033, 035	P56-C
B23H-003	X24-F01A		
	•		

B24	P61	B60B-015/00-28	Q11-A15A
524	X25-A03C2	B60B-017/00-02	Q11-A13A
	X25-A03C2 X25-A03C3	B60B-017/00-02	Q11-A17
B25	P62	B60B-019/02	Q11-A
B23			
D05.1	X25-A03D	B60B-019/04-14	Q11-A
B25J	X25-A03E	B60B-021/00-025/22	Q11-A03
B26	P62	B60B-027/00-06	Q11-A04
B27	P63	B60B-029/00	Q11-A28
B27B	X25-A03	B60B-030/00-10	Q11-A30
	X25-X01	B60B-031/00-06	Q11-A28
B28	P64	B60B-033/00-08	Q11-A08
B29	X25-A06	B60B-035/00-18	Q11-A05
B29C-027	X24-D04	B60B-037/00-12	Q11-A19
B29C-033,-035,-67	X25-A08	B60B-039/00-12	Q11-A15B
B30	P71	B60C-001/00	Q11-B
B30B	X25-A02A	B60C-003/00-08	Q11-B
B31,D21	X25-T09A	B60C-005/00-24	Q11-B01A
,	X25-T09B	B60C-007/00-28	Q11-B01S
B31	P72	B60C-009/00-30	Q11-B04
B32	P73	B60C-011/00-24	Q11-B06
B33	X25-A08	B60C-013/00-04	Q11-B05
B41	S06-C	B60C-015/00-04 B60C-015/00-06	Q11-B03
		B60C-013/00-06 B60C-017/00-017/10	
B41B-G	P74		Q11-B15
B41B	S06-C01	B60C-019/00-023/20	Q11-B30
B41C,G03F	S06-C02	B60C-023/02-08,20	X22-E02B
B41F	S06-C03	B60C-023/10-14	X22-X09
B41J-N	P75	B60C-027/00-22	Q11-A15
B41J,G06F-003/09,12,	S06-K07	B60C-029/00-06	Q11-B02
B41J,G06K	S06-K	B60D-001/00	Q11-C
B41J,G06K,G09G	T04-L, T04-X	B60D-001/00-66	Q11-C02
B41J,G06K-015	S06	B60D-001/01-07	Q11-C01
B41J-002/01-215	S06-G	B60D-003/00	Q11-C05
B41J-002/02-035	S06-G02	B60D-005/00	Q11-C07
B41J-002/04-065	S06-G01	B60D-007/00	Q11-C
B41J-002/22-31	S06-F	B60F-001/00-04	Q19-R02
B41J-002/23-305	S06-F01	B60F-003/00	Q19-R01
B41J-002/305	S06-F03	B60F-005/00-02	Q19-R09
B41J-002/31	S06-F02	B60F-005/02	Q25-P10
B41J-002/315-38	S06-H	B60G	X22-M01
B41J-002/325	S06-H02	B60G-001/00-001/04	Q12-A
B41J-002/335-34	U14-H01B	B60G-003/00-28	Q12-B
B41J-002/335-375	S06-H03	B60G-005/00-26	Q12-B
B41J-002/39-425	S06-J	B60G-003/00-04	Q12-B
B41J-002/435-48	S06-E	B60G-007/00-04 B60G-011/00	Q12-B
B41J-002/435-48,G03	S06-E01	B60G-011/02-12	Q12-B01A
B41J-002/525	S06-K01	B60G-011/14-16	Q12-B01B
B41J-003	S06-K99A	B60G-011/18-20	Q12-B01C
B41J-011-015	S06-K03A	B60G-011/22-24	Q12-B01D
B42	P76	B60G-011/26-30	Q12-B01E
	X27-A02C	B60G-011/32-64	Q12-B01F
B43	P77	B60G-013/00-02	Q12-B02
B43M	P77-D	B60G-013/04	Q12-B02A
B44	P78	B60G-013/06-12	Q12-B02B
B44B	X25-X10	B60G-013/14-18	Q12-B02
B51F-017/00-36	Q21-D07	B60G-015/00-14	Q12-B03
B60B-001/00-14	Q11-A01	B60G-017	X22-M
B60B-003/00-18	Q11-A02	B60G-017/00-08	Q12-B04
B60B-005/00-04	Q11-A30	B60G-017/015	X22-M03
B60B-007/00-20	Q11-A07	B60G-021/00-025/00	Q12-X
B60B-009/00-24	Q11-A	B60H	X22-J02
B60B-009/26	Q11-A01	B60H-001/00-003/06	Q14-M
B60B-009/28	Q11-A01	B60J-001/00-20	Q17-A07
B60B-011/00-10	Q11-A	B60J-003,-007	X22-J08
		•	

B60J-003/00-06	Q14-D	E	360P-001/43	Q15-A04
B60J-005/00-14	Q17-A06	E	360P-001/44-46	Q15-A05
B60J-010/00-12	Q17-A09		B60P-001/48-50	Q15-A15
B60J-011/00	Q14-X		360P-001/52	Q15-A07
B60K	X21-A02		360P-001/54	Q15-A06
B60K-003/00-006/12	Q17-E01		360P-001/56	Q15-A05
B60K-005/00-000/12	X21-A01D		360P-001/58-62	Q15-A13
B60K-006/02	X21-A01D1		360P-001/64	Q15-A15
B60K-006/10	X22-A09		360P-003/00	Q15-B
B60K-008/00	Q17-E01		360P-003/022-025	Q15-B01
B60K-011/00-08	Q17-E02		360P-003/03	Q15-B02
B60K-011/12	Q17-A		360P-003/035	Q15-B03
B60K-013/00-06	Q17-E15	E	360P-003/04-05	Q15-B04
B60K-015/00-10	Q17-E04	E	360P-003/055	Q15-B06
B60K-016/00	Q17-X	E	360P-003/06-12	Q15-B07
B60K-017/00	Q13-A	E	360P-003/14	Q15-B30
B60K-017/02	Q13-A03	E	360P-003/16	Q15-B11
B60K-017/04-16	Q13-A	E	360P-003/18	Q15-B30
B60K-017/22-24	Q13-A07	E	360P-003/20	Q15-B05
B60K-017/26-32	Q13-A30	E	360P-003/22-24	Q15-B08
B60K-017/34-356	Q13-A11	E	360P-003/28	Q15-B07
B60K-017/36	Q13-A	E	360P-003/30	Q15-B09
B60K-025/00-10	Q13-C	E	360P-003/32-39	Q15-B10
B60K-025/02	Q11-C02	E	360P-003/40-41	Q15-B12
B60K-025/06	Q11-C02		360P-003/42	Q15-B30
B60K-026/00	Q17-E05		360P-005/00	Q15-C
B60K-028/16	X22-G03B		360P-007/00-18	Q15-D
B60K-031	X22-G03A		360P-009/00	Q15-X
B60K-031/00	X22-C02D4		360Q	X22-B
B60K-031/00,12-14	X22-A03B1		360Q-001,F21Q-001	X22-B02
BOOK 031700,12 14	X22-C02D4		360Q-001/04-20,	X22-B01
B60K-031/02-10	X22-A03B1A		360Q-001/04-20, 360Q-001/22,005/00	X22-B01 X22-B02R
B60K-035/00-037/06	Q17-A11		360Q-001/24-32,46-52	
	X22-G		·	X22-B02A X22-B02D
B60K-041,F16H-061 B60K-041/00-20	Q17-E05		360Q-001/34-42	
			360Q-001/44	X22-B02A
B60L	X21-A X23-A		360Q-001/52	X22-B02E
D/OL 001/02 1/			360Q-003-007	X22-B03B
B60L-001/02-16	X23-A10		360Q-005/00	Q14-C04
B60L-003	X21-A05		360Q-007/00-02	Q14-C05
5.401.005	X23-A02G		360R-001/00-12	Q14-E
B60L-005	X21-B03		360R-003/00-/04	Q14-I
	X23-A04		360R-005/00-04	Q14-F
B60L-007,H02P-003	X21-A03		360R-007/00-14	Q14-F01
	X23-A01B		360R-009/00-12	Q14-F02
	X23-A01B3	E	360R-011/00-06	Q14-F
B60L-008,-009,-011,-13			360R-011/02	X22-X02
B60L-009-011	X21-A01	E	360R-013/00-04	Q17-A10
B60L-013/00	Q21-B05A	E	360R-013/06-07	Q17-A09
B60L-013/04,06,08	X23-A01A4	E	360R-013/08	Q17-N
B60L-013/04-10	Q21-B05A	E	360R-013/10	Q17-A10
B60L-015,H02P-005,-7	X21-A04	E	360R-015/00-04	Q14-L
	X23-A02A	E	360R-016/02-06	X22-X
B60M-001-005	X21-B02	E	360R-017/00-02	Q17-X
B60M-001-007	X23-A03A	E	360R-019/00-56	Q17-A12
B60N-002	X22-J03A	E	360R-021/00	X22-J11
B60N-002/00-72	Q14-A			X22-J11B
B60N-002/48	X22-J03A3	E	360R-021/00-34	Q14-C02
B60N-003/00-005/00	Q14-X		360R-021/01	X22-J11
B60P-001/00-64	Q15-A		360R-021/16	X22-J07
B60P-001/02	Q15-A15		360R-022	X22-J03B
B60P-001/04-34	Q15-A01		360R-022/00-48	Q14-C01
B60P-001/36-38	Q15-A02		360R-022/195	X22-J03B1
B60P-001/40-42	Q15-A03		360R-022/32	X22-J03B1
			· **=	

B60R.025.G08B-013   W03-B03A1   B61D-013/00-02   C21-C03F   B60R.025/00-10   014-H   B61D-015/00-02   C21-B03A   B60R.027/00   O17-X   B61D-015/00-04   C21-C03K   B60S-001/00-003/06   C16-A01   B61D-015/06-12   C21-C03I   B60S-003   X22-H09C   B61D-015/06-12   C21-C03I   B60S-005/00-06   O16-A02   B61D-017/00   C21-D03   B60S-005/00-06   O16-A02   B61D-017/00   C21-D14   B60T-003/00   O18-A07   B61D-017/02-22   C21-D14   B60T-003/00   O18-A07   B61D-017/02-22   C21-D14   B60T-003/00   O18-A07   B61D-017/02-22   C21-D15   B60T-007/02-06   O18-A07   B61D-017/02-02   C21-D15   B60T-007/02-06   O18-A07   B61D-03/00-02   C21-D15   B60T-007/02-06   O18-A07   B61D-025/00   C21-D16   B60T-007/02-06   O18-A07   B61D-025/00   C21-D16   B60T-007/08-10   O18-A07   B61D-03/00-02   C21-D16   B60T-007/08-10   O18-A07   B61D-037/00   C21-D16   B60T-007/12-22   O18-A07   B61D-031/00   C21-J01   B60T-007/12-22   O18-A07   B61D-031/00   C21-J01   B60T-007/12-22   O18-A07   B61D-031/00   C21-J01   B60T-008   X22-C02C   B61D-031/00   C21-J01   B60T-008/32-50, 58-64, 72-86   B61D-033/00   C21-J03   B60T-008/32-50, 58-64, 72-86   B61D-033/00   C21-J03   B60T-008/32-50, 66-84   X22-C02C7   B61D-045/00   C21-J07   B60T-013/74   X22-C02C7   B61D-045/00   C21-J07   B60T-013/74   X22-C02C7   B61D-045/00   C21-J07   B60T-013/74   X22-C02C7   B61D-045/00   C21-J07   B60T-003/00-02   O19-R01   B61F-005/28-36   C21-D06   B60V-003/00   C25-A05F   B61F-005/28-36   C21-D06   B60V-003/00   C24-P10   B61F-005/38-48   C21-D06   B60V-003/00   C21-B03   B61F-007/00   C21-D08   B60V-003/00   C21-B03   B61F-007/00   C21-D08   B61B-003/00-02   C21-B03   B61F-007/00   C21-D09   B61B-003/00-02   C21-B03   B61F-007/00   C21-D09   B61B-003/00-02   C21-B03   B61F-007/00   C21-B03   B61B-003/00-02   C21-B03				
B60R 025/000-10         014-H         B61D-013/00-02         221-B03A           B60R 027/00         017-X         B61D-015/00-04         221-C03X           B60S-001/00         022-01         B61D-015/06-04         221-C03X           B60S-005/00-06         016-A02         B61D-015/08-12         021-C03X           B60S-009/00-013/02         016-A03         B61D-017/02-22         021-D1           B60T-007/00         018-A07         B61D-017/02-26         021-D           B60T-007/00         018-A07         B61D-019/00-02         021-D1           B60T-007/08.10         228-A07A         B61D-019/00-02         021-D1           B60T-007/08.10         18-A07B         B61D-033/00         021-J05           B60T-007/12         22-C02D         B61D-033/00         021-J05           B60T-007/12-22         018-A07B         B61D-033/00         021-J04           B60T-008/32-50, 58-64,72-86         B61D-033/00         021-J04           B60T-008/32-50, 66-84         X22-C02C1         B61D-037/00         021-J07           B60T-013/74         X22-C02C1         B61D-049/00         021-J09           B60T-008/32-50, 66-84         X22-C02C1         B61D-049/00         021-J09           B60T-009/03/00         21-J09         B6	BA0R-025 G08B-013	W03-B03Δ1	B61D-011/00-02	O21-C03E
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B605-001/00-003/00			B61D-013/00-02	
B605-001/08         X22-J01         B610-015/06         C21-C03H           B605-005/00-06         O16-A02         B61D-017/00         C21-D3I           B605-005/00-06         O16-A02         B61D-017/00         C21-D3I           B607-003/00         C18-A07         B61D-017/00-22         C21-D15           B607-007/02-06         C18-A07A         B61D-019/00-02         C21-D15           B607-007/08-10         X22-C02A         B61D-023/00-02         C21-D15           B607-007/08-10         X22-C02D         B61D-025/00         C21-D16           B607-007/12-12         X22-C02D         B61D-033/00         C21-J01           B607-007/12-22         C18-A07C         B61D-033/00         C21-J03           B607-007/12-22         C18-A07C         B61D-033/00         C21-J04           B607-008/32-50, 58-64/72-86         B61D-033/00         C21-J04           B607-008/32-50, 68-84         X22-C02C3         B61D-037/00         C21-J04           B607-013/74         X22-C02C3         B61D-037/00         C21-D17           B607-013/74         X22-C02C7         B61D-045/00         C21-D0           B607-013/74         X22-C02C3         B61D-045/00         C21-D0           B607-013/74         X22-C02C3         B61D-045/00 <td></td> <td>=::::</td> <td></td> <td></td>		=::::		
860S-003         X25-H0PC         B61D-015/08-12         C21-C031           860S-009/00-013/02         Q16-A03         B61D-017/02-22         Q21-D14           860S-009/00-013/02         Q16-A03         B61D-017/02-22         Q21-D14           860T-007/00         Q18-A07         B61D-017/02-22         Q21-D15           860T-007/08.10         Q18-A07A         B61D-025/00         Q21-D15           860T-007/08.10         Q18-A07B         B61D-025/00         Q21-D16           860T-007/12         Q22-C02D         B61D-031/00         Q21-J01           860T-007/12         Q22-C02C         B61D-031/00         Q21-J02           860T-008         X22-C02C         B61D-035/00         Q21-J03           860T-008         X22-C02C3         B61D-035/00         Q21-J04           860T-008/32-50, 66-84         X22-C02C1         B61D-039/00         Q21-J07           860T-013/74         X22-C02C7         B61D-041/00-043/00         Q21-J09           860T-008/32-50, 66-84         X22-C02C7         B61D-044/00         Q21-J09           860T-008/000         Q19-R01         B61D-049/00         Q21-J09           860T-008/001/002         Q19-R01         B61D-049/00         Q21-J06           860V-003/000         Q24-P10	B60S-001/00-003/06	Q16-A01	B61D-015/00-04	Q21-C03X
B60S-005/00-06         Q16-A02         B61D-017/00         Q21-D1           B60S-009/00-013/02         Q16-A03         B61D-017/02-22         Q21-D1           B60T-007/00         Q18-A07         B61D-017/02-26         Q21-D1           B60T-007/02-06         Q18-A07A         B61D-019/00-02         Q21-J05           B60T-007/08-10         X22-C02A         B61D-025/00         Q21-J05           B60T-007/08-10         X22-C02D         B61D-025/00         Q21-J01           B60T-007/12-22         X22-C02D         B61D-033/00         Q21-J01           B60T-007/12-22         X22-C02C         B61D-035/00         Q21-J02           B60T-008/32-50, 58-64/72-86         B61D-035/00         Q21-J04           B60T-008/32-50, 58-64/72-86         B61D-037/00         Q21-J07           B60T-008/32-50, 58-64/72-86         B61D-037/00         Q21-J07           B60T-008/32-50, 58-64/72-86         B61D-045/00         Q21-J07           B60T-008/32-50, 58-64/72-86         B61D-045/00         Q21-J07           B60T-008/32-50, 58-64/72-86         B61D-045/00         Q21-J07           B60T-008/32-50, 58-64/72-86         B61D-045/00         Q21-J07           B60T-008/02-50, 58-64/72-86         B61D-045/00         Q21-J07           B60T-008/02-70	B60S-001/08	X22-J01	B61D-015/06	Q21-C03H
B60S-009/00-013/02         Q16-A03         B61D-017/02-22         Q21-D14           B60T-007/00         Q18-A07         B61D-017/02-26         Q21-D15           B60T-007/02-06         Q18-A07A         B61D-017/02-02         Q21-D15           B60T-007/08-10         Q18-A07B         B61D-025/00         Q21-D16           B60T-007/012         Q18-A07B         B61D-025/00         Q21-D16           B60T-007/12         Q18-A07C         B61D-033/00         Q21-J03           B60T-008/32-50, 58-64,72-86         B61D-035/00         Q21-J03           B60T-008/32-50, 58-64,72-86         X22-C02C3         B61D-035/00         Q21-J07           B60T-008/32-50, 66-84         X22-C02C1         B61D-039/00         Q21-J07           B60T-008/32-50, 66-84         X22-C02C7         B61D-047/00         Q21-J07           B60T-013/74         X22-C02C7         B61D-047/00         Q21-J07           B60T-017/18-22         Q19-R01         B61D-047/00         Q21-J07           B60T-013/74         X22-C02C7         B61D-047/00         Q21-J06           B60V-003/00-02         Q19-R01         B61D-047/00         Q21-J07           B60V-003/00-02         Q19-R01         B61D-05/80-8         Q21-D05           B61B-003/00-02         Q12-B01	B60S-003	X25-H09C	B61D-015/08-12	Q21-C03I
B60S-009/00-013/02         Q16-A03         B61D-017/02-22         Q21-D14           B60T-007/00         Q18-A07         B61D-017/02-26         Q21-D15           B60T-007/02-06         Q18-A07A         B61D-017/02-02         Q21-D15           B60T-007/08-10         Q18-A07B         B61D-025/00         Q21-D16           B60T-007/012         Q18-A07B         B61D-025/00         Q21-D16           B60T-007/12         Q18-A07C         B61D-033/00         Q21-J03           B60T-008/32-50, 58-64,72-86         B61D-035/00         Q21-J03           B60T-008/32-50, 58-64,72-86         X22-C02C3         B61D-035/00         Q21-J07           B60T-008/32-50, 66-84         X22-C02C1         B61D-039/00         Q21-J07           B60T-008/32-50, 66-84         X22-C02C7         B61D-047/00         Q21-J07           B60T-013/74         X22-C02C7         B61D-047/00         Q21-J07           B60T-017/18-22         Q19-R01         B61D-047/00         Q21-J07           B60T-013/74         X22-C02C7         B61D-047/00         Q21-J06           B60V-003/00-02         Q19-R01         B61D-047/00         Q21-J07           B60V-003/00-02         Q19-R01         B61D-05/80-8         Q21-D05           B61B-003/00-02         Q12-B01			B61D-017/00	
B60T-007/00				
B60T-007/02				
BAOT-007/02-06				
B60T-007/08,10				
B60T-007/102   X22-C02D	B60T-007/02-06	Q18-A07A	B61D-023/00-02	Q21-J05
B60T-007/102   X22-C02D	B60T-007/08,10	X22-C02A	B61D-025/00	Q21-D16
B60T-007/12   X22-C02D	·	O18-A07B	B61D-027/00	O21-I02
B60T-007/12-22				
B60T-008/32-50, 58-64,72-86				
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B60T-013/74		X22-C02C3	B61D-039/00	Q21-D17
B60T-013/74	B60T-008/32-50, 66-84	X22-C02C1	B61D-041/00-043/00	Q21-J09
B60T-017/18-22   Q18-A15   B61D-047/00   Q21-J06   B60V-001/00-22   Q19-R01   B61D-049/00   Q21-J09   B61D-049/00   Q21-J09   B60V-003/00-02   Q19-R01   B61F-005/28-36   Q21-D05   B60V-003/06   Q24-P10   B61F-007/00   Q21-D05   B60V-003/08   Q25-A05F   B61F-009/00   Q21-D09   B61B-001/00-02   Q21-A   B61F-001/00   Q21-D10   B61B-001/00-02   Q21-B01A   B61F-011/00   Q21-D10   B61B-005/00-02   Q21-B01B   B61F-015/00-28   Q21-D06   B61B-005/00-02   Q21-B01B   B61F-019/00-10   Q21-D11   B61B-007/00-06   Q21-B03A   B61G-001/00-007/14   Q21-D12   B61B-007/00-06   Q21-B03A   B61G-001/00-007/14   Q21-D12   B61B-010/00-04   Q21-B03A   B61G-001/00-007/14   Q21-D12   B61B-013/00   Q21-B03C   B61H   X23-A01B   B61B-013/00   Q21-B03C   B61H   X23-A01B   B61B-013/00   Q21-B03   B61H-001/00-005/00   Q21-F01   B61B-013/00   Q21-B03   B61H-001/00-005/00   Q21-F02   B61B-013/00   Q21-B03   B61H-001/00-005/00   Q21-F02   B61B-013/00   Q21-B03   B61H-001/00-005/00   Q21-F03   B61B-013/00   Q21-B03   B61H-001/00-006   Q21-F03   B61B-013/00   Q21-B03   B61H-001/00-006   Q21-F03   B61B-013/01   Q21-C01D   B61B-013/01   Q21-C01D   B61B-013/01   Q21-C01D   B61H-011/06-10   Q21-F03   B61B-013/00   Q21-B03   B61H-011/00-04   Q21-F03   B61B-013/00   Q21-B03   B61H-011/00-10   Q21-B03   B61B-005/00-04   Q21-C01D   B61H-011/00-10   Q21-A06   B61C-005/00-04   Q21-C01D   B61H-011/00-10   Q21-A06   B61C-005/00-04   Q21-C01D   B61L-001/00-10   Q21-A06   B61C-005/00-06   Q21-C01D   B61L-001/00-02   Q21-A05   B61C-001/00-02   Q21-A05   B61C-001/00-03   Q21-B03   B61C-001/00-03   Q21-B03   B61C-001/00-03   Q21-B03   B61C-001/00-03   Q21-B03   B61C-001/00-03   Q21-B03   B61C-	·		B61D-045/00	O21-J07
B60V-001/00-22         Q19-R01         B61D-049/00         Q21-J09           B60V-003/00-02         Q19-R01         B61F-005/38-36         Q21-D06           B60V-003/06         Q24-P10         B61F-005/38-48         Q21-D08           B60V-003/08         Q25-A05F         B61F-007/00         Q21-D08           B61B-001/00-02         Q21-A         B61F-011/00         Q21-D01           B61B-005/00-02         Q21-B01A         B61F-015/00-28         Q21-D06           B61B-005/00-02         Q21-B03         B61F-019/00-10         Q21-D12           B61B-007/00-06         Q21-B03         B61G-001/00-007/14         Q21-D12A           B61B-007/00-04         Q21-B03A         B61G-001/00-007/14         Q21-D12A           B61B-010/00-04         Q21-B03A         B61G-011/00-18         Q21-D12A           B61B-010/00-04         Q21-B03A         B61G-011/00-18         Q21-D12C           B61B-013/00         Q21-B03C         B61H         X23-A01B           B61B-013/00         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/12         Q21-C01D				
B60V-003/00-02				
B60V-003/00-02	B60V-001/00-22			
B60V-003/06         Q24-P10         B61F-007/00         Q21-D08           B60V-003/08         Q25-A05F         B61F-009/00         Q21-D09           B61B-001/00-02         Q21-A         B61F-011/00         Q21-D10           B61B-005/00-02         Q21-B01A         B61F-015/00-28         Q21-D06           B61B-007/00-06         Q21-B01B         B61F-019/00-10         Q21-D12           B61B-009/00         Q21-B03A         B61G-001/00-007/14         Q21-D12A           B61B-010/00-04         Q21-B03B         B61G-001/00-18         Q21-D12B           B61B-012/00-12         Q21-B03B         B61G-009/00-24         Q21-D12B           B61B-013/00         Q21-B03B         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B03         B61H-001/00-018         Q21-D12C           B61B-013/00         Q21-B03         B61H-001/00-05/00         Q21-F01           B61B-013/00         Q21-B03         B61H-007/00-12         Q21-F01           B61B-013/00         Q21-B09         B61H-009/00-06         Q21-F02           B61B-013/04-06         Q21-B02         B61H-009/00-02         Q21-B03           B61B-013/08         Q21-B02         B61H-011/00-02         Q21-B03           B61B-013/00         Q21-B03		Q17-A15	B61F-005/28-36	Q21-D06
B60V-003/08         Q25-A05F         B61F-009/00         Q21-D09           B61B-001/00-02         Q21-A         B61F-0011/00         Q21-D10           B61B-003/00-02         Q21-B01A         B61F-015/00-28         Q21-D06           B61B-005/00-02         Q21-B01B         B61F-019/00-10         Q21-D11           B61B-007/00-06         Q21-B03         B61G-001/00-007/14         Q21-D12B           B61B-010/00-04         Q21-B03A         B61G-001/00-0224         Q21-D12B           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-013/00-12         Q21-B03         B61H-001/00-005/00         Q21-F02           B61B-013/00         Q21-B03         B61H-001/00-005/00         Q21-F02           B61B-013/00         Q21-B03         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B09         B61H-009/00-06         Q21-F09           B61B-013/04-06         Q21-B02         B61H-009/02-06         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F03           B61C-003/00-02         Q21-B09         B61H-011/06-10         Q21-F03           B61C-003/00-02         Q21-B09 <td>B60V-003/00-02</td> <td>Q19-R01</td> <td>B61F-005/38-48</td> <td>Q21-D05</td>	B60V-003/00-02	Q19-R01	B61F-005/38-48	Q21-D05
B61B-001/00-02         Q21-A         B61F-011/00         Q21-D10           B61B-003/00-02         Q21-B01B         B61F-015/00-28         Q21-D06           B61B-005/00-02         Q21-B01B         B61F-015/00-20         Q21-D11           B61B-007/00-06         Q21-B03A         B61G-001/00-007/14         Q21-D12A           B61B-010/00-04         Q21-B03B         B61G-001/00-024         Q21-D12B           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-012/00-12         Q21-B03         B61H-007/00-05/00         Q21-F01           B61B-013/00         Q21-B03         B61H-007/00-12         Q21-B03           B61B-013/02         Q21-B03         B61H-007/00-12         Q21-F01           B61B-013/02         Q21-B03         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B03         B61H-007/00-0         Q21-F02           B61B-013/02         Q21-B03         B61H-009/00-0         Q21-F02           B61B-013/08         Q21-B02         B61H-009/00-0         Q21-F02           B61B-013/12         Q21-C01D         B61H-011/00-10         Q21-F09           B61B-013/02         Q21-B03         B61H-011/00-10         Q21-F09           B61B-013/00         Q21-B09         B6	B60V-003/06	Q24-P10	B61F-007/00	Q21-D08
B61B-001/00-02         Q21-A         B61F-011/00         Q21-D10           B61B-003/00-02         Q21-B01B         B61F-015/00-28         Q21-D06           B61B-005/00-02         Q21-B01B         B61F-015/00-20         Q21-D11           B61B-007/00-06         Q21-B03A         B61G-001/00-007/14         Q21-D12A           B61B-010/00-04         Q21-B03B         B61G-001/00-024         Q21-D12B           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-012/00-12         Q21-B03         B61H-007/00-05/00         Q21-F01           B61B-013/00         Q21-B03         B61H-007/00-12         Q21-B03           B61B-013/02         Q21-B03         B61H-007/00-12         Q21-F01           B61B-013/02         Q21-B03         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B03         B61H-007/00-0         Q21-F02           B61B-013/02         Q21-B03         B61H-009/00-0         Q21-F02           B61B-013/08         Q21-B02         B61H-009/00-0         Q21-F02           B61B-013/12         Q21-C01D         B61H-011/00-10         Q21-F09           B61B-013/02         Q21-B03         B61H-011/00-10         Q21-F09           B61B-013/00         Q21-B09         B6	B60V-003/08	O25-A05F	B61F-009/00	O21-D09
B61B-003/00-02         Q21-B01B         B61F-015/00-28         Q21-D06           B61B-005/00-02         Q21-B01B         B61F-019/00-10         Q21-D11           B61B-007/00-06         Q21-B03A         B61G-001/00-007/14         Q21-D12A           B61B-009/00         Q21-B03A         B61G-001/00-024         Q21-D12B           B61B-010/00-04         Q21-B03B         B61G-001/00-18         Q21-D12C           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-013/00         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B03         B61H-007/00-12         Q21-F02           B61B-013/00         Q21-B09         B61H-009/00-06         Q21-F02           B61B-013/02         Q21-B04         B61H-009/00-06         Q21-F09           B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/00-04         Q21-F09           B61B-013/00         Q21-B09         B61H-011/00-10         Q21-F09           B61C-001/00-14         Q21-C01D         B61H-011/06-10         Q21-F03           B61C-003/00-02         Q21-C01B         B61H-011/06-10         Q21-F03           B61C-003/00-02         Q21-C01B <td></td> <td></td> <td></td> <td></td>				
B61B-005/00-02         Q21-B01B         B61F-019/00-10         Q21-D11           B61B-007/00-06         Q21-B03         B61G-001/00-007/14         Q21-D12A           B61B-009/00         Q21-B03A         B61G-009/00-24         Q21-D12B           B61B-010/00-04         Q21-B03B         B61G-009/00-24         Q21-D12C           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-013/00         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B04         B61H-009/00-06         Q21-F02           B61B-013/04-06         Q21-B02         B61H-009/02         Q21-F09           B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/09         Q21-B09         B61H-011/00-04         Q21-F09           B61B-013/00         Q21-B09         B61H-011/00-04         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-011/10-10         Q21-F09           B61C-005/00-04         Q21-C01B         B61H-015/00         Q21-F05           B61C-005/00-04         Q21-C01D				
B61B-007/00-06         Q21-B03         B61G-001/00-007/14         Q21-D12A           B61B-009/00         Q21-B03A         B61G-009/00-24         Q21-D12B           B61B-011/00-04         Q21-B03B         B61G-011/00-18         Q21-D12C           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-013/00         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B04         B61H-009/00-06         Q21-F02           B61B-013/04-06         Q21-B02         B61H-009/02         Q21-B03           B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F03           B61B-015/00         Q21-B09         B61H-011/06-10         Q21-F03           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F03           B61C-003/00-02         Q21-C01B         B61H-011/00-10         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F05           B61C-009/00-04         Q21-C01D         B61J-001/12         Q21-A05           B61C-009/00-05         Q21-M02				
B61B-009/00         Q21-B03A         B61G-009/00-24         Q21-D12B           B61B-010/00-04         Q21-B03B         B61G-011/00-18         Q21-D12C           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-013/00-12         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B04         B61H-009/00-06         Q21-F09           B61B-013/08         Q21-B05         B61H-009/02         Q21-B03           B61B-013/12         Q21-C01D         B61H-011/00-04         Q21-F09           B61B-015/00         Q21-B09         B61H-011/00-10         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F03           B61C-003/00-02         Q21-B09         B61H-011/14-16         Q21-F03           B61C-003/00-02         Q21-C01A         B61H-015/00         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F05           B61C-003/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-009/00-52         Q21-D13         B61J-001/02-12         Q21-A07           B61C-009/00-52         Q21-D13 <td< td=""><td></td><td></td><td></td><td></td></td<>				
B61B-010/00-04         Q21-B03B         B61G-011/00-18         Q21-D12C           B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-012/00-12         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/02         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02-06         Q21-B02         B61H-009/00-06         Q21-F09           B61B-013/08-06         Q21-B02         B61H-010/00-04         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/00-04         Q21-F03           B61B-015/00         Q21-B09         B61H-011/106-10         Q21-F03           B61B-015/00         Q21-B09         B61H-011/106-10         Q21-F03           B61C-001/00-14         Q21-C01A         B61H-011/106-10         Q21-F03           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F05           B61C-007/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-009/00-04         Q21-C01D         B61J-001/12         Q21-A05           B61C-009/00-52         Q21-D13         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61K-003/00-02         Q21-A04           B61C-009/08-36         Q21-C01C <td>B61B-007/00-06</td> <td>Q21-B03</td> <td>B61G-001/00-007/14</td> <td>Q21-D12A</td>	B61B-007/00-06	Q21-B03	B61G-001/00-007/14	Q21-D12A
B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-012/00-12         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02-02         Q21-B04         B61H-009/00-06         Q21-F09           B61B-013/08-03         Q21-B05         B61H-009/02         Q21-B03           B61B-013/12-02         Q21-C01D         B61H-011/00-04         Q21-F09           B61B-015/00         Q21-B09         B61H-011/106-10         Q21-F09           B61B-015/00         Q21-B09         B61H-011/106-10         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-009/00-04         Q21-C01D         B61J-001/00-10         Q21-A06           B61C-009/00-04         Q21-C01D         B61J-001/12         Q21-A06           B61C-009/00-52         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61K-003/00-02         Q21-A04           B61C-009/08-36         Q21-C01D	B61B-009/00	Q21-B03A	B61G-009/00-24	Q21-D12B
B61B-011/00         Q21-B03C         B61H         X23-A01B           B61B-012/00-12         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02-02         Q21-B04         B61H-009/00-06         Q21-F09           B61B-013/08-03         Q21-B05         B61H-009/02         Q21-B03           B61B-013/12-02         Q21-C01D         B61H-011/00-04         Q21-F09           B61B-015/00         Q21-B09         B61H-011/106-10         Q21-F09           B61B-015/00         Q21-B09         B61H-011/106-10         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-009/00-04         Q21-C01D         B61J-001/00-10         Q21-A06           B61C-009/00-04         Q21-C01D         B61J-001/12         Q21-A06           B61C-009/00-52         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61K-003/00-02         Q21-A04           B61C-009/08-36         Q21-C01D	B61B-010/00-04	Q21-B03B	B61G-011/00-18	Q21-D12C
B61B-012/00-12         Q21-B03         B61H-001/00-005/00         Q21-F01           B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B04         B61H-009/00-06         Q21-F09           B61B-013/08         Q21-B05         B61H-009/00-0         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F03           B61B-015/00         Q21-B09         B61H-011/06-10         Q21-F03           B61C-001/00-14         Q21-C01A         B61H-011/06-10         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F09           B61C-003/00-04         Q21-C01B         B61H-015/00         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-013/00-38         Q21-F09           B61C-003/00-04         Q21-C01C         B61J-001/00-10         Q21-F04           B61C-008/00         Q21-C01D         B61J-001/12         Q21-A06           B61C-009/00-52         Q21-D13         B61J-003/00-12         Q21-A07           B61C-009/02-52         Q21-D13         B61K-003/00-02         Q21-A04           B61C-009/08-36         Q21-C01A         B61K-000/00-02         Q21-A04           B61C-009/08-36         Q21-C01B <td></td> <td></td> <td></td> <td></td>				
B61B-013/00         Q21-B09         B61H-007/00-12         Q21-F02           B61B-013/02         Q21-B04         B61H-009/00-06         Q21-F09           B61B-013/04-06         Q21-B02         B61H-009/00-06         Q21-F09           B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F09           B61B-015/00         Q21-B09         B61H-011/14-16         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-011/00-38         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F05           B61C-003/00-04         Q21-C01C         B61J-001/00-38         Q21-F05           B61C-007/00-04         Q21-C01D         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-001/12         Q21-A15           B61C-009/02-06         Q21-C01B         B61J-005/02         Q21-X           B61C-009/08-36         Q21-C01C         B61K-001/00-02         Q21-A04           B61C-011/00         Q21-C01B         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01D <td< td=""><td></td><td></td><td></td><td></td></td<>				
B61B-013/02         Q21-B04         B61H-009/00-06         Q21-F09           B61B-013/04-06         Q21-B02         B61H-009/02         Q21-B03           B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F03           B61B-015/00         Q21-B09         B61H-011/14-16         Q21-F03           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A15           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A04           B61C-011/00         Q21-C01B         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01D         B61K-003/00-02         Q21-A08           B61C-011/00         Q21-C01D <td< td=""><td></td><td></td><td></td><td></td></td<>				
B61B-013/04-06         Q21-B02         B61H-009/02         Q21-B03           B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F09           B61B-015/00         Q21-B09         B61H-011/14-16         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F09           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-001/12         Q21-A15           B61C-009/00-52         Q21-D13         B61J-003/00-12         Q21-A07           B61C-009/08-36         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01B         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01B         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-B01         <				
B61B-013/08         Q21-B05         B61H-011/00-04         Q21-F09           B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F03           B61B-015/00         Q21-B09         B61H-011/06-10         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A06           B61C-009/00-04         Q21-C01D         B61J-001/12         Q21-A06           B61C-009/00-05         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/08-36         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/38-52         Q21-C01B         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           B61C-011/04         Q21-B09	B61B-013/02			
B61B-013/12         Q21-C01D         B61H-011/06-10         Q21-F03           B61B-015/00         Q21-B09         B61H-011/14-16         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-0113/00-38         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-001/12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/08-36         Q21-C01A         B61K-001/00-02         Q21-A05           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01B         B61K-003/00-02         Q21-A08           B61C-011/02         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-B04         B61K-005/00-02         Q21-A02           B61C-011/06         Q21-C01D1         B61K-009/00         Q21-S           B61C-013/00-02         Q21-B04         B61K-011/00         Q21-M02           B61C-013/04         Q21-B01         B61K-	B61B-013/04-06	Q21-B02	B61H-009/02	Q21-B03
B61B-015/00         Q21-B09         B61H-011/14-16         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-008/00         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-B04         B61K-005/00-02         Q21-M03           B61C-011/06         Q21-C01D3         B61K-007/00-22         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/00<	B61B-013/08	Q21-B05	B61H-011/00-04	Q21-F09
B61B-015/00         Q21-B09         B61H-011/14-16         Q21-F09           B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-008/00         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-B04         B61K-005/00-02         Q21-M03           B61C-011/06         Q21-C01D3         B61K-007/00-22         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/00<	B61B-013/12	Q21-C01D	B61H-011/06-10	Q21-F03
B61C-001/00-14         Q21-C01A         B61H-013/00-38         Q21-F05           B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A05           B61C-011/02         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           B61C-011/06         Q21-C01D3         B61K-009/00         Q21-S           B61C-013/06         Q21-B09         B61K-011/00         Q21-M02           B61C-013/06         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/08         Q21-B02         B61L				
B61C-003/00-02         Q21-C01B         B61H-015/00         Q21-F04           B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-011/00         Q21-C01D         B61K-003/00-02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/00-02         Q21-A08           B61C-011/04         Q21-B04         B61K-005/00-02         Q21-A02           Q21-C01D2         B61K-009/00         Q21-S           B61C-011/04         Q21-C01D3         B61K-009/00         Q21-S           B61C-013/00-02         Q21-B09         B61K-011/00         Q21-M02           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/08         Q21-B03         B61K-0013/04         X23-B01 <td></td> <td></td> <td></td> <td></td>				
B61C-005/00-04         Q21-C01C         B61J-001/00-10         Q21-A06           B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/00-02         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-009/00         Q21-S           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/00         Q21-M02           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/004         X23-B01           B61D-001/00-08         Q21-C03A         B61L-001/14,16         X23-B				
B61C-007/00-04         Q21-C01D         B61J-001/12         Q21-A15           B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-009/00         Q21-S           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/06         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/00-04         Q21-J09           B61C-013/08         Q21-B03         B61L         X23-B01           B61D-003/00-20         Q21-C03A         B61L-001/14,16         X23-B01 <td></td> <td></td> <td></td> <td></td>				
B61C-008/00         Q21-M02         B61J-003/00-12         Q21-A07           B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-009/00         Q21-S           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/00-04         Q21-J09           B61C-013/08         Q21-B03         B61L         X23-B01           B61D-003/00-20         Q21-C03A         B61L-001/14,16         X23-B01           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C				
B61C-009/00-52         Q21-D13         B61J-005/02         Q21-X           B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-009/00         Q21-S           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M02           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/00-04         Q21-J09           B61C-013/08         Q21-B02         B61L         X23-B01           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-005/00-06         Q21-C03C         B61L-001/14,16         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B01	B61C-007/00-04	Q21-C01D	B61J-001/12	Q21-A15
B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-007/00-22         Q21-A02           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/00-04         Q21-J09           B61C-013/08         Q21-B03         B61K-013/00-04         Q21-J09           B61L-013/08         Q21-B02         B61L         X23-B01           B61D-003/00-20         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-005/00-06         Q21-C03C         B61L-001/14,16         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B	B61C-008/00	Q21-M02	B61J-003/00-12	Q21-A07
B61C-009/02-06         Q21-C01A         B61K-001/00-02         Q21-A04           B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-007/00-22         Q21-A02           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/00-04         Q21-J09           B61C-013/08         Q21-B03         B61K-013/00-04         Q21-J09           B61L-013/08         Q21-B02         B61L         X23-B01           B61D-003/00-20         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-005/00-06         Q21-C03C         B61L-001/14,16         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B	B61C-009/00-52	Q21-D13	B61J-005/02	Q21-X
B61C-009/08-36         Q21-C01C         B61K-003/00-02         Q21-A05           B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-009/00         Q21-S           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-005/00-06         Q21-C03C         B61L-001/14,16         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02				O21-A04
B61C-009/38-52         Q21-C01B         B61K-003/02         Q21-X           B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-009/00         Q21-S           B61C-013/00-02         Q21-B09         B61K-011/00         Q21-M02           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02				
B61C-011/00         Q21-C01D         B61K-005/00-02         Q21-A08           B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           Q21-C01D2         B61K-09/00         Q21-S           B61C-013/00-02         Q21-B09         B61K-011/00         Q21-M02           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-007/00-32         Q21-C03D         B61L-003         X23-B01				
B61C-011/02         Q21-C01D1         B61K-005/04-06         Q21-M03           B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-007/00-32         Q21-C03D         B61L-003         X23-B01				
B61C-011/04         Q21-B04         B61K-007/00-22         Q21-A02           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-007/00-32         Q21-C03D         B61L-003         X23-B01				
Q21-C01D2         B61K-009/00         Q21-S           B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02	B61C-011/02	Q21-C01D1	B61K-005/04-06	Q21-M03
B61C-011/06         Q21-C01D3         B61K-011/00         Q21-M02           B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02	B61C-011/04	Q21-B04	B61K-007/00-22	Q21-A02
B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02		Q21-C01D2	B61K-009/00	Q21-S
B61C-013/00-02         Q21-B09         B61K-011/02         Q21-M03           B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02	B61C-011/06	O21-C01D3	B61K-011/00	O21-M02
B61C-013/04         Q21-B01         B61K-013/00-04         Q21-J09           B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02				
B61C-013/06         Q21-B03         B61K-013/04         X23-C01           B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02				
B61C-013/08         Q21-B02         B61L         X23-B           B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02				
B61D-001/00-08         Q21-C03A         B61L-001/00-12,20         X23-B01           B61D-003/00-20         Q21-C03B         B61L-001/14,16         X23-B01A           B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02				
B61D-003/00-20       Q21-C03B       B61L-001/14,16       X23-B01A         B61D-005/00-06       Q21-C03C       B61L-001/18       X23-B01C         B61D-007/00-32       Q21-C03D       B61L-003       X23-B02				
B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02	B61D-001/00-08	Q21-C03A	B61L-001/00-12,20	X23-B01
B61D-005/00-06         Q21-C03C         B61L-001/18         X23-B01C           B61D-007/00-32         Q21-C03D         B61L-003         X23-B02	B61D-003/00-20	Q21-C03B	B61L-001/14,16	X23-B01A
B61D-007/00-32 Q21-C03D B61L-003 X23-B02			T	
DOTE 007/00 17 QZ1-000L   DOTE-000/1Z				
	2012 00//00-14	<u> </u>	1 5012-003/12	72J-DUZC

8611_005/90         Q21-S011         B62D-041/00         Q17-A20           8611_005/92-10         Q21-S01C1         B62D-043/00-10         Q17-A20           8611_005/92-24         Q21-S01C1         B62D-043/00-10         Q19-C01           8611_0015/00-02         Q21-S01C         B62D-049/00-051/00         Q17-A20           8611_0115/00-02         Q21-S01C3         B62D-053/00-32         Q17-A14           8611_0117         X23-B03         B62D-055/00-32         Q17-A14           8611_0117         X23-B04A         B62D-055/00-32         Q17-A14           8611_0119         X23-B04A         B62D-055/00-32         Q17-A14           8611_019/00-16         Q21-S01E         B62D-057/00-04         Q17-J           8611_021         X23-B04         B62D-05/00-04         Q17-J           8611_023         X23-B04E         B62D-067/00         Q16-D           8611_023         X23-B04E         B62D-067/00         Q16-D           8611_023/00         Q21-S05         B62D-067/00         Q16-D           8611_023/00         Q21-S05         B62D-067/00         Q16-R           8611_023/00         Q21-S05         B62D-007/00         Q14-C05           8611_027         X23-B05         B62D-007/00         Q14-C				
B61L-005/02-10	B61L-005/00	Q21-S01	B62D-041/00	Q17-A20
B61L_005/12-18         Q21-S01C1         B62D-047/00-02         C19-C01           B61L_005/015         X23-B03         B62D-049/00-051/00         O17-X20           B61L_015/00-04         Q21-S01C         B62D-053/00-12         Q19-C02           B61L-015/00-02         Q21-S01C3         B62D-055/00-32         Q11-C02           B61L-017         X23-B05         B62D-055/00-32         Q17-A14           B61L-019         X23-B04A         B62D-059/00-04         Q19-J           B61L-019/00-16         Q21-S01E         B62D-059/00-04         Q19-J           B61L-021         X23-B04C         B62D-065/00-08         Q19-J           B61L-023         X23-B04E         B62D-065/00-18         Q19-J           B61L-023/00         Q21-S05         B62D-067/00         Q16-D         Q21-M05           B61L-023/00         Q21-S05A         B62D-067/00         Q16-R         Q21-M05           B61L-023/02-22         Q21-S05A         B62D-067/00         Q16-R         Q21-M05           B61L-023/02-23         Q21-S05A         B62D-067/00         Q16-R         Q21-M05           B61L-023/02-24         Q21-S05A         B62D-067/00         Q16-R         Q14-J           B61L-023/02-25         Q21-S05A         B62D-067/00 <th< td=""><td></td><td>O21-S01A</td><td>B62D-043/00-10</td><td>O17-A13</td></th<>		O21-S01A	B62D-043/00-10	O17-A13
B611_005/20-24         C21-501C         B62D_049/00_051/00         017-A20           B611_011/00-08         C21-501A         B62D_053/00-12         Q19-C02           B611_011/00-08         C21-501C         B62D_055/00-32         Q11-C02           B611_0115/00-02         Q21-501C3         B62D_055/00-32         Q17-A14           B611_0119         X23-B05         B62D_057/00-04         Q17-E15           B611_019/00-16         Q21-501E         B62D_059/00-04         Q17-X           B611_021         X23-B04C         B62D_065/00-08         Q17-X           B611_021         X23-B04C         B62D_065/00-18         Q16-D           B611_023/00         Q21-505         B62D_065/00-18         Q16-D           B611_023/00         Q21-505         B62D_067/00         Q16-R           B611_023/02         Q21-505         B62D_067/00         Q1-M           B611_023/02         Q21-505         B62D_067/00         Q1-L           B611_023/02         Q21-505         B62D_067/00         Q14-J           B611_023/02         Q21-505         B62D_007/00         Q14-Q           B611_029/02         X23-B05         B62D_007/00         Q14-C05           B611_029/02         X23-B05         B62D_007/00         Q14-C06<				
B611_001/00-08         Z21-S01A         B62D-049/00-051/00         C17-A20           B611_011/00-08         Q21-S01C         B62D-053/00-12         Q11-C02           B611_013/00-04         Q21-S01C3         B62D-053/00-12         Q11-C02           B611_017         X23-B05         B62D-055/00-02         Q17-A14           B611_019         X23-B04A         B62D-059/00-04         Q17-F15           B611_019/0016         Q21-S01E         B62D-063/06-08         Q19-J           B611_019/023         X23-B04         B62D-065/00-18         Q16-D           B611_023         X23-B04E         B62D-065/00-18         Q16-D           B611_023/00         Q15-055         B62D-065/00-18         Q16-D           B611_023/00         Q21-S05         B62D-065/00-18         Q16-D           B611_023/00         Q21-S05A         B62D-067/00         Q14-C0           B611_023/34         Q21-S05A         B62H-003/00-12         Q14-J           B611_029         X23-B05C         B62H-003/00-12         Q14-D           B611_029         X23-B05C         B62H-007/00         Q14-C06           B611_029         X23-B05C         B62L-007/00         Q14-C06           B611_029         X23-B05C         B62L-007/00         Q14-C0			3023 0 177 00 02	
B611_011/00-08         Q21-S01A         B62D-053/08-12         Q19-C02           B611_015/00-02         Q21-S01C3         B62D-055/00-32         Q17-A14           B611_017         X23-B05         B62D-055/00-32         Q17-A14           B611_019         X23-B05         B62D-055/00-03         Q17-S15           B611_019/00-16         Q21-S01E         B62D-065/00-00         Q19-J           B611_019         X23-B04         B62D-063/06-08         Q19-J           B611_023         X23-B04C         B62D-065/00-18         Q16-D           B611_023         X23-B04E         B62D-065/00-18         Q16-D           B611_023/08-20         Q21-S05         B62D-067/00         Q16-R           B611_023/08-20         Q21-S05         B62D-007/00         Q16-R           B611_023/34         Q21-S05         B62D-007/00         Q14-C06           B611_0023         Q21-S05C         B62D-007/00         Q14-C06           B611_0027         X23-B05C         B62D-007/00         Q14-C06           B611_0029         X23-B05C         B62D-007/00         Q14-C06           B611_0029         X23-B05C         B62D-007/00         Q14-C06           B611_0029/02-0         Q21-S07         B62L-003/00-0         Q14-C06			B62D-049/00-051/00	
B611_013/00-04         Q21-S01C         B62D-055/00-82         Q11-C102           B611_017         X23-B05         B62D-055/00-04         Q17-F15           B611_019         X23-B04         B62D-055/00-04         Q17-F15           B611_019/00-16         Q21-S01E         B62D-055/00-03         Q19-J           B611_019/023         X23-B04         B62D-065/00-68         Q19-J           B611_023         X23-B04E         B62D-065/00-18         Q16-D           B611_023/00         Q21-S05         B62D-065/00-18         Q16-D           B611_023/00         Q21-S05         B62D-067/00         Q14-J           B611_023/30         Q21-S05         B62H-001/00-14         Q14-J           B611_023/34         Q21-S05         B62H-003/00-12         Q14-J           B611_023/34         Q21-S05         B62H-007/00         Q14-C06           B611_029         X23-B05         B62H-007/00         Q14-C06           B611_029         X23-B05         B62H-007/00         Q14-C06           B611_029         Q22-M0         Q21-S07         Q14-C06           B611_029/02-20         Q21-S07         B62L-007/00         Q14-C06           B611_029/02-22         Q21-S07         B62L-0007/00         Q14-C06				
B611_015/00-02         Q21-S01C3         B62D-055/00-32         Q17-A14           B611_017         X23-B04A         B62D-057/00-04         Q17-J           B611_019         X23-B04A         B62D-057/00-04         Q17-J           B611_019/00-16         Q21-S01E         B62D-065/00-08         Q19-J           B611_021         X23-B04C         B62D-065/00-18         Q16-D           B611_023         X23-B04E         B62D-065/00-18         Q16-D           B611_023/08         Q21-S05         B62D-067/00         Q16-R           B611_023/08-20         Q21-S05         B62D-067/00         Q16-R           B611_023/34         Q21-S05C         B62H-003/00-12         Q14-J           B611_023/34         Q21-S05         B62H-007/00         Q14-C06           B611_027         X23-B05C         B62H-007/00         Q14-C06           B611_027         X23-B05C         B62H-007/00         Q14-C06           B611_029         Q23-B05C         B62H-007/00         Q14-C06           B611_029         Q21-S07B         B62H-007/00         Q14-C06           B611_029         Q21-S07B         B62H-007/00         Q14-C06           B611_029         Q21-S07B         B62H-007/00         Q19-A				
B611_017         X23_B05         B62D_057/00_04         Q17-E15           B611_019         X23_B04         B62D_057/00_04         Q17-X           B611_019         X23_B04         B62D_063/06_08         Q17-X           B611_021         X23_B04C         B62D_065/06_08         Q19-J           B611_023         X23_B04E         B62D_065/00_18         Q16-D           B611_023/00         Q21-505         B62D_065/00_14         Q14-D           B611_023/08_20         Q21-505A         B62H_003/00_12         Q14-J           B611_023/22_32         Q21-505         B62H_003/00_12         Q14-J           B611_025/027         X23_B05         B62H_003/00_12         Q14-U           B611_025-027         X23_B05         B621_003/00_12         Q14-U6           B611_029         X23_B05A         B622_029/00         Q14-C06           B611_029         X23_B05A         B622_035/00_037/00         Q17-E04           B611_029/00         Q21-507A         B62L_009/00         Q14-C06           B611_029/00         Q21-507A         B62L_003/00_16         Q19-A           B611_029/24-32         Q21-507C         B62K-001/00         Q19-A           B62B_0007/00         Q2-2-A01         B62K-001/00         Q19-A     <				
B611_019Y_00.16         Q21-S01E         B62D_063/00_04         Q19_J           B611_019Y_00.16         Q21-S01E         B62D_063/00_63/04         Q19_J           B611_021         X23-B04C         B62D_063/06_08         Q19_J           B611_023         X23-B04E         B62D_063/00_08         Q19_J           B611_0023/00         Q21-S05         B62D_067/00         Q16_R           B611_023/08-20         Q21-S05         B62P_001/00_14         Q14_J           B611_023/34         Q21-S05         B62P_001/00_12         Q14_J           B611_023/34         Q21-S05         B62P_001/00_12         Q14_J           B611_022/34         Q21-S05         B62P_001/00_Q         Q14_C0           B611_022/34         Q21-S05         B62P_007/00         Q14_C06           B611_029         X23-B05C         B62P_007/00         Q14_C06           B611_029         X23-B05C         B62P_003/00_01         Q17_E06           B611_029/08-22         Q21-S07         B62P_003/00_01         Q19_B           B611_029/08-22         Q21-S07         B62P_001/00_01         Q19_B           B611_029/08-22         Q21-S07         B62P_001/00_01         Q19_A           B62P_0003/00-13         Q22_S07         B62P_003/00_10_01				
B61L-019/00-16         Q21-S01E         B62D-061/00-063/04         Q17-X           B61L-021         X23-B04C         B62D-063/06-08         Q19-J           B61L-023         X23-B04E         B62D-065/00-18         Q16-D           B61L-023/00         Q21-S05         B62D-067/00         Q16-R           B61L-023/08-20         Q21-S05         B62D-067/00         Q16-R           B61L-023/23/24         Q21-S05         B62H-001/00-14         Q14-J           B61L-023/344         Q21-S05         B62H-001/00-14         Q14-J           B61L-025-029         X23-B05         B62L-007/00         Q14-C07           B61L-027         X23-B05         B62L-027/00         Q14-C06           B61L-029         X23-B05A         B62L-035/00-037/00         Q17-E04           B61L-029/00         Q21-S07A         B62L-003/35/00-037/00         Q17-E04           B61L-029/02-06         Q21-S07A         B62K-001/00         Q19-A           B61L-029/02-20         Q21-S07A         B62K-001/00         Q19-A           B62B-001/00-26         Q22-A01         B62K-001/00         Q19-A           B62B-001/00-26         Q22-A01         B62K-001/00         Q19-A           B62B-001/00-02         B62K-001/00         Q19-A				
B611-021         X23-B04         B62D-033/06-08         C19-J           B611-023         X23-B04E         B62D-065/00-18         C16-D           B611-023/08-20         C21-S055         B62D-067/00         C16-R           B611-023/08-20         C21-S05A         B62H-001/00-14         C14-J           B611-023/22-32         C21-S05C         B62H-003/00-12         C14-J           B611-025-029         X23-B05         B62H-007/00         C14-C06           B611-027         X23-B05C         B62H-007/00         C14-C06           B611-029         X23-B05C         B62J-027/00         C14-C06           B611-029         X23-B05A         B62J-027/00         C14-C06           B611-029         X23-B05A         B62J-027/00         C14-C06           B611-029/02-06         C21-S07A         B62L-001/00         C19-A           B611-029/02-32         C21-S07B         B62K-001/10         C19-A           B611-029/02-32         C21-S07B         B62K-001/10         C19-A           B611-029/02-22         C21-S07B         B62K-001/10         C19-A           B611-029/02-23         C21-S07B         B62K-001/10         C19-A           B62B-001/00-24         C22-A01         B62K-003/00-16         C19-A </td <td></td> <td></td> <td></td> <td></td>				
B611_021         X23_B04C         B62D-065/00-18         Q15_M05           B611_023         X23_B04E         B62D-067/00         Q16_R           B611_023/00         Q21_S05         B62D-067/00         Q16_R           B611_023/302         Q21_S05C         B62H-001/00-14         Q14_J           B611_023/34         Q21_S05C         B62H-007/00         Q14_C07           B611_027         X23_B05C         B62H-007/00         Q14_C06           B611_029         X23_B05C         B62J-027/00         Q14_C06           B611_029         X23_B05A         B62J-027/00         Q14_C06           B611_029/00         Q21_S07A         B62J_035/00-037/00         Q17_E04           B611_029/02-06         Q21_S07A         B62K-001/10         Q19_A           B611_029/02-22         Q21_S07A         B62K-001/10         Q19_A           B611_029/02-23         Q21_S07A         B62K-001/10         Q19_A           B611_029/02-24-32         Q21_S07C         B62K-001/10         Q19_A           B611_029/02-24-32         Q21_S07C         B62K-001/10         Q19_A           B612_001/00-26         Q22_A01         B62K-001/00-14         Q18_B09           B62B_001/00-16         Q22_A03         B62K-001/00-14         Q19_A<				
B611_023/00         X23_B04E         B62D_067/00         Q1-M05           B611_023/08-20         Q21_505A         B62D_067/00         Q16_A           B611_023/08-20         Q21_505C         B62H_001/00-14         Q14_J           B611_023/03/34         Q21_505         B62H_007/00         Q14_C07           B611_025_029         X23_B05         B62H_007/00         Q14_C06           B611_027         X23_B05A         B62J_027/00         Q14_C06           B611_029         X23_B05A         B62J_032/00-037/00         Q17_E04           B611_029/02-06         Q21_507A         B62J_037/00-037/00         Q17_E04           B611_029/02-06         Q21_507A         B62K_001/00         Q19_A           B611_029/08-22         Q21_507B         B62K_001/00         Q19_A           B612_009/00-23         Q21_507C         B62K_001/00         Q19_A           B62B_003/00-18         Q22_A02         B62K_001/02-0         Q19_A           B62B_003/00-18         Q22_A02         B62K_001/00-0         Q19_A           B62B_001/00-0         Q2_2_B         B62K_001/00-0         Q19_A           B62B_001/00-0         Q2_2_B         B62K_001/00-0         Q19_A           B62B_001/00-0         Q2_2_B         B62K_001/00-1				
B611_023/00         Q21-S05A         B62D-067/00         Q16-R           B611_023/08-20         Q21-S05A         B62H-001/00-14         Q14-J           B611_023/32-32         Q21-S05C         B62H-003/00-12         Q14-J           B611_023/34         Q21-S05C         B62H-003/00         Q14-C06           B611_023/34         Q21-S05C         B62H-003/00         Q14-C06           B611_027         X23-B05C         B62J-027/00         Q14-C06           B611_029/00         Q21-S07         B62J-027/00         Q14-C06           B611_029/00         Q21-S07A         B62K-001/00         Q19-A           B611_029/08-22         Q21-S07B         B62K-001/14         Q18-B0           B611_029/08-22         Q21-S07C         B62K-003/00-16         Q19-A           B628-001/00-26         Q21-S07C         B62K-003/00-16         Q19-A           B628-001/00-8         Q22-A01         B62K-007/00-04         Q19-A           B628-007/00-18         Q22-A01         B62K-007/00-02         Q19-A           B628-007/00-19         Q22-B01         B62K-007/00-02         Q19-A           B628-007/02         Q22-B01         B62K-011/00-14         Q19-B           B628-007/02         Q22-B01         B62K-011/00-14 <td< td=""><td></td><td></td><td>B62D-065/00-18</td><td></td></td<>			B62D-065/00-18	
B611_023/08_20         Q21_SOSC         B62H-003/00-12         Q14_J           B611_023/34         Q21_SOSC         B62H-003/00-12         Q14_J           B611_025_029         X23_B05         B62H-007/00         Q14_C06           B611_027         X23_B05C         B62J_027/00         Q14_C06           B611_029         X23_B05A         B62J_035/00-037/00         Q17_E04           B611_029/00         Q21_S07A         B62J_035/00-037/00         Q17_E04           B611_029/02-06         Q21_S07A         B62K_001/10         Q19_A           B611_029/02-07         Q21_S07A         B62K_001/14         Q18_B0           B611_029/02-22         Q21_S07B         B62K_001/10         Q19_A           B62B_001/00-26         Q22_A01         B62K_003/00-16         Q19_A           B62B_003/00-18         Q22_A02         B62K_000/00-04         Q19_A           B62B_007/00         Q22_B         B62K_000/00-02         Q19_A           B62B_007/01         Q22_B01         B62K_001/00-04         Q19_A           B62B_007/02         Q22_B01         B62K_011/02-10         Q17_A           B62B_007/04-14         Q22_B01         B62K_011/02-10         Q17_A           B62B_009/00-28         Q2_B03         B62K_011/02-10	B61L-023	X23-B04E		Q21-M05
B611_023/22_32         Q21_S05C         B62H-003/00-12         Q14_J           B611_023/34         Q21_S05S         B62H-007/00         Q14_C06           B611_027         X23_B05C         B62J-027/00         Q14_C06           B611_029         X23_B05A         B62J-027/00         Q14_C06           B611_029/00         Q21_S07A         B62J-035/00-037/00         Q17_E04           B611_029/02_06         Q21_S07A         B62K-001/00         Q19_B           B611_029/08_22         Q21_S07C         B62K-001/14         Q18_B09           B611_029/24_32         Q21_S07C         B62K-003/00-16         Q19_A           B628_001/00_6         Q22_A01         B62K-007/00-04         Q19_A           B628_005/00_08         Q22_A03         B62K-007/00-04         Q19_A           B628_007/01         Q22_B01         B62K-001/00-14         Q19_A           B628_007/02         Q22_B01         B62K-011/00-14         Q19_B           B628_007/04-14         Q22_B02         B62K-011/00-14         Q19_B           B628_001/00-02         Q22_B01         B62K-011/00-14         Q19_A           B628_001/00-02         B62K-011/00-14         Q19_A         B62K-011/00-14         Q19_B           B628_001/00-02         Q2_B01	B61L-023/00	Q21-S05	B62D-067/00	Q16-R
B611_023/34         Q21-S05         B62J-027/00         Q14-C06           B611_027         X23-B05         B62J-027/00         Q14-C06           B611_029         X23-B05C         B62J-027/00         Q14-C06           B611_029/00         Q21-S07A         B62J-035/00-037/00         Q17-E04           B611_029/02-06         Q21-S07A         B62K-001/10         Q19-B           B611_029/02-22         Q21-S07B         B62K-001/10         Q19-A           B611_029/04-32         Q21-S07C         B62K-001/10         Q19-A           B628_003/00-18         Q22-A01         B62K-005/02-06         Q19-A           B628_003/00-18         Q22-A02         B62K-007/00-04         Q19-A           B628_007/00         Q22-B         B62K-009/00-02         Q19-A           B628_007/01         Q22-B03         B62K-009/00-02         Q19-A           B628_007/02         Q22-B01         B62K-001/00-10         Q19-A           B628_007/02         Q22-B01         B62K-011/00-11         Q19-A           B628_007/02         Q22-B01         B62K-011/00-11         Q19-A           B628_007/02         Q22-B01         B62K-011/02-10         Q17-A           B628_009/00-28         Q22-B01         B62K-011/02-10         Q17-A <td>B61L-023/08-20</td> <td>Q21-S05A</td> <td>B62H-001/00-14</td> <td>Q14-J</td>	B61L-023/08-20	Q21-S05A	B62H-001/00-14	Q14-J
B61L-025-029         X23-B05C         B62J-027/00         Q14-C06           B61L-027         X23-B05A         B62J-029/00         Q14-C06           B61L-029/00         Q21-S07         B62J-035/00-037/00         Q17-E04           B61L-029/02-06         Q21-S07A         B62L-035/00-037/00         Q19-B           B61L-029/08-22         Q21-S07B         B62K-001/14         Q18-B0           B61L-029/24-32         Q21-S07C         B62K-003/00-16         Q19-A           B62B-003/00-18         Q22-A01         B62K-007/00-04         Q19-A           B62B-005/00-08         Q22-A02         B62K-007/00-04         Q19-A           B62B-007/00         Q22-B         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B         B62K-001/02-10         Q19-A           B62B-007/02         Q2-B01         B62K-011/02-10         Q17-A           B62B-007/02-1         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/02-2         Q2-B01         B62K-011/02-10         Q17-A           B62B-007/04-14         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/04-14         Q22-B03         B62K-011/02-10         Q17-A           B62B-001/00-02         B62K-011/02-10         Q17-A	B61L-023/22-32	Q21-S05C	B62H-003/00-12	Q14-J
B61L-027         X23-B05A         B62J-029/00         Q14-C06           B61L-029/00         Q21-S07         B62J-035/00-037/00         Q17-E04           B61L-029/02-06         Q21-S07A         B62J-035/00-037/00         Q19-A           B61L-029/08-22         Q21-S07B         B62K-001/00         Q19-A           B61L-029/08-22         Q21-S07C         B62K-003/00-16         Q19-A           B62B-003/00-18         Q22-A01         B62K-005/02-06         Q19-A           B62B-005/00-08         Q22-A02         B62K-009/00-04         Q19-A           B62B-007/00         Q22-B         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B01         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B01         B62K-009/00-02         Q19-A           B62B-007/02         Q22-B01         B62K-0011/00-14         Q19-B           B62B-007/02-28         Q22-B03         B62K-0111/02-10         Q17-A           B62B-009/00-28         Q22-B03         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/02         Q19-A           B62B-001/00-02         Q18-B01         B62K-013/02         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/02	B61L-023/34	Q21-S05	B62H-007/00	Q14-C07
B61L-029/00         Q21-S07         B62L-035/00-037/00         Q17-E04           B61L-029/02-06         Q21-S07A         B62K-001/00         Q19-B           B61L-029/08-22         Q21-S07B         B62K-001/10         Q19-A           B61L-029/24-32         Q21-S07C         B62K-001/14         Q18-B09           B62B-001/00-26         Q22-A01         B62K-005/02-06         Q19-A           B62B-003/00-18         Q22-A02         B62K-007/00-04         Q19-A           B62B-007/00         Q22-B         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B         B62K-001/02-10         Q19-A           B62B-007/02         Q22-B01         B62K-009/00-2         Q19-A           B62B-007/02         Q22-B01         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-001/00-2         B62K-011/02-10         Q18-B01         B62K-011/02-10         Q17-A           B62B-013/00-01/04-1         Q22-C01	B61L-025-029	X23-B05	B62J-027/00	Q14-C06
B61L-029/00         Q21-S07         B62L-035/00-037/00         Q17-E04           B61L-029/02-06         Q21-S07A         B62K-001/00         Q19-B           B61L-029/08-22         Q21-S07B         B62K-001/10         Q19-A           B61L-029/24-32         Q21-S07C         B62K-001/14         Q18-B09           B62B-001/00-26         Q22-A01         B62K-005/02-06         Q19-A           B62B-003/00-18         Q22-A02         B62K-007/00-04         Q19-A           B62B-007/00         Q22-B         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B         B62K-001/02-10         Q19-A           B62B-007/02         Q22-B01         B62K-009/00-2         Q19-A           B62B-007/02         Q22-B01         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-007/02-2         Q22-B03         B62K-011/02-10         Q17-A           B62B-001/00-2         B62K-011/02-10         Q18-B01         B62K-011/02-10         Q17-A           B62B-013/00-01/04-1         Q22-C01	B61L-027	X23-B05C	B62J-029/00	Q14-C06
B61L-029/00         Q21-S07A         B62K-001/00         Q19-A           B61L-029/08-22         Q21-S07B         B62K-001/14         Q18-B0           B61L-029/24-32         Q21-S07C         B62K-003/00-16         Q19-A           B62B-001/00-26         Q22-A01         B62K-003/00-16         Q19-A           B62B-005/00-08         Q22-A02         B62K-009/00-06         Q19-A           B62B-007/00         Q22-B         B62K-009/00-02         Q19-A           B62B-007/02         Q22-B01         B62K-009/00-02         Q19-A           B62B-007/04-14         Q22-B02         B62K-011/00-14         Q19-A           B62B-009/00-28         Q22-B03         B62K-011/00-14         Q19-A           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-019/00-19/04         Q22-C01         B62K-013/02         Q19-A           B62B-019/00-09         Q22-D         B62K-013/02         Q19-A           B62B-009/00-10         Q22-D         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-D         B62K-013/02         Q19-A           B62B-001/00-02         Q18-B01         B62K-013/02         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/00         Q19-A </td <td></td> <td></td> <td></td> <td></td>				
B61L-029/02-06         Q21-S07A         B62K-001/10         Q19-A           B61L-029/08-22         Q21-S07B         B62K-001/14         Q18-B09           B62L-029/24-32         Q21-S07C         B62K-003/00-16         Q19-A           B62B-001/00-26         Q22-A01         B62K-005/02-06         Q19-A           B62B-005/00-18         Q22-A03         B62K-007/00-04         Q19-A           B62B-007/00         Q22-B0         B62K-009/00-2         Q19-A           B62B-007/02         Q22-B01         B62K-009/00-2         Q19-A           B62B-007/04-14         Q22-B02         B62K-011/00-14         Q19-B           B62B-009/00-28         Q22-B03         B62K-011/00-14         Q19-B           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-007/00-16         Q14-G           B62D-001/00-02         Q18-B01         B62K-007/00-16         Q14-G           B62D-001/12-14         Q18-B01         B62K-007/00-16			2020 000,00 007,00	
B61L-029/08-22         Q21-507B         B62K-001/14         Q18-B09           B61L-029/24-32         Q21-507C         B62K-003/00-16         Q19-A           B62B-001/00-26         Q22-A01         B62K-005/00-06         Q19-A           B62B-003/00-18         Q22-A02         B62K-007/00-04         Q19-A           B62B-005/00-08         Q22-A03         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B         B62K-009/00-02         Q19-A           B62B-007/04-14         Q22-B01         B62K-009/00-10         Q19-A           B62B-009/00-28         Q22-B03         B62K-011/02-10         Q17-A           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-D0         B62K-013/04         Q19-A           B62B-013/00-019/04         Q22-C1         B62K-013/04         Q19-A           B62D-001/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-007/00-16         Q14-G           B62D-001/12-14         Q18-B01         B62M-001/12         Q13-A15           B62D-001/16-20         Q18-B01B         B62M-001/12			B62K-001/00	
B61L-029/24-32         Q21-507C         B62R-001/00-26         Q19-A           B62B-001/00-26         Q22-A01         B62K-005/02-06         Q19-A           B62B-003/00-18         Q22-A02         B62K-007/00-04         Q19-A           B62B-005/00-08         Q22-A03         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B0         B62K-009/00-02         Q19-A           B62B-007/02         Q22-B01         B62K-011/00-14         Q19-B           B62B-007/04-14         Q22-B02         B62K-011/02-10         Q17-A           B62B-009/00-28         Q22-B03         B62K-013/02         Q19-A           B62B-011/00         Q22-C         B62K-013/04         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/04         Q19-A           B62D-01/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-007/00-16         Q14-G           B62D-001/00-02         Q18-B01         B62M-001/02         Q13-A15           B62D-001/10-11         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/10-14         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/10-14         Q18-B01B         B62M-001/12				
B62B-001/00-26         Q22-A01         B62B-003/00-18         Q22-A02         Q19-A           B62B-005/00-08         Q22-A03         B62K-007/00-02         Q19-A           B62B-007/00         Q22-B         B62K-009/00-02         Q19-A           B62B-007/02         Q22-B01         B62K-0011/00-14         Q19-A           B62B-007/04-14         Q22-B02         B62K-011/00-14         Q19-B           B62B-009/00-28         Q22-B03         B62K-011/12         Q18-B15           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-011/00-04         Q22-C01         B62K-013/04         Q19-A           B62D-01/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-001/02         Q13-A15           B62D-001/12-14         Q18-B01B         B62K-001/02         Q13-A15           B62D-001/12-24         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/12-22         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-003/00         Q18-B01         B62M-003				
B62B-003/00-18         Q22-A02         B62K-007/00-04         Q19-A           B62B-005/00-08         Q22-A03         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B         B62K-009/02         Q19-A           B62B-007/02         Q22-B01         B62K-011/00-14         Q19-B           B62B-009/00-28         Q22-B02         B62K-011/02-10         Q17-A           B62B-009/00-28         Q22-B03         B62K-011/12         Q18-B15           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/04         Q19-A           B62C-001/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-001/06         Q13-A15           B62D-001/00-02         Q18-B01         B62K-001/02         Q13-A15           B62D-001/10-11         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/10-14         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/10-22         Q18-B01X         B62M-003/08-12				
B62B-005/00-08         Q22-A03         B62K-009/00-02         Q19-A           B62B-007/00         Q22-B01         B62K-009/02         Q19-A           B62B-007/02-14         Q22-B01         B62K-011/00-14         Q19-B           B62B-007/04-14         Q22-B02         B62K-011/02-10         Q17-A           B62B-009/00-28         Q22-B03         B62K-011/12         Q18-B15           B62B-013/00         Q22-C01         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/04         Q19-A           B62C-001/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-001/00-01         Q14-G           B62D-001/00-02         Q18-B01         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/12-22         Q18-B01B         B62M-003/00-06         Q13-A15           B62D-001/12-22         Q18-B01B         B62M-003/00-06         Q13-A15           B62D-003/00         Q18-B01         B62M-003/14		-		
B62B-007/00         Q22-B         B62K-009/02         Q19-A           B62B-007/04-14         Q22-B01         B62K-011/00-14         Q19-B           B62B-007/04-14         Q22-B02         B62K-011/02-10         Q17-A           B62B-009/00-28         Q22-B03         B62K-011/12         Q18-B15           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62E-013/00-19/04         Q22-D         B62K-013/06         Q19-A           B62D-01/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q19-A           B62D-001/04-11         Q18-B01A         B62M-001/02         Q13-A15           B62D-001/04-11         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/12-22B         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/12-22B         Q18-B01D         B62M-003/08-12         Q13-A15           B62D-003/00         Q18-B02         B62M-003/08-12         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/14         Q13-A15           B62D-003/04-12         Q18-B02A         B62M-003/14				
B62B-007/02         Q22-B01         B62K-011/00-14         Q19-B           B62B-007/04-14         Q22-B02         B62K-011/02-10         Q17-A           B62B-009/00-28         Q22-B03         B62K-011/12         Q18-B15           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-D         B62K-013/04         Q19-A           B62D-01/00-02         Q18-B01         B62K-013/06-16         Q14-G           B62D-001/00-02         Q18-B01         B62K-07/00-16         Q14-G           B62D-001/04-11         Q18-B01         B62M-001/02         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01B         B62M-003/00-06         Q13-A15           B62D-001/16-20         Q18-B01B         B62M-003/00-06         Q13-A15           B62D-001/16-20         Q18-B01X         B62M-003/00-06         Q13-A15           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/14         Q18-B02         B62M-003/14				
B62B-007/04-14         Q22-B02         B62K-011/02-10         Q17-A           B62B-009/00-28         Q22-B03         B62K-011/12         Q18-B15           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/04         Q19-A           B62D-001/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-027/00-16         Q14-G           B62D-001/04-11         Q18-B01A         B62M-001/02         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-60         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/08-12         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A15           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-005/00         Q13-A15           B62D-005/00         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         B62M-007/00-14				
B62B-009/00-28         Q22-B03         B62K-011/12         Q18-B15           B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/04         Q19-A           B62C-001/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-027/00-16         Q14-G           B62D-001/04-11         Q18-B01A         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/16-20         Q18-B01X         B62M-003/00-06         Q13-A15           B62D-001/16-20         Q18-B01X         B62M-003/00-06         Q13-A15           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/01         Q18-B02         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02A         B62M-003/16         Q13-A15           B62D-005/00         Q18-B06         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         B62M-007/00-02 </td <td></td> <td></td> <td></td> <td></td>				
B62B-011/00         Q22-C         B62K-013/02         Q19-A           B62B-013/00-019/04         Q22-C01         B62K-013/04         Q19-A           B62C-001/00-04         Q22-D         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-013/06         Q14-G           B62D-001/04-11         Q18-B01A         B62M-001/02         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/12-28         Q18-B01X         B62M-003/00-06         Q13-A15           B62D-003/00         Q18-B02         B62M-003/04-12         Q13-A16           B62D-003/02         Q18-B02A         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/14         Q13-A15           B62D-005/05         X22-C05A         B62M-005/00         Q13-A15           B62D-005/00         Q18-B06         B62M-007/00-14         Q19-B           B62D-005/02         Q18-B06A         B62M-007/00-02         Q22-C01           B62D-005/04         X22-C05A3         B62M-007/00-02         Q22-C01           B62D-005/06-32         Q18-B06C         B63         <				
B62B-013/00-019/04         Q22-C01         B62K-013/06         Q19-A           B62D         X22-C05         B62K-013/06         Q19-A           B62D-001/00-02         Q18-B01         B62K-027/00-16         Q14-G           B62D-001/04-11         Q18-B01A         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/00-12         Q13-A15           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/01         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02         Q18-B02A         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02A         B62M-003/16         Q13-A15           B62D-005/0         Q18-B06A         B62M-007/00-14         Q19-B           B62D-005/0         Q18-B06         B62M-007/00-14         Q19-B           B62D-005/04         X22-C05A3         B62M-027/00-02         Q22-C01           B62D-005/06-32         Q18-B06         B63         Q24				
B62C-001/00-04         Q22-D         B62K-013/06         Q19-A           B62D         X22-C05         B62K-027/00-16         Q14-G           B62D-001/00-02         Q18-B01         B62M-001/02         Q13-A15           B62D-001/04-11         Q18-B01A         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A15           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/01         Q18-B02A         B62M-003/14         Q13-A15           B62D-003/14         Q18-B02A         B62M-003/16         Q13-A15           B62D-005/0         Q18-B06A         B62M-005/00         Q13-A15           B62D-005/0         Q18-B06         B62M-007/00-14         Q19-B           B62D-005/0         Q18-B06         B62M-007/00-14         Q19-B           B62D-005/0         Q18-B06         B62M-007/00-02         Q22-C01           B62D-005/0         Q18-B06         B63         Q24           B62D-005/0         X22-C05A         B63         Q24-P18	B62B-011/00	Q22-C	B62K-013/02	Q19-A
B62D         X22-C05         B62K-027/00-16         Q14-G           B62D-001/00-02         Q18-B01         B62M-001/02         Q13-A15           B62D-001/04-11         Q18-B01A         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A16           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-003/16         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/0         Q18-B06         Q17-A         Q22-C01           B62D-005/02         Q18-B06         B62M-007/00-14         Q19-B           B62D-005/04         X22-C05A3         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05B         B63         Q24           B62D-006         X22-C05B         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07         W06-C07	B62B-013/00-019/04	Q22-C01	B62K-013/04	Q19-A
B62D-001/00-02         Q18-B01         B62M-001/02         Q13-A15           B62D-001/04-11         Q18-B01A         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A16           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-003/16         Q13-A15           B62D-005/0         X22-C05A         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/02         Q18-B06         B62M-007/00-14         Q19-B           B62D-005/04         X22-C05A3         B62M-027/00-02         Q22-C01           B62D-005/06-32         Q18-B06         B63         Q24           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07A           B62D-0011/00-24         Q18-B09         B63,B63C         W06-C07A <t< td=""><td>B62C-001/00-04</td><td>Q22-D</td><td>B62K-013/06</td><td>Q19-A</td></t<>	B62C-001/00-04	Q22-D	B62K-013/06	Q19-A
B62D-001/04-11         Q18-B01A         B62M-001/12         Q13-A15           B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A16           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-003/16         Q13-A15           B62D-005         X22-C05A         B62M-005/00         Q13-A15           B62D-005/00         Q18-B06         Q17-A         Q19-B           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         B62M-027/00-02         Q22-C01           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07           B62D-0011/00-24         Q18-B03         W06-C07A           B62D-011/00-24         Q18-B15         W06-C01A           B62D-013/00-06         Q19-J	B62D	X22-C05	B62K-027/00-16	Q14-G
B62D-001/12-14         Q18-B01B         B62M-001/12-16         Q13-A15           B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A16           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A         Q19-B           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         B63         Q24           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-007/00-22         Q18-B03         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         B63B-022         Q24-P18           B62D-011/00-24         Q18-B09         B63,B63C         W06-C07C           B62D-011/00-24         Q18-B15         W06-C01A           B62D-021/00-20	B62D-001/00-02	Q18-B01	B62M-001/02	Q13-A15
B62D-001/16-20         Q18-B01D         B62M-003/00-06         Q13-A15           B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A16           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A         Q17-A           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         B63         Q24           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-001/00-04         Q18-B15         W06-C07A           B62D-011/00-24         Q18-B15         W06-C01C           B62D-021/00         Q17-A08         B63,G01S         W06-C01C           B62D-021/20         Q17-A08         B63,G06F,G08C         <	B62D-001/04-11	Q18-B01A	B62M-001/12	Q13-A15
B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A16           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A         Q22-C01           B62D-005/04         X22-C05A3         B62M-027/00-02         Q22-C01           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-0011/00-24         Q18-B03         B63,B63C         W06-C07C           B62D-011/00-24         Q18-B15         B63-001-005         Q24-R           B62D-013/00-06         Q19-J         B63,G01S         W06-C01A           B62D-021/00-20         Q17-A08         B63,G06F,G08C         W06-C01A           B62D-023/00         Q17-A08         B63B,H01R,H02G         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,G01         W06-C01C5	B62D-001/12-14	Q18-B01B	B62M-001/12-16	Q13-A15
B62D-001/22-28         Q18-B01X         B62M-003/08-12         Q13-A16           B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A         Q22-C01           B62D-005/04         X22-C05A3         B62M-027/00-02         Q22-C01           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006/06-32         Q18-B06C         B63         Q24           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-0011/00-24         Q18-B09         B63,B63C         W06-C07C           B62D-011/00-24         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B           B62D-021/20         Q17-A08         B63,G05         W06-C01A           B62D-023/00         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02	B62D-001/16-20	Q18-B01D	B62M-003/00-06	Q13-A15
B62D-003/00         Q18-B02         B62M-003/14         Q13-A15           B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         B63         Q24           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-009/00-04         Q18-B09         B63,B63C         W06-C07C           B62D-011/00-24         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         <				Q13-A16
B62D-003/02-12         Q18-B02A         B62M-003/16         Q13-A15           B62D-003/14         Q18-B02B         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         B63         Q24           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-007/00-22         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-009/00-04         Q18-B09         B63,B63C         W06-C07C           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C01A         W06-C01A           B62D-021/00-02         Q17-A08         B63,G01S         W06-C01C           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01				
B62D-003/14         Q18-B02B         B62M-005/00         Q13-A15           B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         B63         Q24           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-007/00-22         Q18-B07         B63B-022         Q24-P18           B62D-009/00-04         Q18-B03         W06-C07C           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B           B62D-021/00-20         Q17-A08         B63,G01S         W06-C01C           B62D-023/00         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5				
B62D-005         X22-C05A         B62M-007/00-14         Q19-B           B62D-005/00         Q18-B06         Q17-A           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         Q22-C01           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-007/00-22         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-009/00-04         Q18-B09         B63,B63C         W06-C07           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B           B62D-021/00-20         Q17-A08         B63,G01S         W06-C01C           B62D-023/00         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5				
B62D-005/00         Q18-B06         Q17-A           B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         Q22-C01         Q22-C01           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-007/00-22         Q18-B07         B63B-022         Q24-P18           B62D-009/00-04         Q18-B09         B63,B63C         W06-C07C           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G06F,G08C         W06-C01A           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5				
B62D-005/02         Q18-B06A         B62M-027/00-02         Q22-C01           B62D-005/04         X22-C05A3         Q22-C01           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C           B62D-007/00-22         Q18-B07         B63B-022         Q24-P18           B62D-009/00-04         Q18-B03         W06-C07C           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G06F,G08C         W06-C01A           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5			B021VI-007700-14	
B62D-005/04         X22-C05A3         Q22-C01           B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C         W06-C           B62D-007/00-22         Q18-B07         B63B-022         Q24-P18           B62D-009/00-04         Q18-B03         W06-C07C           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5			P42M 027/00 02	
B62D-005/06-32         Q18-B06C         B63         Q24           B62D-006         X22-C05B         W06-C           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-001/00-04         Q18-B09         B63,B63C         W06-C07           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5			B62IVI-027700-02	
B62D-006         X22-C05B         W06-C           B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-009/00-04         Q18-B09         B63,B63C         W06-C07           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5			D / 2	
B62D-006/00-10         Q18-B07         B63B-022         Q24-P18           B62D-007/00-22         Q18-B03         W06-C07C           B62D-009/00-04         Q18-B09         B63,B63C         W06-C07           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5			В63	
B62D-007/00-22       Q18-B03       W06-C07C         B62D-009/00-04       Q18-B09       B63,B63C       W06-C07         B62D-011/00-24       Q18-B12       B63-001-005       Q24-R         B62D-012/00-019/00       Q18-B15       W06-C07A         B62D-013/00-06       Q19-J       B63,G01S       W06-C01B1         B62D-021/00-20       Q17-A08       B63,G05       W06-C01A         B62D-021/20       Q19-J       B63,G06F,G08C       W06-C01B8         B62D-023/00       Q17-A03       B63,H01R,H02G       W06-C01C1         B62D-024/00-04       Q17-A08       B63B       W06-C01C         B62D-025/00-033/10       Q17-A02       B63B,F21,F24       W06-C01C5         B62D-031/00-04       Q19-C01       B63B,G01       W06-C01B5				
B62D-009/00-04         Q18-B09         B63,B63C         W06-C07           B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-021/20         Q19-J         B63,G06F,G08C         W06-C01B8           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5		Q18-B07	B63B-022	
B62D-011/00-24         Q18-B12         B63-001-005         Q24-R           B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-021/20         Q19-J         B63,G06F,G08C         W06-C01B8           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5				
B62D-012/00-019/00         Q18-B15         W06-C07A           B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-021/20         Q19-J         B63,G06F,G08C         W06-C01B8           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5		Q18-B09	· ·	
B62D-013/00-06         Q19-J         B63,G01S         W06-C01B1           B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-021/20         Q19-J         B63,G06F,G08C         W06-C01B8           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5	B62D-011/00-24	Q18-B12	B63-001-005	Q24-R
B62D-021/00-20         Q17-A08         B63,G05         W06-C01A           B62D-021/20         Q19-J         B63,G06F,G08C         W06-C01B8           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5	B62D-012/00-019/00	Q18-B15		W06-C07A
B62D-021/20         Q19-J         B63,G06F,G08C         W06-C01B8           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5	B62D-013/00-06	Q19-J	B63,G01S	W06-C01B1
B62D-021/20         Q19-J         B63,G06F,G08C         W06-C01B8           B62D-023/00         Q17-A03         B63,H01R,H02G         W06-C01C1           B62D-024/00-04         Q17-A08         B63B         W06-C01C           B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5	B62D-021/00-20	Q17-A08	B63,G05	W06-C01A
B62D-023/00       Q17-A03       B63,H01R,H02G       W06-C01C1         B62D-024/00-04       Q17-A08       B63B       W06-C01C         B62D-025/00-033/10       Q17-A02       B63B,F21,F24       W06-C01C5         B62D-031/00-04       Q19-C01       B63B,G01       W06-C01B5				
B62D-024/00-04       Q17-A08       B63B       W06-C01C         B62D-025/00-033/10       Q17-A02       B63B,F21,F24       W06-C01C5         B62D-031/00-04       Q19-C01       B63B,G01       W06-C01B5			'	
B62D-025/00-033/10         Q17-A02         B63B,F21,F24         W06-C01C5           B62D-031/00-04         Q19-C01         B63B,G01         W06-C01B5			, ,	
B62D-031/00-04 Q19-C01 B63B,G01 W06-C01B5				
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003/00-03/100 Q17-A03   0030,G013,1101Q W00-C01B			T	
	DUZD-033/00-037/00	Q17-A03	0000,0010,11010	**************************************

B63B,H01Q,H04B	W06-C01B7
B63B,H02J,H02K	W06-C01C3
B63C-009	W06-C10
D03C-007	
	W06-C15C
B63G-007,F41	W07-F05
B63H,F02,G05	W06-C01A1
B63H,G05D-001	W06-C01A5
B64	W06-B
B64,B64G-007,G09B	W06-B04
B64,G01N,G01V	W06-B02A
B64C,B64D	W06-B01
B64C,B64D,F02C,	W06-B01A1
B64C,B64D,G05D-001	W06-B01A5
B64C,B64D,G06F	W06-B01B8
	W06-B01C
B64C,B64D,G07C	W06-B01B6
B64C,B64D,H01R	W06-B01C1
B64C-013/00-50	W06-B01A5
B64C-015/00-14	W06-B01A5
B64C-031/00-036	W06-B09
B64D	W06-B02D
B64D,F21,F24	W06-B01C5
B64D,G01C,G01S	W06-B01B1
B64D,G11B,H04B	W06-B01C7
B64D,H01Q,H04B	W06-B01B
B64D,H02J,K,M	W06-B01C3
B64D-001	Q25-B15
B64D-003	Q25-R07
B64D-007	Q25-P13
	Q25-M
B64D-009	Q25-B02C
B64D-010	Q25-X01
B64D-011	Q25-B01
B64D-013	Q25-B03
B64D-013	W06-B01C5
B64D-015	Q25-B04
	W06-B01C4
B64D-017	Q25-B09G
B64D-019,21	Q25-B09G
B64D-023	Q25-X03
B64D-025	Q25-B09
	W06-B01C8
	W06-B01C9
B64D-025/68	Q25-A07G
B64D-027,29,31,33,35	Q25-C02
B64D-031	W06-B01A1
B64D-035	Q25-C03
B64D-037,39	Q25-C02M
B64D-043	W06-B01B
B64D-045	Q25-B09
B64D-045	W06-B01C
B64F	W06-B02
B64F-001/02	Q25-A07G
B64F,F21,G01S	W06-B02E
B64F-001,003	Q25-R
B64F-001	W06-B02
B64F-003	W06-B01C3
B64F-005	Q25-R09
DO-11 -000	
	Q25-X05
	Q25-X07
	W06-B06
	W06-B08
B64G	W06-B03

B64G-001 W06-B03A B64G-001,-006 W06-B03D B64G-001,F24J,H02M, W06-B03B B65 X25-F01 X25-F03 X25-F03B1 B65,B66 X25-F B65,G01,H01L-021 U11-F B65,H01J-009 V05-L07E7 B65F-001/014 X25-W04 B65F-003/00-28 Q19-C04 B65G X25-F07 B65H X25-F02A B66 X25-F04 X25-F05A B81 U12-B03F1 V03-C07A V03-C10 V03-D06B1 V03-D10 V06-V01K1 V06-V03A7 V06-M06G V06-M11G V06-N22 V06-N40H B82 U12-B03F2 V03-C07A V03-C10A V03-D06B1 V03-D10A V06-V01K2 V06-V03A7 V06-M06G9 V06-M11G V06-N22A V06-N40H1

### **Section C**

Section C	
C02F-001/00-011/20	X25-H03
C09K-011,H05B-033	U11-A15
C09K-019	U11-A03A
C12C	X25-P01B
C12C-013	X27-X02
C14B	X25-X07
C21	X25-Q
C23C	X25-A04
C23C,H01J	V05-F08D
C23C,H01J-037	V05-F08D5
C23C,H01J-037/32-36	V05-F05C
C23C-014,H01J-037/34	
	V05-F08D1A
C23C-014/24	U11-C01A1
C23C-014/34	U11-C01A3
	U11-C09A
	U11-C01A9
C23C-016	U11-C09B
C25	X25-R
C25B	X25-R01
C25B-001/13	X25-X04
C25B-009	X25-R01A
C25B-011	X25-R01B
C25B-013	X25-R01C
C25C	X25-R02
C25D	X25-R03
	X25-R04
	X25-R05
	X25-R07
C30B-013	U11-B02A
	U11-B02B
C30B-015	U11-B01
C30B-015/34	U11-B04
C30B-029/04,08,36	U11-B03C
C30B-029/40	U11-B03A
C30B-029/48	U11-B03B

## Section D

occion b	
D01,02,07	X25-T04A
D01-07	X25-T04
D03	X25-T04B1
D03-06	X25-T04B
D04B	X25-T04B2
D04H	X25-T04B3
D05B,D05C	X25-T04C
D06	X25-T04G
D06F	X27-D01A
D06F-019/00	X27-D01A
	X27-D07
D06F-039/20	X27-D01A3E
D06F-039/30	X27-D01A3X
D06F-039/40	X27-D07E
	X27-D01A3E
D06F-049,058	X27-D02
D06F-053	X27-D06
D06F-075	X27-D03
D21	X25-T09

### **Section E**

E01	Q41
	X25-U
E02	Q42
E02F	X25-D01
E02F,E21C,D,F	X25-D
E03D-001/00-013/00	X27-L
E03	Q42
E04B	Q43
E04C	Q44
E04D, F	Q45
E04H-004	X25-X06
E04H-006	X25-U02
E05	Q47
E06	Q48
E05B	X25-M
E21	Q49
E21B	X25-E
E21B,G01V,G08C	W05-D07H
E21C	X25-D02B
E21C,D,F	X25-D02
E21F	X25-D02C

# Section F

Section F	
F01	X11-A
F01B-001/01	Q51-A01A
F01B-001/02-12	Q51-A01B
F01B-003/00	Q51-A
F01B-005/00	Q51-A
F01B-007/00-20	Q51-A01C
F01B-009/00-08	Q51-A03E
F01B-021/00-04	Q51-A03A
F01C-001/02-46	Q51-B
F01C-003/00-08	Q51-B
F01C-005/00-08	Q51-B
F01C-007/00	Q51-B
F01C-009/00	Q51-B05
F01C-017/00-06	Q51-B03E
F01C-019/00-12	Q51-B03C
F01D	Q52
	X11-A01
F01D-005,-007	X11-A01A
F01D-005/02-10	X11-A01A2
F01D-005/12-20	X11-A01A1
F01D-005/22-34	X11-A01A2
F01D-009,-011	X11-A01B
F01D-017	X11-A10A
F01D-019,-021	X11-A10B
F01D-025	X11-A01C
F01L-001/00-3/24	Q51-E
F01L-005/00-24	Q51-E02
F01L-007/00-18	Q51-E03
F01L-009/04	X22-A11
F01L-015/00-031/00	Q51-E04
F01M-	Q51-F
F01M-003/00-04	Q51-F02
F01M-011/00-25	Q51-F01
F01N-009	X22-A07
F01P	X22-A10
F01P-	Q51-G
F01P-001/00-10	Q51-G01
F01P-003/00-22	Q51-G02
F02	W06-C01A1
F02B	X11-C02
F02B-033/00-44	Q51-H05A
F02C	X11-C01
F02D	X22-A03
	W06-B01A1
F02D,G05	W06-B01A1
F02D-001	X22-A03A3
F02D-009	X22-A03B
F02D-009/06	X22-A03B5
F02D-013	X22-A03G
F02D-013,-017	X22-A03D
F02D-023,-043	X22-A03C
F02D-041/02-20,24-28	X22-A03A
F02D-041/08,16,	X22-A03B3
F02D-041/30-32, 36-38	X22-A03A1
F02D-041/34,40	
1 020-04 1/34,40	X22-A03A1A
	X22-A03A1C
F02D-043	X22-A03A2
F02D-043,F02M-007/10	X22-A03A2A
F02M,F02M-027/04	X22-A02
F02M-001/12,	
-003/045,07,-007/10-1	1 X22-A02C
200,010,01,007,10-1	. 722 7020

F02P-007/02-04	F02M-003/045,06-07 F02M-013/00-15/02 F02M-025/08 F02M-025/08,-033 F02M-031/125 F02M-031/13 F02M-035 F02M-035/00-16 F02M-037/08-10 F02M-039-059 F02M-051,069/42 F02M-1/00-19/02 F02M-011,H01H F02P F02P,H01F-038/12 F02P-001 F02P-003/01,06-12 F02P-003/02-055 F02P-005	X22-A03B3 Q51-H01 X22-A03A4 X22-A02E X22-A02B X22-A15 X22-A06 Q51-H05 X22-A02D Q51-H01B X22-A02A Q51-H01A X22-A08 X22-A01 X22-A01 X22-A01A X22-A01A	F16C-001 F16C-003 F16C-005, -007 F16C-009 F16C-011 F16C-013 F16C-017 -043 F16D,F F16D,H F16G,H F16H-061 F16J F16K F16L F16K F16L F16M-S F16N F16T	Q62-A Q62-B Q62-C Q62-G Q62-D Q62-G Q62-G Q63 X25-L02 Q64 X22-G Q65 Q66 X25-L01 Q67 Q68 X25-X09 Q69
F02P-007/06	F02P-007	X22-A01C	F21	Q71
F02P-007/063-073   X22_A01C3   F21L-004/00-08   X26_E01   F02P-019				
F02P-009         X22-A01A9         F21M-003         X22-B01           F02P-011         X22-A01D         F21M-007         X22-B01           F02P-01702         X22-A01D         F21P-005         X26-K           F02P-019/02         X22-A01A3         F21P-001/002-6         X26-P           F03B         Q54-A         F21V-003/00-04         X26-D03           F03B         Q54-B         F21V-005/00-08         X26-D01           F03B-01-011         X11-B01         F21V-005/00-08         X26-D01           F03B-013/06         X11-B06         F21V-007/00-22         X26-D01A           F03B-013/12-24         X15-C01         X26-G           F03B-013/12-24         X15-C01         X26-G           F03B-013/12-24         X15-C01         X26-G           F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         Q53         X26-G           F03D-001-005         X15-B         F21V-009/00-16         X26-D01           F03D-007-011         X15-B01A         F21V-014/00-08         X26-D01           F03D-007-005         X15-B01A         F21V-014/00-08         X26-D01           F03G         Q54-F         F21V-014/00-08         X26-D01           F03				
FO2P-017         X22-A01D         F21P-005         X26-K           F02P-017/02         X22-A01E         F21Q-001         X22-B02           F02P-019/02         X22-A01A3         F21V-001/00-26         X26-P           F03B         Q54-A         F21V-003/00-04         X26-D03           X11-B         X26-D01         X26-D01           F03B-001-011         X11-B01         F21V-005/00-08         X26-D01B           F03B-013         X11-B09         F21V-007/00-22         X26-D01A           F03B-013/06         X11-B06         F21V-008         V07-N03           F03B-013/12-24         X15-C01         X26-G           F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         Q53-G         X26-G           F03D         Q54-G         F21V-008/00         V07-N03           F03D         X15-B01A         F21V-008/00         V07-N03           F03D-001-005         X15-B01A         F21V-009/00-16         X26-D01           F03D-001-005         X15-B01A         F21V-013/00-14         X26-D01           F03D-007-011         X15-B09         F21V-013/00-14         X26-D01           F03G         Q54-E         F21V-013/00-14         X26-D01 <tr< td=""><td></td><td></td><td></td><td></td></tr<>				
FO2P-017/02         X22-A01A3         F21V-001/00-26         X26-P           FO3B         Q54-A         F21V-003/00-04         X26-D01           F03B         Q54-B         F21V-005,-007,-009,-011,-013           X11-B         X26-D01           F03B-001-011         X11-B01         F21V-005/00-08         X26-D01B           F03B-013         X11-B09         F21V-007/00-22         X26-D01A           F03B-013/06         X11-B06         F21V-008         V07-N03           F03B-013/12-24         X15-C01         X26-G           F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         O53         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C           X15-B         F21V-009/00-16         X26-D01C           X15-B         F21V-011/00-18         X26-D01D           F03D-001-005         X15-B01A         F21V-013/00-14         X26-D01D           F03D-001-005         X15-B01A         F21V-013/00-14         X26-D01D           F03G         Q54-F         F21V-014/00-08         X26-LD01D           F03G         Q54-F         F21V-017/019         X26-X           F03H         Q54-X         F21V-029         X26-	F02P-011	X22-A01A7	F21M-007	X22-B01
F02P-019/02         X22-A01A3         F21V-001/00-26         X26-D03           F03B         Q54-A         F21V-003/00-04         X26-D03           C54-B         F21V-005,-007,-009,-011,-013         X11-B           F03B-001-011         X11-B01         F21V-005/00-08         X26-D01B           F03B-013         X11-B09         F21V-007/00-22         X26-D01A           F03B-013/06         X11-B06         F21V-008/00-22         X26-D01A           F03B-013/12-24         X15-C01         X26-G         X26-G           F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         Q53         X26-G         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C           X15-B         F21V-011/00-18         X26-D01C         X26-D01C           F03D-001-005         X15-B01A         F21V-013/00-14         X26-D01D         X26-D01D           F03G         Q54-E         F21V-014/00-08         X26-L         X26-D01D				
F03B				
Q54-B X11-B         F21V-005,-007,-009,-011,-013 X26-D01           F03B-001-011         X11-B01         F21V-005/00-08         X26-D01B           F03B-013         X11-B09         F21V-007/00-22         X26-D01A           F03B-013/06         X11-B06         F21V-008         V07-N03           F03B-013/12-24         X15-C01         X26-G         F21V-008/00         V07-N03           F03B-015         X11-B10         F21V-008/00         V07-N03         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C         X26-G           F03D         Q54-G         F21V-019/00-18         X26-D01C         X26-D01D         X26-D01D				
X11-B	FU3B			
F03B-001-011         X11-B01         F21V-005/00-08         X26-D01B           F03B-013         X11-B09         F21V-007/00-22         X26-D01A           F03B-013/06         X11-B06         F21V-008         V07-N03           F03B-013/12-24         X15-C01         X26-G           F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         Q53         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C           X15-B         F21V-011/00-18         X26-D01D           F03D-001-005         X15-B01A         F21V-013/00-14         X26-D01D           F03B-007-011         X15-B09         F21V-013/00-14         X26-D01           F03G         Q54-E         F21V-015/00-08         X26-L           F03G         Q54-E         F21V-015/00-08         X26-D03           F03H         Q54-X         F21V-017,-019         X26-X           F03H-005         W06-B03A         F21V-021         X26-R           F03H-005         W06-B03A         F21V-029         X26-D02           F04C         Q55         F23         Q73           F04C         Q55         F23         Q73           F04C         Q56-A			1214-005,-007,-007,-01	
F03B-013         X11-B09         F21V-007/00-22         X26-D01A           F03B-013/06         X11-B06         F21V-008         V07-N03           F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         Q53         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C           K15-B         F21V-011/00-18         X26-D01D           F03D-001-005         X15-B01A         F21V-011/00-18         X26-D01D           F03D-007-011         X15-B09         F21V-014/00-08         X26-L           F03G         Q54-E         F21V-015/00-08         X26-D01           F03H         Q54-F         F21V-015/00-08         X26-D03           F03H-005         W06-B03A         F21V-017,-019         X26-X           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F22         Q72           F04B         Q55         F23         Q73           F04D         Q56-A         X27-W02           F04F         Q56-B         F23G-007         X25-W01           F04F         Q56-B         F23G-007         X25-W01           F15B-007         Q57-A         F23Q	F03B-001-011		F21V-005/00-08	
F03B-013/12-24         X15-C01         X26-G           F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         Q53         X26-G         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C           F03D-001-005         X15-B         F21V-011/00-18         X26-D01D           F03D-007-011         X15-B09         F21V-013/00-14         X26-D01           F03G         Q54-E         F21V-015/00-08         X26-L           F03H         Q54-F         F21V-017/019         X26-X           F03H         Q54-X         F21V-017/019         X26-X           F03H-005         W06-B03A         F21V-021         X26-R           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F2         Q72           F04B         Q55         F23         Q73           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G         X25-W02           F04F         Q56-C         X25-W01         X25-W01           F04F         Q56-C         F23G-007         X25-W01           F15B-007         Q57-A         F23Q				
F03B-015         X11-B10         F21V-008/00         V07-N03           F03C         Q53         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C           X15-B         F21V-011/00-18         X26-D01D           F03D-001-005         X15-B01A         F21V-013/00-14         X26-D01           F03D-007-011         X15-B09         F21V-013/00-14         X26-D01           F03G         Q54-E         F21V-015/00-08         X26-L           F03H         Q54-X         F21V-017,-019         X26-X           F03H-005         W06-B03A         F21V-021         X26-R           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F22         Q72           F04B         Q55         F23         Q73           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G         X25-W01           F04F         Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01         X27-G0           F15B-007         Q57-A         F23Q         X27-G01           F15B-007         Q57-B         F23Q         Q72-A01E<	F03B-013/06	X11-B06	F21V-008	V07-N03
F03C         Q53         X26-G           F03D         Q54-G         F21V-009/00-16         X26-D01C           F03D-001-005         X15-B         F21V-011/00-18         X26-D01D           F03D-007-011         X15-B09         F21V-013/00-14         X26-D01           F03G         Q54-E         F21V-014/00-08         X26-L           F03G         Q54-F         F21V-015/00-08         X26-D03           F03H         Q54-X         F21V-017,-019         X26-X           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F21V-029         X26-D02           F04B         Q55         F22         Q72           F04B         Q55         F23         Q73           F04D         Q56-B         F23G-007         X25-W01           F04F         Q56-B         F23G-007         X25-W01           F04F         Q56-B         F23N         X27-G0           F15B-007         Q57-A         F23N         X27-G01           F15B-007         Q57-A         F23Q         X27-G01           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-C03				
F03D         Q54-G X15-B         F21V-009/00-16 F21V-011/00-18         X26-D01C X26-D01D           F03D-001-005         X15-B01A         F21V-011/00-18         X26-D01D           F03D-007-011         X15-B09         F21V-013/00-14         X26-D01           F03G         Q54-E Q54-F         F21V-015/00-08         X26-L           F03H         Q54-F         F21V-017,-019         X26-X           F03H         Q54-X         F21V-021         X26-R           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F22         Q72           F04B         Q55         X25-W02           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G           Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01           F04F         Q56-C         X25-W01           F15B-007         Q57-A         F23Q         X27-G02           F15B-009 - 13         Q57-B         F23Q         X27-G01           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-C03           F15B-015/19         Q57-B<			F21V-008/00	
X15-B			F31\/ 000/00 1/	
F03D-001-005         X15-B01A         F21V-013/00-14         X26-D01           F03D-007-011         X15-B09         F21V-014/00-08         X26-L           F03G         Q54-E         F21V-015/00-08         X26-D03           C54-F         F21V-017,-019         X26-X           F03H         Q54-X         F21V-021         X26-R           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F22         Q72           F04B         Q55         F23         Q73           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G         X25-W01           F04F         Q56-C         X25-W01A         X25-W01A           F15         Q57         F23N         X27-G01           F15B-007         Q57-A         F23Q         X27-G01           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-C           F15B-015/19         Q57-D         F24C         X27-C03           F15B-021/02         Q57-B         X27-C04           F15B-021/02         Q57-B         X27-C07           F15B         Q57-E	FU3D			
F03D-007-011         X15-B09         F21V-014/00-08         X26-L           F03G         Q54-E         F21V-015/00-08         X26-D03           Q54-F         F21V-017,-019         X26-X           F03H         Q54-X         F21V-021         X26-R           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F22         Q72           F04B         Q55         X25-W02           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G           P04F         Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01A           F15         Q57         F23N         X27-G02           F15B-007         Q57-A         F23Q         X27-G01           F15B-019-13         Q57-B         F23Q-007/00         X22-A01E           F15B-018         Q57-B         F24C         X27-C03           F15B-019         Q57-C         F24C         X27-C04           F15B-021/02         Q57-B         X27-C07           F15B-021/08         Q57-B         X27-C07           F15B-021/08         Q57-B         X27-C05 <t< td=""><td>F03D-001-005</td><td></td><td></td><td></td></t<>	F03D-001-005			
Q54-F       F21V-017,-019       X26-X         F03H       Q54-X       F21V-021       X26-R         F03H-005       W06-B03A       F21V-029       X26-D02         F04       X25-L03       F22       Q72         F04B       Q55       X25-W02         F04C       Q55       F23       Q73         F04D       Q56-A       X27-G         Q56-B       F23G-007       X25-W01         F04F       Q56-C       X25-W01A         F15       Q57       F23N       X27-G02         F15B-007       Q57-A       F23Q       X27-G01         F15B-009 - 13       Q57-B       F23Q-007/00       X22-A01E         F15B-017       Q57-C       F24       Q74         F15B-018       Q57-B       F24C       X27-E         F15B-019/19       Q57-X       X27-C03         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C07         F15C       Q57-E       F24C,H05B-006/02-44       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06				
F03H         Q54-X         F21V-021         X26-R           F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F22         Q72           F04B         Q55         X25-W02           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G         X25-W01           F04F         Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01A         X27-G02           F15B-007         Q57-A         F23N         X27-G02           F15B-009 - 13         Q57-B         F23Q-007/00         X22-A01E           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         F24C         X27-C03           F15B-015/19         Q57-D         F24C         X27-C03           F15B-021/02         Q57-B         X27-C07           F15B-021/08         Q57-B         X27-C09           F15C         Q57-E         F24C,F23         X27-C05           F16B         Q61         F24C,H05B-006/02-44         X27-C06	F03G		F21V-015/00-08	
F03H-005         W06-B03A         F21V-029         X26-D02           F04         X25-L03         F22         Q72           F04B         Q55         X25-W02           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G         X25-W01           F04F         Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01A         X27-G02           F15B-007         Q57-A         F23N         X27-G02           F15B-009 - 13         Q57-B         F23Q-007/00         X22-A01E           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-E           F15B-015/19         Q57-D         F24C         X27-C03           F15B-021/02         Q57-B         X27-C04           F15B-021/08         Q57-B         X27-C07           F15C         Q57-E         F24C,F23         X27-C05           F16B         Q61         F24C,H05B-006/02-44         X27-C06			•	
F04         X25-L03         F22         Q72           F04B         Q55         X25-W02           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G         X25-W01           F04F         Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01A         X27-G02           F15B-007         Q57-A         F23N         X27-G02           F15B-009 - 13         Q57-B         F23Q-007/00         X22-A01E           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-E           F15B-015/19         Q57-D         F24C         X27-C03           F15B-019         Q57-X         X27-C04           F15B-021/02         Q57-B         X27-C07           F15B-021/08         Q57-B         X27-C05           F16B         Q61         F24C,H05B-006/02-44         X27-C06				
F04B         Q55         X25-W02           F04C         Q55         F23         Q73           F04D         Q56-A         X27-G         X27-G           Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01A           F15         Q57         F23N         X27-G02           F15B-007         Q57-A         F23Q         X27-G01           F15B-009 - 13         Q57-B         F23Q-007/00         X22-A01E           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-E           F15B-015/19         Q57-D         F24C         X27-C03           F15B-019         Q57-X         X27-C04           F15B-021/02         Q57-B         X27-C07           F15B-021/08         Q57-B         X27-C09           F15C         Q57-E         F24C,F23         X27-C05           F16B         Q61         F24C,H05B-006/02-44         X27-C06				
F04C         Q55         F23         Q73           F04D         Q56-A         X27-G           Q56-B         F23G-007         X25-W01           F04F         Q56-C         X25-W01A           F15         Q57         F23N         X27-G02           F15B-007         Q57-A         F23Q         X27-G01           F15B-009 - 13         Q57-B         F23Q-007/00         X22-A01E           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-E           F15B-019/19         Q57-D         F24C         X27-C03           F15B-021/02         Q57-B         X27-C04           F15B-021/08         Q57-B         X27-C07           F15C         Q57-E         F24C,F23         X27-C05           F16B         Q61         F24C,H05B-006/02-44         X27-C06			F22	
F04D       Q56-A       X27-G         Q56-B       F23G-007       X25-W01         F04F       Q56-C       X25-W01A         F15       Q57       F23N       X27-G02         F15B-007       Q57-A       F23Q       X27-G01         F15B-009 - 13       Q57-B       F23Q-007/00       X22-A01E         F15B-017       Q57-C       F24       Q74         F15B-018       Q57-B       X27-E         F15B-019/9       Q57-D       F24C       X27-C03         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06			F23	
Q56-B       F23G-007       X25-W01         F04F       Q56-C       X25-W01A         F15       Q57       F23N       X27-G02         F15B-007       Q57-A       F23Q       X27-G01         F15B-009 - 13       Q57-B       F23Q-007/00       X22-A01E         F15B-017       Q57-C       F24       Q74         F15B-018       Q57-B       X27-E         F15B-015/19       Q57-D       F24C       X27-C03         F15B-019       Q57-X       X27-C04         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06			123	
F04F         Q56-C         X25-W01A           F15         Q57         F23N         X27-G02           F15B-007         Q57-A         F23Q         X27-G01           F15B-009 - 13         Q57-B         F23Q-007/00         X22-A01E           F15B-017         Q57-C         F24         Q74           F15B-018         Q57-B         X27-E           F15B-015/19         Q57-D         F24C         X27-C03           F15B-019         Q57-X         X27-C04           F15B-021/02         Q57-B         X27-C07           F15B-021/08         Q57-B         X27-C09           F15C         Q57-E         F24C,F23         X27-C05           F16B         Q61         F24C,H05B-006/02-44         X27-C06	1040		F23G-007	
F15B-007       Q57-A       F23Q       X27-G01         F15B-009 - 13       Q57-B       F23Q-007/00       X22-A01E         F15B-017       Q57-C       F24       Q74         F15B-018       Q57-B       X27-E         F15B-015/19       Q57-D       F24C       X27-C03         F15B-019       Q57-X       X27-C04         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06	F04F			
F15B-009 - 13       Q57-B       F23Q-007/00       X22-A01E         F15B-017       Q57-C       F24       Q74         F15B-018       Q57-B       X27-E         F15B-015/19       Q57-D       F24C       X27-C03         F15B-019       Q57-X       X27-C04         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06	F15	Q57	F23N	X27-G02
F15B-017       Q57-C       F24       Q74         F15B-018       Q57-B       X27-E         F15B-015/19       Q57-D       F24C       X27-C03         F15B-019       Q57-X       X27-C04         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06				
F15B-018       Q57-B       X27-E         F15B-015/19       Q57-D       F24C       X27-C03         F15B-019       Q57-X       X27-C04         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06				
F15B-015/19       Q57-D       F24C       X27-C03         F15B-019       Q57-X       X27-C04         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06			F24	
F15B-019       Q57-X       X27-C04         F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06			F24 <i>C</i>	
F15B-021/02       Q57-B       X27-C07         F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06			1240	
F15B-021/08       Q57-B       X27-C09         F15C       Q57-E       F24C,F23       X27-C05         F16B       Q61       F24C,H05B-006/02-44       X27-C06				
F15C Q57-E F24C,F23 X27-C05 F16B Q61 F24C,H05B-006/02-44 X27-C06				
F16B Q61 F24C,H05B-006/02-44 X27-C06			F24C,F23	
			•	
	F16C	Q62	F24C-007,	X27-C01

F42C-013 F42C-015 F42C-019

W07-C03C W07-C05 W07-C01

F24C-007,-015,	X27-C02
F24C-007,H05B	X27-C02C
F24C-007,H05B-003	X27-C02A
F24C-15/20	X27-B05
F24D	X27-E01A
F24D,F24H	X27-E01A1
F24D,F24J	X27-E01A5
F24D,H05B-003	X27-E01A3
F24F	X27-E01B
F24H	X27-E09
F24H,H05B	X27-E03A
F24H,H05B-003	X27-E03
F24J-002/04-40	X15-A01
F24J-003/08,H01L-035	X15-X
F25	Q75
F25B	X27-F X27-F02B X27-F02C
F25B-030/00 F25D-023 F26	X27-F03 X27-F02B X27-F01 Q76
F26B	X25-G
F27	Q77
F27D	X25-C
F27D-011/02-04	X25-C01
F27D-011/06	X25-C05
F27D-011/08-12	X25-C02
F27D-019,-021	X25-C03
F28	Q78
F41	Q79
F41,F42,H01,H02	W07-J
F41,F42,H01B,H01R	W07-J01
F41,F42,H02	W07-J03
F41,F42,H05K	W07-J05
F41,G09B	W07-D05
F41,H01J-031,H04N	W07-G
F41A-019/58	W07-E01
F41B-006,F41F	W07-E05
F41B-006,H02K	W07-E05A
F41B-015/04	W07-E08
F41G-001	W07-B01
F41G-001-003	W07-B
F41G-003,005	W07-B05
F41G-007	W07-A
F41G-007,G01C,S F41G-007,G01J,H01L F41G-007,G02B, F41G-007,H01Q	W07-A01C W07-A01A W07-A03B W07-A03D W07-A03A
F41G-007/20-22 F41G-007/24-28 F41G-007/30-32 F41H-005/007	W07-A03A W07-A01C W07-A01E1 W07-A01E3 W07-F03
F41H-007/00-10	Q19-D
F41H-011	W07-F03
F41H-011/12-16	W07-F05
F41H-011/16	Q19-D
F41J	W07-D01
F41J,G09B	W07-D
F42	Q79
F42C	W07-C
F42C-009	W07-C03E

	1	0045 007/04	
Section G		G01B-007/34	S02-A02,
G01,B64D	W06-B01B5	G01B-009,11	S02-A10E
G01,F41,F42	W07-H	G01B-009,11 G01B-009/02-029	S02-A03
G01,H01C-010	V01-A03D3	G01B-009/02-029	S02-A03, S02-A03A
G01,H01G-007	V01-B02B3	G01B-009/04-08	S02-A03A
G01,H01J-037	V05-F08B	G01B-007/04-00	S02-A03
G01B	S02-A	G01B-007/10	S02-A03,
G01B-003,005	S02-A01	G01B-011/02-06	S02-A03,
G01B-003/02-10, 12,18		0012 011/02 00	S02-A10B
G01B-003/11	S02-A10B	G01B-011/08-12	S02-A03,
C04D 002/40	S02-A01		S02-A10A
G01B-003/12	S02-A01A	G01B-011/14	S02-A03,
G01B-003/14	S02-A01		S02-A10B
G01B-003/16	S02-A10C S02-A01A	G01B-011/16	S02-A03,
G01B-003/18	S02-A01A		S02-A10F
G01B-003/18-56	S02-A01A S02-A01B	G01B-011/22	S02-A03,
G01B-003/56	S02-A01B,		S02-A10B
G01D 003/30	S02-A10D1	G01B-011/24-25	S02-A03,
G01B-005	S02-A01	0045 044/055	S02-A10C
G01B-005/004-016	S02-A01,	G01B-011/255	S02-A03,
	S02-A10G1	CO4D 044/07 075	S02-A10A
G01B-005/02-06	S02-A01,	G01B-011/26-275	S02-A03,
	S02-A10B	C01B 011/20	S02-A10D S02-A03,
G01B-005/08-12	S02-A01,	G01B-011/28	S02-A03, S02-A10C
	S02-A10A	G01B-011/30	S02-A10C S02-A03,
G01B-005/14-18	S02-A01,	G01B-011/30	S02-A03, S02-A10E
	S02-A10B	G01B-013	S02-A10L
G01B-005/20, 207, 213	•	G01B-013/02-06	S02-A04,
	S02-A10C	0012 010/02 00	S02-A10B
G01B-005/24	S02-A01	G01B-013/08-10	S02-A04,
CO4B 005/045 05 050	S02-A10D		S02-A10A
G01B-005/245, 25, 252,		G01B-013/12-14	S02-A04,
	S02-A01		S02-A10B
G01B-005/26	S02-A10D2 S02-A01,	G01B-013/16	S02-A04,
G01B-003/28	S02-A01, S02-A10C		S02-A10C
G01B-005/28	S02-A10C	G01B-013/18	S02-A04,
G01D 003/20	S02-A10E		S02-A10D
G01B-005/30	S02-A01	G01B-013/19, 195	S02-A04,
	S02-A10F	CO45 042/00	S02-A10D2
G01B-007	S02-A02	G01B-013/20	S02-A04,
G01B-007/004-016	S02-A02,	C01B 013/33	S02-A10C
	S02-A10G1	G01B-013/22	S02-A04, S02-A10E
G01B-007/02-06	S02-A02,	G01B-013/24	S02-A10L
	S02-A10B	G01B-013/24	S02-A04,
G01B-007/12-13	S02-A02,	G01B-015	S02-A05
0045 00744 45	S02-A10A	G01B-015/02	S02-A05,
G01B-007/14,15	S02-A02,		S02-A10B
C04D 007/4/ 04	S02-A10B	G01B-015/04	S02-A05,
G01B-007/16, 24	S02-A02,		S02-A10C
G01B-007/26	\$02-A10F	G01B-015/06	S02-A05,
G01B-007/20	S02-A02, S02-A10B		S02-A10F
G01B-007/28-293	S02-A10B	G01B-015/08	S02-A05,
301D-00//20-2/3	S02-A02, S02-A10C		S02-A10E
G01B-007/30	S02-A10C	G01B-017	S02-A05B
23.2 0000	S02-A10D	G01B-017/02	S02-A05B,
G01B-007/305, 315	S02-A02,	CO4D 047/01	S02-A10B
	S02-A10D2	G01B-017/04	S02-A05B,
G01B-007/32	S02-A02,		S02-A10F
	S02-A10C		
	·		

	1		
G01B-017/06	S02-A05B,	G01F-001/56-64	S02-C01B4
	S02-A10C	G01F-001/56-68	S02-C01B
G01B-017/08	S02-A05B,	G01F-001/66	S02-C01B1
	S02-A10E	G01F-001/68	S02-C01B7
C01B 021		G01F-001/684-692	
G01B-021	S02-A10		S02-C01B7A
G01B-021/02-08	S02-A10B	G01F-001/696-699	S02-C01B7C
G01B-021/10-14	S02-A10A	G01F-001/76-90	S02-C01F
G01B-021/16-18	S02-A10B	G01F-003	S02-C02
G01B-021/20	S02-A10C	G01F-011,013	S02-C04
G01B-021/22	S02-A10D	G01F-011/02-08	S02-C04A
G01B-021/24, 26	S02-A10D2	G01F-011/10-26	S02-C04B
G01B-021/28	S02-A10C	G01F-011/28-46	S02-C04C
G01B-021/30	S02-A10E	G01F-013	S02-C04X
G01B-021/32	S02-A10F	G01F-017,019	S02-C05
G01C	S02-B	G01F-023	S02-C06
G01C-001	S02-B05	G01F-023/14-20	S02-C06B
G01C-003	S02-B01	G01F-023/24	S02-C06C1
G01C-005,007	S02-B02	G01F-023/24,26	S02-C06C
G01C-009	S02-B03	G01F-023/26	S02-C06C3
G01C-011,013	S02-B04	G01F-023/26,28	S02-C06C9
G01C-017	S02-B06	G01F-023/28	S02-C06D
G01C-019	S02-B07	G01F-023/30-76	S02-C06A
G01C-019,G01B-009	V07-N01	G01F-025	S02-C07
G01C-019/64-72	S02-B07B	G01G	S02-D
G01C-021	S02-B08	G01G-001	S02-D01A
G01C-021,G01S	X22-E06	G01G-001-009	S02-D01
G01C-022	S02-B12	G01G-003	S02-D01B
G01C-023	S02-B11	G01G-005-009	S02-D01X
		G01G-003-007 G01G-011	S02-D01X
G01C-025	S02-B10		
G01C-029	U14-D01B	G01G-011-019	S02-D02
G01D	S02-K	G01G-013,015	S02-D02B
	S03-B01H5	G01G-017,019/02-07	S02-D02C
G01D,G01J,G12B	S03-A05	G01G-019/08-64	S02-D02X
G01D,G12B	S02-G07C	G01G-021,023/00-16,4	
•			
G01D-001	S02-K01	G01G-023/18-46	S02-D03
G01D-003	S02-K02	G01H	S02-E
G01D-004	S02-K08B	G01H-003,009,011	S02-E02
G01D-004,021	S02-K08	G01H-005,007,013, 015	S02-E01
G01D-005	S02-K03	G01H-017	S02-E09
G01D-005/00-10, 42-52		G01J	V07-N01
G01D-005/12-252	S02-K03A	3010	S03-A
		COA   CAOD OAE (00 0)	
G01D-005/12-40	S02-K03A5F	G01J,G12B-015/00-06	S03-A04
G01D-005/16	S02-K03A2A	G01J-001	S03-A01
G01D-005/16,20,22	S02-K03A2	G01J-001,G03B	W04-M01D5A
G01D-005/20	S02-K03A2C		W04-M01D5B
G01D-005/24	S02-K03A1C	G01J-001/00-60	S03-A01B1
G01D-005/24,242	S02-K03A1	30.0 00.700 00	S03-A01B5
G01D-005/242	S02-K03A1A		S03-A01B7
G01D-005/26-40	S02-K03B		S03-A01B9
G01D-007	S02-K04	G01J-001/00-60,42, 46	S03-A01B
G01D-007/12	S02-K04A	G01J-001/10-36	S03-A01A
G01D-009	S02-K05	G01J-001/12-26	S03-A02A1
G01D-011	S02-K06X	G01J-001/20-60	S03-A01B3
G01D-011,013,015	S02-K06	G01J-003,004	S03-A02
G01D-013	S02-K06A	G01J-003/00-52	S03-A02X
G01D-015	S02-K06B	G01J-003/12-40	S03-A02A
G01D-018	S02-K07	G01J-003/42,44	S03-A02B
G01D-021	S02-K08A	G01J-003/427	S03-E04A4
G01F	S02-C	G01J-003/45-453	S03-A02F
G01F-001	S02-C01	G01J-003/46-52	S03-A02C
G01F-001/05	S02-C01A	G01J-004/02,04	S03-A02C
G01F-001/06-12,34-50	S02-C01A1	G01J-005	S03-A03
G01F-001/20-32,52,54	S02-C01A9	G01J-007,009,011	S03-A09

G01K	S03-B	G01M-015	S02-J01
G01K-001,015	S03-B01H	G01M-017	S02-J02
G01K-001/20-26,015	S03-B01H5	G01N	S05-C05
G01K-001-013	S03-B01K	G01N,G01D,G12B	S03-E04P
	S03-B01X	G01N,G11B-005/84	T03-A02C5A
G01K-001-015	S03-B01	G01N,G11B-011,-013	T03-D01A8J
G01K-005	S03-B01D	G01N,H01J-009/20-223	
G01K-007/01,30-40	S03-B01C		V05-L02H
G01K-007/02-14	S03-B01A	G01N-001	S03-E13
G01K-007/18,20	S03-B01B	CO4NL 004 005 007 004	S03-E13F
G01K-007/22,	V01-A02A7A	G01N-001,005-007, 021	
G01K-007/22,24	S03-B01F	C01N 001/04 00	S03-E S03-E13A
G01K-013 G01K-015	S03-B01E S03-B01H1	G01N-001/04-08 G01N-001/10-20	S03-E13A S03-E13B
G01K-015	S03-B01H1 S03-B01H3	G01N-001/10-20 G01N-001/12,14	S03-E13B1
G01K-017,019	S03-B01113	G01N-001/12,14 G01N-001/16-20	S03-E13B1
G01K-017,017	S02-F	G01N-001/10-20 G01N-001/22-26	S03-E13D2
G01L-001	S02-F01	G01N-001/28-44	S03-E13D
G01L-001/02-08	S02-F01A	G01N-003	S03-F02
G01L-001/10-14	S02-F01B	G01N-003,009-019, 037	
G01L-001/16	S02-F01E		
G01L-001/18-22	S02-F01C	G01N-003/08-18 G01N-003/20-24	S03-F02D
G01L-001/24	S02-F01G	G01N-003/26,28,62	S03-F02X
G01L-001/25-26	S02-F01X	G01N-003/26,28,62 G01N-003/30-38 G01N-003/40-54	S03-F02E
G01L-003	S02-F02	G01N-003/40-54	S03-F02A
G01L-005	S02-F03	G01N-003/56-60	S03-F02B
G01L-005/03-10	S02-F03A	G01N-005	S03-E12B
G01L-005/12,13,16,22,2		G01N-005,007	S03-E12
	S02-F03B	G01N-009	S03-F01
G01L-005/14,18-22,26		G01N-009/02-06, 30-36	
G01L-007	S02-F04A	G01N-009/08-28	S03-F01A
G01L-007/04,06	S02-F04A1	G01N-011	S03-F03
G01L-007/08-14	S02-F04A2	G01N-011/02-08	S03-F03X
G01L-007/16-24	S02-F04A9 S02-F04X	G01N-011/10-16	S03-F03A S03-F04
G01L-007-023 G01L-007-027	S02-F04X	G01N-013/00-04 G01N-015/01	S03-F04 S03-E14H1
G01L-007-027 G01L-009	S02-F04 S02-F04B	G01N-015/01 G01N-015/02	S03-F05C
G01L-007 G01L-009/02-06	S02-F04B1	G01N-015/0205	S03-F03C
G01L-009/08-18	S02-F04B2	G01N-015/02-05	S03-E04
G01L-011/02	S02-F04J	G01N-015/04,05	S03-F05A
G01L-013	S02-F04C1	G01N-015/06	S03-F06A
G01L-013,17	S02-F04C1A	G01N-015/06-14	S03-F06
G01L-013/00-06,15,17	S02-F04C	G01N-015/08-14	S03-F06B
G01L-015	S02-F04C3	G01N-015/1031,12,13	S03-E02
G01L-019	S02-F04E	G01N-017/00-04	S03-F07
G01L-021	S02-F04D1	G01N-019/02-04	S03-F08
G01L-021,023	S02-F04D	G01N-019/10	S03-F09
G01L-023	S02-F04D3	G01N-021	S03-E04
G01L-025,027	S02-F04F		S03-E04R1
G01M	S02-J	G01N-021,G01M-011	V07-J
G01M-001	S02-J05	G01N-021/21-39	S03-E04A5G
G01M-003	S02-J06	CO4N, 004 (0F 30	S03-E04A5L
G01M-003/04-24 G01M-003/16	S02-J06A	G01N-021/25-39	S03-E04A4
	S02-J06A1	C01NL021/27	S03-E04A
G01M-003/20 G01M-003/24	S02-J06A5 S02-J06A3	G01N-021/27 G01N-021/31-39	S03-E04A1 S03-E04A5
G01M-003/24 G01M-003/26-34	S02-J06AS S02-J06B	G01N-021/33 G01N-021/33	S03-E04A5E
G01M-003/26-34 G01M-003/36	S02-J06X	G01N-021/35 G01N-021/35	S03-E04A5B
G01M-003/30 G01M-007	S02-300X S02-J08	G01N-021/41-45	S03-E04A5B
G01M-009/00-08,10	S02-J07	G01N-021/41-61	S03-E04B
G01M-011	S02-J04	G01N-021/47-53	S03-E04C
	V07-N02	G01N-021/51	S03-E04C2
G01M-013	S02-J03	G01N-021/53	S03-E04C1
	•		

G01N-021/55-57	S03-E04B1B	G01N-030,031	S03-E09
G01N-021/55-61	S03-E04B1	G01N-030/02-96	S03-E09C
G01N-021/59-61	S03-E04B1A	G01N-030/62-78	S03-E09C7
G01N-021/62-74	S03-E04D	G01N-030/66	S03-E09C7C
G01N-021/65	S03-E04D1	G01N-030/68	S03-E09C7D
G01N-021/75-83	S03-E04E	G01N-030/70	S03-E09C7E
G01N-021/85	S03-E04H	G01N-030/72	S03-E09C7B
G01N-021/86	S03-E04G	G01N-030/74	S03-E09C7A
G01N-021/87	S03-E04F3	G01N-031/02	S03-E09A
G01N-021/87-91	S03-E04F	G01N-031/10,12	S03-E09B
G01N-021/88-91	S03-E04F1	G01N-031/16-20	S03-E09D
	S03-E04F2	G01N-031/22	S03-E09E
G01N-022	S03-E05	G01N-033	S03-E14
G01N-022/02	S03-E05C	G01N-033,035	S05-C01
G01N-022/04	S03-E05A		S05-C09
G01N-023	S03-E06		S05-C
G01N-023/04	S03-E06H2 V05-F08A		S05-C01 S05-C09
G01N-023/04,	V05-F04J		S05-C07
G01N-023/04, G01N-023/04.05	S03-E06B	G01N-033/02-15	S03-C02
G01N-023/04-03 G01N-023/06-18	S03-E06A	G01N-033/02-13 G01N-033/15	S03-E14A1
G01N-023/00-10 G01N-023/18	S03-E06A1	G01N-033/18	S03-E14A1
G01N-023/20-207	S03-E06C	G01N-033/20	S03-E14D
G01N-023/20-207 G01N-023/22-227	S03-E06D	G01N-033/20 G01N-033/22	S03-E14E1
G01N-024	S03-E07G	30114 033/22	S03-E14E3
30111 021	S03-E07X	G01N-033/22,24	S03-E14E
G01N-024/00-14	S03-E07	G01N-033/24	S03-E14E7
G01N-024/08	S03-E07A	G01N-033/26-32	S03-E14F
	S03-E07C	G01N-033/34,36	S03-E14G
G01N-024/10	S01-E02A4	G01N-033/38	S03-E14D1
	S03-E07E		S03-E14D4
G01N-025	S03-E01	G01N-033/38-46	S03-E14D
G01N-025/02-18	S03-E01A	G01N-033/44-46	S03-E14D7
G01N-025/20-48	S03-E01C	G01N-033/48-98	S03-E14H
G01N-025/25-62	S03-E01B3		S03-E14L
G01N-025/50-72	S03-E01B	G01N-033/53-577	S03-E09F
G01N-027	S03-E02C5	G01N-035	S03-E13D1
G01N-027/02-24	S03-E02	G01N-035/00-10	S03-E15
G01N-027/06-10,14-20		G01P	S02-G
G01N-027/12	S03-E02A	G01P-003	S02-G01
G01N-027/22	S03-E02C1	G01P-003/36-40	S02-G01A S02-G01B
G01N-027/22,24 G01N-027/24	S03-E02C S03-E02C3	G01P-003/42-60 G01P-003/44-495	S02-G01B S02-G01B1
G01N-027/24 G01N-027/26-453	S03-E03A	G011-003/44-473 G01P-003/50-60	S02-G01B1
00111-027720-455	S03-E03A S03-E03B	G01P-005	S02-G01B7
	S03-E03C	G01P-005/01,18-22	S02-G02X
	S03-E03X	G01P-005/02-07, 14-175	
G01N-027/26-49	S03-E03	G01P-005/08-12	S02-G02A
G01N-027/327	S03-E03C1	G01P-013	S02-H
G01N-027/447	S03-E03E	G01P-015/00-16	S02-G03
G01N-027/60-70	S03-E10A8	G01P-021, G01D, G12B	
	S03-E10A2	G01Q	V05-F01A5
	S03-E10A	G01R,H01C-017	V01-A04H1
	S03-E10A1	G01R,H01G-013	V01-B04C
	S03-E10A1A	G01R,H01L,H01P-011	W02-A07B1
	S03-E10A3	G01R,H01Q-001	W02-B08A
	S03-E10A5	G01R,H04B-003/46-48	W01-C08C
G01N-027/72-90	S03-E11		W02-C01D
G01N-027/82-90	S03-E11A	G01R-001,015,035	S01-H
G01N-027/92	S03-E10C	G01R-001/06-067	S01-H03B
G01N-029	S03-E08	G01R-001/06-073	S01-H03
G01N-029/02,16-28	S03-E08X	G01R-001/073	S01-H03A
G01N-029/04-14	S03-E08A	G01R-001-009	T01-A

G01R-011 G01R-013 G01R-013/20-34 G01R-015 G01R-015/02-07 G01R-015/20 G01R-017 G01R-017/02-08, 20,22 G01R-017/10-18 G01R-019 G01R-019/02-03 G01R-019/04 G01R-019/04-12 G01R-019/14 G01R-019/14	\$01-B \$01-C \$01-C01 \$01-H07 \$01-H02 \$01-D01D1 \$01-F \$01-F09 \$01-F01 \$01-D01 \$01-D01A3 \$01-D01A \$01-D01B \$01-D01B	G0 G0 G0 G0 G0 G0 G0 G0 G0	1R-033/02-10 1R-033/032 1R-033/035 1R-033/06 1R-033/12-18 1R-033/12-64 1R-033/20-567 1R-033/20-64 1R-033/24-465 1R-033/30,31 1R-033/32-38 1R-033/38-389 1R-033/48-58	S01-E01 S01-E01C S01-E01A S01-E01B S01-E02X S01-E02 S01-E02A3 S01-E02A8 S01-E02A9 S01-E02A S01-E02A1 S01-E02A1A S01-E02A8A S01-E02A8E S01-E02A2
G01R-019/165-17 G01R-019/18	S01-D01B5 S01-D01C	G0	1R-033/56-567	S01-E02A2A S01-E02A8C
G01R-019/18-20	S01-D01C1A		1R-035	S01-H01
G01R-019/18-20, 25-25		G0	15	W06-A
G01R-019/22 G01R-019/25-257	S01-D01C5 S01-D01C1B			W06-B01B1 W06-B02E
G01R-019-029	S01-D01C1B			X22-E06
G01R-021,022	S01-D02	G0	1S-001	W06-A01
G01R-023	S01-D03		1S-001/68	W06-A01C
G01R-023/06-09,12	S01-D03A	G0	1S-003	W06-A02
G01R-023/10	S01-D03B		1S-003/02-74	W06-A02A
G01R-023/16-20	S01-D03C		1S-003/78-789	W06-A02C
G01R-025	S01-D04 S01-D05		1S-003/80-82,86,	W04-Y03G3 W06-A02E
G01R-027 G01R-027/02-22	S01-D05 S01-D05B		1S-003/80-86 1S-005	W06-A02E
G01R-027/02-22	S01-D03B S01-D05A		1S-007	W06-A03
G01R-027/28-32	S01-D05C		1S-007,-007/28	W06-A04G5
G01R-029/02-033	S01-D06		1S-007,-007/282	W06-A04G1
G01R-029/06	S01-D08A		1S-007,-007/285-34	W06-A04G3
G01R-029/06,26	S01-D08		1S-007,-007/292	W06-A04E5
G01R-029/08,10	S01-D07B		1S-007,-007/40	W06-A04E3C
G01R-029/08-14	S01-D07		1S-007,013	W06-A04
G01R-029/10	S01-D07B1		1S-007,-013	W06-A04G
G01R-029/12,14 G01R-029/26	S01-D07A S01-D08B		1S-007,-013,H01Q 1S-007,013/02-72	W06-A04G7 W06-A04A
G01R-027/20	S01-D00B		1S-007,013/06-48	W06-A04A1
301K 301	V04-R06		1S-007,013/50-64	W06-A04A2
G01R-031/02-06	S01-G04A		1S-007,013/74-84	W06-A04B
	S01-G04C	G0	1S-007,015	W06-A05
G01R-031/02-07	S01-G04		1S-007,015,H04R	W06-A05C7
G01R-031/08-11	S01-G05		1S-007,017	W06-A06
G01R-031/12-20	S01-G03		1S-007/00-51	W06-A06C
G01R-031/24,25, G01R-031/24-25	V05-L07E S01-G02A		1S-007/04-26 1S-007/28-292	W06-A04C W06-A04D
G01R-031/24-25 G01R-031/24-26	S01-G02A S01-G02		1S-007/28-292 1S-007/295,298	W06-A04E3E
G01R-031/26-27	S01-G02 S01-G02B		1S-007/295,298,40	W06-A04E3
G01R-031/28-3163	S01-G01C1		1S-007/36	W06-A04E1C
G01R-031/28-318	S01-G01			W06-A05C8
G01R-031/28-3193	S01-G01A	G0	1S-007/36,38	W06-A04E1
	S01-G01B	G0	1S-007/40	W06-A04E3A
G01R-031/316-3163	S01-G01C		1S-007/495	W06-A06C8
G01R-031/317	U21-C03D1		1S-007/497	W06-A06C5
G01R-031/3177	S01-G01A5		1S-007/51	W06-A06C3
G01R-031/327-333	S01-G10		1S-007/537,-015	W06-A05C8
G01R-031/34 G01R-031/36	S01-G07 S01-G06		1S-007/56-52,-015 1S-013	W06-A05C3A W06-A04H
G011X-031/30	X16-H	GU	13-013	W06-A04A
G01R-033	S01-E	G0	1S-013,-013/90	W06-A04J

G01S-013/32-40,536,		G01V-003/12-40	S03-C02X
82-84	W06-A04F	G01V-003/175	S03-C02F
G01S-013/89,90	W06-A04H3	G01V-005	S03-C03
G01S-013/91,92	W06-A04H7	G01V-005/20,22,26	S03-C06
G01S-013/93	W06-A04H1K	G01V-007-011	S03-C04
G01S-013/94	W06-A04H1	G01V-008/02	S03-C04A
G01S-013/95,G01W-00		G01V-008/10-26	S03-C08
G01S-015	W06-A05C7	G01V-009/04	S03-C08A
G01S-015/02	W06-A05D	3017 007701	S03-C08C
G01S-015/04-46	W06-A05D1	G01V-013	S03-C10
G01S-015/50-62	W06-A05D1	G01V-013 G01V-020	T01-J13
G01S-015/66	W06-A05H5	G01V-020 G01W	S03-D
G01S-015/74	W06-A05B	G01W,G08G	T07-G05
G01S-015/88	W06-A03B W06-A05H	G01W-001/14	S03-D02A
G01S-015/89	W06-A05H3	G01VV-001/14 G02	P81
G01S-015/93	W06-A05H1K	G02B,H01J-029/89	V05-D07C5A
G01S-015/96	W06-A05H1C		V05-D07C5E
G01S-017/02	W06-A06D	C00D 004	V05-D07C5
G01S-017/06-46	W06-A06D1	G02B-001	P81-A
G01S-017/50-58	W06-A06D2	0000 000	V07-F02
G01S-017/66	W06-A06H5	G02B-003	P81-A01
G01S-017/74	W06-A06B	G02B 3/14	P81-A01V1
G01S-017/88	W06-A06H	G02B-005	P81-A
G01S-017/89	W06-A06H3		V 07-F02
G01S-017/93	W06-A06H1K	G02B-003,-005	V07-F02A
G01S-017/95	W06-A06H2	G02B-003,006/32	V07-G04
	W06-A06H9	G02B-005	V07-F02B
G01S-017/96	W06-A06H9	G02B-005/32	V07-F02C
G01S-019	W06-A03A5	G02B-006	P81-A09
G01S-019/13-37	W06-A03A5R		V07-F01
G01S-019/03-12,41	W06-A03A5A		V07-F01A3A
G01S-019/42-51	W06-A03A5C		V07-F01A3C
G01T	S03-G		V07-G02
G01T-001	S03-G02		V07-G03
G01T-001/02-15	S03-G02A		V07-G10A
G01T-001/16-28	S03-G02B		V07-H04
G01T-001/18	S03-G02B2A	G02B-006,H01J-029/89	V05-D07C5C
G01T-001/18-185,22-2	8 S03-G02B2	G02B-006/04-08	V07-F01A1B
G01T-001/185	S03-G02B2C	G02B-006/06	V07-F01A1C
G01T-001/20-208	S03-G02B1	G02B-006/12	V07-F01A5S
G01T-001/24	S03-G02B2G	G02B-006/13	V07-F01A5A
G01T-001/28	S03-G02B2E	G02B-006/14	V07-F03
G01T-001/29	S03-G02C1	G02B-006/24-42	V07-G
G01T-001/29-40	S03-G02C	G02B-006/245,25	V07-G01
G01T-001/30	S03-G02C5	G02B-006/255	V07-G10B
G01T-001/32	S03-G02C1A	G02B-006/28	V07-G10E
G01T-001/34	S03-G02C1C	G02B-006/28,	V07-G11
G01T-001/36-40	S03-G02C3	G02B-006/30	V07-G10D
G01T-003	S03-G01C	G02B-006/42	U12-A01C
G01T-003,005	S03-G01	G02B-000/42	V07-G10C
G01T-005,005	S03-G01A	G02B-006/44	V07-G10C
G01V	S03-C	G02B-000/44	V07-F01B1A
G01V-001	S03-C01		V07-H01B
G01V-001/01	S03-C05		V07-K01
G01V-001/01 G01V-001/02-157	S03-C01A	G02B-006/44,46	V07-H04A
G01V-001/02-157 G01V-001/16-26		•	P81-A
G01V-001/16-26 G01V-001/28-37	S03-C01B S03-C01X	G02B-007	
		C03P 000 01F	P81-T01
G01V-001/38-393	\$03-C01C1	G02B-009 -015	P81-A01
G01V-001/38-40	\$03-C01C	G02B-017	P81-A
G01V-001/40	\$03-C01C5	G02B-019	P81-A13
G01V-003	\$03-C02	G02B-021	P81-A50C
G01V-003/02-06	S03-C02A	G02B-023	P81-A50A
G01V-003/08-11	S03-C02B	G02B-025	P81-A50C

G02B-026	P81-A50J	G03B-003	S06-B01B
0020 020	V07-K	G03B-003,013	S06-B01
G02B-026,H04N-		G03B-003,013,G11B	S06-B01B2B
001/04-20	S06-D03	G03B-003/02	S06-B01B1
G02B-026/02	V07-G15	G03B-005	S06-B01E
	V07-K01B	G03B-007	S06-B02A
G02B-026/06	V07-K02		S06-B02B
G02B-026/08,10	V07-K05		S06-B02C
G02B-027/10	V07-G10E		W04-M01D5C
G02B-027/56	V07-G11	G03B-007,009	S06-B02
G02C	P81-A50G	G03B-007/26	S06-B08C
	X27-A02D	G03B-009	W04-M01C7
G02C,H04R-025	W04-Y05A5		W04-M01C8
G02F	P81-A50J	G03B-011	W04-M01C3
G02F,G02B-026	V07-K	G03B-011,H01L-027, H	
G02F,H04B-010	W02-C04A6	G03B-013	S06-B01A
G02F,H04N-005/74,-9/			W04-M01D
G02F-001	W04-Q01E7	C03D 01E/03 0E	W04-M01D3C
G02F-001	V07-K01A	G03B-015/03-05	S06-B03 S06-B03B
	V07-K01C V07-K10	G03B-015/04 G03B-015/05	S06-B03B
	W04-Q01B5	G03B-021,023	S06-B05A
	T03-B02B7E	G03B-021/56-62	W04-Q01F
	V07-K01C2	G03B-02 1/30-02	W04-Q01F5
	V07-K01C2 V07-K01C1	G03B-027	S06-B04A
	V07-K01C1	G03D-027 G03C	P83
	V07-K02	G03D-H	P84
	W02-C04A5A	G03F	V05-F08C
G02F-001/03	U14-K04	G03F-007	U11-A06
G02F-001/09	V07-K03		V04-R01A
G02F-001/13	U14-K01	G03F-007/004	V04-R01A1
G02F-001/133	U14-K01A	G03F-007/16	U11-C04A1B
G02F-001/133,	U14-K01A2C	G03F-007/20	U11-C04B3
G02F-001/133,134	U14-K01A1		U11-C04B1
G02F-001/1335	U14-K01A1C		U11-C04B2
G02F-001/1337	U14-K01A1A		U11-C04C
G02F-001/1339	U14-K01A1D		U11-C04E1
G02F-001/1341	U14-K01A1J	G03F-007/20-24	V04-R12
G02F-001/1343	U14-K01A1B	G03F-007/213	U11-C04E1A
G02F-001/1345	U14-K01A4B	G03F-007/30	U11-C04A1C
G02F-001/135	U14-K01A2D	G03F-007/32	U11-A11
G02F-001/136	U14-K01A2	G03F-007/36	U11-C04A1D
	U14-K01A2B	G03F-007/38,40	U11-C04A1A
C02F 004 /427	U14-K01A2A	G03F-009	V04-R10
G02F-001/137	U14-K01A1G	G03G G03G-005	S06-D/K S06-E01
G02F-001/15 G02F-001/153,155,157	U14-K02	G03G-005 G03G-005,013/04,015/	
G02F-001/153,155,157	,161 U14-K02A U14-K02B	G03G-005/04-09	S06-E01A
G02F-001/167	U14-K03	G03G-005/04-07	S06-E01A1
G02F-001/107	V07-K04	G03G-005/08	S06-E01A2
G02F-001/29-33	V07-K04 V07-K05	G03G-005/09	S06-E01A3
G02F-001/313,025	U12-A02C3	G03G-005/10,14	S06-E01B
G02F-001/35-39	V07-K10B	G03G-005/12,013/01,	300 E01B
G02F-003	V07-K06	015/01	S06-K01
G02F-007,H01L-039, H		G03G-005/16,013/04,0	
,,	U21-A03G	G03G-009	S06-E04C
G03B	P82	G03G-009,013/06, 015	
G03B,G03G	S06-B04A1	G03G-009,013/06-10,	
G03B,H04N-005/225	W04-M01C	G03G-009,013/08-12,	
G03B-001	S06-B04B	G03G-009/08-10	S06-E04C1
	S06-B08A	G03G-009/08-10,013/0	
G03B-001,017	S06-B08B	G03G-009/12-14	S06-E04C2
G03B-001,027	S06-B04		S06-E04B

SOL-EDID   SOL-EDID	G03G-009/16	S06-E04C9	G04C-001	1,003/14, 003/	16.010
G03G-013/02,015/02   S06-E02			30.000	.,000,, 000,	
G03G-013/02,015/02   S06-E02   S06-E02   S06-E03   S04-E03   S04-E03   S04-E03   S04-E03   S06-E03   S06					S04-B02
S06-E02A   G04C-010   S04-B01A   G03G-013/04,015/04   S06-E03G   G04C-011,013,015   S04-B01A   S06-E03G   G04C-021,064-013   S04-B05   S06-E03B   G04C-022,064G-013   S04-D05   S06-E03B   G04F-007-013   S04-C09   S06-E03G   G04F-007-013   S04-C03   S06-E03G   G04F-007-013   S04-C03   S06-E03G   G04G-G018, MW4-E04C   G03G-013/04,015/04,015/043   S06-E03E   G04G-007,011   S04-B04   S06-E03E   G04G-007,011   S04-B04   G03G-013/04-05,015/04-05   G03G-013/04-05,015/04-05   S06-E03B   G04G-009,011   S04-B04   G03G-013/04-05,015/04-05   S06-E03B   G04G-009,011   S04-B04   G03G-013/04-05,015/04-05   G03B,G06F,G07F   T05-H08C1   T05-H08C1   S06-E04A2   G03B-005,006   T06-A01   S06-E04A2   G03B-005,006   T06-A02   G03G-013/10-11,015/10-11   S06-E04A2   G03B-005,006   T06-A02   G03G-013/10-11,015/10-11   S06-E04B   G03G-013/10-11,015/10-11   S06-E04B   G03G-013/10-11,015/10-12   T06-A06A   G03G-013/10-11,015/10-13   S06-E04B   G03G-011/06-12   T06-A06A   G03G-013/10-11,015/10-13   S06-E05   G03B-011/06-12   T06-A06A   G03G-015,021/02   S06-E06   G03B-011/06-12   T06-A06A   G03G-015,021/02   S06-E07   G03B-011/06-12   T06-A06A   G03G-015,021/02   S06-E07   G03B-011/06-12   T06-A06A   G03G-015,021/02   S06-E07   G03B-011/06-12   T06-A06A   G03G-015/23,021   S06-E03   G03G-015/23,021					
G03G-013/04,013/054   S06-E03X   G04C-011,013,015   S04-B016   S06-E03A   S06-E03A   S06-E03B   G04C-023,G04G-013   S04-B05   S06-E03B   S06-E03B   G04C-023,G04G-013   S04-B05   S06-E03B   S06-E03B   G04C-023,G04G-015   S04-C0   S04-C0   S06-E03G   S06-E03G   G04F-001-005   S04-C09   S06-E03G   S06-E03G   G04F-001-005   S04-C03   S06-E03G   G04F-001-005   S04-C03   S06-E03G   G04F-001-005   S04-C03   S06-E03G   G04G-G01B   W04-E04C   G03G-G11B, W04-E04C   G03G-G11B, W04-E04C   G03G-G11B, W04-E04C   G03G-G11B, W04-E04C   G03G-G11B, W04-E04C   G03G-G013/04,015/041   S06-E03C   G03G-009,011   S04-B06   G03G-013/04,015/041   S06-E03C   G03G-009,011   S04-B06   G03G-013/04,015/041   S06-E03C   G03G-009,011   S04-B06   G03G-013/04,015/041   S06-E03C   G03B-001   T06-A01   G03G-013/04,015/041   S06-E03C   G03B-001   T06-A01   G03G-013/04,015/041   S06-E03C   G03B-001   T06-A01   G03G-013/10-11,015/10-11   G03B-007,009   T06-A02   G03B-001   T06-A01   G03G-013/10-11,015/10-11   G03B-007,009   T06-A02   G03B-013/10-11,015/10-11   G03B-007,009   T06-A02   G03G-013/10-11,015/10-11   G03B-007,009   T06-A02   G03G-013/10-11,015/10-11   G03B-007,009   T06-A02   G03G-013/10-11,015/10-11   G03B-007,009   T06-A03   G03G-013/10-11,015/10-11   G03B-007,009   T06-A02   G03G-013/10-11,015/10-11   G03B-007,009   T06-A02   G03G-013/10-11,015/10-11   T06-A06   G03G-013/10-11,015/	G03G-013/02,015/02				
Gold-013/04,015/04   Sob-E03G3   Gold-017,019   Sob-Bob   Sob-E03B   Sob-E03B   Gold-023,Gold-013   Sob-Bob   Sob-E03B   Gold-023,Gold-015   Sob-C03B   Gold-023,Gold-015   Sob-C03B   Gold-007,005   Sob-C03F   Gold-007,005   Sob-C03F   Gold-007,005   Sob-C03F   Gold-007,005   Sob-C03B   Gold-007,005   Sob-C03G   Gold-007,005   Sob-C03G   Gold-007,005   Sob-E03G   Gold-Gold-007   Sob-E03G   Gold-Gold-007   Sob-E03G   Gold-Gold-007   Sob-Bob   Sob-E03G   Gold-007,001   Sob-Bob   Gold-007   Sob-Bob   Gold-007   Sob-Bob   Gold-007   Sob-Bob   Gold-007,001   Tob-Aob   Gold-007,001   Tob-Aob   Tob-Aob   Tob-Aob   Gold-007,001   Tob-Aob   Tob-	C00C 040/04 040/054				
SO6-E03A   SO6-E03B   SO6-E03B   SO6-E03D   SO6-E03D   SO6-E03D   SO6-E03D   SO6-E03D   SO6-E03D   SO6-E03E1   SO6-E03E1   SO6-E03E1   SO6-E03E1   SO6-E03E3   SO6-E03G3   S					
SO6-E03B   SO6-E03E   SO4-C   SO4-D   SO4-D   SO4-D   SO4-D   SO4-E03E1   SO6-E03E1   SO6-E03E1   SO6-E03E3   SO4-C07   SO4-C07   SO4-E03E3   SO6-E03G3   SO4-C07   SO4-E04-O7-O13   SO4-C03   SO4-C03   SO4-C07   SO4-E04-O7-O13   SO4-C03   SO4-C03   SO4-C07   SO4-E04-O7-O13   SO4-C03   SO4-E03E3   SO4-C03   SO4-C07   SO4-E04-O7-O13   SO4-E04-O7-O13   SO4-E04-O7-O13   SO4-E04-O7-O13   SO4-E04-O7-O13   SO4-E04-O7-O13   SO4-E03E   SO4-G099,011   SO4-B06   SO4-E03E   SO4-G099,011   SO4-B06   SO4-E04-O7-O13-O15-O15-O15-O15-O15-O15-O15-O15-O15-O15	G03G-013/04,015/04				
S06-E03D   S06-E03F   G04F-001-005   S04-C09   S06-E03F   G04F-007-013   S04-C03   S06-E03G3   G04G,G11B, W04-E04C   G03G-013/04,015/04,015/043   G04G-007   S04-B06   G04G-007   S04-B06   G04G-007,011   S04-B06   G03G-013/04,015/041   S06-E03C   G04G-007   S04-B06   G03G-013/04,015/041   S06-E03C   G05B   G04G-007   S04-B06   G03G-013/04-05,015/04-05   G05B-003   T05-H08C1					
SO6-E03E1   SO6-E03E3   SO4-C09   SO4-C09   SO4-C03				7,0040-013	
SO6-E03F   SO6-E03G3   SO4-G07-013   SO4-C03				-005	
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S06-E03E   G04G-099,011   S04-B04   G03G-013/04,015/041   S06-E03   T05-H08C   T05-H08		S06-E03G1	G04G,G1	1B,H04N	W04-E04C
G03G-013/04,015/041 S06-E03C G03G-013/04-05,015/04-05 S06-E03 G05B-013/06,015/06 S06-E04A2 G05B-005,-006 T05-H08C T05-H0	G03G-013/04,015/04,0				
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S06-E04B	G03G-013/10-11 015/1			•	
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G03G-013/20,015/20 S06-E06 G05B-011/14-18 T06-A06A1D G03G-015,021/02 S06-K07C1 G05B-011/26-30,32 T06-A06A2 G03G-015,021/04 S06-K07 G05B-011/36-42 T06-A06A9 G03G-015/04,015/054 S06-E03X G05B-011/34-60 T06-A06B G03G-015/23,021 S06-K02A G05B-013 T06-A05 G03G-015/36 S06-K07A4 G05B-015 T06-A07A G03G-015/36 S06-K07A4 G05B-017 T06-A07B G03G-015/36 S06-K07A4 G05B-017 T06-A07B G03G-016,019 S06-E07 G05B-017 T06-A07B G03G-017 S06-E07 G05B-017 T06-A04B S06-K02 G05B-019/04 T06-A04B S06-K02 G05B-019/04 T06-A04B S06-K02 G05B-019/04 T06-A04B G05B-019/04 T06-A04B S06-K02 G05B-019/18 T06-A04A1 G03G-021/10,021/12 S06-K06C2 G05B-019/14,01,402, G03G-021/10,021/12 S06-K06C2 G05B-019/14,01,402, G03G-021/14 S06-K07A G05B-019/40 T06-A04A9 G03G-021/14 S06-K07A G05B-019/40 T06-A04A9 G03G-021/20 S06-E01D G05B-019/40P T06-A04A6 G03H S04-A0 G05B-019/40P T06-A04A6 G03H S04-A0 G05B-019/40P T06-A04A6 G03H S04-A0 G05B-019/40P T06-A04A6 G03H S04-A0 G05B-019/40P T06-A04A5 G05B-019/41 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/40P T06-A04A6 G05B-019/41 T06-A04A2 G05B-019/41 T06-A04A2 G05B-019/41 T06-A04A2 G05B-019/41 T06-A04A2 G05B-019/41 T06-A04B5 G05B-019/41 T06-A04B5 G05B-019/41 T06-A04B G05B-019/41 T06-A04B G05B-019/41 T06-A04 G05B-019/41 T	G03G-013/14-18,015/1				
G03G-015,021/02 S06-K07C1 G05B-011/26-30,32 T06-A06A2 G03G-015,021/04 S06-K07 G05B-011/36-42 T06-A06A9 G03G-015/04,015/054 S06-E03X G05B-011/44-60 T06-A06B G03G-015/23,021 S06-K02A G05B-013 T06-A05 G03G-015/36 S06-K07A4 G05B-015 T06-A07A G03G-016,019 S06-E07 G05B-017 T06-A07B G03G-017 S06-E08 G05B-017 T06-A07B G03G-017 S06-E08 G05B-019/00,02 T06-A04B S06-K02 G05B-019/04 T06-A04B S06-K04 G05B-019/04-2-16 T06-A04B S06-K04 G05B-019/042-16 T06-A04B G03G-021/10,021/12 S06-K06 G05B-019/042-16 T06-A04B G03G-021/10,021/12 S06-K06B G05B-019/19,401,402, G03G-021/14 S06-K06C2 G05B-019/21-39 T06-A04A1 G03G-021/14 S06-K06C2 G05B-019/40 T06-A04A9 G03G-021/14 S06-K06C2 G05B-019/4069 T06-A04A9 G03G-021/20 S06-E01D G05B-019/4069 T06-A04A9 G03G-021/20 S06-E01D G05B-019/408-4099 T06-A04A4 G03G-021/30 S04-C07 G05B-019/414,4155 T06-A04A2 G04B-003/02-06 S04-B01 G05B-019/418 T06-A04A2 G04B-003/02-06 S04-B02 G05B-019/418 T06-A04A2 G04B-003/02-06 S04-B02 G05B-019/414-105 T06-A04A2 G04B-003/02-06 S04-B02 G05B-019/41-4105 T06-A04A2 G04B-019/02,019/28-34, G05B-019/42-427 T06-A04B5 G04B-019/02,019/28-34, G05B-019/42-427 T06-A04B5 G04B-019/02,019/28-34, G05B-019/43,44,46 T06-A04B5 G04B-019/02,019/28-34, G05B-019/02,019/28-34, G0	•		G05B-011	/06-12	T06-A06A1A
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G03G-015/04,015/054         S06-E03X         G05B-011/44-60         T06-A06B           G03G-015/23,021         S06-K02A         G05B-013         T06-A05           G03G-015/36         S06-K07A4         G05B-015         T06-A07A           G03G-016,019         S06-E07         G05B-017         T06-A07B           G03G-017         S06-E08         G05B-019/00,02         T06-A04B           G03G-021         S06-K06         G05B-019/042-16         T06-A04B           S06-K02         G05B-019/042-16         T06-A04B1           G03G-021/106,021/08         S06-K06B         G05B-019/18         T06-A04A1           G03G-021/10,021/12         S06-K06C2         G05B-019/19,401,402,         G05B-019/19,401,402,           G03G-021/14         S06-K07A         G05B-019/21-39         T06-A04A1           G03G-021/20         S06-E01D         G05B-019/4069         T06-A04A2           G03H         V07-M         G05B-019/4069         T06-A04A2           G04B         S04-C07         G05B-019/414,4155         T06-A04A2           G04B-001,013-018         S04-A01         G05B-019/414,4155         T06-A04A2           G04B-003/02-06         S04-B02A         G05B-019/418         T06-A04A2           G04B-019/02-21         S04-A03 <t< td=""><td>•</td><td></td><td></td><td>•</td><td></td></t<>	•			•	
G03G-015/23,021         S06-K02A         G05B-013         T06-A07A           G03G-015/36         S06-K07A4         G05B-015         T06-A07A           G03G-016,019         S06-E07         G05B-017         T06-A07B           G03G-017         S06-E08         G05B-019/00,02         T06-A044           G03G-021         S06-K06         G05B-019/04         T06-A04B           S06-K02         G05B-019/04         T06-A04B           G03G-021/06,021/08         S06-K06B         G05B-019/18         T06-A04A           G03G-021/10,021/12         S06-K06C2         G05B-019/19,401,402,         T06-A04A           G03G-021/14         S06-K06C2         G05B-019/19,406         T06-A04A1           G03G-021/20         S06-E01D         G05B-019/4069         T06-A04A6           G03H         V07-M         G05B-019/408-4099         T06-A04A6           G03H         V07-M         G05B-019/408-4099         T06-A04A6           G04B         S04-C07         G05B-019/408-4099         T06-A04A2           G04B-001/013-018         S04-A01         T06-A04A2A         G05B-019/414,4155         T06-A04A2A           G04B-003/02-06         S04-B02A         G05B-019/414,4155         T06-A04A85         G04B-019/02,019/28-34,         G05B-019/414,4155	•				
G03G-015/36         S06-K07A4         G05B-015         T06-A07A           G03G-016,019         S06-E07         G05B-017         T06-A07B           G03G-021         S06-K06         G05B-019/00,02         T06-A04B           G03G-021         S06-K06         G05B-019/04         T06-A04B           G03G-021/06,021/08         S06-K04         G05B-019/042-16         T06-A04B1           G03G-021/10,021/12         S06-K06B         G05B-019/19,401,402,           G03G-021/10,021/12         S06-K06C2         G05B-019/19,401,402,           G03G-021/14         S06-K07A         G05B-019/40         T06-A04A1           G03G-021/14         S06-K07A         G05B-019/4069         T06-A04A2           G03H         V07-M         G05B-019/4069         T06-A04A4           G04         S04-C07         G05B-019/408-4099         T06-A04A2           G04B         S04-A         G05B-019/41-4155         T06-A04A2           G04B-003/02-06         S04-B02A         G05B-019/41-4105         T06-A04A2A           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-019/02,019/28-34,         G05B-019/42-427         T06-A04B5           G04B-019/02-21         S04-A02A         G05B-021         T06-A08					
G03G-016,019         S06-E07         G05B-017         T06-A07B           G03G-017         S06-E08         G05B-019/00,02         T06-A04           G03G-021         S06-K06         G05B-019/04         T06-A04B           S06-K02         G05B-019/042-16         T06-A04B1           G03G-021/06,021/08         S06-K06B         G05B-019/19,401,402,           G03G-021/10,021/12         S06-K06C2         G05B-019/21-39         T06-A04A1           G03G-021/14         S06-K06A         G05B-019/40         T06-A04A9           G03G-021/14         S06-K07A         G05B-019/409         T06-A04A9           G03G-021/20         S06-E01D         G05B-019/4069         T06-A04A9           G03H         V07-M         G05B-019/408-4099         T06-A04A2           G04         S04-C07         G05B-019/408-4099         T06-A04A2           G04B         S04-A         G05B-019/41-4105         T06-A04A2           G04B-001/013-018         S04-A0         G05B-019/418         T06-A04A2A           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04A2A           G04B-019/02/019/28-34,         G05B-019/42-427         T06-A04B3           G04B-019/02/019/28-34,         G05B-021         T06-A010           G04B-01	·				
G03G-017         \$06-E08         G05B-019/00,02         \$706-A04           G03G-021         \$06-K06         G05B-019/04         \$706-A04B           \$06-K02         \$06-K02         G05B-019/042-16         \$706-A04B1           \$06-K04         \$05B-019/18         \$706-A04A           \$03G-021/06,021/08         \$06-K06B         \$605B-019/19,401,402,           \$03G-021/10,021/12         \$06-K06C2         \$605B-019/21-39         \$706-A04A1           \$03G-021/14         \$06-K07A         \$605B-019/400         \$706-A04A9           \$03G-021/20         \$06-E01D         \$605B-019/400         \$706-A04A9           \$03G-021/20         \$06-E01D         \$605B-019/408-4099         \$706-A04A6           \$603H         \$07-M         \$605B-019/408-4099         \$706-A04A6           \$603H         \$04-C07         \$605B-019/414,4155         \$706-A04A2           \$604B         \$04-E         \$605B-019/414,4155         \$706-A04A2           \$604B-001,013-018         \$04-A01         \$706-A04A2A         \$706-A04A2A           \$604B-003/02-06         \$04-B02A         \$605B-019/418         \$706-A04A2A           \$604B-003/02-10         \$04-A03         \$605B-019/42-427         \$706-A04B5           \$604B-019/02-21         \$04-A02A         \$605B-021<					
G03G-021         S06-K06         G05B-019/04         T06-A04B           S06-K02         S06-K02         G05B-019/042-16         T06-A04B1           G03G-021/06,021/08         S06-K06B         G05B-019/19,401,402,         T06-A04A           G03G-021/10,021/12         S06-K06C2         G05B-019/19,401,402,         T06-A04A1           G03G-021/14         S06-K07A         G05B-019/40         T06-A04A9           G03G-021/20         S06-E01D         G05B-019/4069         T06-A04A4           G04         V07-M         G05B-019/4069         T06-A04A4           G04         S04-C07         G05B-019/414,4155         T06-A04A4           G04B         S04-A         G05B-019/414,4155         T06-A04A5           G04B         S04-A         G05B-019/414         T06-A04A5           G04B-001,013-018         S04-A01         T06-A04AB7         T06-A04AB7           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-019/02,019/28-34,         G05B-019/42-427         T06-A04B5           G04B-019/02,019/28-34,         G05B-023         T06-A08           G04B-019/02,019/28-34,         G05B-023         T06-A08           G04B-019/02,019/28-34,         G05B-001         T06-B01					
S06-K02					
S06-K04   G05B-019/18   T06-A04A   G03G-021/06,021/08   S06-K06B   G05B-019/19,401,402,   G03G-021/10,021/12   S06-K06C2   G05B-019/19,21-39   T06-A04A1   G03G-021/14   S06-K07A   G05B-019/40   T06-A04A9   G03G-021/20   S06-E01D   G05B-019/4069   T06-A04A6   G03H   V07-M   G05B-019/408-4099   T06-A04A4   G04   S04-C07   G05B-019/414,4155   T06-A04A2   G05B-019/41-4105   T06-A04A2   G05B-019/41-4105   T06-A04A2   G05B-019/41-4105   T06-A04A2   G04B-001,013-018   S04-A01   G05B-019/418   T06-A04A2   G05B-019/418   T06-A04B5   G04B-003/02-06   S04-B02A   G05B-019/42-427   T06-A04B5   G04B-019/02,019/28-34,   G05B-019/42-427   T06-A04B3   G04B-019/02,019/28-34,   G05B-021   T06-A04B   G05B-019/04-21   S04-A02A   G05B-023   T06-A08   G04B-019/02-26   S04-A02B   G05B-024   T06-A02   G05B-019/22-26   S04-A02B   G05B-024   T06-A02   G04B-019/02-04   S04-B05   G04B-029/03   S04-B07   T07-D   G04B-025/06   S04-B08   G05D-001   T06-B01   G04B-029/033   S04-A04   G05D-001/02,03   T06-B01A   G04B-029/033   S04-A04   G05D-001/04-08   W06-B03F   G04B-037/029   S04-A04   G05D-001/04-08   W06-B03F   G04B-037/039   S04-A04A   G05D-001/10   T06-B01B   G04B-045-049   S04-A04   G05D-001/14   X22-X12   G04C,G04G   S04-B09   G05D-001/14   X22-X12   G04C,G04G   S04-	0000 021				
G03G-021/10,021/12         S06-K06C2         G05B-019/21-39         T06-A04A1           G03G-021/14         S06-K07A         G05B-019/40         T06-A04A9           G03G-021/20         S06-E01D         G05B-019/4069         T06-A04A6           G03H         V07-M         G05B-019/408-4099         T06-A04A4           G04         S04-C07         G05B-019/41-4105         T06-A04A2           G04B         S04-E         G05B-019/41-4105         T06-A04A2           G04B-001,013-018         S04-A01         G05B-019/418         T06-A04A2A           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-019/02-06         S04-B02A         G05B-019/43,44,46         T06-A04B5           G04B-019/02-06         S04-B02A         G05B-019/43,44,46         T06-A04B5           G04B-019/02-06         S04-B02A         G05B-019/43,44,46         T06-A04B3           G04B-019/02-06         S04-B02A         G05B-021         T06-A04B3           G04B-019/02-08-34,         G05B-021         T06-A04B3           G04B-019/02-08-34,         G05B-023         T06-A08           G04B-019/02-2-26         S04-A02B         G05B-023         T06-B01           G04B-021/08,047/04         S04-B05         G05D-001					
G03G-021/14         S06-K07A         G05B-019/40         T06-A04A9           G03G-021/20         S06-E01D         G05B-019/4069         T06-A04A6           G03H         V07-M         G05B-019/408-4099         T06-A04A4           G04         S04-C07         G05B-019/414,4155         T06-A04A2           G04B         S04-E         G05B-019/41-4105         T06-A04A2           G04B-001,013-018         S04-A         G05B-019/41-4105         T06-A04A2A           G04B-003/02-06         S04-B02A         G05B-019/418         T06-A04B5           G04B-003-011,027         S04-A03         G05B-019/42-427         T06-A04B5           G04B-019/02,019/28-34,         G05B-019/43,44,46         T06-A04B3           G04B-019/02,019/28-34,         G05B-021         T06-A10           G04B-019/02-26         S04-A02A         G05B-023         T06-A08           G04B-019/02-25         S04-A02B         G05B-023         T06-A08           G04B-019/02-26         S04-A02B         G05B-024         T06-A08           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B08         G05D-001         T06-B01           G04B-025/06         S04-B08         G05D-001/04-08         W06-B03F	G03G-021/06,021/08	S06-K06B	G05B-019	7/19,401,402,	
G03G-021/20         S06-E01D         G05B-019/4069         T06-A04A6           G03H         V07-M         G05B-019/408-4099         T06-A04A4           G04         S04-C07         G05B-019/414,4155         T06-A04A2           G04B         S04-E         G05B-019/41-4105         T06-A04A5           G04B         S04-A01         G05B-019/418         T06-A04A2A           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-003-011,027         S04-A03         G05B-019/43,44,46         T06-A04B3           G04B-019/02,019/28-34,         G05B-021         T06-A10           G04B-019/04-21         S04-A02A         G05B-023         T06-A08           G04B-019/02-26         S04-A02B         G05B-023         T06-A08           G04B-019/02-26         S04-A02B         G05B-024         T06-A20           G04B-019/02-26         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08         W06-B03F		S06-K06C2	G05B-019	7/21-39	T06-A04A1
G03H         V07-M         G05B-019/408-4099         T06-A04A4           G04         \$04-C07         G05B-019/414,4155         T06-A04A2           \$04-E         G05B-019/41-4105         T06-A04A5           G04B         \$04-A         G05B-019/418         T06-A04A5           G04B-001,013-018         \$04-A01         T06-A04B7         T06-A04B7           G04B-003/02-06         \$04-B02A         G05B-019/42-427         T06-A04B3           G04B-003-011,027         \$04-A03         G05B-019/43,44,46         T06-A04B3           G04B-019/02,019/28-34,         G05B-021         T06-A04B3           G04B-019/02-21         \$04-A02A         G05B-021         T06-A08           G04B-019/02-226         \$04-A02B         G05B-023         T06-A08           G04B-019/02-226         \$04-A02B         G05B-024         T06-A20           G04B-019/02-26         \$04-A02B         G05D-001         T06-B           G04B-019/02-26         \$04-A02B         G05D-001         T06-B           G04B-019/02-26         \$04-A02B         G05D-001         T06-B0           G04B-019/02-26         \$04-A02B         G05D-001         T06-B0           G04B-019/02-26         \$04-A02B         G05D-001         T06-B0           G04B-0					
G04         S04-C07         G05B-019/414,4155         T06-A04A2           G04B         S04-A         G05B-019/41-4105         T06-A04A5           G04B-001,013-018         S04-A01         T06-A04B7           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B7           G04B-003-011,027         S04-A03         G05B-019/42-427         T06-A04B5           G04B-019/02,019/28-34,         G05B-019/43,44,46         T06-A04B3           G04B-019/04-21         S04-A02A         G05B-021         T06-A08           G04B-019/22-26         S04-A02B         G05B-023         T06-A08           G04B-019/025-025         S04-A02         G05D         T06-B01           G04B-025/02-04         S04-B05         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D         T07-D01           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-045-049         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12					
G04B         S04-A         G05B-019/41-4105         T06-A04A5           G04B-001,013-018         S04-A01         T06-A04B7           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-003-011,027         S04-A03         G05B-019/42-427         T06-A04B5           G04B-019/02,019/28-34,         G05B-021         T06-A04B3           G04B-019/04-21         S04-A02A         G05B-023         T06-A08           G04B-019/22-26         S04-A02B         G05B-024         T06-A20           G04B-019/08-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D         T06-B01           G04B-029-033         S04-A05         G05D-001/02,03         T06-B01A           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A1         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02					
G04B         S04-A         G05B-019/418         T06-A04A2A           G04B-001,013-018         S04-A01         T06-A04B7           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-003-011,027         S04-A03         G05B-019/43,44,46         T06-A04B3           G04B-019/02,019/28-34,         G05B-021         T06-A10           G04B-019/04-21         S04-A02A         G05B-023         T06-A08           G04B-019/22-26         S04-A02B         G05B-024         T06-A20           G04B-019-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D         T06-B01           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02	G04				
G04B-001,013-018         S04-A01         T06-A04B7           G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-003-011,027         S04-A03         G05B-019/43,44,46         T06-A04B3           G04B-019/02,019/28-34,         G05B-021         T06-A10           G04B-019/04-21         S04-A02A         G05B-023         T06-A08           G04B-019/22-26         S04-A02B         G05B-024         T06-A20           G04B-019-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D         T06-B01           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A1         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02	G04B				
G04B-003/02-06         S04-B02A         G05B-019/42-427         T06-A04B5           G04B-003-011,027         S04-A03         G05B-019/43,44,46         T06-A04B3           G04B-019/02,019/28-34,         G05B-021         T06-A10           G04B-019/04-21         S04-A02A         G05B-023         T06-A08           G04B-019/22-26         S04-A02B         G05B-024         T06-A20           G04B-019-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D         T06-B01A           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01         G04B-037/02,03         T06-B01A           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A1         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02			G05B-017	7410	
G04B-003-011,027         S04-A03         G05B-019/43,44,46         T06-A04B3           G04B-019/02,019/28-34,         G05B-021         T06-A10           G04B-019/04-21         S04-A02A         G05B-023         T06-A08           G04B-019/22-26         S04-A02B         G05B-024         T06-A20           G04B-019-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D         T07-D           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01         G04B-037/02,03         T06-B01A           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A1         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02			G05B-019	9/42-427	
G04B-019/04-21         S04-A02A         G05B-023         T06-A08           G04B-019/22-26         S04-A02B         G05B-024         T06-A20           G04B-019-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A1         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02					
G04B-019/22-26         S04-A02B         G05B-024         T06-A20           G04B-019-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A1         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02	G04B-019/02,019/28-3	4,	G05B-021	I	T06-A10
G04B-019-025         S04-A02         G05D         T06-B           G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A2         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02	G04B-019/04-21	S04-A02A	G05B-023	3	T06-A08
G04B-021/08,047/04         S04-B05A         G05D-001         T06-B01           G04B-025/02-04         S04-B07         T07-D           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-043         S04-A04A2         G05D-001/10         T06-B01X           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02				Į.	
G04B-025/02-04         S04-B07         T07-D           G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-037-039,043         S04-A04A2         G05D-001/10         T06-B01X           G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02				_	
G04B-025/06         S04-B08         G05D-001/02,03         T06-B01A           G04B-029-033         S04-A05         T07-D01           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-037-039,043         S04-A04A2         G05D-001/10         T06-B01X           G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02	•		G05D-007	l	
G04B-029-033         S04-A05         T07-D01           G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-037-039,043         S04-A04A2         G05D-001/10         T06-B01X           G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02			COED OO	1 /02 02	
G04B-037/22         S04-A04B         G05D-001/04-08         W06-B03F           G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-037-039,043         S04-A04A2         G05D-001/10         T06-B01X           G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02			GU3D-UU	1/02,03	
G04B-037-039         S04-A04         G05D-001/04-08,12         T06-B01B           G04B-037-039,043         S04-A04A2         G05D-001/10         T06-B01X           G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02			G05D-001	1/04-08	
G04B-037-039,043         S04-A04A2         G05D-001/10         T06-B01X           G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02					
G04B-043         S04-A04A1         G05D-001/12         W07-A01C           G04B-045-049         S04-A09         G05D-001/14         X22-X12           G04C,G04G         S04-B         G05D-003         T06-B02					
G04C,G04G S04-B G05D-003 T06-B02	•				
		S04-A09			X22-X12
G05D-003/10 T06-B02A	G04C,G04G	S04-B			
		l	G05D-003	3/10	106-B02A

G05D-003/12-20	T06-B02B	G06F-001/26-32	T01-L01
G05D-005/12-20	T06-B03	G06F-001/30	T01-L01
G05D-005 G05D-007	T06-B03	G06F-001/30 G06F-003	T01-L01B
	T06-B04A	G06F-003/02	
G05D-007/01			T01-C02
G05D-007/03	T06-B04X	G06F-003/023	T01-C02A
G05D-007/06	T06-B04B	CO/E 003/033 037	T04-F01
G05D-009	T06-B05	G06F-003/023-027	T01-C02A1
G05D-011	T06-B08	G06F-003/03	T01-C02B
G05D-011/02	T06-B08A	G06F-003/033	T01-C02B1
G05D-011/03-12	T06-B08A9	G06F-003/05	T01-C08
G05D-011/13	T06-B08A1	G06F-003/06	T01-C01
G05D-011/16	T06-B08X	G06F-003/09	T01-C05
G05D-013/02-06	T06-B09	G06F-003/12	T01-C05A
G05D-013/08-60	T06-B09A	G06F-003/13	T01-C05B
G05D-013/62	T06-B09B	G06F-003/13,	S06-K99E
G05D-015	T06-B10	G06F-003/14	T01-C04
G05D-016/02,20	T06-B11	G06F-003/147	T01-C04B
G05D-016/04-12	T06-B11A	G06F-003/153	T01-C04A
G05D-016/14-18	T06-B11X	G06F-005	T01-D
G05D-017,-019	T06-B12		T01-D01
G05D-021	T06-B06		T01-D01A
G05D-022,024,025	T06-B07	CO/F 00F/04	T01-D09
G05D-023	T06-B13	G06F-005/01	T01-D03
G05D-023/01-13	T06-B13A	G06F-005/06	T01-D04
G05D-023/185	T06-B13X	G06F-007	T01-E
G05D-023/19	T06-B13B	G06F-007/06-36	T01-E01
G05D-023/20-26	T06-B13B1	G06F-007/10-12	T01-E01B
G05D-023/27-275	T06-B13B9	G06F-007/38,40,48	T01-E02
G05D-023/30-32	T06-B13B2	G06F-007/42,50	T01-E02A
G05D-027	T06-B14	G06F-007/44,52	T01-E02B
G05D-029 G05D-105/05	T06-B20 X25-D01	G06F-007/48,49,544,56 G06F-007/58	T01-E02X
G05D-105/05	X25-D01 X25-D02	G06F-007/60-72	T01-E04
G05F	U24-E	G06F-009	T01-E03
G05F-001/10	U24-E02	G001 -007	T01-H07C3E
G05F-001/12-455	U24-E02A	G06F-009/04-06	U21-C03B9
G05F-001/46-62	U24-E02A	G06F-009/22	T01-F01
G05F-001/625-656	U24-E02C	G06F-009/24	T01-F01B
G05F-001/66	U24-E02D	G06F-009/26	T01-F01C
G05F-001/67	U24-E02D1	G06F-009/28	T01-F01A
G05F-001/70	U24-E02D2	G06F-009/30-318	T01-F03
G05F-003	U24-E01	G06F-009/32-36	T01-F03A
G05F-005	U24-E03	G06F-009/38	T01-F03B
G05F-007	U24-E04	G06F-009/40-42	T01-F04
G05G	T06-C	G06F-009/44	T01-F05
G05G-001,-003	T06-C01		T01-F07
G05G-005	T06-C02	G06F-009/445	T01-F01B
G05G-007,-009,-011,-13	3 T06-C03		T01-F05B
G05G-007,-011	T06-C03A	G06F-009/45	T01-F05A
G05G-009,-013	T06-C03B	G06F-009/455	T01-F05G3
G05G-015-025	T06-C09	G06F-009/46	T01-F02
G06-007/30-46	T02-A04B5		T01-F05G5
G06C	T01-A	G06F-011	T01-G
G06D	T01-B		T01-G11X
G06E	T01-M06D	G06F-011/08	T01-G01A
	T02-A03B	G06F-011/10	T01-G01A1
G06F,G11B,H04B,H04N	I W03-G03A1	G06F-011/14-20	T01-G03
	W03-G06	G06F-011/16	T01-G05B
G06F-001/02	T01-J17	G06F-011/22	T01-G02
G06F-001/04-14	T01-K	G06F-011/24	T01-G02B
G06F-001/08	T01-K01	G06F-011/25	T01-G
G06F-001/16	T01-L02	G06F-011/263	T01-G07A
G06F-001/20	T01-L02A	G06F-011/267	T01-G02A1

G06F-011/27	T01-G02A2B	G06F-018/20	T04-D04
G06F-011/277	T01-G02A2C	0001-010/20	T01-J10B2
G06F-011/30	T01-G02A2C	G06F-018/21	T01-J10B2A
G06F-011/34	T01-G05C1	G06F-018/211	T01-J10B2A
G06F-012	T01-H	G06F-018/2111	T01-J16C4
G06F-012,G11C,	W04-P01C8	G06F-018/2113	T01-J04B2
G06F-012/02-04	T01-H01	G06F-018/2115-2131	T01-J04B2
G06F-012/06	T01-H01A	G06F-018/2132, 2133	T01-J04B
G06F-012/08-12	T01-H03A	G06F-018/2134-2136 G06F-018/2137	T01-J04D
CO/E 012/14	T01-H03B		T01-J04C
G06F-012/14	T01-H01C2	G06F-018/214	T04-D04
CO/F 040/4/	T01-H01C1	CO/F 040/00	T01-J10B2
G06F-012/16	T01-H01C3	G06F-018/22	T04-D04
CO/F 043	T01-H01C4	CO/F 040/02 020	T01-J10B2A
G06F-013	T01-H	G06F-018/23-232	T04-D04
00/5 0/0/40	T01-N01D	G06F-018/2321	T01-J03
G06F-013/10	T01-H05	60/5 040/00044	T04-D04
G06F-013/12	T01-H05A	G06F-018/23211	T01-J04
G06F-013/14	T01-H05B		T04-D04
G06F-013/16-18	T01-H05B1	G06F-018/23213	T01-J04
G06F-013/20-34	T01-H05B2		T04-D04
G06F-013/36-378	T01-H05B3	G06F-018/2323	T01-J04
G06F-013/38	T01-H07		T04-D04
G06F-013/40	T01-H07A	G06F-018/2325	T01-J04C
G06F-013/42	T01-H07B		T04-D04
G06F-015	T01-J	G06F-018/2337	T01-J16B
	S05-D06		T04-D04
G06F-015/02	T01-J01	G06F-018/24-28	T01-J16C3
G06F-015/16	T01-M02	G06F-018/30	T01-J10B2
	U11-G	G06F-018/40	T01-J20B1
G06F-015/18	T01-J16		T01-J12B
	U21-C03B1B	G06F-019/00	T01-J
G06F-015/76	T01-M		T01-J07B1
	T01-M02C3	G06F 21/76	T01-F06
G06F-015/78	T01-M01	G06F 123/00	T01-J05B1
G06F-015/80	T01-M02C		T01-J10B2
G06F-015/82	T01-M03	G06F 123/00	T01-J05B2
G06F-017	S05-G02G1	G06F 123/02	T01-J05B2
G06F-017,-163,-171	T01-J07D	G06F-101/00	T01-J17
	T01-J07D3	G06F-151, 153, 155	T01-J05A
G06F-017,-165	T01-J07D3A	G06F-157/00	T01-J05A1
G06F-017/10	T01-J04	G06F-159/00	T01-J06A
G06F-017/11-13	T01-J04A	G06F-161/00	T01-P02
G06F-017/14	T01-J04B	G06F-163, 165	T01-J06B
G06F-017/14,H03H-		G06F-167/00	T01-J
017	W04-Y03G1		T01-J07
G06F-017/15	T01-J04B2	G06G	T02-A
G06F-017/16	T01-J04C	G06G-001	T02-A01
G06F-017/17	T01-J04D	G06G-003,005	T02-A02
G06F-017/18	T01-J03	G06G-007	T02-A04
G06F-017/20	T01-J18	G06G-007/02-10	T02-A04X
3001 017720	W04-V	G06G-007/12	T02-A04B
G06F-017/21-27	T01-J11A	G06G-007/16-164	T02-A04B1
G06F-017/28	T01-J14	G06G-007/18-188	T02-A04B1
G06F-017/30	T01-J05B	G06G-007/20,24,25	T02-A04B3
3001-017730	T01-J05C	G06G-007/26,28	T02-A04B4
G06F-017/40	T01-J07A	G06G-007/48	T02-A04A
G06F-017/40 G06F-017/50	T01-J07A	G06G-007/52,62-635	T02-A04A
G06F-017/30 G06F-018	T04-D	G06G-007/60-80	T02-A04A1
0001-010	T01-J10B2A	G06G-007/60-80 G06G-009,G06E	T02-A04A9
G06F-018/10	T04-D03	G06G-009,G06E G06J	T02-A03
G06F-018/15	T04-D03	9003	IUZ-D
0001-010/13	T01-J03		
	101-303	I	

00/1/	607.1707	60/11/000/04/4/047	T04 14 ( 04
G06K	S06-K07	G06N-003/0464, 047	T01-J16C1
	T04-L	G06N-003/0475	T01-J16C4
00444 0075 007	T04-X	G06N-003/048	T01-J16C1
G06K,G07F-007	T05-H02C5X	CO (N. 000 (0 40 0 / F	T01-J04
G06K,G11B-007,	T00.1100.10	G06N-003/049-065	T01-J16C1
G06K,G11B-023/40	T03-H02A3	G06N-003/08-0985	T01-J16C2
G06K-001,-007	T04-A	G06N-003/10	T01-J16C4
G06K-001/02-10,20-22,			T01-J12B1
	T04-A01	G06N-003/12-126	T01-J16C4
G06K-001/12	T04-A02	G06N-005/00-047	T01-J16C
G06K-005	T04-B	G06N-005/048	T01-J16C
G06K-007	T04-A03X		T01-J16B
G06K-007/08	T04-A03A	G06N-007/00	T01-J16A
G06K-007/08,	T05-H02C5A		T01-J04E
G06K-007/08-14	T04-A03	G06N-007/01	T01-J16A
G06K-007/10-14	T04-A03B		T01-J04E
	T05-H02C5B	G06Q	T01-J05A
G06K-009	T04-D		T01-N01A
G06K-009,-011	T04-F04	G06Q-010	T01-J05A1
G06K-009/18	T04-D01		T01-J05A2
G06K-009/20-34	T04-D02		T01-N01A1
G06K-009/24	T04-D02A		T01-N01A2
G06K-009/36-60	T04-D03	G06Q-010/04	T01-J05A2C
G06K-009/40	T04-D03A		T01-N01A2F
G06K-009/48,52	T04-D03B	G06Q-010/047	T01-J05A
G06K-009/62-82	T04-D04		T01-N01A
G06K-011	T04-M		T01-J21C
G06K-011/02-04	T04-E	G06Q-010/06	T01-J05A2B
G06K-011/06-20	T04-F		T01-N01A2H
	T04-F02B2	G06Q-010/063	T01-J05A2C
	T04-F02C		T01-N01A2C
G06K-011/18	T04-F02B1A	G06Q-010/0631	T01-J05A2B
G06K-011/18-20	T04-F02A1	3334 3 : 3, 333 :	T01-N01A2H
2001(011) 10 20	T04-F02B3	G06Q-010/0633	T01-J05A2B
	T04-F05	3004 010/0000	T01-N01A2B
G06K-013	S06-K03A	G06Q-010/0635	T01-J05A2F
3001013	T04-J	3002 010/0000	T01-N01A2J
G06K-015	\$06	G06Q-010/0637	T01-J05A2F
G06K-019	T04-C	3002 010/000/	T01-N01A2E
3001(01)	T05-H02C5C	G06Q-010/0639	T01-J05A2H
G06K-019/07	W02-C02G7	3002 010/003/	T01-N01A2H
G06K-019/07-077	T04-K	G06Q-010/067	T01-J05A2A
G001K-017/07-077	T04-K01	0000-010/00/	T01-N01A2H
G06K-019/12	T04-C01	G06Q-010/08	T01-J05A2D
G06K-019/14-16	T04-C02	0000-010/00	T01-N01A2B
G06M-001003	T05-B	G06Q-010/083	T01-N01A2D
G06M-003	T05-B01	0000-010/000	T01-S03A2B
G06M-007	T05-A01	G06Q-010/0831	T01-J05A2D
G06M-007-011	T05-A	0000-010/0031	T01-N01A2B
G06M-009-011	T05-A02		T01-N01A2B
G06N-003/00	T01-J13A	G06Q-010/0832	T01-N01A1
G06N-003/004-008	T01-313A T01-J13A	0000-010/0032	
		C0/O 010/0933	T01-N01A2B
G06N-003/02 G06N-003/04	T01-J16C1 T01-J16C1	G06Q-010/0833	T01-J05A2D T01-N01A2B
		C0/O 010/0934	
G06N-003/042	T01-J16C1	G06Q-010/0834	T01-J05A2D
G06N-003/043	T01-J16C1	G06Q-010/0835-0837	T01-N01A2B
CO (NI 002 (0 4 4	T01-J16B	G06Q-010/0835-0837	T01-J05A2D
G06N-003/044	T01-J16C1	C0/O 040/007	T01-N01A2B
G06N-003/0445	T01-J16C1	G06Q-010/087	T01-J05A2F
CO (NL 002 /045	T01-J05B	60/0.040/0075	T01-N01A2B
G06N-003/045	T01-J16C1	G06Q-010/0875	T01-J05A2D
G06N-003/0455	T01-J16C1	C0/O 010/10	T01-N01A2B
	T01-D02	G06Q-010/10	T01-J05A2

	T01-N01A2	G06Q-040/08	T01-J05A2E
G06Q-010/101	T01-J05A2D	60/0.040/40	T01-N01A2J
G06Q-010/105-1053	T01-N01A2B T01-J05A2H	G06Q-040/10	T01-J05A3 T01-N01A2L
G00Q-010/103-1033	T01-S03A211 T01-N01A2H	G06Q-040/12	T01-N01A2L
G06Q-010/1057	T01-J05A2H	3004 0 10/ 12	T01-N01A1
	T01-N01A2H	G06Q-050	T01-N01A2
G06Q-010/107	T01-N01C	G06Q-090/00	T01-J05A
G06Q-010/109	T01-J05A2H		T01-N01A1
G06Q-010/1091	T01-N03A3 T01-J05A2H	G06T G06T-003/40-60	T01-J10 T01-J10B3A
0000-010/1091	T01-S05A2H T01-N01A2H	G06T-003/40-60 G06T-009/00-40	T01-J10B3A
	T01-N03A3	G06T-007/00-40	
G06Q-010/1093	T01-J05A2H		T01-J10C4
	T01-N03A3	G06T-03/00-60	T01-J10B3
G06Q-020	T01-N01A1	G06T-05/00-50	T01-J10B1
G06Q 20/18	T01-N01A1	G06T-07/00-60	T01-J10B2A
G06Q-030	T05-H04 T01-N01A2A	G06T-13/00 G06V-010/10	T01-J10C5 T04-D02
G06Q-030/01	T01-J05A2H	G06V-010/10 G06V-020/00	T04-D02
	T01-N01A2B	G07	T05
G06Q-030/012	T01-J05A2D	G07B	T05-C
	T01-N01A2B	G07B-001-011	T05-C01
G06Q-030/014	T01-J05A2D	G07B-011,G07C-009	T05-D01A1
G06Q-030/015	T01-N01A2H T05-L01F	G07B-013,-015 G07B-015,G07C-009	T05-C03 T05-D02
0000-030/013	T01-J05A2D	G07B-015/00	T05-D02
	T01-N01A2H	3072 010700	X22-X07
G06Q-030/016-018	T01-J05A2D	G07B-015/01	T07-A03E
	T01-N01A2H	G07B-017	T05-C05
G06Q-030/02-0201	T01-J05A2M	G07C	W06-B01B6
C0/O 020/0202	T01-N01A2C	G07C-001 G07C-001/30	T05-G03 T05-G03A
G06Q-030/0202	T01-J05A2F T01-N01A2C	G07C-001/30 G07C-001-007	T05-G03A T05-G
G06Q-030/0203-0207	T01-J05A2M	G07C-003	T05-G02
	T01-N01A2C	G07C-005	T05-G01
G06Q-030/0208-0234	T01-J05A2F	G07C-009	T05-D
0010 00010005	T01-N01A2C	G07C-009,G07B-011	T05-D01A
G06Q-030/0235	T01-J05A2M T01-N01A2C	G07C-011 G07C-013,-015	T05-E T05-F
G06Q-030/0238	T01-N01A2C	G07C-013,-013 G07D	T05-K01
000000000000000000000000000000000000000	T01-N01A2C	G07 <i>D</i>	T05-K02
G06Q-030/0241-0273	T01-J05A2M	G07D-005,-007	T05-J
	T01-N01A2C	G07D-009	T05-L
G06Q-030/0279	T01-J05A2F	G07F	T05-H
G06Q-030/0282	T01-N01A2C T01-J05A2M	G07F,H04N-007/10,173 G07F,H04N-007/173	3 W03-A16C5J W02-F10J
0000-030/0202	T01-303A2Wi T01-N01A2C	G07F,H04N-007/173	W02-F103 W02-F10N5
G06Q-030/0283	T01-J05A2F	G07F-003	T05-H03
	T01-N01A2C	G07F-005	T05-H01
G06Q-030/06-0645	T01-J05A2F	G07F-007	T05-H02
	T01-N01A2A	G07F-007/04	T05-H02A
G06Q-040	T01-J05A1	G07F-007/06	T05-H02E
G06Q-040/02	T01-N01A T01-J05A1	G07F-007/08-12	T05-H02C5A T05-H02C5B
00002-040/02	T01-N01A1		T05-H02C5C
G06Q-040/03	T01-J05A1		T05-H02C
	T01-N01A1	G07F-011	T05-H04
G06Q-040/04	T01-J05A2F	G07F-013,-015	T05-H06
C040 040/0/	T01-N01A2F	G07F-017	T05-H05
G06Q-040/06	T01-J05A2F T01-N01A2F	G07F-017/02-18 G07F-019	T05-H05C T05-L03
	131 140 17121	G07F-17/30-38	T05-E05
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G07G-001	T05-L01	G08C,H02J-13/00	W05-D07F
G07G-001,H04L	T05-L01D	G08C,H04L	W05-D06F
G07G-001-005	T05-L	G08C-015	W05-D02
G08B	W05	G08C-017	W05-D06A1
G08B,H04N-007/18	W02-F01A5		W05-D06T
G08B-001	W05-A01	G08C-017/02, H04B 1/5	59 W05-D08G
G08B-003	W05-A02	G08C-017/02	W05-D06A1A
G08B-005	W05-A03		W05-D06G5
G08B-005/36-38	W05-A03A	G08C-017/02, H04B 1/5	59
G08B-006	W05-A01A1		W05-D06A1A
G08B-007	W05-A04A		W05-D08G
G08B-007,009	W05-A04	G08C-017/04	W05-D06A1B
G08B-009	W05-A04C		W05-D06T1
G08B-013	W05-B01	G08C-017/06	W05-D06A1B
G08B-013,G11B-027	W04-J01C	6006.040	W05-D06T5
G08B-013/02	W05-B01B	G08C-019	W05-D
G08B-013/04	W05-B01G	G08C-019,H04M-011	W05-D06G1
G08B-013/06-12	W05-B01B1	G08C-019/02-14	W05-D08A
G08B-013/14	W05-B01B2	G08C-023	W05-D06M W05-D06A5
G08B-013/16 G08B-013/18-193	W05-B01C1 W05-B01C2	G08C-023,H04B-011 G08C-023/02	W05-D06A5
G08B-013/194-196	W05-B01C5	G06C-023/02	W05-D06A5
G08B-013/174-170	W05-B01C3 W05-B01X	G08C-023/04	W05-D06A3
G08B-013/24	W05-B01A	G08C-023/04 G08C-023/06	W05-D06C
G08B-013/24	W05-B01A1	G08C-025	W05-D05
G08B-015	W05-B01D	G08G	T07
G08B-017	W05-B02	G08G-001	T07-A
G08B-017/02	W05-B02C	333 33 .	T07-H
G08B-017/06	W05-B02D	G08G-001,-001/014	T07-F
G08B-017/10	W05-B02A	G08G-001,-001/054	T07-A03C
G08B-017/103-107	W05-B02A1	G08G-001,G09F	T07-B05C
G08B-017/11	W05-B02A5		T07-B05E
G08B-017/11-113	W05-B02A3	G08G-001/002	T07-A01B1
G08B-017/117	W05-B02A5	G08G-001/015	T07-A01D
	W05-B05B4	G08G-001/016	T07-E
G08B-017/12	W05-B02B	G08G-001/02-048	T07-A01B
G08B-019	W05-B03	G08G-001/07-087	T07-C
G08B-021/02-08	W05-B07	G08G-001/087	T07-C07
G08B-021/10	W05-B08	G08G-001/09-096	T07-B
G08B-021/12-14	W05-B07L	G08G-001/095	T07-B05A
G08B-021/16	W05-B02A	G08G-001/0955	T07-B05A1
	W05-B07L	G08G-001/096	T07-B05A5
COOD 004 /40 04	W05-B08J	G08G-001/0965	X22-E14 T07-C05
G08B-021/18-24	W05-A W05-B	G08G-001/097	T07-C05 T07-A05B
C00D 022	W05-B04	G08G-001/127 G08G-001/14	T07-A05B T07-F
G08B-023 G08B-025	W05-B05	G08G-001/14	W06-C
G08B-025/06	W05-B05B1	G08G-005	W06-B
G08B-025/08	W05-B05B3	0000-003	W06-A04H7
G00D-023/00	W05-B05G1	G08G-015	W06-B01C8
	W05-B05G5	G09B	P85-A
G08B-025/10	W05-B05B2	3075	W04-W
0000 020/10	W05-B05B4	G09B-003	P85-A07
	W05-B05G5	G09B-007	W04-W01
G08B-025/14	W05-B05	G09B-009	P85-A05A
G08B-026	W05-B05A5		W04-W07A
G08B-027	W05-B05A7	G09B-011	P85-A01C
G08B-029	W05-C	G09B-015	P85-A01J
G08B-029/04	W05-C01A	G09B-017	P85-A01C
G08B-029/06-08	W05-C01B	G09B-023-027	P85-A05
G08B-031	W05-C02C3		W04-W07C
G08C	W05-D	G09B-029	P85-A50E
G08C,B64	W05-D07D	G09C	P85-C

G09D-001	P85-A50A	G10L-013	W04-V02
G09D-003	P85-A50C		W04-V04C1
G09F	P85-E W05-E	G10L-015	W04-V01
G09F,H04M-001	W01-C01A2	G10L-015/26	W04-V04A W04-V04A6
G09F,H04N-005/74	W04-Q01K	G10L-017	W04-V04A3
G09F,H05K	W05-E05G	G10L-019	W04-V05G
G09F-007	P85-E01	G10L-019/02	W04-V05G5
G09F-009	W05-E01	G10L-019/04-113	W04-V05G3
	W05-E02	G10L-019/12-135	W04-V05G3A
G09F-011	W05-E03	G10L-019/16-22	W04-V05G
G09F-013	W05-E03	G10L-019/24	W04-V05G8
G09F-013/16	T07-B05G X22-B03	G10L-021 G10L-021/02	W04-V05
G09F-013/17	X22-B03 X22-B03	G10L-021/02 G10L-021/04	W04-V05E W04-V05J
G09F-015 -017	P85-E01	G10L-021/043-049	W04-V05J5
0071-013-017	P85-T01	G10L-021/055-057	W04-V0555 W04-V05
G09G	T04-H	G10L-021/06-18	W04-V04
G09G,G11B,H04B, H04	N W03-G05G		W04-V05
G09G-001	T04-H01	G10L-025	W04-V04
G09G-001/06-18	T04-H01A		W04-V05
G09G-001/20-28	T04-H01B	G10L-025/78-84	W04-V04A1
G09G-001/28	T04-H01B1	G11B	T03
G09G-003	T04-H03	G11B,A63	W04-X03A
C00C 002 00E	W04-M01D3C	G11B,H01J-037	T03-C03
G09G-003,-005 G09G-003,H01J-017/36	T04-H03D	G11B,H01L-039 G11B,H02M,H04B	T03-C07 W03-G02
G09G-003/04-19	T04-H03A	G11B,H04N-005/335,-0	
G09G-003/20-38	T04-H03B	G11B,110+11 003/333, 0	W04-M01B1A
G09G-003/28	T04-H03C4	G11B,H04N-005/781	W04-B14
G09G-003/30-32	T04-H03C3	G11B,H04N-005/84-85	W04-C
G09G-003/36	T04-H03C2	G11B,H04N-005/913	W04-F01L
G09G-005/22-32	W03-A10C	G11B,H04N-007/173	W02-F10K
G10B	P86-A01C	G11B,HO4N	W04-E04C5E
0.405 004 000	W04-U02C	0445.000	W04-E20
G10D-001 -003	P86-A03	G11B-003	W04-A W04-A03
G10D-007 -009 G10D-011	P86-A01A P86-A01C1	G11B-003/02-42 G11B-003/44-56, 60,61	
G10D-011	P86-A05	G11B-003/58,68-90	W04-A02 W04-A01
G10D-015 -017	P86-A	G11B-005	T03-A
G10F	P86-A99	G11B-005,H01L-039	T03-A01E
G10G	P86-A30	•	T03-A06K
G10G,G10H	W04-U07	G11B-005/02-09	T03-A06
G10G-001/04,G10H	W04-U06	G11B-005/024	T03-A06E
G10H	W04-U	G11B-005/027	T03-A06A
G10H-001	W04-U04	C44D 005/02	T03-A06B
G10H-001/02-16 G10H-001/18-30,34	W04-U03 W04-U04A	G11B-005/03	T03-A06G
G10H-001/16-30,34	W04-U04A W04-U04J	G11B-005/035 G11B-005/09	T03-A06D T03-A06C
G10H-001/32	W04-U04G	G11B-005/10-115	T03-A00C
G10H-001/36-42	W04-U04C	G11D 003/10 113	T03-A04A1D
G10H-003	W04-U02	G11B-005/10-40	T03-A03
G10H-003,H04R	W04-U02A1		T03-A04A1
G10H-005	W04-U01A	G11B-005/127	T03-A03B
G10H-005,-007	W04-U01		T03-A03J5
G10H-007	W04-U01C		T03-A04A1C
G10K	P86-E	G11B-005/127-153,33	T03-A03J1A
G10K-011/178	W04-V07	G11B-005/133	T03-A03J1C
G10L G10L,G11B,H03M	W04-V W04-G01F	G11B-005/133-153 G11B-005/187	T03-A03J1 T03-A03J3
G10L,H03M,	W02-C06C	G11B-005/187-21	T03-A03J3A
G10L,H04R-025	W04-Y03G5	G11B-005/23	T03-A0353A
,			T03-A03J3C
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G11B-005/265-29	T03-A03A	G11B-007/0033	T03-B10C
G11B-005/31	T03-A03E	G11B-007/0037	T03-B10A
G11B-005/325	T03-A06E1	G11B-007/004-006	T03-B05
G11B-003/323		G11B-0077004-000	
	T03-A03J1E		W04-C05
G11B-005/33-35	T03-A03C	G11B-007/0065	T03-B12
G11B-005/37	T03-A03C5	G11B-007/007-013	T03-B01F
G11B-005/39	T03-A03C3		W04-C01F
3112 000/07	T03-A03C9J	G11B-007/033	T03-B10C
0445 005440			
G11B-005/40	T03-A03	G11B-007/037	T03-B10A
G11B-005/41	T03-A04B	G11B-007/08-10	T03-B02A
G11B-005/455	T03-A04A5	G11B-007/12-22	T03-B02B
G11B-005/465	T03-A04B1	G11B-007/125	T03-B02A7
G11B-005/48-60		G11B-007/125	
	T03-A05		T03-B02B1
G11B-005/49,50	T03-A05C3	G11B-007/125,135	T03-B02B7E
G11B-005/49,50,54	T03-A05C	G11B-007/13	T03-B02B3
G11B-005/53	T03-A05D	G11B-007/135	T03-B02B5
G11B-005/54	T03-A05C5		T03-B02B6
3112 000/01	T03-A05G		T03-B02B7
C11D 00F/FF		C11D 007/04	
G11B-005/55	T03-A05B	G11B-007/24	T03-B01
G11B-005/55,584,596	T03-A05B1A	G11B-007/26	T03-B01E
G11B-005/56	T03-A05A3	G11B-009	T03-C
G11B-005/58	T03-A05A	G11B-009,H01J-037	T03-C05
	T03-A05C1	G11B-009-013,	W04-D
G11B-005/584,596	T03-A05A1C	G11B-011,-013	T03-D
G11B-003/364,396		G116-011,-013	
	T03-A05A1G		T03-A06N
G11B-005/588,-015/47	3 T03-A05A1D		W04-D
G11B-005/588,592	T03-A05A1A	G11B-015	T03-E
G11B-005/60	T03-A05C1A	G11B-015/02-03	T03-E05
G11B-005/627,-023/26		G11B-015/04	T03-A07A1A
G11B-005/66			T03-E05A
	T03-A01F	G11B-015/05-093	
G11B-005/68-618	T03-A01A8C	G11B-015/087	T03-E05A1
G11B-005/68-718	T03-A01A7	G11B-015/093	T03-E05A3
	T03-A01A8		T03-E05A7
G11B-005/702	T03-A01A3	G11B-015/10	T03-E05B
G11B-005/704			
	T03-A01B1	G11B-015/26-295, 34-4	
G11B-005/704,71,72	T03-A01B	G11B-015/30-32	T03-E06
G11B-005/706	T03-A01A1A	G11B-015/30-32, H02K	T03-E06A
	T03-A01A1C	G11B-015/43,44	T03-E04
G11B-005/706,714	T03-A01A1	G11B-015/46-54	T03-E03
G11B-005/708,71	T03-A01A5	G11B-015/467	T03-E03A7
G11B-005/71	T03-A01B5A	G11B-015/52	T03-E03A5
	T03-A01B5B	G11B-015/52,-019/28, -	2//19-32
G11B-005/712,714	T03-A01A1E		T03-J03A1
G11B-005/716,718	T03-A01A6	G11B-015/54	T03-E03A1
G11B-005/72	T03-A01B5C	G11B-015/60-64	T03-E02
3112 000/72	T03-A01B5D	G11B-015/60-70, -23/3	
C11D 00F /72			
G11B-005/73	T03-A01B1	G11B-015/665	T03-E01C1
G11B-005/74-82	T03-A01C	G11B-015/66-67	T03-E01C
G11B-005/76	T03-A01C7	G11B-015/675-68	T03-E01B
G11B-005/78	T03-A01C3	G11B-015/68	T03-E01B5
G11B-005/80	T03-A01C5	G11B-017	T03-F01
G11B-005/82	T03-A01C1	G11B-019	T03-F02
G11B-005/84	T03-A02	G11B-019,H02K	T03-F02C1
G11B-005/842-848	T03-A02A1	G11B-019/22	T03-F02C5
G11B-005/85	T03-A02A3	G11B-019/24,28	T03-F02A1
G11B-005/852	T03-A02A5A	G11B-020	T03-P
G11B-005/855	T03-A02A	G11B-020/02-08	T03-P02
G11B-005/858	T03-A02A1	G11B-020/10	T03-P01D
G11B-005/86	T03-A07B	G11B-020/10-18	T03-P01
G11B-007	T03-B	G11B-020/12	T03-P01F
	W04-C		T03-B05F
G11B-007/002	T03-B10	G11B-020/12-16	T03-J03A3
G11B-007/003	T03-B10E		T03-J03A5

G11B-020/14-16	T03-J03C5	G11C-011/404,405,412	2 U14-A03B
G11B-020/14-16,-027	T03-J03A	G11C-011/408,415,418	
G11B-020/14-16, H03K		G11C-011/409,416,419	•
G11B-020/18	T03-P01A	G11C-011/41	U14-A07C
G11B-020/24	T03-P05	G11C-011/411	U14-A03A1
	W04-G01D	G11C-011/412	U14-A03B1
G11B-021	T03-G	G11C-011/42	U14-A02A
G11B-021			
	W04-V04E	G11C-011/42,	U14-A02
G11B-021,H02K	T03-G02A1	G11C-011/44	U14-A03G
G11B-021/08,10	T03-G02B	G11C-011/54	U14-B01
	T03-G02C	G11C-013/02,06	U14-A02B9
G11B-021/12,14,21	T03-G01	G11C-013/04	U14-A02B
G11B-021/24	T03-G02A5	G11C-013/04-08	U14-A02
G11B-023	Т03-Н	G11C-014	U14-A03B9
G11B-023/037	T03-E01A	G11C-015	U14-A05
G11B-023/06,07	T03-H01C	G11C-016/02	U14-A06C
G11B-023/08-107	T03-H01B	G11C-016/04	U14-A03B7
G11B-023/28	T03-H02A1C	G11C-016/06	U14-A07B
G11B-023/40	T03-H02A1A	G11C-016/06,	U14-A07
G11B-025	T03-M	G11C-017	U14-A06
G11B-025/04	T03-M01	G11C-017/10,12	U14-A06B5
G11B-025/06,08	T03-M02	G11C-017/16,14	U14-A06B1
G11B-027	T03-J03A5	G11C-017/18	U14-A07
05 02.	T03-J	G11C-019	U14-A01
	T03-K	G11C-019/02	U14-A01A
	W04-H	G11C-020/18	W04-G01F1
	W04-J	G11C-027	U14-B
G11B-027/02-06	T03-K01	G11C-027/02	U21-B03
	W04-H05E	G11C-029	U14-D
G11B-027/10-32	T03-J01	G12B	S01-J
G11B-027/10-32		GIZB	
	W04-H01		S01-J03
G11B-027/34	T03-K03		S02-G07C
	W04-J03	G12B-001,011-017	S01-J02
G11B-027/36	T03-K07	G12B-009/02-06	S01-J01
	W04-J07	G12B-011	S01-J02A
C11D 021	W04-K	G16B	
G11B-031	-		S05, T01
G11B-033	T03-L	G16C	T01
	W04-L	G16H	S05, T01
G11B-033/08	T03-L05N	G16Y	T01
	T03-L05S	G16Z	T01
G11C	U14	G21B-001	X14-A03
G11C,H03,H04B	W04-G01B	G21C	X14-A03
G11C-005	U14-C	G21C,D	X14-C
G11C-005/06-12	U14-C01	G21C-001/00	X14-A
G11C-005/14	U14-A09	G21C-001/02-03	X14-A01
G11C-007	U14-A07	G21C-001/04-28	X14-A02
G11C-007/06	U14-A07A	G21C-001/30-32	X14-A09
G11C-008	U14-A08B	G21C-003/02	X14-B04
G11C-000			
	U14-A08	G21C-003/04-38	X14-B04X
G11C-008/02	U14-A08A	G21C-003/42-64	X14-B04A
G11C-011	U14-A03B5	G21C-005	X14-B05
G11C-011/02,08,12, 16	.18.19	G21C-007	X14-C01
	U14-A04	G21C-009-011	X14-B02
G11C-011/04,06	U14-A04X	G21C-007-011	X14-B02 X14-B01
•			
G11C-011/13	U14-A03X	G21C-015	X14-B03
G11C-011/14,-019	U14-A01A1	G21C-017	X14-C02
G11C-011/14,15	U14-A04A	G21C-019	X14-C03
G11C-011/21	U14-A03	G21C-021	X14-C04
G11C-011/22	U14-A03F	G21D	X14-C05
G11C-011/23,26-30, 46		G21D-003	X14-C05B
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G11C-011/24	U14-A03B4	G21D-005-007	X14-C05A
G11C-011/36,39,411	U14-A03A	G21F-003/02-035	X14-C05X
G11C-011/401-406	U14-A03B4A	G21F-009	X14-D

G21G-004/02	V05-E06
G21H-001	X14-E
G21K	V05-E08
G21K,G03B	V05-M01C
G21K,H01J-037	V05-F01A
G21K-001/02-04	V05-E08C
G21K-001/06	V05-E08A
G21K-007	V05-F01A3

#### **Section H**

Section H	
H01-031/03	U12-A02B5X
H01B	X12-D
	X12-E
H01B-001	X12-D01
H01B-001/02	X12-D01A
H01B-001/04,06	X12-D01C
H01B-001/08-10	X12-D01B
H01B-001/12	X12-D01C1
H01B-001/14-18	X12-D01F2
H01B-001/14-24	X12-D01F1
H01B-003	X12-E
H01B-003/02	X12-E01
H01B-003/04-06,10,14-1	
H01B-003/08	X12-E01X
H01B-003/12	X12-E01A
H01B-003/18	X12-E02
H01B-003/20-28	X12-E02A
H01B-003/30-46	X12-E02B
H01B-003/48-56	X12-E02X
H01B-005	X12-D02
H01B-005/02-12,16	X12-D02
H01B-005/14	X12-D02A
H01B-007/00	X12-D03
H01B-007/02	X12-D03D
H01B-007/04-06	X12-D03B
H01B-007/08	X12-D03A2
H01B-007/10	X12-D03A1
H01B-007/12,14	X12-D03K
H01B-007/16	X12-D03L
H01B-007/17-24	X12-D03B1
H01B-007/26,30	X12-D03B3
H01B-007/28-288	X12-D03H
H01B-007/29-295	X12-D03C
H01B-007/32	X12-D03B2
H01B-007/36	X12-D03C
H01B-007/38-40	X12-D03X
H01B-007/42	X12-D03C
H01B-009/00-06	X12-D04
H01B-009/02,-11/6-10	X12-D03E
H01B-011/00-16	X12-D05
H01B-011/18-20	X12-D05 X12-D05M
	X12-D03W
H01B-011/22	
H01B-012	X12-D06
H01B-013,-015	X12-D07
H01B-013/012	X12-D07D
H01B-013/02-04	X12-D0/C
H01B-013/04-08,16, 28-3	
	X12-D07X
H01B-013/06	X12-D07B
H01B-013/08-12,18-20	X12-D07B9
H01B-013/14-16	X12-D07B1
H01B-013/22-26,32	X12-D07A
H01B-013/30,-015	X12-D07X
H01B-015	X12-D07X
H01B-017	X22-X01B2
H01B-017, H01F-027/29	
H01B-017/00	X12-E03
H01B-017/02-30	X12-E03A
H01B-017/32-54	X12-E03X
H01B-017/56,60-66	X12-E03C

H01B-017/58	X12-E03C1	H01F-005,-027/28,30,32	2X12-C01B
	X12-G04A3	H01F-006	V02-E02X1
H01B-019	X12-E04	H01F-006/02,06	X12-C05
H01C	V01-A	H01F-006/04	X12-C02A3
11010	X12-A	H01F-007	V02-E
H01C H01C 000	V01-A02X	11011-007	X12-C06
H01C,H01C-008		11045 007/00 04	
H01C-001	V01-A01	H01F-007/02-04	V02-E01
H01C-001,-010	V01-A03A	H01F-007/06	V02-E02
	V01-A03A1	H01F-007/08-18	V02-E02A
	V01-A03B	H01F-007/20	V02-E02X
H01C-001/01-016	V01-A01A	H01F-010/00-32	V02-B
H01C-001/02-036	V01-A01B	H01F-010/10-24	V02-A01
H01C-001/04	V01-A01D		V02-A02
H01C-001/14-148	V01-A01C	H01F-013	V05-D08A
H01C-003	V01-A01C V01-A02F	11011-015	W03-A08A4
		11045 047	
H01C-003,-008,-011,-13		H01F-017	V02-F01
H01C-003,-017,	V01-A04K5	H01F-019	V02-F02
H01C-007	V01-A02A7A	H01F-021	V02-F01D
	V01-A02C		V02-F02G
	V01-A02D	H01F-027	V02-F03
H01C-007,-017	V01-A04K3		V02-G02
, ,	V01-A04K4	H01F-027/00,038/26, 30	
H01C-007/02	V01-A02A5B	11011 027700,000720,00	V02-G02
H01C-007/02,04,-017	V01-A02A3B	H01F-027/02-06	V02-G02 V02-F03A3
		HUTF-027/02-06	
H01C-007/04	V01-A02A5A		V02-G02A3
H01C-007/06	V01-A02H	H01F-027/02-06,33	X12-C03
H01C-007/10-13	V01-A02B	H01F-027/08-10, 18-22	
H01C-007/10-13,-017	V01-A04K2	H01F-027/08-22	V02-F03A1
H01C-010	V01-A03		V02-G02A1
H01C-010/04	V01-A03C8	H01F-027/12-14	X12-C02A1
H01C-011	V01-A02X	H01F-027/16	X12-C02A2
H01C-013	V01-A02G	H01F-027/23,40-42	X12-C09
H01C-013/02	V01-A02G1	H01F-027/24-26	V02-F03A2
H01C-017		11011-027/24-20	
	V01-A04	11045 007/00 00	V02-G02A2
H01C-017,-017/30	V01-A04E	H01F-027/28-30	V02-F03B
H01C-017/06-20	V01-A04B		V02-G02B
H01C-017/22	V01-A04H3	H01F-027/29,33,40-42	V02-F03X
H01C-017/22-26	U14-H04B		V02-G02X
	U14-H01C	H01F-027/32	V02-F03B1
H01C-017/28	V01-A04F		V02-G02B1
H01F	V02	H01F-027/34-38	V02-F03D
	X12		V02-G02d
H01F,H04B-015	V05-D08B		X12-C04
H01F,H04N-009/28,285		H01F-029	V02-G01A1
		HU1F-U29	
H01F-001	V02-A		V02-G01C1
H01F-001/032	V02-A01	H01F-029,-030,-036, -38	
H01F-001/04-08	V02-A01A		X12-C01E
H01F-001/09	V02-A01C	H01F-029,037	X12-C01F
H01F-001/10	U11-A04	H01F-029/00,06	V02-F03C
H01F-001/10-117	V02-A01B		V02-G02C
H01F-001/113-117	V02-A09	H01F-029/02-04	V02-G02C1
H01F-001/12	V02-A02		V02-F03C1
H01F-001/14-28	V02-A02A		X12-C02B1
	V02-A02A V02-A09	H01F-029/06-14	X12-C02B1
H01F-001/28		HU1F-U29/U0-14	
H01F-001/33	V02-A02C		V02-F03C2
H01F-001/34-38	V02-A02B		V02-G02C2
H01F-001/37-375	V02-A09	H01F-030,038/08-10	V02-G01A
H01F-001/40	V02-A05	H01F-037,038/08-10	V02-G01C
H01F-001/42	V02-A03	H01F-038/02-06	V02-G01A2
H01F-001/44	V02-A04	H01F-038/10,	X26-C01B1
H01F-003	V02-C	H01F-038/12	V02-G01
H01F-003,-027/24-26	X12-C01A	H01F-038/14	V02-G01D
H01F-005,-013	V02-D	H01F-038/18	V02-F02D
11011 000, 010	102.0	71011 000/10	102 1 020

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H01F-038/20-24,28,32,	34,40	H01G-009/038	V01-B01B
	V02-G01B		V01-B01D
H01F-038/20-40	X12-C01G	H01G-009/04	V01-B01A
H01F-038/42	V02-F02A	H01G-009/052	V01-B01A1
H01F-041	T03-A04A1C	H01G-009/055	V01-B01A15
	V02-H	H01G-009/058	V01-B01A3
	X12-C01D	H01G-009/08-12	V01-B01B7
H01F-041/02	V02-H03	H01G-009/12	V01-B01B7A
11011-041/02			
	V02-H04	H01G-009/16-22	V01-B01C
	X12-C01D1	H01G-009/24	V01-B01G
H01F-041/04-12	V02-H01	H01G-011	V01-B01D
	X12-C01D2	H01G-013	V01-B01G
H01F-041/14-16,22,28-			V01-B04
H01F-041/18	V02-H02B	H01G-013,-013/02	V01-B04A1
H01F-041/20	V02-H02A	H01G-013,-013/04	V01-B04B7
H01F-041/24-26	V02-H02C	H01G-013	V01-B01G
H01G	X12-B		V01-B04
	V01-B	H01G-015	V01-B03C8
H01G-002	V01-B	H01G-017	V01-B03C8
H01G-002/02-06	V01-B01B7	H01H	V03-C
	V01-B03D7		X13-A
H01G-002/08	V01-B01X		X13-B
	V01-B03X	H01H-001	V03-A09
H01G-002/10-12	V01-B01B7	H01H-001,-011	V03-A
HUTG-002/T0-T2			
	V01-B03D3	H01H-001/02-04	V03-A01A
H01G-002/14	V01-B01F		X13-A01A
	V01-B03D3A	H01H-001/02-10	V03-A01
	V01-B03E5	H01H-001/02-10, 011/0	)4 X13-A01
H01G-002/16	V01-B01F1	H01H-001/06-10	V03-A01B
11010-002/10		110111-001700-10	
	V01-B03E5		X13-A01B
H01G-002/18	V01-B01F5	H01H-001/12-48	V03-A02
	V01-B03E5	H01H-001/12-66	X13-A02
H01G-004	V01-B03	H01H-001/64-66	V03-A03
H01G-004/005	V01-B03D1	H01H-003,-009	V03-B09
H01G-004/008	V01-B03D1G	110111 003, 007	X13-A03
		110411 000 000 40	
H01G-004/01-012	V01-B03D1	H01H-003/02-12	X13-A03A
H01G-004/015	V01-B03E1	H01H-003/14	V03-B01B
H01G-004/08-12	V01-B03A	H01H-003/14-18	V03-B01
H01G-004/14-18	V01-B03B	H01H-003/16-18	V03-B01A
H01G-004/224	V01-B03D3	H01H-003/22-52	V03-B02
	V01-B03D5		
H01G-004/228-252		H01H-003/22-58	X13-A03B
H01G-004/258	V01-B03H	H01H-003-009	V03-B
H01G-004/30	V01-B03C3A	H01H-005	V03-B03A
H01G-004/32	V01-B03C1	H01H-005,-007	V03-B03
H01G-004/35	V01-B03C7	•	X13-A04A
H01G-004/40	V01-B03C8	H01H-005,-007,-40	X13-A04
		110111-003,-007,-40	
H01G-004/42	V01-B03C7	H01H-009/02-06	V03-B04A
H01G-005	V01-B02A	H01H-009/02-14	V03-B04
H01G-005,007	V01-B02	H01H-009/16-18	V03-B05
H01G-005/38	V01-B02A5F	H01H-009/20	V03-B06A
H01G-007	V01-B02B	H01H-009/20-30	V03-B06
H01G-007/02	V01-B02B5	H01H-009/20-50	X13-A03C
H01G-009	V01-B01	H01H-009/30	V03-B06B
H01G-009/008-12	V01-B01A7	H01H-011	V03-C07
H01G-009/016	V01-B01A7		X13-A04F
	V01-B01D	H01H-011/04	V03-A08
H01G-009/02	V01-B01B3	H01H-013	V03-A00 V03-C01A
		110111-013	
H01G-009/022	V01-B01B		X13-A04B2
H01G-009/025-032	V01-B01B1	H01H-013,-015	V03-C01
H01G-009/035	V01-B01B5		X13-A04B
		H01H-013/02-48	V03-C01A3
		H01H-013/50-66	V03-C01A3
		H01H-013/68-76	V03-C01A2

H01H-013/702-718	V03-C01A2	H01H-063-067	V03-E
H01H-015	V03-C01B	H01H-069	X13-D01C
	X13-A04B1		X13-D08
H01H-017,025	V03-C03	H01H-069,-085	X13-D01
H01H-019	V03-C02A	H01H-069-087	X13-D
	X13-A04C1	H01H-071,-079,-081,-8	
H01H-019,-021	V03-C02	H01H-071/02-08	X13-D06
	X13-A04C	H01H-071/14-22	X13-D03
H01H-021	V03-C02B	H01H-071/24-38,50-74	
	X13-A04C2	H01H-071/40	X13-D03A
H01H-023	V03-C04	H01H-071/50-74	X13-D04A
H01H-023,-027	X13-A04D	H01H-073	X13-D02A
H01H-025	V03-C03A	H01H-073-077	X13-D02
H01H-027	V03-C05	H01H-075	X13-D02B
H01H-029,-039	V03-C09	H01H-077	X13-D02C
H01H-031	X13-B01	H01H-083	X13-D05
H01H-033 H01H-033/04-26	X13-B09 X13-B04	H01H-085 H01H-085/045	X13-D01T X13-D01T2
H01H-033/28-42	X13-B05	H01H-085/046	X13-D0112 X13-D01T5
H01H-033/60-68	X13-B02	H01H-085/047	X13-D0113 X13-D01T8
H01H-033/64	X13-B02B	H01H-085/048	X13-D0116 X13-D01T6
H01H-033/66-668	X13-B02B X13-B02A	110111-003/048	X13-D0110 X13-D01T7
110111-033/00-000	X26-A03B	H01H-085/055-157,18	X13-D0117 X13-D01A
H01H-033/70-99	X13-B03	H01H-085/16-62	X13-D01A X13-D01B
H01H-033/82-835,	X13-B03A	H01H-085/42	X13-D01B X13-D01T9
H01H-033/86-873, 91,9		H01J	V05
110111-033/00-073, 71,7	X13-B03A	11013	X26
H01H-035	V03-C06X	H01J-001	V05-M02
H01H-035/02-14	V03-C06C		V05-M03
H01H-035/18,42	V03-C06X	H01J-001/02-12	V05-M02
H01H-035/24-40	V03-C06D		V05-M03A
H01H-035-039	V03-C06	H01J-001/10	V05-M07
H01H-036	V03-C06A	H01J-001/12	V05-M03A
H01H-037	V03-C06B	H01J-001/13-28	V05-M02
H01H-037/36-44	V03-C06B9	H01J-001/14	V05-M02A
H01H-037/46-56	V03-C06B1	H01J-001/30	V05-M03A
H01H-039	V03-C09	H01J-001/304-316	U12-B03D
H01H-043	S04-C01	H01J-001/36-44	V05-M03E
	V03-C08	H01J-001/46-48	V05-M03C
H01H-045,-049,-050	V03-D06	H01J-001/54-78	V05-M01
H01H-045,-050/02-14	V03-D06A	H01J-001/63	V05-M01A
H01H-045-061	V03-D	H01J-003	V05-M04
H01H-047/02-20,-50/8		H01J-005	V05-M05
	V03-D01	H01J-005/02-16	V05-M05A
H01H-047/22-36	V03-D02	H01J-005/18	V05-M05E
H01H-049	V03-D06B	H01J-005/20-44	V05-M05C
H01H-050,-051	X13-A04G1	H01J-005/46	V05-M05B
H01H-050/02-14	V03-D06A	H01J-007/02-12	V05-M09
H01H-050/16-42	V03-D03A	H01J-007/18	V05-M06
H01H-050/16-84	V03-D03	H01J 007/24-28	V05-M07
H01H-050/44-46 H01H-050/54-62	V03-D03B	H01J-009	V05-L X26-A03
H01H-050/64-84	V03-D03C V03-D03D	H01J-009/02	V05-L01
H01H-051	V03-D03D V03-D04	H01J-009/04	V05-L01A1
H01H-051/22-26	V03-D04 V03-D04A1	H01J-009/08-10	V05-L01A1
H01H-051/22-29	V03-D04A1 V03-D04A	H01J-009/08-10	V05-L01A1A
H01H-051/28.29	V03-D04A V03-D04A5	H01J-009/14	V05-L01A3
H01H-053	V03-D04A3 V03-D05E	H01J-009/16	V05-L01B1
H01H-053-061	V03-D05E	H01J-009/18	V05-L01B
H01H-055	V03-D05B	H01J-009/20-233	V05-L02
H01H-057	V03-D05A	H01J-009/236	V03-E02 V02-H01
H01H-059	V03-D05C	· <del></del>	W03-A08A1B
H01H-061	V03-D05D		
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H01J-009/24	V05-L03A	H01J-019,-021	V05-B
	X26-A03B	H01J-019,H01L	V05-B05A8
H01J-009/26	V05-L03C		V05-B05B7
	X26-A03B	H01J-019/02-22	V05-B01B1
H01J-009/28	V05-L03A5	H01J-019/16	V05-B01B1A
	X26-A03	H01J-019/24	V05-B03B1
H01J-009/30	V05-L03A		V05-B05A5
11013-007/30	X26-A03B		V05-B05B3
1101 1 000/22		1101   010/24   1011	
H01J-009/32	V05-L03C	H01J-019/24,H01L	V05-B05A5A
	X26-A03B	H01J-019/28-38	V05-B05B5
H01J-009/34	V05-L03C5	H01J-019/32	V05-B05B5B
	X26-A03B	H01J-019/32-34	V05-B03B5
H01J-009/36	V05-L03C1	H01J-019/32-36	V05-B01B5
	X26-A03B	H01J-019/38	V05-B01B3
H01J-009/28	V05-L03A5		V05-B03B3
H01J-009/36	V05-L03C1		V05-B05B5A
H01J-009/38	V05-L03C5	H01J-019/54-62	V05-B03B3/A
11013-007/30	X26-A03B	H01J-019/62	V05-B03B7
1101 1 000/205			
H01J-009/385	V05-L03C5C	H01J-019/74	V05-B01B6
	X26-A03B	H01J-021	V05-B01
H01J-009/39	V05-L03C7A		V05-B03
	X26-A03B		V05-B05
H01J-009/395	V05-L03C5E	H01J-021,H01L	V05-B05A3C
	X26-A03B	H01J-021/04	V05-B01A1
H01J-009/40	V05-L03C5		V05-B05A1A
	X26-A03B	H01J-021/10	V05-B01A3
H01J-009/42	V05-L07E1	11013 021/10	V05-B01A7
11013-007/42	X26-A03		V05-B05A1B
1101 1 000 /44		1101 1 001 /10 14	
H01J-009/44	V05-L07E5	H01J-021/10,14	V05-B01A5
	X26-A03	H01J-023	V05-C02
H01J-009/46	V05-L07A		V05-C03
	X26-A03	H01J-025	V05-C01
H01J-009/48	V05-L07C	H01J-025/10-30	V05-C01C
	X26-A03	H01J-025/34-49	V05-C01B
H01J-009/50	V05-L07E5	H01J-025/50-60	V05-C01A
	X26-A03	H01J-027	V05-E05
H01J-009/52	V05-L07E6	H01J-027,H01J-035,	V05-E
11013 007/32	X26-A03	H01J-029	V05-D
H01 I 011			
H01J-011	V05-A	H01J-029,-029/89	V05-D07C
H01J-013	V05-B03	H01J-029,-031	V05-D
H01J-015	V05-A03	H01J-029,-043	V05-D06E
	V05-A05	H01J-029,H05K-009	V05-D07B5
H01J-017	V05-A	H01J-029/02-45	V05-D05
H01J-017,H02H	V05-A05	H01J-029/04	V05-D01C3
H01J-017/04,16	V05-A01D1C		V05-D05C
H01J-017/04-12	V05-A01C		V05-D05C5
H01J-017/06	V05-A01C3A	H01J-029/06	V05-D05E
H01J-017/06-08	V05-A01C3	H01J-029/07	V05-D05D
H01J-017/10	V05-A01C1	H01J-029/07,-009/227	V05-D05D5A
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H01J-017/12	V05-A01C2	H01J-029/18	V05-D05B3
H01J-017/16	V05-A01D1	H01J-029/18-34	V05-D05B
	V05-A01D3	H01J-029/20	V05-D05B1
H01J-017/16-18	V05-A01D	H01J-029/22,28	V05-D05B7
H01J-017/18	V05-A01D1A	H01J-029/26	V05-D05B5C
	V05-A01D3A	H01J-029/28	V05-D05B7A
	V05-A01D5	H01J-029/30,32	V05-D05B5
H01J-017/20	V05-A01B1	H01J-029/34	V05-D05F
H01J-017/49	V05-A01	H01J-029/36,38	V05-D05A1
H01J-017/64	V05-A01 V05-A03	H01J-029/36-45	V05-D05A1
H01J-019	V05-B01B	H01J-029/39-45	V05-D05A5
	V05-B03B	H01J-029/46-82	V05-D06
	V05-B05A8X	H01J-029/48	V05-D06A1A
	V05-B05B	H01J-029/48,50	V05-D06A1

H01J-029/48-68	V05-D06A	H01J-037/244	V05-F04H
H01J-029/50	V05-D06A1B	H01J-037/248	V05-F05E5
	V05-D06A1C	H01J-037/252,256	V05-F01A4
	V05-D06A1E	H01J-037/26	V05-F01A1
H01J-029/52	V05-D06A2	H01J-037/26-295	V05-F01A1C
H01J-029/56	V05-D06A5		V05-F01A2
H01J-029/58-68	V05-D06A3	H01J-037/27	V05-F01A1A
H01J-029/74	V05-D06B5	H01J-037/28	V05-F01A1B
H01J-029/76	V02-F01A	H01J-037/30-317	V05-F05A
1104 1 000 /00 04	V05-D06B1	H01J-037/30-36	V05-F05
H01J-029/80,81	V05-D06C	H01J-037/32-36	V05-F08D1
H01J-029/86	V05-D07A3	H01J-037/73-77	V05-F04A
	V05-D07A5	H01J-040	V05-G
1104 1 000 /0 / 07	V05-D07A7A	H01J-040/06	V05-G01
H01J-029/86,87	V05-D07A	H01J-041	V05-K03
H01J-029/86,90	V05-D07A7	H01J-043	V05-K01
H01J-029/86-90	V05-D07	H01J-047	V05-H
H01J-029/87	V05-D07A1	H01J-049	V05-J01
H01J-029/88	V05-D07B3	H01J-049/04	V05-J01C
H01J-029/88,90	V05-D07B	H01J-049/10-18	V05-J01E
H01J-029/89	V05-D07C3	H01J-049/20,22	V05-J01G
	V05-D07C5C	H01J-049/26-42	S03-E10A
H01J-029/90	V05-D07B1	1104 1 0 40 /00	V05-J01A1
H01J-029/94	V05-D07E	H01J-049/30	S03-E10A1
	V05-D08	H01J-049/32	S03-E10A1A
H01J-031	V05-D	H01J-049/40	S03-E10A3
H01J-031/08-22	V05-D01	H01J-049/42	S03-E10A5
H01J-031/26-42	V05-D02	H01J-049/44-48	V05-J01A5
H01J-031/44,48-56	V05-D03	H01J-061/02	X26-A02
H01J-031/49-495	V05-D03C	H01J-061/04-10	X26-A02B
H01J-031/50-56	V05-D03B	H01J-061/12-22	X26-A02C
H01J-031/58-68	V05-D04	H01J-061/24-28, 50-56	
H01J-033	V05-J	H01J-061/30-35	X26-A02A2
H01J-035	V05-E01	H01J-061/36	X26-A02A1
H01J-035/06	V05-E01C	H01J-061/38-48	X26-A02D
H01J-035/08	V05-E01A	H01J-061/60-68	X26-A01A
H01J-035/10	V05-E01B	H01J-061/70-80	X26-A01E
H01J-035/10-14	V05-E01D	H01J-061/80-82	X26-A01D
H01J-035/12	V05-E01F	H01J-063	X26-A01A
H01J-035/14	V05-E01D1	H01J-063,H05B-031 H01J-065	X26-A01A
H01J-035/16	V05-E01E3	H013-005	X26-A01B
11011035/1/ 19	V05-E01E5	11011/	X26-A01C
H01J-035/16-18 H01J-035/18	V05-E01E V05-E01E1A	H01K H01K,H04N-005/225	X26-B W04-M01H
H01J-035/16	V05-E01ETA V05-E01H7	H01K,H04N-005/74	W04-M01H W04-Q01B7
H01J-035/26		•	
H01J-035/30	V05-E01H1 V05-E01H5	H01K-001 H01K-001/02-16	X26-B02 X26-B02A3
H01J-037	V05-E01113 V05-F	H01K-001/02-10	X26-B02A3
H01J-037/02-06	V05-F04	H01K-001/16-24,40	X26-B02X
H01J-037/073	V05-F04A3	H01K-001/28-38, 42-48	
H01J-037/075	V05-F04A1A	H01K-003	X26-B03
H01J-037/08	V05-F04A5	H01K-003/02-04	X26-B03A
H01J-037/10-153	V05-F04A3	H01K-003/22-26	X26-B03B
H01J-037/12	V05-F04C1E	H01K-005-013	X26-B03B
H01J-037/14-143	V05-F04C1A	H01L,G11C	T01-H01B3
H01J-037/145	V05-F04C1C	H01L,H01P-011,H05K	W02-A07A1
H01J-037/147	V05-F04C5	H01L,H04B-001/10	W02-G03B3C
H01J-037/16	V05-F04D1	H01L,H04N-005/33	W04-M01E1A
H01J-037/16-18	V05-F04D	H01L-021	U12-A01B2
H01J-037/18	V05-F04D3		U12-A02A3
H01J-037/20	V05-F04G		3 12 MOZAG
H01J-037/22	V05-F04J		
H01J-037/24	V05-F05E5		
	. 33 1 0020		

H01L-021/027	U11-C04A1B	H01L-021/304	U11-C06A1A
	U11-C04C	H01L-021/304,306	U11-A10
	U11-C04E1	H01L-021/306	U11-C06A1B
	U11-C04A1H	H01L-021/306,465	U11-C07B
	U11-C04D	H01L-021/308,467,302	U11-C07D
	U11-C04E2	H01L-021/31	U11-C05B9C
	U11-C04F	H01L-021/31,32,469,47	5 U11-C05B9
	U11-C04G	H01L-021/31,469,475	U11-C05B9A
	U11-C04H		U11-C05B9B
	U11-C04B3	H01L-021/31,88,95	U11-C05D1
	U11-C04B1	H01L-021/311	U11-C07C3
	U11-C04B2	H01L-021/312	U11-A06A
H01L-021/027,033	U11-C04D1		U11-A08A1
H01L-021/027,66	U11-C04A1E	H01L-021/312,47	U11-C05A
H01L-021/06	U11-C01J3B	H01L-021/314,16,18	U11-A08A2
H01L-021/078	U11-C06B	H01L-021/314,471	U11-C05B
H01L-021/078,304	U11-C06A2	H01L-021/316	U11-C05B7
H01L-021/18	U11-C01J3A	H01L-021/318	U11-C05B5
H01L-021/20,36	U11-C01J1	H01L-021/32,26,475	U11-C05B3
H01L-021/203	U11-C09A	H01L-021/321,311	U11-C02J3
H01L-021/203	U11-C01A9	H01L-021/322	U11-C03J2B
	U11-C01A2	H01L-021/324	U11-C03A
	U11-C09D		U11-C03J1
H01L-021/203,205, 306	5 U11-C09M		U11-C03J2A
H01L-021/203,363	U11-C01A	H01L-021/324,76	U11-C08C
H01L-021/205	U11-C09B	H01L-021/328,331	U13-D03B2
H01L-021/205,26	U11-C01B1	H01L-021/328,334	U11-C18
H01L-021/205,302	U11-C09C	H01L-021/329	U11-C18B1
H01L-021/205,365	U11-C01B	H01L-021/331	U11-C18A2
H01L-021/208,368	U11-C01H	H01L-021/331,335	U11-C18A
H01L-021/22,26	U11-C02J1A	H01L-021/332	U11-C18B2
,	U11-C02J1C	H01L-021/334	U11-C18A3
	U11-C02J2	H01L-021/339	U11-C18B3
	U11-C02J5	H01L-021/34	U11-C01J4
	U11-C02J6	H01L-021/363,44	U11-C05B2
	U11-C02J7	H01L-021/38,42	U11-C02J1B
	U11-C02A	H01L-021/40,24	U11-C02X
H01L-021/26	U11-C03B	H01L-021/50	U11-E
	U11-C03J5	H01L-021/52,58	U11-D03B3
H01L-021/26,261	U11-C02J4	·	U11-E02A3
H01L-021/26,42	U11-C02B	H01L-021/52,68	U11-F02A3
H01L-021/261,263	U11-C03E	H01L-021/56	U11-E02A
H01l-021/266,426	U11-C02B2	H01L-021/60	U11-E01
H01L-021/268	U11-C03C	H01L-021/60,52,58	U11-E01C
H01L-021/28	U11-C05E	H01L-021/60,603,607	U11-E01A
	U11-C05F1		U11-E01B
	U11-C05F2	H01L-021/60,H01L-023	U14-H05
	U11-C05F3	H01L-021/66	U11-F01
	U11-C05F4	H01L-021/66,G06K-009	U11-F01B3
	U11-C05F5	H01L-021/68	U11-F02
	U11-C05F6	H01L-021/72,74,76	U11-C08A5
H01L-021/28,44	U11-C05C	H01L-021/74,76	U11-C08B1
H01L-021/285,443	U11-C05C3		U11-C08B2
	U11-C05C5		U11-C08B3
H01L-021/30	U11-C07C1		U11-C08B9
	U11-C07C4	H01L-021/76	U11-C08A2
	U11-C07D2	H01L-021/761	U11-C08A1
	U11-C07D3	H01L-021/762	U11-C08A4
	U11-C07D4	H01L-021/762,763	U11-C08A3
H01L-021/30,28,88	U11-C07C2	H01L-021/82	U11-D03C1
H01L-021/302,26,461	U11-C07A2		U11-D03C2
H01L-021/302,308, 467			U13-C04D
H01L-021/302,461	U11-C07A		U11-G

H01L-021/8246 H01L-021/84,86	U13-C04A1 U11-C08A6	H01L-025	U11-D01A6 U14-H03
H01L-021/88	U11-C05D3		X15-A02
H01L-021/88,90	U11-C05D2 U11-C05G2C	H01L-025,-049 H01L-025,H05K	U14-H04 U14-H03G
H01L-021/90	U11-C05C7	H01L-025,H05K-001	U14-H05
11012 021/70	U11-C05D4	H01L-027	U13-A
H01L-021/90,50	U11-D03B9		U13-C06
H01L-021/90,92	U11-D03B1		U13-C08
H01L-021/90,92,60	U11-D03A2		U13-C09
H01L-021/90,92,88 H01L-021/92,90	U11-D03B2 U11-C05G2B		U13-E02 U14-H03H
H01L-023	U11-D		U13-D03B2
11012 025	U11-E02A2		U13-C04C
	U11-E02B		W04-M01B5
	U14-H04A3	H01L-027,-049,H05K	U14-H
	U12-A02B3	H01L-027,H03	U13-B
11011 022 025	U12-A01B3	H01L-027/01	U14-H01C
H01L-023,-025	U14-H05 U14-H03A3	H01L-027/02	U13-E01 U13-E09
	U14-H03B	H01L-027/04	U11-C05G1A
	U14-H03B1		U11-C05G1B
	U14-H03B2		U11-C05G1C
H01L-023,-025,G11C	U14-A10		U12-C02A1
H01L-023/02,04,05,08	U11-D01A1		U12-C03
H01L-023/02,32	U11-D01A3 U11-D01	H01L-027/06	U13-C04B1A U13-C01A
H01L-023/02,32	U11-D01A	H01L-027/06,01	U13-D01B
H01L-023/29	U11-A07	H01L-027/06,07	U13-B04
H01L-023/32	U11-D01Q	H01L-027/07	U13-B03
H01L-023/34	U11-D02A		U13-C02C
H01L-023/34,36	U11-D02B		U13-C03
H01L-023/38 H01L-023/40	U11-D02D2 U11-D02B2	H01L-027/082	U13-D03 U13-B01
H01L-023/46	U11-D02B2	H01L-027/082	U13-C01
H01L-023/48	U11-A08B		U13-D01
	U11-D03	H01L-027/085	U13-B02
H01L-023/48,50	U11-D03A1		U13-C02
H01L-023/495	U11-D03A1A	H01L-027/085,088,092	
H01L-023/498	U11-D03A1B	H01L-027/088,092	U13-B02A
H01L-023/52	U11-D03A4 U11-D03A5	H01L-027/095	U13-C02A U13-B02B
	U11-D03A6	11012 0277075	U13-C02B
	U11-D03A9	H01L-027/10	U13-C04
	U11-C06B	H01L-027/108	U13-C04B1A
H01L-023/52,047, 049,5		H01L-027/11	U13-C04B1B
H01L-023/525	U11-D03A3 U11-C05G2A	H01L-027/112,115	U13-C04A U13-C04B2
H01L-023/528	U11-D03C1A	H01L-027/118,	U11-D03C2
H01L-023/532	U11-D03B1	H01L-027/118,02	U13-C04D
	U11-D03B2	H01L-027/12	U11-C08A6
H01L-023/535,538	U11-C05D3	H01L-027/14	S06-E03G1
H01L-023/538	U14-H03F2		U11-C18B4
H01L-023/552,556	U11-C05D2 U11-D01C2		U11-C18D U13-A01
H01L-023/332,330	U11-D01C3		U13-D04A
H01L-023/62	U11-D03C1B	H01L-027/14,16	U13-A01X
H01L-023/62,528,	U11-D03C1	H01L-027/146	U13-A01A
H01L-023/64,66,535,53			U13-A01B
H01L-023/66	U11-D03B9	H01L-027/148	U13-A02X
	U11-D01A4		U13-A02C U13-A02
			U13-A02B
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11041 027/45 27	U111 C10D0	11041 024 022	1110 4
H01L-027/15-26	U11-C18B9	H01L-031,-033	U12-A
H01L-027/16	U14-E01	H01L-031,H01L-031/04	
H01L-027/20-26	U13-D04	H01L-031/02,03	U12-A02B5
H01L-029	U12-C02F	H01L-031/02,03,04	U12-A02A3
	U12-D	H01L-031/02,04	U12-A02A4
	U12-E01A4	H01L-031/02,04,068,072	
	U12-E01A5	H01L-031/0203,	U12-A02A1
	U14-K01A2B	H01L-031/0216,04	U12-A02A4D
H01L-029,-027	U12-C02	H01L-031/0224,04	U12-A02A4A
H01L-029,-049	U12-C02C	H01L-031/0236,04	U12-A02A4B
H01L-029/02-10	U12-E01B	H01L-031/0248	U12-A02A2
H01L-029/02-38	U12-E	H01L-031/0296	U12-A02B5A
H01L-029/12	U12-E01A		U12-A02A2A
H01L-029/15	U12-E01A	H01L-031/0304	U12-A02B5B
		HU1L-031/0304	
H01L-029/16	U12-E01A3		U12-A02A2B
H01L-029/20	U12-E01A1	H01L-031/0312	U12-A02B5D
H01L-029/22,18	U12-E01A2		U12-A02A2C
H01L-029/24-28	U12-E01A9	H01L-031/032,0336	U12-A02A2E
H01L-029/40,45,47	U12-E02	H01L-031/032,0336,034	4 U12-A02A2X
H01L-029/66	U12-D02K	H01L-031/0352	U12-A02A2Q
H01L-029/70	U12-D01	H01L-031/036,0376	U12-A02A2F
H01L-029/72	U12-D01A1		
HU1L-029/72		H01L-031/0368,0376	U12-A02B5C
	U12-D01A5	H01L-031/04	U12-A02A1
H01L-029/72,73	U12-D01A		U12-A02A2
H01L-029/73	U12-D01A3		U12-A02A2A
	U12-D01A4		U12-A02A2B
H01L-029/73,72	U12-D01A9		U12-A02A2C
H01L-029/737	U12-D01A2		U12-A02A2X
H01L-029/74	U12-D01B		U12-A02A2Q
H01L-029/74,87	U12-D01B		U12-A02A2G
H01L-029/744	U12-D01B3		U12-A02A4E
H01L-029/745,749	U12-D01B1	H01L-031/042	U12-A02A5
H01L-029/747	U12-D01B2		U12-A02A6
H01L-029/76	U12-D02	H01L-031/05	U12-A02A7
H01L-029/76,78	U12-D02A5	H01L-031/058,055	U12-A02A9
H01L-029/76,80	U12-D02J2	H01L-031/08	U12-A02B1
H01L-029/775	U12-D02D1	H01L-031/08,09,10	U12-A02B
H01L-029/775,778	U12-D02D	H01L-031/08,10,11	U12-A02B3
H01L-029/778	U12-D02D2	H01L-031/10	U12-A02B2A
H01L-029/78	U12-D02A	H01L-031/10,11	U12-A02B2
H01L-029/784	U12-D02A3		U12-A02B4
	U12-D02A4	H01L-031/11,112,113	U12-A02B2B
H01L-029/786	U12-B03A	H01L-031/111	U12-A02B2C
H01L-029/788	U12-D02A1	H01L-031/115-119	U12-A03
H01L-029/792	U12-D02A2	H01L-031/12	U12-A02C1
H01L-029/796,816	U13-A02B	H01L-031/12,14,16,18	U12-A02C
11012 0277770,010	U13-A02A	H01L-033	U12-A01
	U13-A02C	11012 000	X26-H
		11041 022 024	
	U13-A02	H01L-033,-021	U12-A01A2
H01L-029/80,812	U12-D02B	H01L-033,-023	U12-A01A4
H01L-029/84	U11-C18C	H01L-035	U14-E05
H01L-029/84,G01L-009	U12-B03E		U14-E09
H01L-029/861	U12-C01	H01L-035,-037	U14-E
H01L-029/864	U12-C01E	H01L-037	U14-E01B
H01L-029/866	U12-C01D		U14-E01C
H01L-029/868,872	U12-C01C	H01L-037/02	U14-E01A
H01L-029/88,885	U12-C01G	H01L-037/04	U14-E02
H01L-029/93		H01L-037/04 H01L-039	
□01L-027/73	U12-C02B	H01L-037	U14-F
	V01-B02B1		T03-A01E
H01L-029/94	U12-C02A		T03-A06K
H01L-029/95	U12-C02X	H01L-039/22	U14-F02B
H01L-031	U12-A02		
	U12-A02C3		
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11041 030/24	1111 01000	LIO1N4 010/40	V1/ D01F
H01L-039/24	U11-C18B9	H01M-010/40	X16-B01F
	U14-F01A1	H01M-010/42	X16-B09
11011 041	U14-F01B1	H01M-010/50	X16-K
H01L-041	U11-A02	H01M-012	X16-B01D
	U14-G	H01M-012,-014,-016	X16-D
	V06-V01B	H01P	W02-A
11011 041/04 053	V06-V01D	H01P-001	W02-A01C
H01L-041/04-053,	V0/ V01B		W02-A01D
08-113, 18-193	V06-V01B		W02-A04
H01L-041/06,12,20 H01L-041/22-26	V06-V01D V06-V01B	H01P-001,H03H	W02-A06 W02-A06E
H01L-041/22-26	V06-V01D	H01P-001/02	W02-A01C1
H01L-041/22-26	V06-V03	H01P-001/04	W02-A01C1
H01L-043	U12-B01	H01P-001/06	W02-A01C2
H01L-043,-045,-047	U12-B	H01P-001/08	W02-A01C5
H01L-043/04,06,14	U12-B01A	H01P-001/10-15	W02-A04A
H01L-043/08	U12-B01B	H01P-001/11,12	W02-A04A1
H01L-045	U12-B02	H01P-001/14	W02-A04A3
H01L-047/02	U12-B02A	H01P-001/15	W02-A04A5
H01L-049	U12-B03	H01P-001/16	W02-A06A
	U14-K01A2A	H01P-001/162	W02-A06A1
H01L-049,G02F	U14-H01A	H01P-001/165	W02-A06B
H01L-049/02	U12-B03B	H01P-001/17	W02-A06B1
	U14-H01	H01P-001/175	W02-A06B3
	U14-H02	H01P-001/18-195	W02-A06C
	U12-B03A	H01P-001/185	W02-A06C1
H01M-002	X16-F	H01P-001/19-195	W02-A06C2
H01M-002/02-06	X16-F01	H01P-001/201-205	W02-A05A
H01M-002/08	X16-F01A	H01P-001/201-219	W02-A05K
H01M-002/10	X16-F06	H01P-001/202	W02-A05A1A
H01M-002/12	X16-F03B		W02-A05A1C
H01M-002/14-18	X16-F02	H01P-001/20-219	W02-A05
H01M-002/20-34	X16-F03	H01P-001/203	W02-A05A2
H01M-002/36-40	X16-F04	H01P-001/205	W02-A05A1E
H01M-004	X16-E	LI01D 001/207	W02-A05A3
H01M-004/02,36-46 H01M-004/06-12	X16-E01 X16-E03	H01P-001/207 H01P-001/208	W02-A05B W02-A05B1
H01M-004/14-23	X16-E03 X16-E04	H01P-001/210-219	W02-A05K4
H01M-004/24-34	X16-E05	H01P-001/211	W02-A05R4
H01M-004/48-57	X16-E01C1	H01P-001/212	W02-A05B2
H01M-004/60	X16-E01A	H01P-001/213	W02-A05K7
H01M-004/64-84	X16-E02	H01P-001/215-218	W02-A05E
H01M-004/86-98	X16-E06	H01P-001/219	W02-A05F
H01M-006/02	X16-A	H01P-001/22	W02-A04C5
H01M-006/04	X16-A01	H01P-001/22-23	W02-A04C
H01M-006/06-12	X16-A01A	H01P-001/23	W02-A04C1
H01M-006/14-20	X16-A02	H01P-001/24	W02-A04D
H01M-006/30-32	X16-A03	H01P-001/36-375	W02-A04E
H01M-006/34	X16-A03B	H01P-001/38-397	W02-A04F
H01M-006/36	X16-A03A	H01P-001/387	W02-A04F1
H01M-008	X16-C	H01P-003	W02-A01
	X21-B01A	H01P-003/02-08	W02-A01A
H01M-008/04	X16-C09	H01P-003/10-18	W02-A01B
H01M-008/10-12	X16-C01	H01P-005/00-04	W02-A02
H01M-008/14	X16-C02	H01P-005/08-10	W02-A02A
H01M-008/16	X16-C06	H01P-005/103	W02-A02A1
H01M-008/24	X16-C18	H01P-005/107	W02-A02A2
H01M-010	X16-B	H01P-005/12	W02-A02B
H01M-010/00-02	X16-B01	H01P-005/16-22	W02-A02B1
H01M-010/06-22 H01M-010/24-32	X16-B01B	H01P-005/18 H01P-005/20	W02-A02B1A W02-A02B1C
H01M-010/36-38	X16-B01A X16-B01X	H01P-005/20 H01P-005/22	W02-A02B1C W02-A02B1D
H01M-010/39	X16-B01X X16-B01C	H01P-007	W02-A03A
110 1111 0 10/07	7.10 B010	11011 -007	**0Z-AUJA

H01P-007/02 H01P-007/04	W02-A03A2 W02-A03A2A	H01R-004 H01R-004/02,06,08	V04-A V04-A01
	W02-A03A2C	H01R-004/04	V04-A06
H01P-007/06	W02-A03A3	H01R-004/10-20	V04-A02
H01P-007/08	W02-A03A4	H01R-004/24-26	V04-A03
H01P-007/10	W02-A03A5	H01R-004/28	V04-A04
H01P-009/00-04	W02-A03B	H01R-004/30-36	V04-A04B
H01P-011	W02-A07	H01R-004/38-46	V04-A04A
H01Q	W02-B	H01R-004/48	V04-A04C
H01Q-001	W02-B	H01R-004/50-52	V04-A04X
H01Q-001/02	W02-B07B	H01R-004/54-62	V04-A09
H01Q-001/04	W02-B07	H01R-004/64,66	V04-A05
	W02-B08	H01R-004/68	V04-A10
H01Q-001/06	W02-B08X		X12-G02X
H01Q-001/08	W02-B07A5	H01R-004/70,72	V04-A08
	W02-B08K	H01R-009	V04-B
H01Q-001/10	W02-B01C1A	H01R-009/05	V04-B03
H01Q-001/12-22	W02-B07A	H01R-009/11	V04-B04
H01Q-001/24	W02-B08C3	H01R-009/15	V04-B09
H01Q-001/26	W02-B08B	H01R-009/16-24,28	V04-B05
H01Q-001/28	W02-B08F5	H01R-009/26	V04-B05A
	W02-B08F7	H01R-011	V04-C
11040 004/20	W02-B08F6	H01R-011/01-09	V04-C05
H01Q-001/32	W02-B07C1	H01R-011/11-32	V04-C01
	W02-B07D	H01R-012,-024	V04-B
11010 001/24	W02-B08F1	LIO1D 012/02 10	V04-G
H01Q-001/34	W02-B08F2	H01R-012/02,18	V04-G09
H01Q-001/42	W02-B07C	H01R-012/04-06,32-36	V04-B01
H01Q-001/50	W02-B08B1	H01R-012/08-12,38 H01R-012/16-28	V04-B02
H01Q-001/52	W02-B08P6		V04-G02
H01Q-003 H01Q-003/00-46	W02-B06E W02-B06	H01R-012/18,20 H01R-012/22	V04-G02A V04-G02B
H01Q-005	W02-B08 W02-B08R1	H01R-013	V04-G02B V04-D
H01Q-007/00-08	W02-B00K1 W02-B01A	H01R-013/02-03	V04-D V04-D01
H01Q-007/06-08	W02-B01A1	H01R-013/02-03	V04-D01 V04-D01A
H01Q-009	W02-B01A1	H01R-013/10-14	V04-D01A V04-D01B
H01Q-009,011	W02-B01C	H01R-013/40-436	V04-D01B V04-D02
H01Q-009/16	W02-B01B1	H01R-013/44-453	V04-D02 V04-D06A
H01Q-009/261	W02-B01B2	H01R-013/46-533	V04-D03
H01Q-009/27	W02-B01B3	H01R-013/56-60,72-74	
H01Q-011	W02-B01D	H01R-013/58-595	V04-D06D
H01Q-011/08	W02-B01C3	H01R-013/62-625, 629-6	
H01Q-013	W02-B02		V04-D04
H01Q-013/00-28	W02-B02	H01R-013/627	V04-D04A
H01Q-013/02	W02-B02B	H01R-013/64-645	V04-D06C
H01Q-013/08	W02-B02A	H01R-013/648-658	V04-D06B
H01Q-013/10-18	W02-B02C	H01R-013/66-719	V04-D05
H01Q-015	W02-B03	H01R-024	V04-E
H01Q-015/02-12	W02-B03A		V04-F
H01Q-015/14	W02-B03B2A		V04-G01
H01Q-015/14-22	W02-B03B	H01R-025,-027,-029	V04-H
H01Q-015/24	W02-B03C	H01R-025/14-16	V04-H01
H01Q-017	W02-B03D	H01R-031	V04-J
H01Q-019	W02-B04	H01R-033	V04-K
H01Q-019/02	W02-B04A	H01R-033/02-46	V04-K01
H01Q-019/06-09	W02-B04B		X26-F
H01Q-019/12	W02-B04E	H01R-035,041	V04-N
H01Q-019/30	W02-B04D	H01R-039/02	V04-L
H01Q-021	W02-B05	H01R-039/04-16,56,32-3	
H01Q-021/06	W02-B05B	H01R-039/04-59	V06-M12
11040 004/40	W02-B05B6	1104D 020440 22 24 111	X11-J03
H01Q-021/10	W02-B05C	H01R-039/18-30,36-44,	
H01R	V04		V04-L01B

H01R-039/60-64	V04-L09	H01T-013/39	X22-A01E1C
H01R-043	V04-P	H01T-013/41	X22-A01E1J
H01R-043/01,027,26-28	-	H01T-013/44	X22-A01E1G
H01R-043/02	V04-P08	H01T-015	X12-F02
H01R-043/033	V04-P01C	H01T-019	X12-F04
H01R-043/04-058	V04-P01A	H01T-019/00	S06-E02A
			X22-A01E1E
H01R-043/06-14	V04-P02	H01T-021/02-04	
	V06-M11A	H01T-021/06	X12-F09
	X11-J08A	H01T-023	X12-F03
H01R-043/16,20-24	V04-P06	H02B	X13-E
H01R-043/18	V04-P07	H02B-001	X13-E09
H01R-101/00	V04-E	H02B-001/01-056,-015	X13-E01
H01R-103/00	V04-F	H02B-001/06-24	X13-E04
H01R-105/00	V04-G	H02B-001/20-24	X13-E04A
H01R-107/00	V04-G	H02B-001/26-52	X13-E02
H01S-001/00,02,04,06	V08-B01	H02B-003	X13-E08
H01S-003	V08-A06	H02B-005-013	X13-E03
	V08-A	H02B-011	X13-E03A
H01S-003/02,05	V08-A01	H02B-011,-013	X13-A04E
H01S-003/036	V08-A01C	H02B-013	X13-E03B
H01S-003/038	V08-A01B	H02G	W06-B01C1
H01S-003/04	V08-A05	11023	W01-D
H01S-003/043	U12-A01B3A		X12-G
H01S-003/05	V08-A01A		W06-C01C1
H01S-003/082	V08-A01A3	11026 001	W06-B01C1
H01S-003/083	V08-A01A1	H02G-001	W01-D01
H01S-003/09	V08-A02	11000 004/00 04	X12-G01
H01S-003/0941,16,17	V08-A04C1	H02G-001/02,04	X12-G01A1
H01S-003/096	V08-A02A	H02G-001/06	X12-G01A7
H01S-003/097	V08-A02C	H02G-001/08	X12-G01A7D
H01S-003/098	V08-A03B	H02G-001/10	X12-G01A7G
H01S-003/10	V08-A06A	H02G-001/12	X12-G01B
	V08-A03	H02G-001/14	X12-G01E
H01S-003/10,11,13,34	V08-A01A2	H02G-001/16	X12-G01D
H01S-003/109	V08-A03C1	H02G-003,009/00-12	X12-G04
H01S-003/11	V08-A03D	H02G-003/02-06,22	X12-G04A
H01S-003/13	V08-A03A1	H02G-003/02-06,22-24	
	V08-A03C2	H02G-003/08-20	X12-G04B
H01S-003/133	U12-A01B4	H02G-003/26,28	X12-G04A1
H01S-003/14	V08-A01D1	H02G-003/30,36	X12-G04A
H01S-003/16,17	V07-K01C2	H02G-003/32	X12-G04A2
	V08-A04C	H02G-003/34,38-40	X12-G04A1
H01S-003/17	V08-A04C2	H02G-005	X12-G03
H01S-003/18	U12-A01B1A	H02G-007	X12-G05
	U12-A01B1B	H02G-011	X12-G08
H01S-003/18,19	V07-K01C1	H02G-013	X12-G01F
	U12-A01B	H02G-015	W01-D02
	V08-A04A		X12-G02
	U12-A01B2	H02G-015/007-013,20-3	34 X12-G02X
	U12-A01B3	H02G-015/02-076	X12-G02B
H01S-003/19,085	U12-A01B1	H02G-015/08-196	X12-G02C
H01S-003/20	V08-A04D	H02H	X13-C
H01S-003/22	V08-A04B	H02H-001-007.011	U24-F
H01S-003/23	V08-A07	H02H-001-009H04M	W01-C08A
H01S-003/30	V08-A04X	H02H-003	X13-C01
H01S-004,H01S-001	V08-B	H02H-003/08-10	X13-C01A
H01S-004/00	V08-B02	H02H-003/14-17	X13-C01B
H01T	X12-F	H02H-003/20-253	X13-C01C
H01T-001,-002,-007,-00		H02H-003/26-36	X13-C01D
	X12-F01	H02H-005	X13-C02
H01T-004	X12-F01A	H02H-006,-011	X13-C02 X13-C09
H01T-013	X22-A01E	H02H-007	X13-C04
H01T-013/22-36	X22-A01E1A	H02H-007/04-06	X13-C04B
22.0.22.00			

H02H-007/08-097	X13-C04C	H02K-009/19-22	X11-J06A
H02H-007/10-127	U24-D01B	H02K-011	V06-M14
	X12-J01B		X11-J04
	X13-C04D	H02K-013	V06-M12
H02H-007/26-30	X13-C04A	11021( 010	X11-J03
		11001/2 045	
H02H-009	U24-F02	H02K-015	V06-M11
	X13-C03		X11-J08
H02H-009/02,08	X12-H01A3	H02K-015/02-03	V06-M11D
·	X13-C03B	H02K-015/02-04	X11-J08A
H02H-009/04	X13-C03A	H02K-015/04-095	V06-M11B
		110210-013/04-073	
H02J	U24-H		X11-J08B
	X12-H	H02K-015/10-12	V06-M11C
H02J-001/00-16,-003/3	6X12-H01D	H02K-015/10-12,16	X11-J08C
H02J-001-005,-017	X12-H01	H02K-016,-025-027,-03	1,-047,-053,-057
H02J-003	U24-H		X11-H09
H02J-003/01	X12-H01A4	H02K-017	X11-E
	X12-1101A4		
H02J-003/04-08,34,		H02K-017,-023,-027	V06-M02
38-50	X12-H01B	H02K-017,027	V06-M02B
H02J-003/12	X12-H01A1	H02K-019	V06-M01B
H02J-003/14	X12-H01A1A		X11-D
H02J-003/16	X12-H01A1C	H02K-019,-021	V06-M01
		H02K-021	
H02J-003/18-22	X12-H01A2	HU2N-U21	V06-M01A
H02J-003/24	X12-H01A5		X11-G
H02J-003/26	X12-H01A6	H02K-023	V06-M02A
H02J-003/28-32	X12-H01A7		X11-F
H02J-003/38	U24-E02D1A	H02K-024	V06-M06A
H02J-007/00,32,36	X16-G	H02K-025-026,-031,	V 00 1V100/ (
			\/O/ NAO/
H02J-007/02-12	X16-G01	-047,-057	V06-M06
H02J-007/14-30	X16-G02C	H02K-029	V06-M03
H02J-007/35	X16-G02A		X11-H01
H02J-009	U24-J	H02K-029/06-12	X11-H01C
H02J-009,-011	X12-H02	H02K-033,035	V06-M04
H02J-013	X12-H03	H02K-033/18	V06-M04A
H02J-015	X12-H06	H02K-037	V06-M05
H02J-017	U24-H02	H02K-037/02-08	V06-M05A
	X12-H01E	H02K-037/10-20	V06-M05B
H02J-050	U24-H02	H02K-041	V06-M06B
	X12-H01E		X11-H02
H02K	V06-M	H02K-041/025	V06-M06B1
11021	X11	110210-0417023	
			X11-H02A
H02K-001	V06-M07	H02K-041/03	V06-M06B2
	X11-J01		X11-H02B
H02K-001/12-20	V06-M07A	H02K-041/035	V06-M06B3
	X11-J01A		X11-H02C
H02K-001/22-32	V06-M07B	H02K-044	X11-H03B
11021-001/22-32			
	X11-J01B	H02K-044,-049,-051	X11-H03
H02K-001-015	X11-J	H02K-044/02, 04, 06	V06-M06K
H02K-003	V06-M08	H02K-044/08-28	V06-M06Q
	X11-J02		X11-H03B1
H02K-003/04-24	X11-J02A	H02K-049,-051	X11-H03A
H02K-003/04-28	V06-M08A	H02K-055	X11-H05
H02K-003/30-44	X11-J02B	H02M	W06-C01C3
H02K-003/32-44	V06-M08B		U24-D
H02K-003/46-52	X11-J02C		X12-J
H02K-005	X11-J07		X23-A01A3
H02K-005/00-99	V06-M09		W06-C01C3
H02K-005/14-173	X11-J07A		W06-B01C3
H02K-007	V06-M10		W06-B03B
	X11-J05	H02M,H03G,H03D-001	U24-C03
H02K-007/10-12	X11-J05A	H02M,H03K	U21-B05C
H02K-007/14-20	X11-J05B	H02M,H04N-005/225	W04-M01P
H02K-009	V06-M13	H02M-001	U24-D01
	X11-J06		X12-J01

H02M-001/02-096	U24-D01A X12-J01A	H02P-003	V06-N06 X13-H01
H02M-001/02-096,			X21-A03
-007	X13-H03B		X23-A01B
H02M-001/10,16,	1104 5047	11000 005	X23-A01B3
20-30	U24-D01X	H02P-005	X13-H01X
	X12-J01X	H02P-006	X13-H01G
H02M-001/12	X12-J01E1	H02P-021	X13-H01D1C
	U24-D01E1	H02P-005,-007	X21-A04
H02M-001/12,14,15	U24-D01E	H02P-005/06-26	X13-H01C
	X12-J01E	H02P-005/06-26,46-52,	
H02M-001/14,15	X12-J01E2		V06-N02
	U24-D01E2	H02P-005/28-44,46-52,	·
H02M-003	U24-D02		V06-N03
	X12-J02	H02P-005/46-52	X13-H01X
H02M-003/02-158,20	U24-D02A		V06-N30
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H02M-003/137-142,	0.740.11007	11005 007	X13-H01E
156-158,-005/451,45		H02P-007	V06-N
H02M-003/16-18, 34-42	· ·		X13-H
54-62,86-96,-009,011			X13-H01G1
	U24-D09	11005 007/0/ 04	X13-H01G2
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H02M-003/22-338,44	U24-D02B	H02P-007/282,298	X13-H01C1A
	X12-J02B	H02P-007/28-298	X13-H01C1
H02M-005	U24-D03	H02P-007/285-295	X13-H01C1B
110014 007/00 455	X12-J03	H02P-007/36-66	X13-H01D
H02M-007/02-155,	V40 104	H02P-007/38-50,54, 56,	•
17-217,23,26-28,40	X12-J04	11020 007/50 /20	X13-H01D
H02M-007/02-155,	1124 504	H02P-007/58-638	X13-H01D1
17-28,40	U24-D04	H02P-007/622	X13-H01D1B
H02M-007/162,219	U24-D04C1	H02P-007/628-632	X13-H01D1A
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H02M-007/25	U24-D04E	11020 000	X13-H01X
110014 007/40 510	X12-J04E	H02P-008	V06-N01
H02M-007/42-519, 523-5383,539-5395, (	64 94 09	H02P-009	V06-N40 X13-H02
323-3303,337-3373, (	U24-D05		X13-H02 X13-H02T7
	X12-J05		X13-H02T8
H02M-007/521,5387	U24-D05A		X13-H02T6 X13-H02T9
H02M-007/525-529, 53			X13-H02T7B
1102101-007/323-327, 33	X13-H03A	H02P-009/08-38	X13-H0217B
H02N	V06-N13	H02P-011,015,017	X13-H04
H02N-001	V06-M06B8	H02P-021	V06-N37
110214 001	V06-M06F	11021 021	X13-H01D1C
	V06-N11F	H02S	X15-A
	V06-N40F	H03B-001	U23-A
H02N-001,-010,-013	X11-H04		U23-E
H02N-001,H02N-013	V06-N08	H03B-005/00-06	U23-A01
H02N-002/02-04,08	V06-M06B7	H03B-005/08-16	U23-A01B
	V06-M06B9	H03B-005/18	U23-A01B2
H02N-002/06	V06-N11D	H03B-005/30-42	U23-A01A
	V06-N11E	H03B-005/32-38	U22-A04A2
H02N-002/10-12,16	V06-M06D	H03B-007,009	U23-A02
	V06-M06H	H03B-011-017,023-029	U23-F
H02N-002/14	V06-N07	H03B-019	U23-B
	V06-N09	H03B-021	U23-J05
H02N-002/18	V06-M06D2	H03B-021,H03D-007	U23-J
H02P,H02N	V06-N	H03B-021-028	U23-F03
H02P-001	V06-N05	H03B-023-029	U23-F03
	X13-H01A	H03B-029/00	U23-F05
		H03C,H03D	U23-P
		H03C-001	U23-G

H03C-003 H03D,H03G-003/20 H03D,H04B-001 H03D-001	U23-H U24-C01G W03-B02C U23-K	H03G-011 H03H	U24-C02A U14 U25 V06
H03D-003	U23-K	H03H-003	V06 V06-V01E
H03D-003	U23-L	H03H-003	V06-V01L
H03D-007,H03B-021	U23-J05	H03H-007	U25-D
H03D-007/00-12	U23-J01C1	110011 007	U25-E
H03D-007/14	U23-J01C5	H03H-007/01-13	U25-E02
H03D-013	U23-C	H03H-007/18	U25-F01
H03D7/18	W02-G03A5A	H03H-007/19	U25-E05Q
	W03-A01B5A	H03H-007/20	U25-F01A
	W03-B01A5A	H03H-007/21	U25-F01
H03F	U24-G	H03H-007/24-27	U25-D07C
H03F,H04N-005/44	W03-A	H03H-007/30-34	U25-A05
H03F,H04R-027	W04-S05A	H03H-007/38-40	U25-D05
H03F,H05K	W03-C07	H03H-007/42	U25-D03
H03F-001	U24-G03	H03H-007/46	U25-D01C
H03F-001/02-07	U24-G03N		U25-E05K
H03F-001/26-28	U24-G03D1	H03H-007/48	U25-D01C
H03F-001/30	U24-G03G	H03H-009	V06-V01E
H03F-001/32	U24-G03H U24-G03D5	H03H-009/02-25 H03H-009/02-25	V06-V01E V06-V02
H03F-001/34-36	U24-G03A	H03H-009/40-44	V06-V02 V06-V04D2
H03F-001/38-40	U24-G03A	H03H-009/46-64	V06-V04D2
H03F-001/42-50	U24-G03J	H03H-011	U25
H03F-001/52,54	U24-G03C	H03H-011/04-06	U25-E01
H03F-003	U24-G	H03H-011/08,10	U25-C
H03F-003/181-187	U24-G01C	H03H-011/12-14	U25-E01
	W03-C01A	H03H-011/16	U25-F01
H03F-003/189-195	U24-G01D	H03H-011/18	U25-E05Q
H03F-003/20-24	U24-G01B	H03H-011/20	U25-F01A
H03F-003/26-32	U24-G02C	H03H-011/22	U25-F01
H03F-003/34-36	U24-G02D	H03H-011/24	U25-D07
H03F-003/38	U24-G02E	H03H-011/26	U25-A05
H03F-003/45	U24-G02A	H03H-011/28-30	U25-D05
H03F-003/50,52	U24-G02A7	H03H-011/32	U25-D03
H03F-003/62,64	U24-G02F3	H03H-011/34	U25-D01A
H03F-003/68	U24-G02F2	H03H-011/36	U25-E05K
H03F-003/72 H03F-007	U24-G02F1 U24-G04E	H03H-015	U25-D01A U25-A02
H03F-007-021	U24-B	H03H-017	U22-G
H03G	U24-C	H03H-017,H04R-025	W04-Y03G3
H03G,H04B	W04-G04	H03H-017/02	U22-G01
H03G,H04B-001	W02-G03D	H03H-017/04	U22-G01A1
	W03-A03A	H03H-017/06	U22-G01A3
	W03-B02A	H03H-017/08	U22-G03
H03G,H04M-001/60	W01-C01C1C	H03H-019	U25-A01
H03G-003/02-18	U24-C05A	H03H-021	U22-G01A5
H03G-003/02-18,	U24-C05		U25-A
H03G-003/20	U24-C01G	H03J	U25
H03G-003/20-22	U24-C01	H03J-001	U25-K
H03G-003/20-22,30	U24-C01A	H03J-003	U25-G
H03G-003/20-24,30-32		H03J-005	U25-H
H03G-003/26,28,34 H03G-003/30	W02-G03B1 U24-C01B	H03J-007 H03J-007/02-16	U25-J U25-J05
H03G-003/34	U24-C016	H03J-007/02-16 H03J-007/18-32	U25-J05
H03G-005/54	U25-F05	H03J-007/18-32	W03-A02C
11000 000	W03-C05A	11000 007	W03-A02C W03-G05A
H03G-005/02-14	U25-F05C	H03K	U21
H03G-005/16-28	U25-F05A	···	U22
H03G-007	U24-C02B	H03K-003	U22-A
H03G-009	U24-C05D		U22-B

H03K-003/01-017	U22-B05	H03K-017/945-955	U21-B02C1
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H03K-003/027-037	U22-A02D	H03K-019	U21-C
H03K-003/16-22	U22-A04A1	H03K-019/003	U21-C03A
H03K-003/26-30	U22-A02A	H03K-019/007	U21-C03C
H03K-003/295-297	U22-A02E	H03K-019/0175	U21-C02
11031( 003/2/3 2//	U22-A04D5	H03K-019/0175,018,18	
H03K-003/353-356	U22-A02B	H03K-019/02	U21-C01
H03K-003/53-57	U22-A03	H03K-019/04,06,16,17,	
H03K-003/64-86	U22-A01	110010 01770 1700,10717	U21-C01X
H03K-003/84	U22-A01A	H03K-019/08	U21-C01C
H03K-004	U22-C	H03K-019/082,10,12	U21-C01A
H03K-004/04	U22-C09	H03K-019/084,09	U21-C01A1
H03K-004/06-90	U22-C01	H03K-019/086	U21-C01A2
H03K-004/92-94	U22-C09	H03K-019/088	U21-C01A3
H03K-005	U22-D	H03K-019/091	U21-C01A4
H03K-005/003-007	U22-D01A1A	H03K-019/094	U21-C01B
H03K-005/01	U22-D01	H03K-019/0944	U21-C01B5
H03K-005/02	U22-D01A1	H03K-019/0944,0948	U21-C01B3
H03K-005/04	U22-D01A6	H03K-019/0952,0956	U21-C01B1
H03K-005/05	U22-D01A6C	H03K-019/10	U21-C01R
	U22-D01A7	H03K-019/14	U21-C01G
H03K-005/06,07	U22-D01A5	H03K-019/173,177	U21-C01E
	U22-D01A6A	H03K-019/177	U13-C04C
H03K-005/08	U22-D01A1C	H03K-019/195	U21-C01F
H03K-005/12	U22-D01A1	H03K-019/20	U21-C03B
H03K-005/125	U22-D02	H03K-019/23	U21-C03B2
H03K-005/1252-1254	U22-D01A3	H03K-021/02,08	U21-D01
H03K-005/13-145	U22-D04	H03K-021/38	U21-D02A
H03K-005/15-151	U22-D06	H03K-021/38,40	U21-D02
H03K-005/153-1536	U22-D07	H03K-021/40	U21-D02B
H03K-005/1532	U22-D07C	H03K-021-023	U21-D09
H03K-005/1534-1536	U22-D07A	H03K-021-029	U21-D
H03K-005/156	U22-D05		U23-D01B1
H03K-005/19	U22-D03	H03K-023	U21-D05
H03K-005/22	U22-D02		U21-D06
H03K-005/24	U22-D02A	H03K-023/03,74	U21-D06B
H03K-005/26	U22-D02E	H03K-023/06,28,46,76,	
	U22-D02C		U21-D06X
	U22-D02G	H03K-023/23,80	U21-D06A
H03K-007	U22-E	H03K-023/40	U21-D03
H03K-007/02	U22-E01E	H03K-023/44,52,60	U21-D06A1
H03K-007/04	U22-E01C	H03K-023/54	U21-D03A
H03K-007/06	U22-E01G	H03K-023/58	U21-D04
H03K-007/08	U22-E01A	H03K-023/62	U21-D05A
H03K-009	U22-E05A	H03K-023/64	U21-D05B
H03K-011	U22-E05C	H03K-023/66	U21-D05B1
H03K-017	U21-B	H03K-023/68	U21-D05B2B
H03K-017/04,06, 10,12		11021/ 002/70	U21-D05B3
H03K-017/08	U21-B02E	H03K-023/72	U21-D05B2A
H03K-017/14	U21-B02G	H03K-023/78	U21-D06A3
H03K-017/16	U21-B02F	H03L	U22
H03K-017/20,22 H03K-017/28	U21-B02B U21-B02A1	H03L-001/02-04	U23 U23-E05
H03K-017/296	U21-B02A1	H03L-001-005	U23-EU3 U22-B
H03K-017/296 H03K-017/30,13	U21-B02A2 U21-B02A3	11031-001-003	U23-E
H03K-017/30,13 H03K-017/57	U21-B02A3 U21-B01	H03L-003	U23-E U22-B09
H03K-017/57 H03K-017/58,60,74	U21-B01 U21-B01A	FIU3L-003	U23-E
H03K-017/58,60,74 H03K-017/687	U21-B01B	H03L-005	U23-E U23-E01A
H03K-017/723	U21-B01B	H03L-005	U23-EUTA U22-H
H03K-017/725	U21-B01D1	11031-007	U23-D
H03K-017/72-733	U21-B01C U21-B01E	H03L-007/00-04	U23-D02
H03K-017/76	U21-B02C	H03L-007/06-07	U23-D01

H03L-007/08-083	U23-D01A	H04B-001/10-12	W02-G03B
H03L-007/085-093	U23-D01A3	H04B-001/14	W02-G03B2
H03L-007/095	U23-D01A5	H04B-001/16,28	W02-G03C1
H03L-007/099	U23-D01A1		W03-B02B1
H03L-007/10-14	U23-D01F		W02-G03
H03L-007/16-23	U23-D01B	H04B-001/26	W03-B01A5
		11040-001/20	
H03L-007/193	U23-D01B1		W02-G03C
H03L-009	U23-D02	H04B-001/30	W02-G03A8
H03M	U21-A		W03-A01B6
H03M-001	U21-A02		W03-B01A6
1103141-001		LIO4D 001/20 E0	
	U21-A03	H04B-001/38-58	W02-G02
	W05-D01		
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H03M-001/06,08	U21-A02B7G	H04B-001/3827	W02-G02A1
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	U21-A03F7G	H04B-001/46	W02-G02A5C
H03M-001/08,10,68	U21-A02B	H04B-001/59	W05-D08G
H03M-001/10	U21-A02B2		W02-G05
	U21-A03F1		W05-D08G
H03M-001/22,28,30	U21-A03J9	H04B-001/62	W02-G04B
· · ·			
H03M-001/24	U21-A03J1	H04B-001/64	W02-G04B1
H03M-001/36	U21-A03C		W02-G04B9
H03M-001/38	U21-A03B	H04B-001/66	W02-G04
H03M-001/50,60	U21-A03A	H04B-001/69-713	W02-K05
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H03M-001/66	U21-A02A	H04B-001/707	W02-K05A7
H03M-001/76,68	U21-A02A9	H04B-001/7115	W02-G03B6A
H03M-001/78	U21-A02A2	H04B-001/713	W02-K05A6
H03M-001/80	U21-A02A1	H04B-001/74	W02-G08
H03M-001/82,86	U21-A02A3	H04B-003	W02-C01
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H03M-003	U21-A04	H04B-003/03	W02-C01X
H03M-003/02	U21-A04A	H04B-003/04-18	W02-C01B
H03M-003/04	U21-A04B	H04B-003/20-23	W02-C01C1
H03M-005/00-22	U21-A05C	H04B-003/26	W02-C01B
	W01-A02	H04B-003/28	W02-C01C3A
110214 007			
H03M-007	U21-A05A	H04B-003/30	W02-C01C3B
	W01-A02A	H04B-003/32-34	W02-C01C2
H03M-007/02-28	U21-A05A1	H04B-003/36-38	W02-C01E
H03M-007/30	U21-A05A2	H04B-003/40-42	W02-C01X
H03M-007/40	U21-A05A2A	H04B-003/44	W02-C01E1
H03M-007/46	U21-A05A2B	H04B-003/46-48	W02-C01D
H03M-009	U21-A05B	H04B-003/50	W02-C01X
H03M-011	U21-A05D	H04B-003/52	W02-C01A1
H03M-013	U21-A06	H04B-003/54	W02-C01A3
	W01-A01B	H04B-005	W02-C02G7
	W01-A01B4	H04B-005/00	W02-C02
H03M-013/05-21	W01-A01B1	H04B-005/04	W02-C02G5
H03M-013/09-11	W01-A01B1A		W05-A05C
H03M-013/23	W01-A01B2G	H04B-005/06	W02-C02
H04B	W02		W04-S05C1
11040	-	LIO4D 007	
	W03	H04B-007	W02-C03
H04B-001	W02-G	H04B-007/02-08	W02-C03A
	W03	H04B-007/02-12	W02-C03A5
H04B-001/02	W02-G01	H04B-007/10	W02-C03A4
H04B-001/02-04	W02-G01	H04B-007/12	W02-C03A3
H04B-001/03-036	W02-G01H	H04B-007/14-17	W02-C03B
H04B-001/04	W02-G01	H04B-007/185-195	W02-C03B1B
H04B-001/06	W02-G03	H04B-007/204-216	W02-C03B
	W03-B		W02-C03B1D
U04P 001/09			W02-C03B1
H04B-001/08	W02-G03H		
	W03-B01A8		W02-K
	W03-B05	H04B-007/24	W02-C03D
H04B-001/10	W02-G03B1	H04B-007/26	W02-C03C
H04B-001/10,H04B-001		H04B-010	W02-C04
H04B-001/10,H04H-040		H04B-010/03-079	W02-C04C1
110-10-001/10,110411-040	7 1100-D02C3A	11070-010/03-07/	V V U Z - C U + C I

H04B-010/11-118	W02-C04B2	H04J-001/00-20	W02-K01
H04B-010/25	W02-C04B1	H04J-003	W02-K02
H04B-010/2507-2569	W02-C04B1	H04J-003.H04Q	U21-B05E
	W02-C04A7	H04J-003/04	W02-K02
H04B-010/2575-2587	W02-C04B1	H04J-003/06	W02-K02A
H04B-010/27	W01-A06C1	H04J-003/07	W02-K02A3
	W02-C04	H04J-003/08	W02-K02B3
H04B-010/272	W01-A06B3	H04J-003/08,12-14	W02-K02B
110 15 010/2/2	W01-A06C1	H04J-003/12	W02-K02B1
	W02-C04	H04J-003/14	W02-K02B1
H04B-010/275	W01-A06B2	H04J-004/00	W02-K07A
11040 010/2/3	W01-A06C1	H04J-004/00,-011/00	W02-K07
	W02-C04	H04J-011/00	W02-K07E
H04B-010/278	W01-A06B1	H04J-013	W02-K08
11046-010/2/0	W01-A06C1	H04J-013/00-06	W02-K05
	W02-C04	H04J-013/04	W02-K05A7
H04B-010/29-299	W02-C04 W02-C04A5	H04J-013/06	W02-K05A7
H04B-010/40-43	W02-C04A3 W02-C04A4	H04J-013/00	W02-K03A0
H04B-010/50-556	W02-C04A4 W02-C04A1	H04K	W02-R04 W02-L
H04B-010/564	W02-C04A1 W02-C04A1C	1104K	W02-E W02-F10N1
H04B-010/572-588	W02-C04A1C W02-C04A1	H04L	W01-A
H04B-010/60-69	W02-C04A3	H04L,H04B-010	W01-A07E
H04B-010/70-85	W02-C04	H04L-001	W01-A01
H04B-010/90	W02-C09	11041 004/000 040	W03-A10A1
H04B-011	W02-C07	H04L-001/002-018	W01-A01A
H04B-014/02-06	W02-C06C	H04L-001/02	W01-A01A
11045 045	W02-C06	H04L-001/16	W01-A01A
H04B-015	W02-H	H04L-001/1607	W01-A01A
H04B-017	W02-C05	H04L-001/18-1809	W01-A01A
H04B-017/309	W02-C03E1	H04L-001/1812	W01-A01B4
H04B-017/318	W02-G03J1	H04L-001/1822-1867	W01-A01A
H04B-017/336	W02-G03J5	H04L-001/20-24	W01-A01C
H04B-017/391	W02-C03E5	H04L-005	W01-A03
H04H-020	W02-D	H04L-005/14-18	W01-A03D
	W02-F	H04L-005/22-26	W01-A03C
H04H-020/12-14	W02-D04	H04L-007	W01-A04
	W02-F04	H04L-007/02	W01-A04B
H04H-020/38	W02-F10	H04L-007/027	W01-A04B2
H04H-020/47-49	W02-E	H04L-007/033	W01-A04B1
	W02-F06B	H04L-007/04-10	W01-A04A
H04H-020/51	W02-D05A	H04L-007/06	W01-A04A1
	W02-E	H04L-007/08	W01-A04A2
	W02-F06A	H04L-007/10	W01-A04A9
	W02-F06B	H04L-009	W01-A05
H04H-020/59	W02-D		W01-A05E
	W02-F	H04L-009/06-30	W01-A05A
	W05-B08	H04L-009/32	W01-A05B
H04H-020/78-79	W02-F03A	H04L-012	W01-A06
H04H-020/81	W02-E	H04L-012/02-16	W01-A06
	W02-F06B	H04L-012/14	W01-A07K
H04H-020/88-9	W01-C05B5A	H04L-012/18	W01-A06E1A
	W02-D	H04L-012/24-26	W01-A06A
	W02-F	H04L-012/28	W01-A06B5A
H04H-040	W03-A		W01-A06B5B
	W03-B		W01-A06B7
H04H-040/90	W03-A16A	H04L-012/28,H04M-01	1 W01-A06B5C
	W03-B06A	H04L-012/40	W01-A06B1
H04H-060	W02-D	H04L-012/403	W01-A06B1
	W02-F		W01-A06E2A
H04H-060/72	W02-D07E	H04L-012/407	W01-A06B1
	W02-F10E5		W01-A06E2B
H04J	W02-K	H04L-012/417	W01-A06B1
H04J-001,-011	W02-K07C		W01-A06E2B
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H04L-012/42	W01-A06B2	H04L-012/939-945	W01-A03B
H04L-012/423	W01-A06B2	11042-012/737-743	W01-A06A1
11042-012/423	W01-A06E2A		W01-A06E1
H04L-012/427	W01-A06E2A	H04L-012/947	W01-A06E1J
H04L-012/427	W01-A06B2 W01-A06E2B	H04L-012/951-955	W01-A03B
H04L 012/42			W01-A036
H04L-012/43	W01-A03C	H04L-013-017	
11041 0407433	W01-A06B2	H04L-015/00-34	W01-A07A
H04L-012/433	W01-A06B2	H04L-015/04-22	W01-A07A
11041 0407407	W01-A06E2B	11041 045/04 04	W01-A07C
H04L-012/437	W01-A06A	H04L-015/24-34	W01-A07A
11041 040744	W01-A06B2	11041 047/00 00	W01-A07D
H04L-012/44	W01-A06B3	H04L-017/00-30	W01-A07B
	W01-A06B4	H04L-017/02-14	W01-A07C
H04L-012/46	W01-A06G3		W01-A07B
H04L-012/50-52	W01-A06G1	H04L-017/16-30	W01-A07D
H04L-012/54-58	W01-A06G2	H04L-025	W01-A08
H04L-012/66	W01-A06G3	H04L-025/03-04	W01-A08B2
H04L-012/70	W01-A03B	H04L-025/20-28	W01-A06G5G
H04L-012/701	W01-A03B	H04L-025/30-36	W01-A08C
	W01-A06E1J	H04L-025/38-66	W01-A08A
H04L-012/703-713	W01-A03B	H04L-025/40-52	W01-A08A1
	W01-A06A1	H04L-025/48	W01-A08A1A
	W01-A06E1J	H04L-025/50	W01-A08A1B
H04L-012/715-749	W01-A03B	H04L-025/52-66	W01-A06G5G
	W01-A06E1J	H04L-027	W01-A09
H04L-012/751	W01-A03B	H04L-027/02-08	W01-A09A1
	W01-A06A3	H04L-027/02-16	W01-A09A
	W01-A06E	H04L-027/10-16	W01-A09A2
H04L-012/753	W01-A03B	H04L-027/18-24	W01-A09B
	W01-A06A3	H04L-027/26-30	W01-A09D
	W01-A06E1J	110 12 027720 00	W02-K05
H04L-012/755	W01-A03B	H04L-027/34-38	W01-A09C
11042-012/733	W01-A06A3	H04L-029	W01-A07G9
	W01-A06AS W01-A06E	11046-027	W01-A07X
H04L-012/757	W01-A03E W01-A03B	H04L-029,H05K-005	W01-A07J
HU4L-U12/737	W01-A03B W01-A06A3	H04L-029,H03K-003	
			W01-A07F
11041 012/750	W01-A06E1J	H04L-029/04	W01-A07F1
H04L-012/759	W01-A03B	H04L-029/06	W01-A07G
	W01-A06A3	H04L-029/08	W01-A07G1
11041 040/7/4	W01-A06E	H04L-029/10	W01-A07H2
H04L-012/761	W01-A03B	H04L-029/10	W01-A07H1
	W01-A06E1A		W01-A07H4
	W01-A06E1J	H04L-029/10-12	W01-A07H
H04L-012/763	W01-A03B	H04L-029/10-12,	
	W01-A06E1J	H04M-001	W01-C01R
H04L-012/771-775	W01-A06G5E	H04L-029/14	W01-A07L
H04L-012/781	W01-A03B	H04L-065/1101-1108	W01-A06F3
	W01-A06E1J	H04L-065/403	W01-A06E1A
	W01-A06F2	H04M	W01-C
H04L-012/801-841	W01-A03B	H04M-001/00-78	W01-C01
	W01-A06E1L	H04M-001/02,23	W01-C01A2
	W01-A06E1J	H04M-001/24	W01-C01K
H04L-012/851-893	W01-A03B	H04M-001/26	W01-C01B8
	W01-A06A3	H04M-001/26-56	W01-C01B
	W01-A06E1L	H04M-001/27-278	W01-C01B1
H04L-012/901-905	W01-A03B	H04M-001/30-54	W01-C01B7
	W01-A06E1	H04M-001/36,66	W01-C01B5
	W01-A06G3	H04M-001/56	W01-C01B3
H04L-012/911-927	W01-A03B	H04M-001/57	W01-C01F3
- · · · · <del>-</del> ·	W01-A06E1L	H04M-001/57,66	W01-C01F
H04L-012/931-935	W01-A06G5	H04M-001/58	W01-C01C3
H04L-012/937	W01-A06E1	H04M-001/58-65	W01-C01C
		H04M-001/60	W01-C01C1
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H04M-001/64,65	W01-C01C5		W04-Q
, , , , , , , , , , , , , , , , , , , ,	W01-C01P3	H04N-001	S06
H04M-001/66	W01-C01F5	H04N-001/024-032,23	S06-G
H04M-001/72	W01-C01D1	H04N-001/024-036,23-	29 S06
H04M-001/725-737	W01-C01D1	H04N-001/028	S06-D05
H04M-001/738-76	W01-C01L	H04N-001/028,	U14-H01B
H04M-001/80	W01-C01N	H04N-001/028,001/19	S06-D
H04M-001-009	W01-C01G1	H04N-001/032	S06-G03
H04M-003	W01-C02	H04N-001/032,23	S06-H
H04M-003/02,18	W01-C02D5	H04N-001/032-036,23-	
H04M-003/02-04	W01-C02D3	H04N-001/036	S06-E
H04M-003/06	W01-C02D1	H04N-001/04-20	S06-D03
H04M-003/08,22	W01-C02A7	H04N-001/04-20,31	S06-D04
H04M-003/08-14	W01-C02A	H04N-001/047,001/053	
H04M-003/22-36	W01-C02A1	H04N-001/21,32-44	S06-K07
H04M-003/36	W01-C02A1A	H04N-001/21,64	S06-K07A4
H04M-003/38	W01-C02B6	H04N-001/31	S06-K03
H04M-003/42	W01-C02B	H04N-001/32,333,42	S06-K07C4
H04M-003/44-45	W01-C02B5	H04N-001/32,36,42	S06-K07C5
H04M-003/46	W01-C02B2C	H04N-001/32,411,42,6	
H04M-003/48	W01-C02B3	H04N-001/32-36,42-44	
H04M-003/50-52	W01-C02B4	1104N1 004/22 27 42 47	S06-K07C2B
H04M-003/53	W01-C02B4	H04N-001/32-36, 42-44	
H04M-003/533 H04M-003/54	W01-C02B7C	H04N-001/38-40,50 H04N-001/38-409,	S06-K04A4C
HU4IVI-UU3/54	W01-C02B2N	•	CO/ KO474C
H04M-003/54,58	W01-C02B2E W01-C02B2	001/46-62	S06-K04A4C S06-K07
H04M-003/56	W01-C02B2 W01-C02B1	H04N-001/38-409,52-6	
H04M-003/58	W01-C02B1 W01-C02B2L	H04N-001/387	S06-K04A4B
H04M-003/58	W01-C02B2M	H04N-001/393	S06-K04A4A
H04M-003/60	W01-C02D2W1	H04N-001/401	S06-K04A4A
H04M-003/60-64	W01-C02D	H04N-001/40-401	S06-K07A4
H04M-005	W01-C09	H04N-001/41-419,64	S06-K07A4D
H04M-007	W01-C03	H04N-001/44	S06-K07C7
H04M-009,-013	W01-C04	H04N-001/46,50-64	S06-K01
H04M-009/08	W01-C01G2	H04N-003	W03-A08A1
H04M-011	W01-C01P		W04-M
	W01-C05	H04N-003/02-08	W03-A08F
	W01-C01F6C		W04-M01E5
H04M-011/02,04	W01-C05A	H04N-003/09	W04-M01E1
H04M-011/06-10	W01-C05B		W04-M01E5
H04M-011/08	W01-C05B5A	H04N-003/16	W03-A08A1
	W01-C05B5C	H04N-003/18-19	W03-A08A1C
H04M-011/10	W01-C05B5E	H04N-003/20	W03-A08A7A
H04M-015	W01-C01B4	H04N-003/223	W03-A08A1F
	W01-C01J	H04N-003/227	W03-A08A1E
	W01-C06	H04N-003/23-237	W03-A08A1D
H04M-015/28,30	W01-C01J	H04N-003/24	W03-A08A7
H04M-017	W01-C07A	H04N-003/24,-005/46	W03-A08A7C
	W01-C07A	H04N-003/26	W03-A08A3A
H04M-017,-003	W01-C07A7	H04N-003/27	W03-A08A
H04M-017,-019	W01-C07	110.4N1.003./30	W03-A11B1A
H04M-019	W01-C07B	H04N-003/30	W03-A08A1J
H04M-019/00-06	W01-C02E	H04N-003/30-32	W03-A08A1G W04-M02
H04M-019/02 H04M-019/08	W01-C01F1 W01-C01E	H04N-003/36-40 H04N-005	W03
H04N	S06	110411-003	W04
III	S06-K	H04N-005/04-06	W03-A06
	W03-A	H04N-005/04-06	W04-M05
	W04-F	H04N-005/08	W03-A06A
	W04-N	H04N-005/10	W03-A06C
	W04-N	H04N-005/14	W03-A04
	W04-P	000, 17	W04-P
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H04N-005/16-18	W03-A04C	H04N-005/44,H05K	W03-A19
H04N-005/202	W04-P01K W03-A04A		W03-A19A W03-A19C
	W04-P01E1	H04N-005/445	W03-A13
H04N-005/205	W03-A04B	H04N-005/45	W03-A13B
	W04-P01E	H04N-005/455	W03-A03C
H04N-005/208	W03-A04B1	H04N-005/46	W03-A11
	W04-P01E5	H04N-005/46,-009/66	W03-A05D1
H04N-005/21	W03-A04G	H04N-005/50	W03-A01C
	W03-A04H		W03-A02A
	W04-P01F	H04N-005/52-56	W03-A03A
	W03-A04G	H04N-005/57	W03-A04D
H04N-005/21,-009/78	W03-A05B5	H04N-005/58	W03-A04D5
H04N-005/213	W02-G03B5	H04N-005/59	W03-A04D1
	W03-A04H	H04N-005/60	W03-A03
1104N1 00F/247	W04-P01F1	H04N-005/62	W03-A03C1
H04N-005/217	W04-M01D6 W04-P01H1	H04N-005/63 H04N-005/64	W03-A07 W03-A09A1
	W04-P01H3	H04N-005/645	W03-A09A1
H04N-005/222	W04-N	H04N-005/65	W03-A07A5 W03-A08E
H04N-005/225	W04-M01C3	110414-003/03	W03-A08X
110+14 003/223	W04-M01P5		W03-A09
	W04-M01D8	H04N-005/655	W03-A09A5
	W04-M01C	H04N-005/66	W03-A08
H04N-005/225,232	W04-M01D3C	H04N-005/68	W03-A08A8
	W04-M01D	H04N-005/70	W03-A08C
	W04-M01D1		W03-A08X
H04N-005/225,232,278	W04-M01D4	H04N-005/72	W03-A08E
H04N-005/225,335	W04-M01M	H04N-005/74	W04-Q01
H04N-005/228	W04-M01A	H04N-005/76	W04-F
H04N-005/232	W04-M01D5A	H04N-005/761	W04-E04C8
	W04-M01D5B	H04N-005/765-775	W04-K
	W04-M01D5C	H04N-005/78	W04-B
	W04-M01D	H04N-005/781	W04-B14
H04N-005/262	W04-N05	H04N-005/782-783	W04-B10G
H04N-005/262,272, -9/7			W04-B10
H04N-005/265	W04-N05B1		W04-B10D
H04N-005/268 H04N-005/272	W04-N05B5 W04-N05C5	H04N-005/84	W04-B10 W04-C
H04N-005/272,275	W04-M01S	H04N-005/84-85	W04-C10A3
H04N-005/275	W04-N05C5A	H04N-005/907	W04-P01C8
110+14 003/2/3	W04-N05C5E	110414 003/707	W04-F01M
H04N-005/278	W04-M01D4		W04-P01C
	W04-N05C1A	H04N-005/91	W04-F01
H04N-005/28	W04-N01	H04N-005/911	W04-F01E
H04N-005/30	W04-M01	H04N-005/913	W04-F01L
H04N-005/31	W04-M01F5	H04N-005/91-956, -9/79	9-898
H04N-005/32-325	W04-M01F1		W04-F01
H04N-005/33	W04-M01E1	H04N-005/919-917	W04-F01F
H04N-005/335	W04-M01C3E	H04N-005/92-973	W04-F01
	W04-M01B5	H04N-005/94-945	W04-F02A
	W04-M01B	H04N-005/95-956	W04-F02B
H04N-005/335,101/00	W04-M01B1	H04N-007	W02-F
H04N-005/335,781,85	W04-M01B1E	1104N1 007/04	W04-P
H04N-005/341-349	W04-M01B5A	H04N-007/01	W03-A11A W04-N05A
H04N-005/44	W03-A01B5 W03-A15	H04N-007/01,26	W04-N05A W04-F01H3A
	W03-A13	H04N-007/01,28	W04-P01H3A W04-N05A1
	W03-A W03-A18A2	H04N-007/015	W04-N03A1 W02-F06C
H04N-005/44,-007/10	W03-A01A5	H04N-007/015	W02-F05B
H04N-005/44,-007/20	W03-A01A1		W04-N05C1A
H04N-005/44,H04Q-009		H04N-007/081-088	W02-F05B
			W03-A10
	!		

H04N-007/087	W03-A10C	H04N-017/04	W03-A18A1
	W03-A10A1	H04N-017/06	W04-J07
H04N-007/10	W02-F03A	H04N-019	W04-P01A
H04N-007/10,173	W03-A16C5G	H04N-019/34-36	W04-P01A4S
H04N-007/12	W02-F07M	H04N-019/50	W04-P01A5
	W02-F08		W04-P01A3
H04N-007/14		H04N-019/60	
H04N-007/15	W02-F08A	H04N-019/61-615	W04-P01A4
H04N-007/16	W02-F05A	H04N-019/67	W04-P01A6
	W03-A16C3	H04N-019/91-93	W04-P01A4J
H04N-007/16-173	W02-F10N1	H04N-021	W02-F10
H04N-007/167-171	W02-F05A1A		W03-A16
	W02-F05A1B	H04N-021/20-222	W02-F10K
	W02-F10N1	H04N-021/2225	W02-F10A1
		110414-021/2223	W02-F10K
	W03-A16C3A		
H04N-007/173	W02-F10		W03-A16C5A
	W03-A16C5	H04N-021/226-233	W02-F10K
H04N-007/18	W02-F01	H04N-021/234-2343	W02-F10A
H04N-007/20	W02-F06A		W02-F10K
	W02-F03A7	H04N-021/2347	W02-F10A
H04N-007/22	W02-F03A3		W02-F10K
H04N-007/24-28	W02-F07M		W02-F10N1
110411-007/24-20	W04-F01F	LIO4NI 021/23E 22/2	W02-F05C
		H04N-021/235-2362	
	W04-P01A		W02-F10K
H04N-007/30	W02-F07B		W02-F10N1
	W04-P01A3	H04N-021/2365-2368	W02-F10A
H04N-007/32-44	W02-F07C		W02-F10K
	W04-P01A5	H04N-021/237-2385	W02-F10K
H04N-007/46	W02-F07D	H04N-021/2387	W02-F10K
	W04-P01A7		W04-E20T
H04N-007/48-50	W02-F07M	H04N-021/2389	W02-F10
110411-007748-30			
110401 007/50 / 0	W04-P01A4	H04N-021/239	W02-F10N7
H04N-007/52-68	W02-F07M	H04N-021/24-254	W02-F10K
	W04-P01A	H04N-021/2543-2547	W02-F10N5
H04N-009/04-10	W04-M01	H04N-021/258	W02-F10N
H04N-009/24	W03-A08A5E		W02-F10Q
H04N-009/28-285	W03-A08A5	H04N-021/262	W02-F10
H04N-009/29	W03-A08A4	H04N-021/266	W02-F10A
H04N-009/31	W04-Q01	H04N-021/2662	W02-F07M1A
H04N-009/44	W03-A05A	110-114 02 1/2002	W02-F10A
		1104NL021/2//E	
H04N-009/45	W03-A05A1	H04N-021/2665	W02-F10
H04N-009/455	W03-A05A3	H04N-021/2668	W02-F10Q
H04N-009/65	W04-Q05	H04N-021/27-274	W02-F10K
H04N-009/66	W03-A05D	H04N-021/2743	W02-F10A
H04N-009/67	W03-A05E		W02-F10F
H04N-009/68-69	W03-A05C		W02-F10K
H04N-009/70-71	W03-A05C3	H04N-021/2743-2747	W02-F10A
H04N-009/73	W03-A05C5		W02-F10K
110414 007773	W04-P01D	H04N-021/278	W02-F10E5
LIO4NL000/74			W03-A16
H04N-009/74	W04-N05C	H04N-021/40-414	
H04N-009/75	W04-N05C5A	H04N-021/4147	W03-A16E1
H04N-009/76	W04-N05B1	H04N-021/418	W03-A16C3C
H04N-009/78	W03-A05B	H04N-021/4223	W03-A16
	W04-P01L		W04-M01
H04N-009/79-877	W04-F01D	H04N-021/4227	W03-A16
H04N-009/88-888	W04-F02A		W03-G05A
H04N-009/89-898	W04-F02B		W04-E04
H04N-011	W02-F02	H04N-021/426-43	W03-A16
H04N-013/128	W04-N05C7	H04N-021/431	W03-A02C5A
H04N-013/189	W04-F01P		W03-A16
H04N-013/194	W02-F03B		W04-E04A
H04N-013/20-296	W04-M01L		W04-J03C
H04N-013/30-398	W03-A12A	H04N-021/432-4335	W03-A16E1
H04N-017	W02-F04		W04-B14C3
	'		

H04N-021/436-4367	M/03 A14	H04N-023/56	\A/O.4 \A/O.1 LI
HU4IN-U2 1/430-430/	W03-A16		W04-M01H
	W03-G05C1	H04N-023/57	W04-M01G7
H04N-021/437	W02-F10N7	H04N-023/58	W04-M01B8
H04N-021/438-439	W03-A16	H04N-023/60	W04-M01D2
H04N-021/44	W03-A16C5A	H04N-023/61	W04-M01D2C
H04N-021/4402	W03-A11A	H04N-023/611	W04-M01D2F
	W03-A16C5A	H04N-023/617	W04-M01D2S
H04N-021/4405-4408	W03-A16C3	H04N-023/62	W04-M01D3
110 114 02 17 1 100 1 100	W03-A16C5A	H04N-023/63	W04-M01D3A
1104N1 021/441 441E			
H04N-021/441-4415	W03-A16C3C	H04N-023/65	W04-M01P
	W03-A18A6	H04N-023/66	W04-M01D3
H04N-021/442-4425	W03-A16	H04N-023/661	W04-M01D2X
	W03-A18A2		T01-N01D3
H04N-021/443	W03-A16	H04N-023/663	W04-M01B8
	W03-A18A2	H04N-023/667	W04-M01D3
	W03-A18A8		W04-M01D2F
H04N-021/45	W03-A18A5C	H04N-023/67	W04-M01D2E
H04N-021/454-4545	W03-A18A5G	H04N-023/68	W04-M01D7
H04N-021/458	W03-A16G	H04N-023/69	W04-M01C1B
HU4IN-UZ 1/430			
	W03-A18A8A	H04N-023/695	W04-M01G7
H04N-021/462	W03-A11A		W04-M01D2C
	W03-A13J	H04N-023/698	W04-M01S
H04N-021/4623-4627	W03-A16C3	H04N-023/70	W04-M01B8
H04N-021/466	W03-A18A5C		W04-M01D2E
H04N-021/47-4728	W03-A16C5	H04N-023/71	W04-M01B8
H04N-021/475	W03-A18A5C	110 114 020//1	W04-M01D2E
110411-021/4/3	W03-A18A6	H04N-023/72	W04-M01D2C
1104N1 004 /470			
H04N-021/478	W03-A16C5	H04N-023/73, 74	W04-M01D2A
H04N-021/4782	T01-N03A1	H04N-023/741	W04-M01D2C
	W03-A16C5K		W04-M01B8
H04N-021/4786	T01-N01C	H04N-023/743	W04-M01D2A
	W03-A16C5K	H04N-023/745	W04-M01H1
H04N-021/4788	T01-N03A1C	H04N-023/75	W04-M01C
	W03-A16C5K	H04N-023/76-85	W04-M01D6A
H04N-021/60-61	W01-A06	H04N-023/86	W04-M01B8
110414-02 1/00-01	W02-F03	H04N-023/87, 88	W04-N05C
		The state of the s	
110451 00477004	W02-F10	H04N-023/90	W04-N01
H04N-021/6334	W02-F10N3	H04N-023/95	W04-M01H
H04N-021/637-6379	W02-F10N7	H04N-023/951	W04-N05C5
H04N-021/64-6547	W02-F10	H04N-023/955	W04-N05C1
H04N-021/658-6587	W02-F10N7	H04N-023/957	W04-M01H1
H04N-021/80-8355	W02-F10	H04N-023/958	W04-M01D2C
H04N-021/8358	W02-F10N1C	H04N-023/959	W04-M01D2C
	W04-F01L3		W04-N05C7
	W04-G01L3	H04N-25/00	W04-M01B5
LIO4NI 021/04 040E			
H04N-021/84-8405	W02-F10E5	H04N-25/10-17	W04-M01B5
H04N-021/845-858	W02-F10	H04N-25/20,21	W04-M01B5
H04N-023/00	W04-M01B5	H04N-25/30	W04-M01F1
H04N-023/10	W04-M01B5A	H04N-25/40	W04-M01B5A
H04N-023/11	W04-M01F	H04N-25/42	W04-M01D1
H04N-023/12, 13	W04-M01B5	H04N-25/44-447	W04-M01E5
H04N-023/15	W04-M01D7	H04N-25/46	W04-M01E5C
H04N-023/16	W04-M01C3A	H04N-25/47	W04-M01B8
H04N-023/17	W04-M01E5	H04N-25/48	W04-M01B8A
H04N-023/20, 21, 23	W04-M01E1	H04N-25/50,51	W04-M01B8B
H04N-023/30	W04-M01F1	H04N-25/53-535	W04-M01B8X
H04N-023/40	W04-M01D6	H04N-25/57-59	W04-M01B8B
H04N-023/45	W04-M01B7	H04N-25/60-628	W04-M01B8C
H04N-023/50	W04-M01G	H04N-25/63-633	W04-M01B8X
H04N-023/51, 52	W04-M01G1A	H04N-25/65	W04-M01B5
H04N-023/53	W04-M01D3	H04N-25/67-677	W04-M01C3
H04N-023/54	W04-M01G1B	H04N-25/68-69	W04-M01G1B
H04N-023/55	W04-M01B8	H04N-25/70-709	W04-M01G1B
020/00		.10 114 20,70 707	

H04N-25/71-715	W04-M01B7	H04R-001/20-40	W04-S01E5
	W04-M01B5		V04-301E3 V06-V02S
H04N-25/72,73		H04R-003	
H04N-25/74	W04-M01B5A	11040 005	W04-T
H04N-25/75	W04-M01D6A	H04R-005	W04-R
H04N-25/76-79	W04-M01B5A	H04R-007	V06-V02A
H04N-101/00	W04-M01B1	H04R-009	V06-V01A
H04Q	W03-G05	H04R-009-023	V06-V
	W01-B	H04R-011-015,-023	V06-V01A2
H04Q-001/02-16	W01-B20		V06-V04B
H04Q-001/20-26	W01-B08		V06-V01X
H04Q-001/30-50	W01-B09	H04R-017	V06-V01B
H04Q-003	W01-B01	H04R-019	V06-V01C
	W01-B02	H04R-025	W04-Y
H04Q-003/545	W01-B02A1	H04R-027	W04-S05
H04Q-003/54-555	W01-B02A	H04R-029	V06-V03B
H04Q-003/58-68	W01-B03A	H04R-031	V06-V03
H04Q-003/58-78	W01-B03	H04S	W04-R
H04Q-003/70-78	W01-B03C	H04S-003	W04-R01E
H04Q-005/00-24	W01-B04	H04S-005	W04-R01A
H04Q-007	W01-B05	H04S-007	W03-C03A
H04Q-007,H04B-007/2		11043-007	W04-R
1104Q-007,1104B-007/2		H04W	
11040 007/0/	W02-C03C		W01-A06C4
H04Q-007/06	W01-B05A	W01-B05A1	14/00 0000
H04Q-007/08	W01-B05A5		W02-C03C
	W05-A05C	H04W-004/02-04	W01-C02B7L
H04Q-007/10	W01-B05A5	H04W-004/06	W01-A06E1A
	W05-A05C1E		W01-B05A1M
H04Q-007/12	W01-B05A5	H04W-004/10	W01-C05B4G
	W05-A05C	H04W-004/14	W01-B05A1F
H04Q-007/14-18	W05-A05C1A		W01-C02B7D
H04Q-007/20	W01-B05A	H04W-004/16	W01-C02B2
	W02-C03C	H04W-004/24-26	W01-A06E1E
H04Q-007/22	W01-B05A1A		W01-C06
	W02-C03C1	H04W-008/00	W01-A06E
H04Q-007/24	W01-B05A1	H04W-008/02	W01-A06E1
H04Q-007/26	W01-B05A1		W01-B05A1
	W01-C02G5		W02-C03C1E
H04Q-007/28	W01-B05A	H04W-008/04-06	W01-A06E1
	W01-B05A7		W01-E01C1
	W02-C03C3G		W01-E01C3
H04Q-007/30	W01-B05A		W02-C03C1E
11042-007/30	W02-C03C1B	H04W-008/08-16	W01-A06E1
	W02-C03C1B W02-C03C3B	110477-000/00-10	W01-A00E1
H04Q-007/32	W01-C01D1		W02-C03C1E
1104Q-007/32	W01-C01D1 W01-C01D3	H04W-008/18	W01-A06E
11040 007/34		HU4VV-UU0/10	
H04Q-007/34	W01-B05A	1104)4/ 000/20	W01-B05A1
	W01-B08	H04W-008/20	W01-E01C5
	W01-C01K	H04W-008/22	W01-A06E
	W02-C05		W01-B05A1
H04Q-009	W03-G05A	H04W-008/24	W01-E01C5
	W05-D	H04W-008/26-28	W01-A06E1
H04Q-011	W01-B07		W01-B03C
H04R	V06-V		W01-B05A1
H04R,H04N-005/44	W03-A15C	H04W-008/30	W01-A06E
H04R,H04R-001	W04-S01C	H04W-012	W01-A06E1C
H04R,H04R-025	W04-Y02		W01-C02B6A
H04R,H04R-027	W04-S05C	H04W-016/02-16	W01-A06E1L
H04R-001	V06-V02		W02-C03G1
	W04-S01	H04W-016/22	W01-A06D
H04R-001,-027	W04-S		W02-C03E5
H04R-001/02-04,14-18	V06-V02E	H04W-016/24	W02-C03C1
	V06-V02F	H04W-016/26	W02-C03C1B
H04R-001/20-40	V06-V02G		300010

H04W-016/28	W02-C03A4	H04W-072/121	W02-C03R1
	W02-C03C1		W01-A06A3
H04W-016/30-32	W02-C03C1A	H04W-072/1263	W02-C03R1
H04W-024/00-04	W01-A06A	110400-072/1203	W01-A06A3
HU4VV-U24/UU-U4		110414/072/12/0	
	W01-A06E	H04W-072/1268	W02-C03R1F
H04W-024/06	W01-A06A3	H04W-072/1273	W02-C03R1G
	W01-A06D	H04W-072/14	W02-C03R1
	W02-C03E5	H04W-072/20	W02-C03R4
H04W-024/08	W01-A06A3	H04W-072/21	W02-C03R4
H04W-028/00-26	W01-A06E1L		W02-C03R1F
	W02-C03G1	H04W-072/23	W02-C03R4
H04W-028/00-088	W01-A06A3		W02-C03R1G
	W01-A06E1L	H04W-072/231	W02-C03R4
H04W-036/00-18	W02-C03C1D	H04W-072/232	W02-C03R4
H04W-036/20	W02-C03C1D W02-C03C1D	H04W-072/252	W02-C03R4
HU4VV-U30/2U			
	W02-H01J5	H04W-072/27	W02-C03R4
H04W-036/22-28	W02-C03C1D	H04W-072/29	W02-C03R4
H04W-036/22	W01-A06A3	H04W-072/30	W02-C03R5
	W01-A06E1L	H04W-072/40	W02-C03R6
H04W-036/30	W01-A01C	H04W-072/50	W02-C03R1
	W02-C03C1D	H04W-072/51	W02-C03R1
	W02-G03J1A	H04W-072/512	W02-C03R1
	W02-G03J5A	H04W-072/52	W02-C03R1
H04W-036/32-38	W02-C03C1D	110444 072/32	W01-A06A3
H04W-040/00-38	W01-A06E1J	H04W-072/53	W02-C03R1
H04W-048/00-20	W01-A06E1	H04W-072/54	W02-C03R1
H04W-052/00-04	W02-C03E3		W02-G03J5
H04W-052/06-16	W02-C03E3A	H04W-072/541	W02-C03R1
H04W-052/18	W02-C03E3		W02-G03J5
H04W-052/20	W01-A01C1C	H04W-072/542	W02-C03R1
	W02-C03E3		W02-G03J5
H04W-052/22	W02-C03E3	H04W-072/543	W02-C03R1
H04W-052/24	W02-C03E3		W02-G03J5
	W02-G03J1A	H04W-072/56	W02-C03R1
	W02-G03J5A	H04W-072/563	W02-C03R1
H04W-052/26	W01-A06A3	H04W-072/566	W02-C03R1
110477-032720	W02-C03E3	H04W-074/00-04	W01-A06F1
1104)4/052/20 20		HU4VV-U74/UU-U4	
H04W-052/28-38	W02-C03E3	110414/074/07	W02-K
H04W-052/40	W02-C03A	H04W-074/06	W01-A06F1C
	W02-C03C1D	H04W-074/08	W01-A06F1A
	W02-C03E3		W01-A06F1G
H04W-052/44	W02-C03E3	H04W-076/45	W01-C05B4G
H04W-052/46	W02-C03B2	H04W-080/00	W01-A06F
	W02-C03E3	H04W-080/02-06	W01-A06F2
H04W-052/48	W01-A01A	H04W-080/08	W01-A06F
	W02-C03E3	H04W-080/10-12	W01-A06F3
H04W-052/50	W02-C03E3	H04W-084/00-02	W01-A06B5
H04W-052/52	W02-C03E3	H04W-084/04-08	W01-A06B5B
HU4VV-U32/32			
110 414 050 /54 / 0	W02-G01C1	H04W-084/10-16	W01-A06B5A
H04W-052/54-60	W02-C03E3	H04W-084/18-22	W01-A06B8
H04W-060/00-06	W01-E01C3	H04W-088/02-06	W01-A07H2
H04W-064/00	W02-C03C1E		W01-C01D3
H04W-072/00-14	W01-A06E1L		W02-C03C1C
	W02-C03G1	H04W-088/08-12	W01-A06G5C
H04W-072/0457	W02-C03R1C		W01-B05A1
H04W-072/06	W02-C03R1		W02-C03C1B
H04W-072/08	W02-C03R1	H04W-088/14	W01-A06G3
110111 072700	W02-G03J5	H04W-088/16	W01-A06G5C
H04W-072/10	W02-G0333 W02-C03R1	H04W-088/18	W01-A06G3C
		110477-000/10	
H04W-072/11	W02-C03R1D	11055	W01-A06E
H04W-072/115	W02-C03R1E	H05B	X25-B
H04W-072/12	W02-C03R1	LIGER OC.	X26-C
	W01-A06A3	H05B-001	X25-B04

H05B-003	X27-C02	H05K	W03-G01
	V01-A02A7D X25-B01	H05K-001	W02-A07B1 V04-Q
	X27-E02	H05K-001/02	V04-Q V04-Q05
H05B-003/02-08	X25-B01A	H05K-001/03-05	V04-Q03 V04-R07L
H05B-003/10-18	X25-B01B	H05K-001/09	V04-R02P
H05B-003/22-38	X25-B01C	H05K-001/11	V04-Q01
H05B-003/34-38	X25-B01C3	H05K-001/14	V04-Q02B
H05B-003/42-58	X25-B01D	H05K-001/16	V04-Q04
H05B-003/60-66,		H05K-001/18	V04-Q02A
78-82	X25-B01E	H05K-003	U14-H03F
H05B-003/62-66	X25-B01E1		U14-H03F1
H05B-003/68-76	X25-B01C1B		U14-H03F2
H05B-003/78-82	X25-B01E2	110514 002400 00	V04-R
H05B-003/84-86	X25-B01C1C	H05K-003/02-08	V04-R01C
H05B-006	X25-B02	H05K-003/10-20	V04-R02 V04-R03
H05B-006/02-34 H05B-006/36-44	X25-B02A X25-B02A1	H05K-003/22 H05K-003/24	V04-R03 V04-R03A
H05B-006/46-62	X25-B02A1 X25-B02D	H05K-003/24	V04-R03A
H05B-006/64-80	X27-C01	H05K-003/28	V04-R03E
11002 000701 00	X25-B02B	H05K-003/30-32,36	V04-R04
H05B-006/80	X25-B02B1	H05K-003/34	V04-R04A
H05B-007	X25-B03	H05K-003/38	V04-R07P1
H05B-007/02-14	X25-B03A	H05K-003/42	V04-R02C
H05B-007/16-22	X25-B03B	H05K-003/44	V04-R07B
H05B-031	X26-A01A	H05K-003/46	U14-H03F
H05B-033	U14-J		V04-R05A
	X26-J	H05K-005/02	V04-S
H05B-033,H01L-041	U11-C01J7	H05K-005/04-06	V04-S01
H05B-033/04	U14-J02B	H05K-005/06	V04-S02A
H05B-033/06,26,28 H05B-033/08	U14-J02A U14-J03	H05K-007 H05K-007/02-12	V04-T V04-T01
H05B-033/10	U14-J03	H05K-007/02-12	V04-T01 V04-T02
H05B-037	X26-C03	H05K-007/14-10	U24-D01G
H05B-037/02	X26-C03A	11031( 007720	V04-T03
H05B-037/03-04	X26-C03X		X12-J01G
H05B-039	X26-C02	H05K-009	V04-U
H05B-041	X26-C01	H05K-011	W03-G03
H05B-041/02-12	X26-C01B1	H05K-013	V04-V
H05B-041/14-24	X26-C01B		X12-D07D
H05B-041/14-298	X26-C01B2	H05K-013,H02G-003	X22-X01B
H05B-041/231	X26-C01B4	H05K-013/02	V04-R04
H05B-041/232-234	X26-C01B5	11051/ 013/03 04	V04-R04G
H05B-041/26-29 H05B-041/30-34	X26-C01B2A X26-C01A	H05K-013/02-04 H05K-013/06	V04-V01 V04-V02
H05B-041/36.44-46	X26-C01X	H05K-013/08	V04-V02 V04-V09
H05B-041/38-42	X26-C01C	H10B-0	U14-A03
H05F	X25-S	H10B-010/00	U14-A03A
H05G	V05-E	H10B-010/10	U14-A03A1
H05G-001	V05-E02	H10B-012/00, 10	U14-A03B4
H05G-001/10-24	V05-E02A	H10B-020/00, 10	U14-A03B7
H05G-001/30-54	V05-E02C	H10B-020/20 - 20/25	U14-A06B
H05H	V05-E03A	H10B-041/00-70	U14-A03B7
	V05-E03B	H10B-043/00-50	U14-A03B7
	V05-E03C	H10B-051/00-50	U14-A03F
H05H,H05G-002	V05-E03	H10B-053/00-50	U14-A03F
H05H-001	X14-F U11-C09C	H10B-061/00 H10B-063/00 - 63/10	U14-A04A U14-A03H
H05H-003/06	V05-E06	H10B-063/00 - 63/10	U14-A03H U14-A06C
H05H-003-005,-007	X14-G	H10B-080/00	U14-A08C
H05H-007,-011-013	X14-G02	H10K-010/20 - 10/43	U21-B01A
H05H-007-009	X14-G01	H10K-010/46	U21-B01B
		H10K-019/10	U21-B01B
	·		

H10N-030/87 V06-V02B V06-V02H H10N-030/88 V06-V02F V06-V02F H10N-035/00-85 V06-V01D H10N-039/00 U13-D04 H10N-050/10 U12-B01A H10N-050/20 U12-B H10N-050/80-85 U12-B01A H10N-052/80 U12-B01 H10N-052/80 U12-B01 H10N-052/85 U12-B01A	H10K-030/00 - 30/65 H10K-030/00 H10K-030/50-57 H10K-030/80 - 30/89 H10K-039/10 H10K-039/10 H10K-039/10-18 H10K-039/12 - 39/36 H10K-039/12 - 39/36 H10K-039/18 H10K-050/00 - 50/30 H10K-050/80 - 50/88 H10K-059/00 - 59/88 H10K-059/00 - 59/88 H10K-059/00 - 71/80 H10K-071/00 - 71/80 H10K-010/00 H10N-010/01 H10N-010/13 H10N-010/17 H10N-010/17 H10N-010/85-857 H10N-015/20 H10N-015/20 H10N-030/00 H10N-030/00 H10N-030/00 H10N-030/50 H10N-030/50 H10N-030/50 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80 H10N-030/80	U12-A02 U12-A02 X15-A02 U12-A02A X15-A02 U12-A02A5 U12-A02A5 U12-A02A2D X15-A02C U12-A02A2D U12-A02A2D U12-A02A2D U12-A02A2D U12-A02A2D U12-A02A2D U12-A02A2D U14-E05 U14-E05 U14-E05 U14-E05A3 U14-E05A3 U14-E05A0 U14-E05B U14-E05
V06-V02F       H10N-035/00-85     V06-V01D       H10N-039/00     U13-D04       H10N-050/01     U12-B01A       H10N-050/10     U12-B01       H10N-050/20     U12-B       H10N-050/80-85     U12-B01A       H10N-052/00,01     U12-B01A       H10N-052/80     U12-B01       H10N-052/85     U12-B01A	H10N-030/87	V06-V02B
	H10N-035/00-85 H10N-039/00 H10N-050/01 H10N-050/10 H10N-050/20 H10N-050/80-85 H10N-052/00,01 H10N-052/80	V06-V02F V06-V01D U13-D04 U12-B01A U12-B01 U12-B U12-B01A U12-B01A U12-B01

### **Appendix 4: Concise Guide to EPI and Mechanical Classification**

In the following list, the main IPCs for each class are indicated purely as a guide.

#### P1 AGRICULTURE, FOOD TOBACOO

### P11 Soil working, planting

(A01B, C)

### **P12 Harvesting**

(A01D, F)

### P13 Plant culture, dairy products

(A01G, H, J)

### P14 Animal management and care

(A01K, L, M)

#### P15 Tobacco

(A24)

#### **P2 PERSONAL, DOMESTIC**

### **P21 Wearing apparel**

(A41, A42)

#### **P22 Footwear**

(A43)

### P23 Haberdashery, jewellery

(A44).

### P24 Hand, travelling articles, brushes

(A45, A46)

#### **P25 Office furniture**

(A47B)

### P26 Chairs, sofas, beds

(A47C, D)

### P27 Shop, household, furnishings, upholstery

Covers upholstery from 201201, prior to 2012 this was classified as Q39. (A47F, G, H, B68F, G)

#### P28 Kitchen, sanitary equipment

(A47J, K, L)

#### P3 HEALTH, AMUSEMENT

### P31 Diagnosis, surgery

(A61B)

### P32 Dentistry, bandages, veterinary, prosthesis

(A61C, D, F)

### P33 Medical aids, oral administration

(A61G, H, J)

### P34 Sterilising, syringes, electrotherapy

(A61L, M, N)

### P35 Life-saving, fire-fighting

(A62)

### P36 Sports, games, toys, saddlery

Covers saddlery from 201201, prior to 2012 this was classified as Q39. (A63, B68B, C)

#### **P4 SEPARATING, MIXING**

### P41 Crushing: centrifuging, separating solids

(B02, B03, B04, B07)

### P42 Spraying, atomising

(B05)

### P43 Sorting, cleaning, waste disposal

(B06, B08, B09)

#### **P5 SHAPING METAL**

**P51 Rolling, drawing, extruding** (B21B, C)

**P52 Metal punching, working, forging** (B21D-L)

**P53 Metal casting, powder metallurgy** (*B22*)

**P54 Metal milling, machining** (B23B-H)

**P55 Soldering, welding metal** (*B23K*)

**P56 Machine tools** (B23P,Q)

**P6 SHAPING NON-METALS** 

**P61 Grinding, polishing** (*B24*)

**P62 Hand tools, cutting** (B25, B26)

**P63 Working, preserving wood** (B27)

**P64** Working cement, clay, stone (*B28*)

### **P7 PRESSING, PRINTING**

**P71 Presses** 

(B30)

**P72 Working paper** 

(B31

**P73 Layered products** 

(B32)

**P74 Printing: lining machines** 

(B41B-G)

P75 Typewriters, stamps, duplicators

(B41JN)

P76 Books, special printed matter

(B42)

P77 Writing, drawing appliances, bureau/desk accessories

(B43)

**P78 Decorative art** 

(B44)

P8 OPTICS, PHOTOGRAPHY, GENERAL

**P81 Optics** 

(G02)

**P82 Photographic apparatus** 

(G03B)

P83 Photographic processes,

compositions

(G03C)

**P84 Other photographic** 

(G03D-H)

P85 Education, cryptography, adverts.

(G09)

**P86 Musical instruments, acoustics** 

(G10)

#### **Q1 VEHICLES IN GENERAL**

Includes mechanical aspects of vehicles in general and associated vehicle equipment.

### Q11 Wheels; Tyres; Connections

Alloy, steel, spoked wheels. Hubs, axles, rims, bearings, covers. Snow chains, spikes. Wheel manufacture, assembly and mounting. Inflatable, solid, runflat, heavy duty tyres. Tyre sidewalls, beads, valves, reinforcements, inserts. Tyre manufacture, mounting and inspection. Connections, hitches, towing, draw gear. (B60B-D)

### **Q12 Suspension systems**

Rigid and resilient suspensions. Springs, dampers, shock absorbers, anti-roll bars. Ride height adjustment. Ball joints, Panhard rods, Watt linkages, trailing arms. (B60G)

### Q13 Powertrain; Chainset; Transmission systems and their control

Automatic, double clutch, manual, semiautomatic, CVT transmissions. Torque converter, clutch, retarder, gearbox, differential. All wheel drive, 4WD. Cranks, pedals. Cooling and lubrication. Powertain/transmission control. Power take-offs. (B60K, B60W, B62M)

### Q14 Vehicle accessories

Seats, saddles, beds. Safety devices, inflatable airbags, seatbelts, crash bars, horns, reflectors. Sun shades/visors, curtains. Mirrors, windscreen wipers. Luggage racks, panniers, mudguards. Side cars, forecars. Anti-theft arrangements, locks. Steps, stands. Heating, ventilating and air-conditioning. Sanitation. (B60H, B60N, B60Q, B60R, B62H-J)

### Q15 Vehicle arrangements for transporting special loads

Loading and unloading arrangements. Ramps, platforms, conveyors, belts, rollers, vibrators. Carrying buildings, meat, animals, reels, vehicles, concrete. Cargo tie-down equipment. On-board weighing equipment. (B60P)

### Q16 Vehicle servicing; Maintenance; Cleaning equipment; Vehicle design and manufacture

Servicing, maintenance, repair. Car wash, cleaning. Vehicle manufacture/assembly. (B60S)

### Q17 Vehicle construction; Fittings; Propulsion arrangements

Subframes, chassis, superstructures. Doors, windows. Sunroofs, convertible roofs. Dashboards, instrumentation. Body finishing parts. Endless tracks. Air-cushion equipment. Engine propulsion arrangements. Engine cooling, mounting, lubricating. Noise/vibration/harshness reduction/control. (B60J-K, B60R, B60V-W)

### Q18 Brake systems; Steering systems; Control

Discs, drums, pads, callipers, valves, cylinders. Disc/drum brake assemblies. Brake cooling. Brake control, pedals, levers. Steering systems. Rack and pinion. Hydraulic power assistance. Steering wheel, steering column. (B60T, B62L)

### **Q19 Vehicle applications**

Cycles, motorcycles, scooters, mopeds. Cars, vans, trucks, buses, taxis. Military vehicles, tanks. Agricultural vehicles, tractors, combine harvesters. Recreational vehicles, SUV, MPV, motor home, camper van, snow mobile. Emergency vehicles, police car, fire engine, ambulance. Electric and hybrid vehicles.

#### **Q2 SPECIAL VEHICLES**

Includes mechanical aspects of special vehicles.

### **Q21 Railways**

Track construction. Station/platform equipment. Monorail, elevated, rope/cable, tramway, funicular, rack railways. Propulsion. Passenger carriage, freight car, wagon, hopper, buffer car. Superstructures, under frames, bogies, doors, windows. Brake systems. Accessories. HVAC, sanitation. Railway servicing, maintenance, manufacture, assembly. Train control. Level crossings, gates, signals, points. (B60L-M, B61)

#### Q22 Hand/foot/animal drawn vehicles

Hand carts, wheelbarrows. Perambulators. Sledges/ice boats. Wheelchairs. Foot propelled vehicles. Horse-drawn carts. (B62B-C)

### Q24 Ships; Waterborne vessels; Related equipment

Hulls, frames, keels, decks, bulkheads, masts. Windows, doors, hatches, port holes. Accessories. Heating/ventilating/airconditioning. Sanitation. Desalination plants. Safety equipment, fire-fighting, lifeboats, life vests. Mooring/anchoring. Ship propulsion, propellers, engines, steering. Boats, submarines, hovercraft, surfboards, canoes. Harbour, dock, pier, jetty, boat hoist. Marine vessel servicing, maintenance, manufacture, assembly. (B63)

### Q25 Aircraft; aviation; cosmonautics

Aircraft construction, fuselage, hull, wings. Doors, windows, undercarriage.
Accessories. Sanitation, toilets, shower, HVAC. Safety systems, fire-fighting, oxygen supply, escape slide, parachute. Aircraft propulsion and steering. Altitude/attitude control, flaps, control surfaces. Balloon, helicopter, glider, military, commercial aircraft. Ground equipment, hangar, runway construction. Space vehicles. Aircraft/spacecraft servicing, maintenance, manufacture, assembly. (B64)

#### Q3 CONVEYING, PACKAGING, STORING

From 2012 manual codes have been assigned for all mechanical details of conveying, packaging and storing (B65, B66)

### Q31 Packaging processes and equipment

From 2012 Q31 has been redefined to cover codes that are intended to highlight the equipment/methods etc. used for packaging/labelling material/goods during primary and secondary packaging. The type of container/bottle being filled/labelled/closed etc., as well as the container material can be specified by assigning Q32 and Q33 codes, respectively. The type of product being packaged/bottled can also be highlighted by the assignment of Q34 codes. For novel details of the actual container/bottle or its closure see Q32 codes instead. Details of transit packaging are coded under Q32-T. Prior to 2012 Q31 remains searchable for packaging and labelling in general. (B65B,C)

# Q32 Container/Closure Types, Special packaging features and Transit packaging

From 2012 Q32 has been redefined to cover container and closure types and special features of containers/packaging. Q32 codes should be used in conjunction with Q31, Q33 and Q34 codes as appropriate. Manufacturing and recycling details are covered by Q31-R. Prior to 2012 Q32 remains searchable for containers in general.

### Q33: Packaging container and closure materials

From 2012 Q33 has been redefined to highlight the material the container or closure is made of. Q33 codes should be used with Q31, Q32 and Q34 as appropriate. Prior to 2012 Q33 remains searchable for closures in general.

### Q34: Types of goods packages, bottled, bound, labelled, unpacked

From 2012 Q34 has been redefined to highlight the type of product being packaged/bottled etc. and should be used in conjunction with other Q31-Q33 codes as appropriate. Prior to 2012 Q34 remains searchable for packaging elements/types in general (now covered in general by Q32).

**Q35:** Refuse Collection; Conveyors (*B65F*,*G*)

**Q36: Handling Thin Materials** (B65H)

Q37 Container traffic (pre-1984 only)

**Q38:** Hoisting; Lifting; Hauling; Trucks (B66)

### Q39 Liquid, handling, saddlery, upholstery - discontinued 2012

From 201201 liquid handling is incorporated into Q31-Q34, saddlery is incorporated into P36 and upholstery is incorporated into P27.

### **Q4 BUILDINGS, CONSTRUCTION**

### **Q41** Road, rail, bridge construction (E01)

## Q42 Hydraulic engineering, soil shifting and sewerage

(E02,3)

### **Q43** General building constructions (E04B)

### **Q44 Structural elements**

(E04C)

### **Q45** Roofing, stairs, floors (*E04D*,*F*)

### **Q46** Building aids, special structures (E04G,H)

### **Q47** Locks, window and door fittings (*E*05)

**Q48** Blinds, shutters, ladders, doors (*E06*)

### **Q49 Mining**

(E21)

### Q5 ENGINES; PUMPS; COMPRESSORS; FLUID PRESSURE ACTUATORS

Includes engines, pumps, compressors, actuators etc. of relevance to the transportation area.

### Q51 Internal combustion engines; Reciprocating engines; Rotary engines

Internal combustion engines. Reciprocating, rotary, oscillating piston engines. Hot gas positive displacement engines, steam engines. Pistons and cylinders. Valves and valve drive arrangements. IC engine cooling/lubricating. Fuel systems. Ignition systems. Exhaust systems, silencing, pollution control. (F01, F02B,D,F,G,M,N,P)

### Q52 Reaction engines: External combustion; Gas turbines; Rockets

Gas turbine, turbofan, turboprop, RAMJET, rocket engines. Pulse detonation engines. External combustion engines, steam turbines. Rotors, stators, nozzles, nacelles, afterburners. Fuel systems. Ignition systems. Lubrication and cooling. (F01D, F02C, F02K, F02M)

### Q53 Positive displacement fluid engines (i.e. driven by fluid)

Liquid driven positive displacement engines and motors. Reciprocating, rotary, oscillating piston engines. Valves, pistons, cylinders, seals. (F03C)

### Q54 Non-positive displacement fluid engines (i.e. driven by fluid);

Miscellaneous motors and machines for producing mechanical power/thrust Liquid driven non-positive displacement engines and motors. Impulse, reaction, friction, endless chain type engines. Waterwheels, water turbines. Francis, Kaplan and propeller turbines. Spring motors. Gravity/inertia motors. Wind, solar, geothermal, muscle power motors. (F03B,D,G,H)

## Q55 Positive displacement fluid machines/pumps/compressors (i.e. for driving fluid)

Positive displacement pumps, compressors. Scroll compressors. Reciprocating, rotary or oscillating piston machines. Valves, seals, rotors, casings. (F04B,C)

## Q56 Non-positive displacement fluid machines/pumps/compressors (i.e. for driving fluid)

Radial flow, axial flow, jet and diffusion pumps and compressors. Fans. Siphons. Shafts, bearings, rotors, casings, cavitations reducers. (F04D,F)

### Q57 Fluid pressure actuators; Hydraulic/pneumatics in general

Telemotors. Servomotors. Pyrotechnic actuators Controlling fluid flow. Hydraulics. *(F15)* 

#### **Q6 ENGINEERING ELEMENTS**

Includes novel engineering elements of relevance to the transportation area.

### **Q61 Fastening elements; Connections**

Nuts, bolts, washers. Rivets and rivnuts. Nails, staples, dowels. Clamps, suction cups, hooks. Torque-limiting, anti-tamper, locking, friction grip, key connections. (F16B)

### **Q62 Shafts and bearings**

Flexible and rigid shafts. Crankshafts, eccentrics. Pivotal connections. Ball joints Ball, roller, sliding contact and hydrodynamic bearings Cooling and lubricating. Manufacture. (F16C)

### Q63 Couplings; Clutches; Brakes; Springs; Dampers Universal joints

Constant velocity (CV) joints. Slip, yielding, impulse couplings. Fluid couplings. Clutches. Disc, drum and band brakes. Brake pads, callipers. Springs, shock absorbers, dampers. Coil springs and leaf springs. (F16D,F)

#### Q64 Belts; Chains; Gearing

Drive belts, timing belts. Drive chains. Pulleys, sprockets, gearing. Cams, cam followers, worms, toothed gears. Fluid gearing. Gearing control, gear levers. Lubrication and cooling. (F16G,H)

### Q65 Pistons; Cylinders; Packing; Seals

Pistons, plungers. Cylinders and liners. Seals, packing. Piston rings *(F16J)* 

### **Q66 Valves; Taps; Cocks; Vents**

Lift, gate, sliding, diaphragm and rotary valves. Valve seats, seals, casings, housings. Poppet valves. Check valves. Safety/equalising valves. Vent valves. (F16K)

### **Q67 Pipes; Joints; Fittings**

Pipes and hoses. Pipe/hose connections/joints. Compression joints. Quick fastening/release connections. Seals. Clips. Pipe laying and repair. (F16L)

### **Q68 Other engineering elements**

Frames. Machinery beds. Engine beds. Axle stands. Trestles. General lubrication arrangements. General safety devices. (F16M-S)

### Q69 Storing/distributing gas/liquid

Pressure vessels. Gas holders/tanks. Vessel filling and discharging equipment. Pipeline systems.

(F16T, F17)

### **Q7 LIGHTING, HEATING**

### **Q71 Lighting**

(F21)

### **Q72 Steam generation**

(F22)

### **Q73 Combustion equipment/processes**

(F23)

### Q74 Heating; Ranges; Ventilating

(F24)

### **Q75** Refrigeration; Liquefaction

(F25)

### Q76 Drying

(F26)

### Q77 Furnaces; Kilns; Ovens; Retorts

(F27)

### Q78 Heat exchange in general

(F28)

### Q79 Weapons; Ammunition; Blasting

(F41,42)

#### S INSTRUMENTATION MEASURING AND TESTING

Includes electrical aspects of medical equipment, photographic and printing apparatus.

#### **S01 Electrical Instruments**

Oscilloscopes, multimeters, electricity meters, semiconductor devices and PCB testing, NMR, MRI, magnetic and electric field measurement, radio test equipment, instrument housing and other details. (G01R, G12B)

### **S02 Engineering Instrumentation**

Measuring dimensions, weight, flow rate, mechanical vibrations, force, acceleration and velocity measurement, measurement transducers, testing engines and machines, gyroscopes, scales, dials, pointers and other details. (G01B-H, L, M, P)

**S03 Scientific Instrumentation** 

Photometry, calorimetry.
Thermometers.
Meteorology, geophysics, measurement of nuclear or X-radiation. Investigating chemical or physical properties.
Immunoassay, LAB-ON-CHIP, Chemical indicators or reagents.
(G01J, K, N, T-W)

#### **S04 Clocks and Timers**

Electronic and mechanical clocks and watches. Time switches. Time-interval measuring. (G04B-G)

### **S05 Electrical Medical Equipment**

Electrotherapy. Electrosurgical apparatus. Blood cell counters. Electrical diagnostic apparatus. Tomography. Veterinary apparatus.

(A61B, C, F - J, L- N)

### **S06 Electrophotography and Photography**

Cameras, film projectors and processing (electrical aspects only). Electrography, xerography. Rotary press printers (electrical aspects only). (G03, G03G)

#### T COMPUTING AND CONTROL

Covers control systems, data recording equipment, computing devices and peripheral apparatus, including construction details.

### **T01 Digital Computers**

Electronic data processors, interfaces and programme control. Mechanical digital computers.

(G06C-F, T, G16)

### **T02 Analogue and Hybrid Computers**

Function evaluators, equation solvers, simulators. (G06G, J)

### **T03 Data Recording**

Analogue and digital recording on tape, disc etc, using for example, magnetic, optical, magneto-optical, capacitive methods. (G11B)

### **T04 Computer Peripheral Equipment**

Card and tape punches and readers. Magnetic, optical and smart cards. VDUs, character and graphics generators. Pattern recognition, magnetic ink recognition, bar codes. COM equipment. (G06K)

### T05 Counting, Checking, Vending, ATM and POS Systems

Counting systems. Ticket issuing, registering and franking apparatus. Attendance registering apparatus. Coin and paper currency handling. Point-of-sale equipment. Electronic funds transfer. (G06M, G07B-G)

### **T06 Process and Machine Control**

General control systems. (Non)numerical, programmable and adaptive control. Control of non-electrical variables e.g. temperature or flow. Control system applications e.g. machine tools, lifts. (G05B, D)

### **T07 Traffic Control Systems**

Road traffic monitoring. Road traffic control. Traffic light systems, flow control. Traffic, weather and navigation data updating. (G08G)

#### **U SEMICONDUCTORS AND ELECTRONIC CIRCUITRY**

Includes semiconductor components *per se*, their manufacture and circuitry. Circuits using electronic components are included, e.g. filters and oscillators.

### **U11 Semiconductor Materials and Processes**

Semiconductor, insulating and conductive materials. Crystal growth. Substrate and layer processing: deposition, etching, doping and heat treatment. Packages, mountings and assembly. Testing and handling of both integrated and discrete semiconductor devices. (Manufacture of LEDs, lasers, solar cells and aspects of thick film and hybrid circuits are covered in U12 and U14). (C30B, H01L)

#### **U12 Discrete Devices**

Discrete semiconductor devices or specific components of integrated circuits. Optoelectronic devices: discrete Photodetectors, LEDs and lasers both discrete or array. Solar cells. Hall-effect, magnetoresistive or spintronic devices. Diodes, capacitors and resistors. Bipolar transistors, thyristors, FETs. Quantum interference devices. Micromechanical devices. Semiconductor transducers. (H01L)

### **U13 Integrated Circuits**

(H01L)

Digital circuits, especially with matrix array, e.g. ROM, DRAM, SRAM memories, programmable logic and gate array. Solid state image sensors, e.g. CCD, photodetector array. Excludes routinely integrated circuits with no integration novelty.

### **U14 Memories, Film and Hybrid Circuits**

Digital memories including magnetic, optical, semiconductor, ferroelectric, analog memories. Testing of memories. Thermoelectric devices. Superconductive materials and devices. Acoustic wave devices. Thin film arrays and layers. Thick film and hybrid circuits including multilayer ceramic wiring boards and aspects of manufacture. Electroluminescent light sources. Liquid crystal displays, electrochromic, electrophoretic, electroluminescent and electrowetting displays. Non-display switchable glass panels.

(G11C, H01L)

### **U21 Logic Circuits, Electronic Switching** and Coding

Logic gates, inverters, buffers, field programmable gate arrays. A/D and D/A conversion, position encoders, delta modulation. Code conversion, data compression, error detection and correction. Counter circuits, frequency dividers. Electronic switching, proximity/touch switches. (H03K, M)

### **U22 Pulse Generation and Manipulation**

Rectangular and triangular wave Oscillators, pulse generators, (astable, bistable, etc). Pulse shaping and manipulation. Pulse modulation and demodulation including PAM, PPM, PFM, and PDM. Digital filters. DSP. (H03H, K, L)

### **U23 Oscillation and Modulation Oscillators, mixers.**

Amplitude and angle (de)modulation. Frequency and phase comparators. PLLs, indirect and direct frequency synthesisers. (H03B-D, H03L)

### **U24 Amplifiers and Low Power Supplies**

DC, LF, HF, small signal and power amplifiers. Gain control. Volume compression or expansion. Limiters. Voltage and current stabilisation, power supplies, converters, inverters, rectifiers. Low power protection. (H03F, H03G, G05F, H02M)

### **U25 Impedance Networks and Tuning**

Tone or bandwidth control. Impedance converters. Analogue filters (active and passive). Voltage dividers, attenuators, impedance matching, baluns. Tuning circuits. AFC. (H03H, H03J)

#### **V ELECTRONIC COMPONENTS**

Includes electrical and electro-optical components. Component mounting and construction details. Electrical discharge devices, for purposes other than lighting, are included

### **V01 Resistors and Capacitors**

Low power fixed and variable discrete devices. Thermistors and varistors. Electrolytic (including double-layer, superand ultracapacitors) and non-electrolytic capacitors. (H01C, G)

#### **V02 Inductors and Transformers**

Low power inductive components. Communication type inductive components. (Electro)magnets. Magnetic materials. (H01F)

### V03 Switches, Relays

Low power switches and relays. Thermally or magnetically operated switches. (H01H)

#### **V04 Printed Circuits and Connectors**

PCBs and their manufacture. Low power connectors. Electronic apparatus, housings and constructional details. RFI/EMI screening. General circuit manufacture. (H01R, H05K)

### **V05 Valves, Discharge Tubes and CRTs**

Vacuum tubes, klystrons, TWTs, magnetrons, CRTs, field emission displays, camera tubes, X-ray tubes and operating circuits. Photoelectric discharge tubes, electron multipliers, plasma/ion processing tubes. Electron and scanning probe microscopes. Gas filled tubes. Gas discharge displays. (H01J, H05G)

### V06 Electromechanical Transducers and Small Machines

Audio, communication, and measurementtype transducers. Electromechanical resonators. Small electric machines and their controllers. Micromachines. (H04R, H03H, H02K)

### **V07 Fibre-optics and Light Control**

Light-guides, optical fibres, integrated optics and optical cables. Connectors, couplers, mode selectors, polarisers. Control of intensity, phase, polarisation, wavelength and direction. Spatial light modulators. Optical fibre amplifiers. (G02B, F)

#### **V08 Lasers and Masers**

Optical resonators. Laser pumping, control e.g. intensity, frequency stabilisation, cooling, testing. Gas, semiconductor, solid state, dye-free electron, X-Ray lasers. Masers. (H01S)

#### **W COMMUNICATIONS**

Covers telecommunications, audio and video equipment, telemetry/telecontrol and radar, aviation, marine and military systems where electrical details are included.

### **W01 Telephone and Data Transmission Systems**

Error detection and correction. Code conversion.

Synchronising. Secret data communication. Data networks (LAN, WAN, etc). ISDN. Baseband and broadband data transmission. Exchanges, call metering, test equipment, equipment racks, intelligent network, call centre. Subscriber equipment, cordless, cellular and satellite phones. Telephone line and cable installation.

(H04L, M, Q, W)

### W02 Broadcasting, Radio and Line Transmission Systems

Aerials, waveguides, resonators and other distributed constant components. Transmitters, transceivers, transponders. Communication receivers. Line transmission systems. Radio systems, including diversity, relay, mobile (including cellular). Optical and ultrasonic wave transmission systems. Spread Spectrum communication. Secret communication, jamming. TV systems, including stereoscopic, cable, subscription, satellite, interactive and high definition. Stereophonic broadcast systems. (H01P, Q, H04B, H, J,K)

#### **W03 TV and Broadcast Radio Receivers**

AM/FM and DAB radio receivers, car radios. TV receivers including text aspects and MHEG, DVB, high definition, satellite, 3D/stereoscopic, stereophonic and surround sound. Remote control and interconnection. (H04)

### W04 Audio/Video Recording and Systems

Stereophonic systems, loudspeaker enclosures, public address Audio/visual recording applications, formatting, signal processing and constructional aspects. General audio signal processing and sound mixing. Electronic musical instruments. Video cameras, TV studio and special effects equipment. General video signal processing. Projection TV and analogous systems. Video games, karaoke. Electronic educational apparatus. Sports equipment, toys. Speech coding, analysis and synthesis. Antiphase sound cancelling. Hearing aids. Audio and video aspects of multimedia.

(G10H,L, G11B, H04N)

### W05 Alarms, Signalling, Telemetry and Telecontrol

Burglar and fire alarms. Personal call arrangements. Paging systems. Signal transmission systems for remote control and monitoring, e.g. in home bus systems, vehicle remote control bus systems. Advertising arrangements (electrical aspects). (GO8B, C)

### W06 Aviation, Marine and Radar Systems

Radar, sonar and lidar. Velocity and depth measuring equipment. Position fixing and direction finding. Navigation systems, e.g. GPS. Airport control systems. Ship and aircraft control and instrumentation. Flight simulators. Space vehicles, including satellites.

(G01S)

### W07 Electrical Military Equipment and Weapons

Target indicating systems. Sighting and aiming devices. Missile direction control. Military training equipment. Arming and safety devices. Electric weapons. Personnel and equipment protection. Battlefield communications. Military reconnaissance. (F41, F42B, C)

#### X ELECTRIC POWER ENGINEERING

Includes power generation, storage, distribution and utilisation. Electrical details of ground vehicles. Industrial-use patents with significant electrical detail are included. Patents relating to domestic electrical appliances do not have to contain electrical novelty to be included.

# X11 Power Generation and High Power Machines

Conventional power generating prime movers. Dynamo-electric machines. MHD generators. (H02K, N)

#### X12 Power Distribution/Components/

Converters High power AC, DC and HVDC distribution/control. Power and communication cables. Superconducting cables, coils and magnets. Installing power cables and lines. Power transformers, reactors. Spark gaps and circuits. Insulators. High power connectors. Power converters. Conductive, superconductive and insulating materials. (H01B, H01T, H02G, H02J, H02M)

# X13 Switchgear, Protection, Electric Drives

Electric machine and static power converter controllers. Switchboards, switchyards, switchgear. Power system protection. Circuit protectors, circuit breakers, fuses. (H02B, H02H, H02P)

#### **X14 Nuclear Power Generation**

Nuclear reactor processes, components and power plants. Control mechanisms. Plasma techniques. Particle accelerators. (G21, H05H)

# X15 Non-Fossil Fuel Power Generating Systems

Geothermal, wind, wave and solar energy, types of power generation. (F03D, F24J)

#### X16 Electrochemical Storage

Primary, secondary and fuel cells and batteries. Battery chargers. Non-electrochemical storage of electric energy. (H01M)

#### **X21 Electric Vehicles**

Electric cars, trolley buses, hybrid vehicles, fuel cell vehicles. Propulsion, braking. Traction batteries. Control equipment. (B60L)

#### **X22 Automotive Electrics**

Vehicle accessories. Vehicle lighting. IC engine ignition. IC engine controllers. Batteries and charging. Starting motors, and generators. Engine and vehicle instrumentation. Non-engine related controllers e.g. transmissions, brakes. Passenger safety. Intra/inter-vehicle communications, multiplexing. (B60K, Q, R, T; F02D, M, N, P; F21M)

#### X23 Electric Railways and Signalling

Electric propulsion and braking. Traction motors and control. Traction power supplies. Power supply lines, current controllers. Signalling equipment. Railway traffic control. (B60L, B61L)

#### **X24 Electric Welding**

Electric soldering. Arc, induction, electron beam, resistance, laser beam, solid state and HF welding. Electroerosion. (B23K)

## **X25 Industrial Electric Equipment**

3-D printing / Additive manufacturing, Electric furnaces and kilns. Resistance, induction, electric discharge and EM field heating. Electrostatic spraying and cleaning. Vibrating apparatus. Electrolytic processes, electro-refining metals. Electrically powered tools. Industrial drying equipment. Ore separating magnets. Magnetic work holders, lifting magnets. Textile and paper manufacture, sewing and embroidery machines. Industrial food processing. Industrial components e.g. pumps, fans. Electric construction/building equipment. Electric agricultural equipment. Cryogenics. (H05B, F27)

## **X26 Lighting**

Discharge, incandescent and electric arc lamps. Operating and control equipment. Light fittings. Portable lighting devices. Stage lighting equipment. LED, EL and fibre-optic illumination, including display back-lighting. (F21, H01J, H01K, H05B)

#### **X27 Domestic Electric Appliances**

Washing machines, dryers, irons. Vacuum cleaners. Electric cookers, microwave ovens. Kitchen equipment. Refrigerators. Water heaters. Space heating and air conditioning equipment. Personal and hygiene electrical appliances. Home automation appliances. (A47, F24)

## **Appendix 5: Nanotechnology**

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to Nanotech industries.

For full details please look up the relevant code in the applicable manual. Classes A-N are covered by the CPI manual and section P-X by the EPI manual.

Note - Items in italics are of nanotech interest but may contain details not applicable to nanotech.

### **FULLERENES**

containing heteroatoms	E05-U01
carbon only	E05-U02
	L02-H04B
electroconductivity agent for polymers	A08-M09A1
thermal conductivity agent for polymers	A08-M09C1

### **GRAPHENE**

carbon nanofilm	E05-U05C
electroconductivity agent for polymers	A08-M09A1
thermal conductivity agent for polymers	A08-M09C1

#### **NANOBUDS**

carbon only	E05-U05D
inorganic	E31-U04

## NANOCATALYSTS N06-C09

### NANOCRYSTALS (NON-FERROUS ALLOYS) M26-C02

#### NANOELECTROMECHANICAL DEVICE/SYSTEM

actuators	V06-M06G9
control	V06-N22A
electronic switching	U21-B01T
generators	V06-M06G8A
medical devices	S05-Y02
motors	V06-M06G9
control	V06-N22A
relays	V03-D10A
resonators	V06-V01E
	V06-V01K2
semiconductor device	U12-B03F2A
semiconductor structure	U12-B03F2
semiconductor structure, manufacture	U11-C18C
semiconductor system	U12-B03F2B
sensors	S03-H02B
	V06-V01K2
	V06-V04G
switches	V03-C10A
manufacture, testing and monitoring	V03-C07A

	DNA switch		B11-C12 C11-C12 V06-V01K2 V06-V04A
NANOELECTRON	NIC DEVICE/	SYSTEM	
		image display field emission device general X-ray tube ctor structure, manufacture	V05-D05C5A V05-B05A5C V05-M03A1 V05-E01C7A U11-C13 U12-E01B2 U21-C01T S03-H02B
NANOFIBERS	carbon nan	ofibers	E05-U05B
NANOFILMS			E31-U03 B05-U05B C05-U05B
NANOFILTERS			J01-C04
NANOHORNS			B05-U05A C05-U05A E05-U05D E31-U04
NANOIMPRINTE	<b>D MAGNETI</b> manufactur	C RECORD CARRIER	T03-A01G3 T03-A02G3
NANOIMPRINT L	ITHOGRAPI	нү	U11-C04J
NANOMATERIAL	battery electrolytes fuel cell sto general use insulating, i magnetic	ement ctrode rage norganic	X16-E01H1 L02-A12 L03-A02G L03-A03N X12-D01D X16-J01E X16-E06A1A X16-C15C3A V04-X01B1 X12-E01D X12-E02D L03-B02N V02-A10

magnetic, manufacture	V02-A10C
magnetic, novel	V02-A10A
structures	U11-A14
	U11-C13
production	J04-F02
manufacture of nanowires/nanotubes	X12-D07E2A

# NANOMORPHOLOGY (COLOR CHEMISTRY)

pigment E27-B01A dye E27-B02A other color chemistry E27-B03A

NANOPARTICLES B12-M11Q

C12-M11Q carbon nanoparticles E05-U05A inorganic E31-U01

NANOPARTICULATE PRODUCTION V05-F08G

**NANOPHASE ALLOYS** 

ferrous M27-D03 non-ferrous M26-C02

NANORELAYS U12-B03F2A

V03-D10A

manufacture V03-D06B1

NANORODS B05-U05A

C05-U05A

carbon nanorods *E05-U05B* inorganic *E31-U02* 

**NANOSTRUCTURES** 

electrically-conductive (general) X12-D02C2D electrically-insulating (general) X12-E03D production J04-F02 magnetic film V02-B04 manufacture V02-H02G inorganic B05-U06 C05-U06 E31-U

organic E05-U pharmaceutical (other) B05-U05C

C05-U05C

dye or pigment bound to nanostructure E24-U

### **NANOTECHNOLOGY**

pharma applications (general)	B11-C12
	C11-C12
polymers application (general)	A12-W14

# **NANOTECHNOLOGY DEVICES (THERAPEUTIC)**B12-M10A7

C12-M10A7

### **NANOTUBES**

carbon only	B05-U03A
	C05-U03A
	E05-U03
	L02-H04B
	V05-B05A5C

used as electroconductivity agent for polymers

A08-M09A1

used as thermal conductivity agent for polymers

 A08-M09C1

 carbon plus heteroatom
 B05-U04

 C05-U04
 E05-U04

 other 3D structures
 B05-U05A

 C05-U05A
 C05-U05A

 inorganic
 E31-U02

 manufacture of nanotubes
 X12-D07E2A

### **NANOWHISKERS**

inorganic E31-U02 organic E05-U05B

## **Appendix 6: Green technology**

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to "green technologies" such as "green" transportation, e.g. hybrid, fuel cell and other zero emissions vehicles; alternative power sources such as wind and solar power; bio-fuels and any other technologies that enable control of pollution or reduction of carbon footprints.

For full details please look up the relevant code in the applicable manual. Classes A-N are covered by the CPI manual and section P-X by the EPI manual.

Note - Items in italics are of green interest but may contain details not applicable to green technologies.

#### **ENVIRONMENTAL AWARENESS**

biodegradability (of pl		A09-A07
environmental vessel f	or collecting pollution from ope	en water
		Q24-P06
green agro-chemicals (	(general)	C14-Y
green catalysts		N07-K01
green chemistry (gene	ral)	E11-K03
applications/co	ompositions	E11-W
green pharmaceuticals	(general)	B14-Y
oil spillage cleanup wa	ste containment	H03-G
to prevent wate	er contamination	D04-A05
GREEN POWER SOURCES AND	ENERGY GENERATION	A12-W16
battery		X16
catalysts		N07-L03A
for electric veh	icle	X21-B01A
electricity generation		
from biomass o	combustion	X15-E
from exercise r	machine	W04-X01A5
		X15-X
from vehicle m	ovement	X15-X
from waste fue	l combustion	X15-E
flywheel energy storag	ge	Q54-F
-		X21-B04
fuel cell		X16-C
		L03-E04
catalysts		N07-L03A
for vehicle		X21-B01A
		X22-F01
polymer details	S	A12-E06

geother	mal power	Q54-H X15-G
hydroel	ectric power dams	X11-B X11-B
	generators	X11-B
	mini/micro plant	X11-B05
	pumped storage	X11-B06
	turbines/water wheels	X11-B01
muscle	power	Q54-I
		X15-X
ocean tl	nermal energy conversion	Q54-X
		X15-C
osmotic	power	X11-B09
		X15-C
profiting	g from waste heat	X15-H
•	IC engine exhaust heat recovery	Q51-J02F
	IC engine waste heat recovery	X22-A17
power g	generation from traffic flow	X15-T
sea pow	ver er	X15-C
Seebecl	c effect	X15-D
salinity	gradient power	X11-B09
		X15-C
solar power		Q54-H
		U12-A02
		X15-A
	for electric vehicle	X21-B04A
	for motor vehicle	X22-F03
	photoelectric cells	A12-E11B
	solar collector	X15-A01
	solar panels	U12-A02A5
		X15-A02B
		L03-E05B
_	polymer details	A12-R02B
	electric power	X15-D
tidal po		X15-C02
vortex p	oower	X11-B09
		X15-C
water p	ower	X11-B
		X15-C
	water turbine	Q54-A
		X11-B01
	generator	X11-B
wave po		X15-C01
wind power		Q54-G
	forbook	X15-B
	for boat	Q24-E01E
	for electric vehicle	X21-B04A
	for motor vehicle	X22-F03

# GREEN FUELS biofuels

**GREEN** 

Diotueis	produco	d from algae	B14-Y
	produce	a nom algae	C14-Y
gaseous	biofuels		H06-A04
•	biogas		H06-A04
	ethane		H06-A04
	structura	l details	E10-J02D2
	hydroge	n	H06-A03
		production by electrical means	E31-A02A
		hydrogen generation-fuel cell	L03-E04I
			X16-C17
		hydrogen reformer-fuel cell	X16-C17
		hydrogen storage-fuel cell	X16-C15
		molecular decomposition of	V05-F08F
		hydrocarbons (plasmatron)	1107.404
	methane		H06-A04
		structural details	E10-J02D1
اما لمانسنا	afı.ala	produced by fermentation	D05-C14
liquid bi	alcohol		H06-B07 H06-B08
	bioalcoh		H06-B08
	biodiese		H06-B04A
	bioether	'	H06-B07
	butanol		H06-B08
	ethanol		H06-B08
	propano	I	H06-B08
	vegetabl		H06-B04A
solid bio	fuels		
	from mui	nicipal/agricultural	D05-A04A
	waste tre	atment	H09-F03
<b>PACKAGI</b>	NG / GRE	EEN FOOD TECHNOLOGY	Q33-J
biodegra	adable		
food pag	:kaging		D03-K08A
			Q33-J
packagii	-		Q31 to Q34
	_	adable packaging	Q33-J01
	edible pa	~ ~	Q33-J04
		fficient packaging	Q33-J06
		ng made from renewable sources	Q33-J02
m a l	•	e/reuseable packaging	Q33-J03
polymer	packagi		A12-P A09-A07
ectan ro		adable plastics ecycling of plastics	A11-C03
sciap ied		ding, cutting, pulverising, granulating	A11-C03A
cellulose		ion (incl. recycling paper bags)	F05-A02B
	. p	(	10071020

E11-Q02A N07-L01C1

Q17-E09 X22-A03J

#### **GREEN TRANSPORTATION** aircraft, muscle/pedal power Q25-C01G battery charging X16-G02 for electric vehicle X21-B01A for motor vehicle X22-F01A for railway train X23-A03C bicycle Q19-A X22-P01 Q24 boat animal-drawn Q24-E02G canoe/kayak Q24-P20 electric propulsion W06-B01C6 muscle/pedal power Q24-E01G wind (sail) power Q24-E01E Q24-P22 electric vehicle Q19-P X21-A01F foot propelled vehicles Q22-M fuel cell vehicle Q19-P X21-A01J hybrid vehicle Q19-Q X21-A01D X22-P04 hybrid-electric Q19-Q01 X22-P04A hybrid-mechanical Q19-Q05 X22-P04E parallel hybrid X21-A01D1 series hybrid X21-A01D3 regenerative braking X13-H01B X21-A03C POLLUTION CONTROL/REDUCTION catalytic combustion N07-L01A desulphurisation of coal H09-H02 polymer application A12-W11 fuel vapour recovery for IC engine Q51-H02 electrical details X22-A02E using coagulants/ flocculants A12-W11E or polyelectrolytes other A12-W11F oil refinery H05-L polymer processing A11-C07 waste gas treatment catalyst details N07-L01C for engine exhaust Q51-J02

for motor vehicle exhaust

removal of N oxides	E31-H02
catalytically	E31-H01
removal of S hydride, H₂S	E31-F01B
removal of S oxide S0 <sub>2</sub> ,SO <sub>3</sub> , S0 <sub>X</sub>	E31-F01A
removal of sulphur compounds	E31-F01
	N07-L02B
H <sub>2</sub> SO <sub>4</sub> , thiosulfate	E31-F01C
RECYCLING/RECOVERY OF MATERIALS	
electrical recycling equipment	X25-W04
chemical extraction, recovery, purification	E11-Q01
medical	P31-R
illedical	P32-R
	P33-R
	P34-R
polymer scrap recovery/recycling	A11-C03
rainwater harvesting systems	Q43-H
recycling electrical components, equipment, and material	
recycling electrical components, equipment, and material	V04-X01G
	L03-J01
AV equipment	W03-G10C
battery materials	X16-M
battery materials	L03-E06
capacitor materials	200 200
electrolytic	V01-B01G6G
non-electrolytic	V01-B04B8G
copier/printer/fax/scanner parts	S06-K04C
discharge tube salvaging	V05-L07E6
mobile phone	W01-C01D3C
mosne priorie	W01-C01W
record carrier recycling and destroying	
general	T03-H02R
magnetic	T03-A01R
magneto-optical	T03-D01R
optical	T03-B01R
resistor materials	V01-A04R2
TV receiver	W03-A19C
semiconductors	U11-H
	L03-X06
recycling/recovery of ceramic	L02-A01
recycling/recovery of clay/slip/cement/stone	P64-R
recycling/recovery of combustion apparatus	Q73-R
recycling/recovery of components from lighting devices	Q71-R
recycling/recovery of drying parts/components	Q76-R
recycling/recovery of furnaces, kilns and retorts parts	Q77-R
recycling/recovery of glass	L01-B02
recycling/recovery of grinding media	P61-R
recycling/recovery of heat exchanger components	Q78-R
recycling/recovery of heating, ranges and ventilating syst	•
	Q74-R

recycling/recovery of medical components and material	
dentistry, bandages, veterinary, prosthesis components	P32-R
diagnosis or surgery components	P31-R
medical aids	P33-R
recycling/recovery of metal working machines and components	
foundry moulding, metal casting and powder metallurgy of	
foundry moditing, metal casting and powder metallurgy c	P53-R
and the second second field to be a second second	P54-R
milling and machining components	
punching, working and forging systems	P52-R
rolling, drawing and extruding systems	P51-R
recycling/recovery of paper	X25-T09G
	P72-A10
	F05-A02B
in copier/printer/fax/scanner	S06-K04A
recycling/recovery of photographic apparatus/components	P82-R
recycling/recovery of photographic agents	P83-R
	P84-R
recycling/recovery of soldering and welding components	P55-R
recycling/recovery of toner	S06-K04B
recycling/recovery of aircraft / space vehicles	W06-B10
recycling/recovery of wood/waste wood/sawdust	P63-R
recycling waste water	D04-A06
	X25-H03
	X25-W04
from semiconductor manufacture	L04-X02
recovery of fibres	F03-E02
recovery of ferrous metals	M24-A07
recovery of non-ferrous metals	M25-E
recovery of organic products/waste	D05-A04A
e.g. for fertilizer production	
regeneration of pulp liquors during paper and fibre-board man	ufacture
	F05-A02C
other	J09-C01A
WATER/WASTE TREATMENT	E11-Q02
WALEN WAS IN INCAMENT	N07-L01
industrial waste/effluent treatment	H09-F02
industriai waste/emuent treatment	
anno aitar manufactura	E11-Q02B
capacitor manufacture	\/01 D01C/F
electrolytic	V01-B01G6E
non-electrolytic	V01-B04B8E
semiconductor manufacture	U11-C15Q
resistor manufacture	V01-A04R1
municipal/agricultural waste treatment	H09-F03
polymer waste treatment	A11-C07
purification of non-gaseous hydrocarbons	N07-L01D
removal of materials/compounds	
removal of carbon compounds	N07-L02D
removal of catalyst poisons	E11-Q02C

removal of impurities in general removal of halogen compounds removal of metal compounds removal of nitrogen compounds removal of sulphur compounds removal of unwanted chemical	N07-L02 N07-L02A N07-L02E N07-L02C N07-L02B E11-Q02C
reaction by-products  sewage treatment  electrical systems incineration of sludge pyrolysis of sludge organic waste, town waste or sludge fermentation  waste disposal processes/purification catalytic combustion of waste  waste water treatment	D04-A01J D04-B10 D04-B11 D05-A04A X25-H03 D04-B10B D04-B10B D05-A04A N07-L01 N07-L01A
waste water from paper manufacture sewage sludge removal/treatment electrical systems dewatering sludge  water treatment  compositions removing coal slurry removing hydrocarbons removing impurities removing inorganic cyanides removing inorganic fluorine compounds	X25-H03 F05-A02C D04-B10 X25-H03 D04-B10A D04-A01J N07-L01B A11-W11J D04-B03 D04-B03 D04-B07A D04-B07E
and (thio)cyanates removing inorganic nitrogen compounds removing inorganic phosphorous removing inorganic sulphur compounds removing metals	D04-B07C D04-B07B D04-B07D D04-B05 D04-B05A D04-B05A D04-B05A D04-B04 D04-B04 D04-B06 D04-B06E D04-B06B D04-B06A D04-B06C D04-B07 K07-B

# **Appendix 7: Internet of Things**

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to the "Internet of Things" (IoT).

For full details please look up the relevant code in the CPI manual (Classes A-N) and EPI manual (Classes P-X).

CONNECTIVITY		T01-N
data tra	data transfer multimedia audio, sound transfer video transfer document transfer from remote site or server cloud computing services internet-based transmission for IoT comms wireless network-based transmission for IoT comms cellular network-based transmission for IoT comms	T01-N01A2A T01-N01D T01-N01D1 T01-N01D1A T01-N01D1B T01-N01D2 T01-N01D3 T01-N01D3A W05-D06E1 W05-D06E1A
network		
	communications and control communication communication protocol addressing ad-hoc network systems network communication LAN WAN client/server system SAN peer-to-peer networks other network communication system hardware dedicated systems for accessing the internet computer based routing servers control access and control	T01-N02 T01-N02A T01-N02A1 T01-N02A1B T01-N02A2 T01-N02A2 T01-N02A2B T01-N02A2C T01-N02A2C T01-N02A2C T01-N02A2E T01-N02A3 T01-N02A3 T01-N02A3B T01-N02A3C T01-N02B
GENERAL	computer networks network-only computers client-server systems internetworking internet-of-things internet-based transmission for IoT comms	T01-M02A1 T01-M02A1A T01-M02A1B T01-M02A1C T01-N01F W05-D06E1

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control or m	easurement si	anal transmis	sinn (s	necitic)
COLLEGE OF THE	Casar Ciricit Si	griar cranising	,5,0,, (5	pcciiic,

	control or measurement signal transmission (speci	•
		W05-D07
HOME		
	home automation - general	
	control	X27-V
	data transmission	W05-D07A
	TV equipment	W03-A16C5K
	kitchen appliances	X27-B
	intelligent refrigerator	X27-F05
	lighting	
	remote-controlled switching	X26-C03C
	robots - domestic assistance	X27-U
	smart grids	X12-H08
	utility meter reading / measurement	S01-B01
	internet/intranet	X12-H03E7
	remote metering	X12-H04A
	internet/intranet metering	X12-H04B
	individual transmission/distribution/mains line me	
		X12-H04C
	for utility meters i.e. electricity, gas, water	W05-D07G
INDUST	TDIAI	
1140031		MOE DOZNI
	agricultural / farming	W05-D07N
	building control	W05-D07C
	earth drilling and well logging	W05-D07H
	factory automation	W05-D07B
		X25-F07
	office automation	W05-D07A
	power generation and distribution	W05-D07F
	smart grids	X12-H08
	utility meter reading / measurement	S01-B01
	internet/intranet	X12-H03E7
	utility electrical measurements	X12-H04
	remote metering	X12-H04A
	internet/intranet metering	X12-H04B
	for utility meters i.e. electricity, gas, water	W05-D07G
MEDICA	<b>AL</b>	
	medical systems / equipment	T01-N01E
	information systems	T01-N01E1
	data transmission	W05-D07M
	telediagnosis	S05-D06A
NETWO	ORK SECURITY	
	data transmission	W05-D05B5
	preventing or detecting interception	W05-D05B5A
	protecting against malicious software	W05-D05B5C
	preventing or detecting unauthorized network acc	
		W05-D05B5E

system / network monitoring	T01-N02B2
user monitoring	T01-N02B2A
system and fault monitoring	T01-N02B2B
transmitted content analysis	T01-N02B2C
network security, anti-malware	T01-N02B3
user authentication / control	T01-N02B1
file management and access	T01-N02B1A
user privileges/password systems	T01-N02B1B
unsolicited advertising protection	T01-N02B1C
firewalls	T01-N02B1D
network operating system management	T01-N02B1E
internet portals	T01-N02B1F
internet gateway	T01-N02B1G
biometric authentication	T01-N02B1H

# **VEHICLES**

ES		
control		X21-A01L
	driverless/autonomous vehicles	X22-P15
data trai	nsmission	W05-D07D
	inter-vehicle communication (V2V)	X21-K05
		X22-K05
	intra-vehicle/vehicle to device communication (V2D)	X21-K03
		X22-K03
	multiplexing/networking/communication	X21-K
		X22-K03
	vehicle to grid communication (V2G)	X21-K08G
	vehicle to network; vehicle to cloud communication (	(V2I)
		X21-K02
		X22-K02
	vehicle to offboard interfacing/communication	X21-K08
		X22-K08
	vehicle to pedestrian communication (V2P)	X21-K06
		X22-K06

## **Appendix 8: Digital Health**

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to Digital Health or Digital Healthcare including telemedicine, health information technology, mobile health and personalized medicine.

For full details please look up the relevant codes in the CPI manual (classes A-N), and the GMPI and EPI manual (classes P-X).

### **ELECTRICAL MEDICAL EQUIPMENT**

alarm based on medical parameter or medical failure	S05-Y01 W05-B07G5
built-in phone medical parameter monitoring equipment electrical medical diagnosis/monitoring	
blood pressure monitoring	S05-D01B1A S02-F04C2
blood flow monitoring	S05-D01B1B
diet/nutrition monitoring	S05-D09
heart rate monitoring	S05-D01B5
implanted device	S05-Y05
ingestible device	S05-Y05
measuring and recording systems for bio-electric cu	rrents
	S05-D01A
electrocardiography (ECG, EKG)	S05-D01A1
encephalography/myography (EMG, EEG, MEG)	S05-D01A2
measuring neurological/nerve stimulation	S05-D01A
online medicine	T01-N01E
sleep monitoring	S05-D01C7
telediagnosis	S05-D06A
diagnostic displays	S05-D07
hospital equipment	
patient monitoring	S05-G02B2
patient monitoring from remote location	S05-G02B2A
pacemakers	
remote programming and control	S05-A01A5A
artificial organs	B11-C04F
peripheral devices for therapeutic regimens	B11-C06C
transmission of control or measurement signals for medical	al equipment
	W05-D07M

## FITNESS/PERFORMANCE TRACKING

performance monitoring during e.g. sports training	W04-A01A1
physiological measurements	S05-D01
smart phones	W01-C01G8S
smart watches	T01-M06A1D
	S04-B09
wearable computers	T01-M06A1D

# HEALTHCARE INFORMATICS - MEDICAL/HOSPITAL IT SYSTEMS

computerised teaching models	B11-C11B
	W04-W
data processing for medical equipment and information	systems
	T01-J06
data transfer/storage	S05-G02G3
data transmission	W01
preventing or detecting interception	W05-D05B5A
protecting against malicious software	W05-D05B5C
preventing or detecting unauthorized network acce	ess
	W05-D05B5E
data/drug database	B11-C11
	T01-J05B4
health care administration	S05-G02G2
	T01-J05A2
hospital IT system	S05-G02G
	T01-J06A
medical simulation and training	S05-P
	T01-J30A
	W04-W07
online medical information systems	T01-N01E1
patient medical records	S05-G02G1
	T01-J05B
	T01-J06A1
pharmacovigilance	S05-G02G5
telediagnosis	S05-D06A
patient medical records	T01-J06A1

## **OPERATING SYSTEMS/NETWORK CONNECTIVITY**

health apps	T01-N03A1
computer processing for sports and training equipment	T01-J30D
data transmission	W01
preventing or detecting interception	W05-D05B5A
protecting against malicious software	W05-D05B5C
preventing or detecting unauthorized network acce	SS
	W05-D05B5E
diagnostic displays	S05-D07
online medicine	T01-N01E
software	T01-S
transmission of control or measurement signals for medic	al equipment
	W05-D07M
user monitoring	T01-N02B2A

## **PERSONAL ITEMS**

calorie counter	S05-D09
	X27-A02
biosensor	B11-C08E8
	S05-C

## PERSONALISED/PRECISION MEDICINE

3D printing of medications/tablets	X25-A08C2 X25-A08U2
bioprinting	B11-C17 X25-A08M3
drug design by computer modelling	X25-A08U2 B11-C08H
formulation counting/measuring devices	T01-J13 B11-C06B B11-C11A
patient compliance methods and systems targeted therapies	S05-G02G5 B12-Q01A
	S05-A

## **REMOTE CONTROL AND MONITORING**

alarm based on medical parameter or medical failure	W05-B07G5
implanted/ingestible device	S05-Y05
	B11-C04A
medical parameter monitoring equipment	W01-C01P8
pacemakers	S05-A01A5A
patient monitoring	S05-G02B2
	T01-J06A
remote control (telemetry)	W05-D08E
telediagnosis	S05-D06A
transmission of control or measurement signals for medical equipment	
	W05-D07M

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