STATUTORY INSTRUMENTS

1989 No. 2376

CUSTOMS AND EXCISE

The Export of Goods (Control) Order 1989

Made - - - -	*15th December 1989*
Coming into force - -	*14th February 1990*

The Secretary of State, in exercise of powers conferred by section 1 of the Import, Export and Customs Powers (Defence) Act 1939(**1**) and now vested in him(**2**), and all other powers enabling him in that behalf, hereby makes the following Order:

Citation, commencement and interpretation

1.—(1) This Order may be cited as the Export of Goods (Control) Order 1989 and shall come into force on 14th February 1990.

(2) In this Order, unless the context otherwise requires—

"aircraft" does not include helicopters;

"Commissioners" means the Commissioners of Customs and Excise;

"country" includes territory;

"document" includes any record or device by means of which information is recorded or stored;

"goods", unless otherwise specified, means both used and unused goods;

"hovercraft" has the same meaning as in section 4(1) of the Hovercraft Act 1968(**3**);

"importation" and "exportation" in relation to a vessel, submersible vehicle, aircraft or helicopter includes the taking into or out of the United Kingdom of the vessel, submersible vehicle, aircraft or helicopter notwithstanding that the vessel, submersible vehicle, aircraft or helicopter is conveying goods or passengers, and whether or not it is moving under its own power; and cognate expressions shall be construed accordingly;

"Member State" means a Member State of the European Communities;

"microprogramme" means a sequence of elementary instructions, maintained in a special storage, the execution of which is initiated by the introduction of its reference instruction into an instruction register;

(**1**) 1939 c. 69.
(**2**) *See* S.I. 1970/1537.
(**3**) 1968 c. 59.

"normal commercial journey" means a journey providing transport services in the ordinary course of business;

"ODMA software" means operating software, diagnostic software, maintenance software or application software; and in each case includes only the minimum software necessary to enable the equipment to perform the function for which it was designed;

"programme" means a sequence of instructions to carry out a process in, or convertible into, a form executable by an electronic computer and includes a microprogramme;

"scheduled goods" means goods of a description specified in Schedule 1 hereto;

"scheduled journey" means one of a series of journeys which are undertaken between the same two places and which together amount to a systematic service operated in such a manner that the benefits thereof are available to members of the public from time to time seeking to take advantage of it;

"ship" includes the hull or part of the hull of a ship;

"software" means one or more programmes fixed in any tangible medium of expression;

"surface effect vehicle" means any air cushion vehicle (whether side wall or skirted) and any vehicle using the wing-in-ground effect for positive lift;

"SWATH vessel" means any small waterplane area twin-hull vessel;

"technological document" means any document containing information relating to the design, production, testing or use of goods or to technologies or processes, excluding:

(i) document which is generally available to the public;

(ii) application for the grant of a patent (or any other form of protection for an invention) or for the registration of a design, or a semi conductor topography, in each case under the law of the United Kingdom or of any other country or under any treaty or international convention;

(iii) document necessary to enable any such application to be filed, made or pursued;

"vessel" includes any ship, surface effect vehicle, SWATH vessel and hydrofoil, and the hull or part of the hull of a vessel;

a prohibition on exportation means a prohibition on exportation from the United Kingdom and shall include a prohibition on shipment as ships' stores;

any reference to scheduled goods or any other item being indicated by a letter shall be taken as a reference to such goods or items being so indicated in Schedule 1 hereto;

numerical references in Schedule 1 hereto to British Standards are references to the standards so numbered published by the British Standards Institution in the year indicated after such references with such amendments (if any) thereto as may have been made before the making of this Order;

references in Schedule 1 hereto to percentages of the contents of any goods are references to percentages by weight;

any description of goods specified in Group A of Part I of Schedule 1 hereto in relation to a Combined Nomenclature heading or sub-heading, other than one covering a whole heading, shall be taken to comprise all goods which would be classified under an entry in the same terms constituting a subheading in the relevant heading in the Combined Nomenclature of the European Economic Community(**4**).

(**4**) *See* Council Regulation (EEC) No.2658/87 O.J.No.L256, 7.9.87, p. 1, amended by Commission Regulation (EEC) No.3985/87 O.J.No.L376 31.12.87, p. 1, Council Regulation (EEC) No.1045/88 O.J.No.L103 22.04.88 p. 1, Council Regulation (EEC) No.1058/88 O.J.No.L104 23.04.88 p. 1, Council Regulation (EEC) No.1315/88 O.J.No.L123 17.05.88 p. 2, Council Regulation (EEC) No.1471/88 O.J.No.L134 31.05.88 p. 1, Commission Regulation (EEC) No.1858/88 O.J.No.L166 01.07.88 p. 10, Commission Regulation (EEC) No.3174/88 O.J.No.L298 31.10.88 p. 1, Council Regulation (EEC) No.3468/88

Prohibitions and restrictions on exportation

2. Subject to the provisions of this Order—

(i) where scheduled goods are indicated by the letter "C", those goods are prohibited to be exported to any destination, and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in a country listed in Schedule 2 to this Order;

(ii) where technology is specified in Schedule 1 to this Order and indicated by the "D", technological documents the information in which includes that technology are prohibited to be exported to any destination in a country listed in Schedule 2 to this Order;

(iii) scheduled goods indicated by the letter "E" are prohibited to be exported to any destination except a destination in another Member State;

(iv) where scheduled goods are indicated by the letter "I", those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in Iran or Iraq;

(v) where scheduled goods are indicated by the letter "L", those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in Libya;

(vi) where scheduled goods are indicated by the letter "S", those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination after delivery or for the purpose of delivery, directly or indirectly, to a person in any country listed in Schedule 2 to this Order;

(vii) scheduled goods indicated by the letter "T" are prohibited to be exported to any destination except that when in relation to such goods the provisions of Commission Regulation (EEC) 1062/87, as amended(**5**), relating to the use of Community transit documents requiring anything to be done at or before the time of exportation have been complied with, the goods may be exported to a destination in another Member State;

(viii) scheduled goods indicated by the letter "W" are prohibited to be exported to any destination;

(ix) scheduled goods indicated by the letter "X" are prohibited to be exported to any destination in India or Pakistan;

(x) where scheduled goods are indicated by the letter "Y", those goods and (whether or not express provision is made in relation to technology) technological documents the information in which relates to those goods are prohibited to be exported to any destination in Syria;

(xi) where scheduled goods are indicated by the letter "Z", those goods and (whether or not express provision is made in relation to technology) technological documents

O.J.No.L305 10.11.88 p. 1, Council Regulation (EEC) No.4107/88 O.J.No.L361 29.12.88 p. 1, Commission Regulation (EEC) No.0020/89 O.J.No.L004 06.01.89 p. 19, Council Regulation (EEC) No.1495/89 O.J.No.L148 01.06.89 p. 1, Council Regulation (EEC) No.1672/89 O.J.No.L169 19.06.89 p. 1, Commission Regulation (EEC) No.2886/89 O.J.No.L282 02.10.89 p. 1, and Commission Regulation (EEC) No.3469/89 O.J.No.L337 21.11.89 p. 5.

(**5**) O.J.No.L107, 22.4.87, p. 1, amended by Commission Regulations (EEC) No.2823/87, O.J.No.L270, 23.9.87, p. 1, No.1469/88, O.J.No.L132, 28.5.88, p. 67 and No.1159/88, O.J.No.L119, 24.4.89, p. 100.

the information in which relates to those goods are prohibited to be exported to any destination in South Africa or Namibia;

(xii) specialised components of any goods of a description specified in Group 1 of Part II of Schedule 1 hereto, whether or not such components are specified in the description, are prohibited to be exported to any destination in South Africa or Namibia;

(xiii) goods of a description specified in Group C of Part I of Schedule 1 hereto are prohibited to be exported to any destination in the United States of America or the Commonwealth of Puerto Rico.

Community steel products

3. The prohibition in article 2(xiii) of this Order shall not apply to any exportation to any destination in the United States of America or the Commonwealth of Puerto Rico in accordance with a European Community export licence issued by the competent authority of a Member State in conformity with the provisions of Commission Decision 2873/82/ECSC(**6**) or Commission Regulation (EEC) No.2874/82(**7**) or Commission Regulation (EEC) No.61/85(**8**).

Exceptions

4. Nothing in article 2 of this Order shall be taken to prohibit the exportation of—

Licensed exports and permitted ships' stores

(a) any goods under the authority of a licence granted by the Secretary of State, or the shipment of any goods as ships' stores with the permission of the proper officer of Customs and Excise at the port of departure for use on board the ship, provided that all conditions attaching to the said licence or the said permission are complied with;

Channel Islands

(b) any goods other than goods of a description specified in Group B of Part I of Schedule 1 hereto or in Group 1 of Part II of the said Schedule, to any destination in the Channel Islands;

Samples

(c) trade samples of any goods of a description specified in Group A of Part 1 of Schedule 1 hereto, if the samples have no saleable value;

Aircraft and helicopters

(d) (i) any aircraft or helicopter which is being exported after temporary importation into the United Kingdom, provided that there has been no change of ownership or registration since such importation;

(ii) any aircraft or helicopter engaged on a scheduled journey;

Cocoa

(e) cocoa beans, whole or broken, raw or roasted, and the following cocoa products namely cocoa paste (in bulk or block) whether or not defatted, cocoa butter (fat and oil) and

(**6**) O.J.No.L307, 1.11.1982, p. 36, amended by Commission Decisions 2149/84/ECSC O.J.No.L202, 31.7.84, p. 1 and 978/86/ECSC O.J.No.L91, 7.4.86, p.49.

(**7**) O.J.No.L307, 1.11.1982, p. 56, amended by Commission Regulations (EEC) 2150/84 O.J.No.L202, 31.7.84, p. 23 and 977/86 O.J.No.L91, 7.4.86, p. 1.

(**8**) O.J.No.L9, 10.1.1985, p. 19, amended by Commission Regulation (EEC) No.979/86 O.J.No.L91, 7.4.86, p. 96.

cocoa powder not containing added sugar or other sweetening matter to any destination if there is produced to the proper officer of Customs and Excise at the place of export the appropriate certificate prescribed for this purpose by the economic and control rules of the International Cocoa Agreement 1986(**9**) which were adopted by the International Cocoa Council on 23rd January 1987

Firearms and ammunition

(f) (i) firearms (not being goods of a description specified in Group B of Part 1 of Schedule 1 hereto) authorized to be held by a valid firearm certificate or shotgun certificate granted or having effect as if granted under the Firearms Act 1968(**10**) or by a valid firearm certificate granted under the Firearms (Northern Ireland) Order 1981(**11**) or granted in the Isle of Man under the Firearms Act 1947 (an Act of Tynwald)(**12**); and

(ii) related ammunition for use therewith;

to any destination other than a destination in South Africa or in Namibia, provided that the firearms and ammunition form part of the personal effects of the holder of the certificate and the certificate is produced by the holder, or his duly authorized agent, with the firearms and ammunition, to the proper officer of Customs & Excise at the place of export;

Live animals

(g) (i) any live animal if the place of export is Great Britain;

(ii) live bovine animals, live swine and live sheep from Northern Ireland to the Republic of Ireland;

Vessels

(h) (i) any vessel registered or constructed outside the United Kingdom which is being exported after temporary importation into the United Kingdom;

(ii) any vessel which is departing from the United Kingdom on trials;

(iii) any vessel proceeding on a normal commercial journey.

Customs powers to demand evidence of destination which goods reach

5. Any exporter or any shipper of goods which have been exported from the United Kingdom shall, if so required by the Commissioners, furnish within such time as they may allow proof to their satisfaction that the goods have reached either—

(i) a destination to which they were authorised to be exported by a licence granted for the purposes of this Order, or

(ii) a destination to which their exportation was not prohibited by this Order;

and, if he fails to do so, he shall be liable to a customs penalty not exceeding two thousand pounds unless he proves that he did not consent to or connive at the goods reaching any destination other than such a destination as aforesaid.

(**9**) Cmnd 9905.
(**10**) 1968 c. 27, as amended by the Firearms (Amendment) Act 1988 (c. 45).
(**11**) S.I.1981/155 (N.I.2).
(**12**) Acts of Tynwald 1947, p. 586.

Offences in connection with applications for licences, conditions attaching to licences, etc.

6.—(1) If for the purpose of obtaining any licence or permission under this Order for the exportation or shipment as ships' stores of any goods or of obtaining from the Secretary of State a European Community export licence as referred to in article 3 of this Order any person makes any statement or furnishes any document or information which to his knowledge is false in a material particular or recklessly makes any statement or furnishes any document or information which is false in a material particular he shall be guilty of an offence and liable on summary conviction to a fine not exceeding two thousand pounds and on conviction on indictment to a fine or imprisonment for a term not exceeding 2 years, or to both; and any licence or permission or European Community export licence which may have been granted for the exportation or shipment as ships' stores of any goods, in connection with the application for which the false statement was made or the false document or information furnished, shall be void as from the time it was granted.

(2) Any person who has exported goods from the United Kingdom under the authority of a licence granted by the Secretary of State in pursuance of Article 4(a) and who fails to comply with any condition attaching to that licence shall be guilty of an offence and liable on summary conviction to a fine not exceeding two thousand pounds and on conviction on indictment to a fine or imprisonment for a term not exceeding 2 years, or to both:

Provided that no person shall be guilty of an offence under this paragraph where he proves that the condition with which he failed to comply was modified, otherwise than with his consent, by the Secretary of State and that the goods in relation to which he failed to comply with the condition had, at the time when the condition was modified, been exported from the United Kingdom.

Declaration as to goods: powers of search

7.—(1) Any person who, on any occasion, is about to leave the United Kingdom shall, if on that occasion he is required to do so by an officer of Customs and Excise—

(a) declare whether or not he has with him any goods the export of which from the United Kingdom is subject to any prohibition or restriction under this Order; and

(b) produce any such goods as aforesaid which he has with him;

and such officer, and any person acting under his directions, may search that person for the purpose of ascertaining whether he has with him any such goods as aforesaid:

Provided that no person shall be searched in pursuance of this paragraph except by a person of the same sex.

(2) Any person who without reasonable excuse refuses to make a declaration, fails to produce any goods or refuses to allow himself to be searched in accordance with the foregoing provisions of this article shall be guilty of an offence and liable to a customs penalty not exceeding one thousand pounds.

(3) Any person who under the provisions of this article makes a declaration which to his knowledge is false in a material particular or recklessly makes any declaration which is false in a material particular shall be guilty of an offence and liable on summary conviction to a customs penalty not exceeding two thousand pounds and on conviction on indictment to a customs penalty of any amount or imprisonment for a term not exceeding two years, or to both.

Modification and revocation of licences, etc

8.—(1) A licence granted by the Secretary of State in pursuance of article 4(a) or having effect as if so granted may be modified or revoked by him at any time.

(2) Any permission granted by the proper officer of Customs and Excise for the shipment of any goods as ships' stores may be modified or revoked by such officer at any time.

Revocations

9. The Orders specified in Schedule 3 hereto are hereby revoked.

Trefgarne
Minister for Trade,
15th December 1989. Department of Trade and Industry

SCHEDULE 1 Article 1(2)

CONTENTS OF SCHEDULE 1

PART I

GROUP A

GOODS SPECIFIED BY REFERENCE TO HEADINGS AND SUB-HEADINGS OF THE COMBINED NOMENCLATURE ("CN")

CN Heading and Sub-Heading No.	*Description of Goods*	
1002	Live bovine animals	W
0103	Live swine	W
010410	Sheep	W
1801	Cocoa beans, whole or broken raw or roasted	E
ex1803	Cocoa paste (in bulk or block), whether or not defatted	E
1804	Cocoa butter, fat and oil	E

CN Heading and Sub-Heading No.	*Description of Goods*	
ex1805	Cocoa powder, not containing added sugar or other sweetening matter, otherwise than in retail packs each of less than 3.5 kg	E
262030	Ash and residues, (other than from the manfuacture of iron or steel), containing metals or metallic compounds—containing mainly copper	E
ex7118	Coin of silver alloy of the United Kingdom minted before 1947, but not more than 100 years old at the date of exportation, exported in a quantity exceeding 10 in number	W
720410	Waste and scrap metal of cast iron (ECSC)	E
	Waste and scrap of alloy stel	E
720421	Waste and scrap of stainles steel (ECSC)	E
720429	Other (ECSC)	E
720430	Waste and scrap of tinned iron or steel	E
720441	Turnings, shavings, chips, milling waste, sawdust, filings, trimmings and stampings, whether or not in bundles (ECSC)	E
720449	Other (ECSC)	E
720450.10	Remelting scrap ingots: Of alloy steel (ECSC)	E
7404	Copper waste and scrap	E
7602	Aluminium waste and scrap	T
7802	Lead waste and scrap	T
790200	Zinc waste and scrap	T

GROUP B

ANTIQUES

Any goods manufactured or produced more than 50 years before the date of exportation except (1) postage stamps and other articles of philatelic interest: (2) birth, marriage or death certificates or other documents relating to the personal affairs of the exporter or the spouse of the exporter; (3) letters or other writings written by or to the exporter or the spouse of the exporter; and (4) any goods exported by, and being the personal property of, the manufacturer or producer thereof, or the spouse, widow or widower of that person.	W

GROUP C

STEEL PRODUCTS PROHIBITED TO BE EXPORTED TO THE UNITED STATES OF AMERICA OR THE COMMONWEALTH OF PUERTO RICO

The products specified in Annex I to the following Community instruments on the restriction of exports of certain steel products to the United States of America,

Commission Decision No. 2872/82/ECSC(**13**)

Council Decision No. 3713/85 ECSC(**14**) and Commission Decision No. 2827/86/ECSC(**15**)

PART II

Note: The goods in this Part are for convenience specified by reference to the classification system used by the Department of Trade and Industry for export control purposes.

GROUP 1

	Note: Goods specified in the heads of this Group may also be specified in Groups 3E, 3F and 3G of this Part of this Schedule. **Military aircraft and helicopters, Arms and related material, Ammunition, Military Stores and Appliances, and**	

(**13**) O.J.No.L307, 1.11.82, p. 27, amended by Commission Decisions No.2192/83/ECSC, O.J.No.L215, 05.08.83, O.J.No.L260, 21.09.83, p. 9 and No.2827/86/ECSC, O.J. No.L262, 13.09.86, p. 12.
(**14**) O.J.No.L355, 31.12.85, p. 155.
(**15**) O.J.No.L262, 13.9.1986, p. 12.

	Security and Para-Military Equipment	
ML1	Small arms and machine guns, the following—	
	(a) (a) Rifles, carbines, revolvers, pistols, machine pistols and machine guns	C
	(b) (b) Smooth-bore weapons specially designed for military use	C
	(c) (c) Specially designed components therefore, such as barrels, cylinders and breeches	C
	except air weapons (other than those declared by the Firearms (Dangerous Air Weapons) Rules 1969(**16**) to be specially danagerous).	
PL5003	Mounting for machine guns	C
ML2	Large calibre armament or weapons and projectors the following: and specially designed components and specially designed ODMA software therefor—	
	(a) (a) Guns, howitzers, cannon, mortars, tank destroyers, projectile and rocket launchers, military flame throwers, recoilless rifles	C
	(b) (b) Military smoke, gas and pyrotechnic projectors	C
PL5004	Military smoke producing appliances and specially	C

(**16**) S.I. 1969/47.

	designed components and specially designed ODMA software therefor	
ML3	Ammunition including projectiles and specially designed components and specially designed ODMA software therefor, for the equipment mentioned in the entries ML1, ML2, PL5003 and PL5004 above	C
ML4	Bombs, torpedoes, rockets and missiles guided and unguided the following and specially designed ODMA software therefor—	
	(a) (a) Bombs, torpedoes, grenades (including smoke grenades), smoke canisters, rockets, mines, missiles guided or unguided, depth charges, fire bombs, incendiary bombs and military demolition charges, devices and kits; and pyrotechnic flare signals for military use; cartridges and simulators; and specially designed components therefor	C
	(b) (b) Apparatus and devices specially designed for the handling, control, activation, launching, laying, sweeping, discharging detonation or detection of items enunerated in head (a); and specially designed components therefor	C
	(c) (c) Military fuel thickeners, including but not limited	C

	to compounds such as octal or mixtures of such compounds such as napalm, specifically formulated for the purpose of producing materials which, when added to petroleum products, provide a gel-type incendiary material for use in bombs, projectiles, flamethrowers or other implements of war	
PL5005	Apparatus and devices specially designed for the refuelling or disruption of items specified in head (a) of entry ML4 in this Group and specially designed components therefor	C
PL5006	Apparatus and devices specially designed for dealing with improvised explosive devices In this entry "improvised explosive devices" means devices placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic or incendiary chemicals, designed to destroy, disfigure or harass. They may incorporate military stores, but are normally devised from non-military components.	C
ML5	Fire control equipment and range finders the following: and specially designed components, accessories and specially designed software therefor—	
	(a) (a) Fire control, gun laying,night sighting, missile	C

			tracking and guidance equipment	
		(b)	(b) Range, position and height finders, and spotting instruments, specially designed for military purposes	C
		(c)	(c) Aiming devices, electronic, gyroscopic, acoustic and optical, specially designed for military purposes	C
		(d)	(d) Bomb sights, bombing computers, gun sights and periscopes, specially designed for military purposes	C
		(e)	(e) Television sighting units specially designed for military use	C
ML6	Tanks and vehicles specially designed for military purposes, the following: and specially designed components and specially designed ODMA software therefor—			
		(a)	(a) Tanks and self-propelled guns	C
		(b)	(b) Military type armed or armoured vehicles, and vehicles fitted with mounting for arms	C
		(c)	(c) Armoured railway trains	C
		(d)	(d) Military half-tracks	C
		(e)	(e) Military type recovery vehicles	C
		(f)	(f) Gun-carriers and tractors specially designed for towing artillery	C

	(g) (g) Trailers specially designed to carry ammunition	C
	(h) (h) Amphibious and deep water fording military vehicles	C
	(i) (i) Military mobile repair shops specially designed to service military equipment	C
	(j) (j) All other specially designed military vehicles	C
PL5007	Engines specially designed or modified for military use for the propulsion of vehicles specified in entry ML6 in this Group	C
PL5008	Pneumatic tyre casings, other than tractor or farm implement types, of a kind specially constructed to be bullet proof or to run when deflated	C
ML7	Toxicological agents and tear gas, related equipment, components and materials the following: and specially designed ODMA software therefor—	
	(a) (a) Biological, chemical and radioactive materials adapted for use in war to produce casualties in men or animals, or to damage crops	C
	(b) (b) Noxious chemicals, the following—	
	(1) Bromobenzyl cyanide	C
	(2) oChlorobenzylidenemalononitrile (oChlorobenzalmalononitrile)	C
	(3) monoChloromethyl chloroformate	C

(4)	2-Chlorotriethylamine	C
(5)	Dibenzoxazepine	C
(6)	Dibromodimethyl ether	C
(7)	Dichlorodimethyl ether	C
(8)	2:2'-Dichlorotriethylamine	C
(9)	Diphenylaminochloroarsine	C
(10)	Diphenylchloroarsine	C
(11)	Diphenylcyanoarsine	C
(12)	Ethyl NN-dimethylphosphoramidocyanidate	C
(13)	Ethyldibromoarsine	C
(14)	Ethyldichloroarsine	C
(15)	Lewisite (chlorovinyldichloroarsine and dichlorodivinylchloroarsine)	C
(16)	Methyldichloroarsine	C
(17)	Mustard gas (dichlorodiethyl sulphide)	C
(18)	Phenylcarbylamine chloride (phenyhlaminocarbony chloride)	C
(19)	Phenylacyl chloride (w-Chloroacetophenone)	C
(20)	Phenyldibromoarsine	C
(21)	Phenyldichloroarsine	C
(22)	Pinacolyl methylphosphofluoridate	C
(23)	isoPropyl methylphosphonofluoridate	C
(24)	2:2':2" Trichlorotriethylamine	C
	(c) (c) Equipment specifically designed and intended for the dissemination of the materials described in heads (a) and (b) above	C

		(d)	(d) Equipment and materials specially designed and intended for defence against the materials described in heads (a) and (b) above and for their detection and identification	C
		(e)	(e) Components specially designed for the items listed in heads (c) and (d) above	C
		(f)	(f) Bipolymers specially designed or processed for detection and identification of chemical warfare materials described in head (a) above and the cultures of specific cells used to produce them	C
PL5009	Explosives, propellants and related substances the following—			
		(a)	(a) Explosives as defined in section 3 of the Explosives Act 1875(**17**) except those specially designed for toys, novelty goods and display fireworks	C
		(b)	(b) Military propellants and fuels not elsewhere specified in this Schedule	C
		(c)	(c) Military pyrotechnics	C
		(d)	(d) Additives, precursors and stabilisers, and	C

(**17**) 1875 c. 17.

	specially designed ODMA software, for the materials specified in heads (a) to (c) above (inclusive)	
ML9	Vessels (including ships) of war and special naval equipment, the following: and specially designed ODMA software therefor—	
	(a) (a) Combatant vessels or vessels designed for offensive or defensive action (surface or underwater) whether or not converted to non-military use and regardless of current state of repair or operating condition	C
	(b) (b) Engines, the following—	
	(1) diesel engines of 1,500 b.h.p. and over with rotary speed of 700 r.p.m. or over, specially designed for submarines	C
	(2) electric motors specially designed for submarines, namely those over 1,000 b.h.p. quick reversing type, liquid cooled and totally enclosed	C
	(3) non-magnetic diesel engines, 50 b.h.p. and over, specially designed for military purposes	C
	(d) (d) Submarine and torpedo nets	C
	(e) (e) Compasses and equipment therefor and ship's course indicators, specially designed for submarines	C

	(f)	(f) Specially designed components, accessories and attachments to the foregoing, such as turrets, naval gun mounts, submarine batteries and catapults	C
	(g)	(g) Hull penetrators and connectors specially designed for military purpposes that enable interaction with equipment external to a vessel	C
	(h)	(h) Silent bearings for military purposes and equipment containing these bearings	C
PL5010	Underwater detection devices specially designed for military purposes; controls and components thereof		C
ML10	Aircraft and helicopters, of the piloted or pilotless types, and aero-engines and aircraft or helicopter equipment, associated equipment and components, specially designed for military purposes, the following: and specially designed ODMA software therefor—		
	(a)	(a) Combat aircraft and helicopters and other aircraft and helicopters specially designed for military purposes, including military reconnaissance, assault, military training and logistic support, and all aircraft and	C

	helicopters having special structural features such as multiple hatches, special doors, ramps, reinforced floors and the like, for transporting and airdroppng troops, military equipment and supplies; aero-engines specially designed or adapted for use with such aircraft and helicopters, but not including those aero-engines not falling within head IL1460(d) in Group 3E, in this Schedule; and specially designed components therefor	
(b)	(b) Airborne equipment, including airborne refuelling equipment specially designed for use with the aircraft and helicopters and the engines for the types of aircraft and helicopters specified in head (a) of this entry and specially designed components therefor	C
(c)	(c) Pressure refuellers, pressure fuelling equipment, equipment specially designed to facilitate operations in confined areas and ground equipment, not elsewhere specified, developed specially for aircraft and helicopters, and aircraft and helicopter engines	C

		specified in head (a) of this entry	
PL5011	Remotely piloted air vehicles specially designed for reconnaissance, surveillance electronic warfare and other military purposes and their launchers ground stations and associated equipment for command and control		C
PL5012	Apparatus and appliances specially designed for use with aircraft and helicopters, associated equipment and components, the following: and specially designed ODMA software therefor—		
	(a)	(a) Pressurised breathing equipment and partial pressure suits	C
	(b)	(b) Anti-g suits	C
	(c)	(c) Military crash helmets	C
	(d)	(d) Military parachutes	C
	(e)	(e) Liquid oxygen converters used for aircraft, helicopters and missiles	C
	(f)	(f) Catapults and cartridge actuated devices used in emergency escape of personnel from aircraft and helicopters	C
PL5013	Supply dropping apparatus for use with aircraft and helicopters specified in entry ML10 in this Group and associated equipment and specially designed components and specially designed ODMA software therefor		C
ML11	Electronic equipment specially designed for military use and specially designed components		C

	and specially designed ODMA software therefor—			
ML12	Photographic and electro-optical imaging equipment, the following: and specially designed components and specially designed ODMA software therefor—			
		(a)	(a) Air reconnaissance cameras and associated equipment designed for military purposes	C
		(b)	(b) Other cameras and electro-optical imaging devices, including infrared and imaging radar sensors, whether recording, or transmitting via data link, designed for military including reconnaissance purposes	C
		(c)	(c) Specialized equipment for the cameras and electro-optical imaging devices specified in head (d) above designed to make the recorded or transmitted information militarily useful	C
		(d)	(d) Film processing and printing machines designed for military purposes	C
ML13	Special armoured equipment, the following—			
		(a)	(a) Armoured plate	C
		(b)	(b) Combinations and constructions of metallic or non-	C

	metallic materials specially designed to provide ballistic protection for military systems	
	(c) (c) Military helmets	C
	(d) (d) Body armour, bullet-proof or bullet-resistant clothing, flack suits and specially designed components therefor	C
PL5014	Specially designed components for the equipment specified in entry ML13 heads (a), (b) and (c), in this Group	C
ML14	Specialised military training equipment and specially designed components and accessories and specially designed ODMA software therefor	C
ML15	Military infrared, thermal imaging and image intensifier equipment, and specially designed components and specially designed ODMA software therefor	C
ML16	Forgings, castings and semi-finished products specially designed for the products specified in by entries ML1, 2, 3, 4 and 6 and PL5003, 5004, 5005, 5006 5007 and 5008 above	C
ML17	Miscellaneous equipment and materials, the following and specially designed ODMA software therefor—	
	(a) (a) Self contained diving and underwater swimming apparatus, the following—	
	(1) closed and semi-closed circuit (rebreathing) apparatus	C

		(2) specially designed components for use in the conversion of open-circuit apparatus to military use	C
		(3) articles exclusively designed for military use with self-contained diving and underwater swimming apparatus	C
	(b)	(b) Silencers or mufflers for armaments	C
	(c)	(c) Power-controlled searchlights and control units therefor, designed for military use and specially designed ODMA softward therefor	C
	(d)	(d) Construction equipment built to military specifications, specially designed for airborne transport and specially designed components therefor	C
PL5002		Telescopic sights for firearms	C
PL5016		Material or devicers specially designed to reduce, distort or eliminate the signature (ie thermal, electronic, acoustic or magnetic) of a vehicle or military installation In this entry “vehicle” means a self-propelled, boosted or towed conveyance for transporting a burden or load on land, sea, through air or space.	C
ML18		Equipment and technology for the production, namely design, examination, manufacture, testing and checking, of goods specified in this Group, the following: and specially	

	designed ODMA software therefor—	
	(a) (a) Specially designed production equipment	C
	(b) (b) Components specially designed for equipment specified in head (a) abovr	C
	(c) (c) Production equipment for goods specified elsewhere in this Schedule	C
	(d) (d) Production technology even if the equipment with which such technology is to be used is not specified in this Group	D
	(e) (e) Technology specific to the design of, the assembly of components into, and the operation, maintenance and repair of complete production installations even if the components are not specified in this Group	D
PL5017	Equipment and technology for the development of the goods specified in this Group and specially designed ODMA software therefor	C
ML19	Environmental chambers capable of pressures below 0.133 microbar (10^{-4} Torr) and specially designed components therefor	C
	except equipment fitted with industrial machinery not specified elsewhere in this Schedule	
ML20	Cryogenic and superconductive equipment	

and components, the following and specially designated ODMA software therefor

(a)	(a) Equipment specially designed or configured to be installed in a vehicle for military ground, marine, airborne or space application and capable of operating while in motion and of producing or maintaining temperatures below 103 K (−170°C) and specially designed accessories and components and specially designed ODMA software therefor	C
(b)	(b) Superconductive electrical equipment (rotating machinery and transformers) designed for operation at temperatures below 103 K (−170°C) and that are specially designed or configured to be installed in a vehicle for military ground, marine, airborne or space applications and capable of operating while in motion, except direct-current hybrid homopolar generators that have single-pole normal metal armatures which rotate in a magnetic field produced by superconducting windings, provided those windings are the only	C

		superconducting component in the generator, and specially designed accessories and components and specially designed ODMA software therefor	
ML22		Electrically triggered shutters of the carbon injection or photochromic function type having a shutter speed of less than 100 microseconds, and specially designed ODMA software therefor; except shutters specially designed for high-speed cameras	C
ML23		Directed energy weapons (DEW) systems, the following and specially designed ODMA software therefor—	
	(a)	(a) Laser systems specially designed for destruction or effecting mission-abort of a target	C
	(b)	(b) Particle beam systems capable of destruction or effecting mission-abort of a target	C
	(c)	(c) High power radio-frequency (RF) systems capable of destruction or effecting mission-abort of a target	C
	(d)	(d) Specially designed components for systems specified in heads (a), (b) or (c) above, including	C
	(1)	prime power generation, energy storage, switching, power conditioning and fuel handling equipment	C

(2)	target acquisition and tracking sub-systems	C
(3)	sub-systems capable of assessing target damage, destruction or mission-abort	C
(4)	beam-handling, propagation and pointing equipment	C
(5)	equipment with rapid beam slew capability for rapid multiple target operations	C
(6)	adaptive optics	C
(7)	current injectors for negative hydrogen ion beams which provide average injection currents over 50 mA with beam brightness (defined as current divided by the product of orthogonal transverse, normalised RMS emittances) greater than 40 A(cm^2 mrad) at kinetic energies greater than 20keV; or	C
(8)	specially designed components for the equipment specified in sub-heads (1) to (7) above	C
(e)	(e) Equipment, and components thereof, specially designed and intended for defence against systems specified in heads (a), (b) and (c) above and for their detection and identification	C
(f)	(f) Physical test models and related documentation for the systems, equipment and components specified	C

		in heads (a) to (e) above	
ML24	Software not elsewhere specified, the following—		
	(a)	(a) Software specially designed for the modelling, simulation or evaluation of military weapons systems	C
	(b)	(b) Software for determining the effects of conventional, nuclear, chemical or biological warfare weapons	C
ML25	Biocatalysts for decontamination and degradation of chemical warfare (CW) agents, technology, and biological systems therefor, the following—		
	(a)	(a) Biocatalysts, specially designed for decontamination and degradation of CW agents specified in head (a) of entry ML7 resulting from directed laboratory selection or genetic manipulation of biological systems	C
	(b)	(b) Technology designed, produced and used exclusively for the incorporation of biocatalysts, specified in head (a) above, into military carrier substances or military material	D
	(c)	(c) Biological systems, the following—	
	Expression vectors, viruses or cultures of		C

cells containing the genetic information specific to the production of biocatalysts specified in head (a) above

except technology and biological systems specified in heads (b) and (c) above designed, produced and used exclusively for civil purposes, such as agricultural, pharmaceutical, medical, veterinary, environmental and waste management uses, and in the food industry.

In this entry
(a) "biocatalysts" means enzymes or other biological compounds which bind to and accelerate the degradation of CW agents.
(b) "expression vectors" are carriers (eg plasmid or virus) which are used to introduce genetic material into host cells.

PL5001	Security and para-military police equipment, the following—	
	(a) (a) Acoustic devices represented by the manufacturers or suppliers thereof as suitable for riot control purposes, and specialised components therefor	C
	(b) (b) Anti-riot shields and components therefor	C
	(c) (c) Leg-irons, shackles (excluding handcuffs) and gangchains, specially	C

	designed for restraining human beings	
(d)	(d) Portable anti-riot devices for administering an electric shock or an incapacitating substance, and specialised components therefor	C
(e)	(e) Water cannon and components therefor	C
(f)	(f) Riot control vehicles which have been specially designed or modified to be electrified to repel boarders	C

GROUP 2

ATOMIC ENERGY MINERALS AND MATERIALS AND NUCLEAR FACILITIES, EQUIPMENT AND APPLIANCES

Note 1: For the purposes of this Group "crude forms" and "semi-fabricated forms" have the same meanings as in Group 3H.

Note 2: Goods specified in this Group may also be specified in Group 3 of this Part of this Schedule.

GROUP 2A

Atomic Energy Minerals and Materials

A1	Special and other fissile materials except three effective grammes or less when contained in a sensing cpomponent in instruments. special or other fissile materials contained in heart pacemakers. In this entry— **1.** "special fissile materials" means plutonium-239, uranium-233, uranium enriched in the isotopes 235 or 233,	C

and any material containing the foregoing.

2. "uranium enriched in the isotopes 235 or 233" means uranium containing the isotopes 235 or 233, or both, in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is more than the ratio of the isotope 235 to the isotope 238 occurring in nature (isotope ratio 0.72 per cent);

3. "other fissile material" means previously separated americium-242m, curium-245 and -247, californium-249 and -251 isotopes of plutonium other than -239, and any material containing the foregoing;

4. "effective gramme" of special or other fissile material is defined as follows:

(a) for plutonium isotopes and uranium-233, the isotope weight in grammes;

(b) for uranium enriched 1 per cent or greater in the isotope U-235, the element weight in grammes multiplied by the square or its enrichment expressed as a decimal weight fraction;

(c) for uranium enriched below 1 per cent in the esotope U-235, the element weight in grammes multiplied by 0.0001;

(d) for americium-242m, curium-245 and -247, and

	californium-249 and -251, the esotope weight to grammes multiplied by 10.	
	5. For the purposes of this item the term "previously separated" means the application of any process intended to increase the concentration of the controlled isotope.	
A2	Source material, the following—	
	Natural and depleted uranium, in any form, or incorporated in any substance in which the concentration of uranium exceeds 0.05%	C
	In this entry— "natural uranium" means uranium contining the mixtures of esotopes occurring in nature; "depleted uranium" means uranium depleted in the isotope 235 below that occurring in nature.	
PL6001	Source material, the following—	
	Thorium, in any form, or incorporated in any substance in which the concentration of thorium exceeds 0.05%	C
	except alloys containing less than 5% thorium.	
A3	Deuterium, heavy water, deuterated paraffins, and simple or complex lithium deuterides, and mixtures and solutions containing deuterium, in which the instopic ratio of deuterium to hydrogen exceeds 1:5,000	C
PL6012	Compounds of deuterium	C
A4	Zirconium in which the ratio of hafnium content to zirconium content is less than one part to	

	five hundred parts by weight, the following—		
	(a)	(a) Zirconium and alloys containing more than 50% zirconium, in crude or semi-fabricated forms	C
	(b)	(b) Zirconium compounds, except zirconium oxide thermally stabilised with calcium oxide or magnesium oxide or both	C
	(c)	(c) Manufactures wholly of any of the foregoing	C
A5	Nickel powder and porous nickel metal, the following—		
	(a)	(a) Powder with a nickel content of 99% or more tha a mean particle size of less than 100 micrometres, whether compacted or not	C
	(b)	(b) Porous nickel metal material produced from materials specified in head (a) above except single porous nickel metal sheets not exceeding 930 cm^2 intended for use in batteries for civil applications	C
PL6011	Graphite, nuclear-grade, having a purity level of less than 5 parts per million boron equivalent and with a density greater than 1.5 g/cm^3		C
A7	Lithium, the following—		
	(a)	(a) Lithium and alloys containing 50 per cent or more	C

			of lithium, in crude or semi-fabricated forms	
		(b)	(b) Lithium and alloys, mixtures, concentrates and compounds, containing lithium enriched in the lithium-6 isotope	C
		(c)	(c) Hydrides in which lithium, whether normal, depleted or enriched in the lithium-6 isotope, is compounded with hydrogen or its isotopes or complexed with other metals or aluminium hydride	C
		(d)	(d) Substances not specified above containing lithium enriched in the lithium-6 isotope	C
A8	Hafnium, the following—			
		(a)	(a) Hafnium and alloys containing more than 60 per cent of hafnium, in crude or semi-fabricated forms	C
		(b)	(b) Hafnium compounds containing more than 60 per cent of hafnium	C
		(c)	(c) Manufacurues of any of the foregoing	C
A9	Berylium, the following—			
		(a)	(a) Beryllium and alloys containing more than 50 per cent of beryllium,	C

		in crude or semi-fabricated forms	
	(b)	(b) Beryllium compounds	C
	(c)	(c) Manufacturers of any of the foregoing except metal windows for medical X-ray machines and oxide shapes in fbricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits	C
PL6002	Fluorine		C
PL6003	Chlorine trifluoride		C
A12	Tritium, compounds and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1,000, and products containing ore or more of the foregoing except (i) labelled compounds not exceeding 100 curies per shipment (in this entry “labelled compounds” means compounds in which one of the atoms is a different isotope from that found normally); (ii) tritium contained in luminous paint, self-luminous products, gas and aerosol detectors, electron tubes, lightning or static elimination devices, ion generating tubes, detector cells of gas chromatography devices, and calibration standards, provided that each product or device contains not more than 40 curies of tritium in		C

	any chemical or physical form; (iii) compounds and mixtures of tritium, where the separation of the constituents cannot result in the evolution of an isotopic mixture of hydrogen in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1,000	
A13	Materials for nuclear heat sources, the following—	
	(a) (a) Plutonium in any form with a plutonium isotopic assay of pultonium 238 except (i) three effective grammes or less when contained in a sensing component in instruments; (ii) plutonium-238 contained in heart pacemakers. Note: for plutonium-238 not for nuclear heat sources see entry A1 in this Group.	C
	(b) (b) Previously separated neptunium-237 in any form	C
	In this entry— "previously separated" means the application of any process intended to increase the concentration of the controlled isotope.	
A14	Specially designed or prepared materials for the separation of isotopes of natural uranium, depleted uranium and special and other fissile materials, including specially designed chemical exchange resins	C

	Note 1: see entries A1 and A2 in this Group for the special and other fissile materials to which this entry refers. Note 2: for isotopic separation plants, see the entry in Group 2B relating thereto.	
PL6005	Calcium containing less than 100 perts per million by weight of impurities other than magnesium and less than 10 parts per million by weight of boron	C
PL6006	Alloys containing a higher percentage of megnesium than of any other element and 10% or more of lithium	C

GROUP 2B

Nuclear Facilities, Equipment and Appliances

B1	Plants for the separation of isotopes of natural and depleted uranium and special and other fissile materials, and specially designed or prepared equipment and components therefor, including	C
	(a) (a) Units capable of separating isotopes of natural uranium, depleted uranium, and special or other fissile materials, such as—	
	(1) Gas cintrifuges	C
	(2) Jet nozzle separation units	C
	(3) Vortex separation units	C
	(4) Laser isotopic separation units	C
	(5) Chemical exchange separation units	C
	(6) Electromagnetic separation units	C

(7)	Plasma separation units	C
(8)	Gaseous diffusion separation units	C
	(b) (b) Specially designed components for the above including—	
(1)	Vlaves wholly made of or lined with nickel, nickel alloy, phosphor bronze, stainless steel, aluminium or aluminium alloy, corrosion resistant to uranium hexafluoride (UF_6) or hydrogen fluoride (HF), 0.5 cm or greater in diameter with bellows seal	C
(2)	Blowers and compressors (turbo, centrifugal and axial flow types) wholly made of or lined with nickel, nickel alloy, phosphor bronze, stainless steel, aluminium or aluminium alloy, corrosion resistant to uranium hexafluoride (UF_6) or hydrogen fluoride (HF) and having a capacity of 1,700 litres ($1.7m^3$) per minute or greater, including compressor seals	C
(3)	Gaseous diffusion barriers	C
(4)	Gaseous diffusion housings	C
(5)	Heat exchangers made of alumium, copper, nickel or nickel alloys, separately or together, and heat exchangers incorporating tubing clad with alumium copper, nickel or nickel alloys, separately or together, and in which the other parts are made wholly	C

	of the foregoing metals, separately or together, designed to operate at sub-atmospheric presssure with a leak rate of less than 10 pascal (0.1 millibar) per hour under a pressure differential of 10^5 pascal (a bar)	
	(For specially designed or prepared materials for the separtion of sotopes, see the entry A14 in Group 2A.)	
B2	Plants for the reprocessing of irradiated nuclear reactor fuel and equipment and components specially designed or prepared therefor, or capable of being adapted for use therein, including—	C
	(a) (a) Fuel element chopping or shredding machines	C
	(b) (b) Criticality safe tanks (eg small diameter, annular or slab tanks)	C
	(c) (c) Counter-current solvent extractors and ion-exchange processing equipment	C
	(d) (d) Process control or instrumentation specially designed or prepared for monitoring or controlling the reprocessing of irradiated source and special and other fissile materials	C
	In this entry "plant for the reprocessing of irradiated nuclear reactor fuel" includes equipment and components which normally come into	

	direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams. Note: For process control equipment for lithium, see entry PL6010 in this Group.	
B3	Nuclear reactors, ie reactors capable of operation so as to maintain a controlled, self-sustaining fission chain reaction, and equipment and components specially designed or prepared for use in connection with a nuclear reactor, including—	C
	(a) (a) Pressure vessels, ie metal vessels as complete units or as major shop-fabricated parts therefor	C
	(b) (b) Fuel element handling equipment, including reactor fuel charging and discharging equipment	C
	(c) (c) Control rods, including the neutron absorbing part and the support or suspension structures therefor, and control rod guide tubes	C
	(d) (d) Electronic controls for controllng the power levels in nuclear reactors, including reactor control rod drive mechanisms and radiation detection and measuring instruments to determine neutron flux levels	C

	(e)	(e) Pressure tubes	C
	(f)	(f) Coolant pumps	C
	(g)	(g) Internals specially designed or prepared for the operation of a nuclear reactor, including but not limited to core support structures, thermal shields, baffles, core grid plates and diffuser plates	C
	(h)	(h) Heat exchangers	C
	In this entry "nuclear reactor" includes the items within or attached directly to the reactor vessel, the equipment which controls the level of power in the core, and the components which normally contain or come into direct contact with or control the primary coolant of the reactor core.		
B4	Plants specially designed for the fabrication of nuclear reactor fuel elements and specially designed equipment therefor		C
	Note: A plant for the fabrication of nuclear reactor fuel elements includes equipment which (1) normally comes into direct contact with or directly processes or controls the production flow of nuclear materials, (2) seals the nuclear material within the cladding, (3) checks the ingegrity of the cladding or the seal, and (4) checks the finish treatment of the solid fuel.		
B5	Plants for the production or concentration of heavy water, deuterium, or deuterium comounds, and specially designed or prepared		C

	equipment and compounds therefor	
B6	Plants for the production of uranium hexafluoride (UF_6) and specially designed or prepared equipment (including UF_6 purification equipment) and components therefor	C
C1	Neutron generator systems, including tubes, designed for operation without an external vacuum system and utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction	C
C2	Power generating or propulsion equipment specially designed or adapted for use with military, space, marine or mobile neclear reactors	C
C3	Electrolytic cells for the production of fluorine with a production capacity greater than 250 g of fluorine per hour	C
C4	Equipment specially designed for the separation of isotopes of lithium (For plants for the separation of isotopes other than lithium, see the entry for such plants in this Group.)	C
C5	Equipment specially designed for the production or recovery of tritium	C
C6	Frequency changers (converters or inverters) capable of a multi-phase electrical output of between 600-2,000 Hz, and specially designed components therefor, for use in gas centrifuge plants	C
PL6007	Equipment specially designed for the manufacture or assembly of gas centrifuges capable of the enrichment or separation of isotopes and specially designed parts,	C

	components and equipment therefor (For gas centrifuge plants, see entry B1, plants for separation of isotopes, in this Group.)	
PL6008	Mass spectrometers and mass spectrometer sources designed for measuring the isotopic composition of uranium hexafluoride (UF_6) gas, uranium and uranyl compounds	C
PL6009	Pressure gauges capable of measuring pressures to 100 Torr (1332.2 newtons per square metre) or less having sensing elements of nickel, nickel alloy, phosphor bronze, stainless steel, aluminium or aluminium alloy, corrosion resistant to uranium hexafluoride (UF_6) or hydrogen fluoride (HF); and such sensing elements	C
PL6010	Process control equipment or instrumentation specially designed or prepared for monitoring or controlling the reprocessing of irradiated lithium	C

GROUP 3

STRATEGIC GOODS AND TECHNOLOGIES NOT SPECIFIED IN GROUPS 1 AND 2

GROUP 3A

Metal Working Machinery and Associated Equipment

IL1001	Technology for metal-working manufacturing processes and specially designed software, the following—	
	(a) (a) Technology for the design of tools, dies and fixtures specially designed for the following processes—	D

(1) hot die forging;

(2) superplastic forming;

(3) diffusion bonding;

(4) metal powder compaction using—

(i) vacuum hot pressing;

(ii) high pressure extrusion; or

(iii) isostatic pressing.

(5) direct-acting hydraulic pressing.

(b) (b) Technology consisting of the physical process parameters listed below in relation to each subhead, using to control— D

(1) hot die forging—

(i) temperature;

(ii) strain rate;

(2) superplastic forming of aluminium alloys, titanium alloys and superalloys—

(i) surface preparation;

(ii) strain rate;

(iii) temperature;

(iv) pressure;

(3) diffusion bonding of superalloys and titanium alloys—

(i) surface preparation;

(ii) temperature;

(iii) pressure;

(4) metal powder compaction using—

(i) vacuum hot processing:

(a) temperature;

(b) pressure;

(c) cycle time;

(ii) high pressure extrusion:

(a) temperature;

(b) pressure;

(c) cycle time;

(iii) isostatic pressing:

(a) temperature;

(b) pressure;

(c) cycle time;

(5) direct-acting hydraulic pressing of aluminium alloys, and titanium alloys—

(i) pressure;

(ii) cycle time;

(6) hot isostatic densification of titanium alloys, alumium alloys and superalloys—

(i) temperature;

(ii) pressure;

(iii) cycle time.

In this entry—

(a) "hot die forcing" means a deformation process where die temperatures are at the same nominal temperature as the workpiece and exceed 850 K (577°C);

(b) "superplastic forming" means a deformation process using heat for metals that are normally characterised by low values of elongation (less than 20%) at the breaking point as determined at room temperature by conventional tensile strength-testing, in order to achieve elongations during processing which are at least 2 times those values;

(c) "diffusion bonding" means a solid-state molecular joining of at least two separate metals into a single piece with a joint strength equivalent to that of the weakest material;

(d) "metal powder compaction" means a process capable of yielding parts having a density of 98% or more of the theoretical maximunm density;

(e) "direct-acting hydraulic pressing" means a deformation process which uses a fluit-filled flexible bladder in direct contact with the workpiece;

(f) "hot isostatic densification" means a process of presurizing a casting at temperatures exceeding 375 K (102°C) in a closed cavity through various media (gas, liquid, solid particles, etc) to create equal force in all directions to reduce or eliminate internal voids in the casting;

(g) "vacuum hot pressing" means a process which uses a press with heated dies to consolidate metal powder under reduced atmospheric pressure into a part;

(h) "high pressure extrusion" means a process yielding a single-pass reduction ratio of 4 to 1 or greater in a cross-sectional area of the resulting part;

(i) "isostatic pressing" means a process which uses a pressurizing medium (gas, liquid, solid particles, etc) in a closed cavity

	to create equal force in all direction upon a metal powder-filled container for consolidating the powder into a part.	
IL1075	Spin-forming and flow-forming machines specially designed or adapted for use with numerical or computer controls and specially designed components and software therefor	C
IL1080	Specially designed equipment, tooling and fixtures and technology for the manufacture or measuring of gas turbine blades or vanes, the following and specially designed components and accessories therefor and specially designed ODMA software for the equipment, components and accessories—	
	Specially designed equipment, tooling, fixtures, component and accessories, the following—	
	(a) (a) Blade or vane aerofoil or root automatic measuring equipment	C
	(b) (b) Precision vacuum investment casting equipment, including core-making equipment	C
	(c) (c) Small-hole drilling equipment for producing holes having depth more than four times their diameter and less than 0.76 mm (0.03 inch) in diameter	C
	(d) (d) Directional solidification casting	C

	equipment and directional recrystallization equipment	
(e)	(e) Segmented cast blade or vane bonding equipment	C
(f)	(f) Integral blade-and-disc casting equipment	C
(g)	(g) Blade or vane coating equipment, except furnaces, molten-metal baths and ion plating baths	C
(h)	(h) Ceramic blade or vane moulding and finishing machines	C
(i)	(i) Moulds, cores and tooling for the manufacture and finishing of—	
(1)	cast hollow turbine blades or vanes	C
(2)	turbine blades or vanes produced by powder compaction	C
(j)	(j) Composite metal turbine blade or vane moulding and finishing machines	C
(k)	(k) Inertial blade or vane welding machines	C
(l)	(l) Machinery and equipment for the manufacture of blades or vanes in the compressor section of aircraft or aircraft-derived gas turbine engines where the technology is the same as for the manufacture of blades or vanes in the turbine section	C

	(2) Technology (except installation, operation and maintenance technology) for use of the following equipment	
	(a) (a) Blade or vane belt grinding machines	D
	(b) (b) Blade or vane edge radiusing machines	D
	(c) (c) Blade or vane aerofoil milling or grinding machines	D
	(d) (d) Blade or vane blank performing machines	D
	(e) (e) Blade or vane rolling machines	D
	(f) (f) Blade or vane aerofoil shaping machines except metal removing types	D
	(g) (g) Blade or vane root grinding machines	D
	(h) (h) Blade or vane aerofoil scribing equipment	D
	(i) (i) Machinery and equipment for the manufacture of blades or vanes in the compressor section of aircraft or aircraft-derived gas turbine engines where the technology is the same as for the manufacture of blades or vanes in the turbine section	D
	In this entry— “manufacture” or “making” includes refurbishing.	
IL1081	Specially designed or modified equipment, tools, dies,	

moulds and fixtures for the manufacture or inspection of aircraft, airframe structures or aircraft fasteners, the following and specially designed components and accessories therefor and specially designed ODMA software for the equipment, components and accessories—

(a) Equipment, tools, dies, moulds or fixtures for:

(1) hydraulic stretch forming—

(i) whose machine motions or forces are digitally controlled or controlled by electrical analogue devices or	C
(ii) which are capable of thermal-conditioning the workpiece	C
(2) the milling of aircraft skins or spars except those which do not present an improvement on machinery in production ten years preceding the year of export	C

(b) (b) Tools, dies, moulds in fixtures for—

(1) diffusion bonding	C
(2) superplastic forming	C
(3) hot-die forging	C
(4) metal powder compaction by vacuum hot pressing, high-pressure extrusion or isostatic pressing	C
(5) direct-acting hydraulic pressing of aluminium alloys and titanium alloys	C
(6) the manufacture, inspection, inserting or securing of specially	C

	designed high-strength aircraft fasteners	
	The definitions in entry IL1001 of the processes and control of the metal working manufacturing technologies mentioned above, apply also for the purposes of this entry.	
IL1086	Specially designed or modified equipment, tools, dies, moulds, fixtures and gauges for the manufacture or inspection of aircraft and aircraft derived gas turbine engines, the following: and especially designed components and accessories and specially designed ODMA software for the equipment, components and accessories—	
	(a) Equipment, tools, dies, moulds or fixtures and gauges—	
	(1) for automated production inspection	C
	(2) for automated welding	C
	(b) (b) Tools, dies, fixtures and gauges—	
	(1) for solid-state joining by inertial welding or thermal bonding	C
	(2) for manufacture and inspection of high-performance gas turbine bearings	C
	(3) for rolling specially configured rings such as nacelle rings	C
	(4) for forming and finishing turbine discs	C
	(c) (c) Compressor or turbine disc broaching machines	C
	this head includes only broaching machines specially designed for the manufacture of aircraft or aircraft derived gas turbine engines and not	

	general purpose broaching machines specially adapted for that purpose.	
IL1088	Gear making or finishing machinery, the following—	
	(a) (a) Bevel gear making machinery, the following—	
	(1) gear grinding machinery (non-generating type)	C
	(2) other machinery capable of the production of bevel gears of module finer than 0.5 mm (diametrical pitch finer than 48) and meeting a quality standard better than DIN 58405 Class 6	C
	(b) (b) Machinery capable of producing gears in excess of AGMA quality level 13 or equivalent	C
	For the purposes of this entry DIN 3963 Class 4 shall be considered equivalent to AGMA quality level 13.	
IL1091	Numerical control units, numerically controlled machine-tools, dimensional inspection machines, direct numerical control systems, specially designed sub-assemblies, and specially designed software, the following—	
	(a) (a) Units for numerically controlling simultaneously co-ordinated (contouring and continuous path) movements of machine-tools and dimensional inspection machines in two or more axes	C

except those having all of the following characteristics—

(i) no more than three contouring interpolating (any mathematical function including linear and circular) axes can be simultaneously co-ordinated Notwithstanding paragraph (i) Units may have—

(1) one or more additional axes for which rate of movement is not coordinated, varied or modulated with that of another axis,

(2) one additional set of up to three contouring axes provided a separate feed rate number, standard or optional, does not control more than any three contouring axes; or

(3) up to three contouring axes switchable out of any number of axes.

(ii) minimum programmable increment equal to or greater than 0.001 mm;

(iii) interfaces limited as follows—

(1) no integral interface designed to meet ANSI/IEEE standard 488-1978, IEC publication 625-I; or any equivalent standard; and

(2) no more than two interfaces meeting EIA standard RS-232-C or any equivalent standard;

(iv) on-line (real-time) modification of the tool path, feed rate and spindle data limited to the following—

(1) cutter diameter compensation normal to the centreline path;

(2) automatic acceleration and deceleration for starting, cornering and stopping;

(3) axis transducer compensation including lead screw pitch compensation (measurements on one axis may not compensate another axis);

(4) constant surface speed with or without limits;
(5) spindle growth compensation;
(6) manual feed rate and spindle speed override;
(7) fixed and repetitive cycles (does not include automatic cut vector generation);
(8) tool and fixture offset;
(9) part programme tape editing, excluding source programme language and centre-line location data (CLDATA);
(10) tool length compensation;
(11) part programme storage;
(12) variable pitch threading;
(13) inch/metric conversion;
(14) feed rate override based on spark voltage for electrical discharge machines;

(iv) word size equal to or less than 16 bits (excluding parity bits);
(vi) software or microprogrammes,

including software or microprogrammes of any programmable unit or device furnished shall not exceed control unit funtions as provided in (i) to (v) above, and is restricted as follows—

(1) only the following application programmes can be furnished which shall be executable without further compilation, assembly, interpretation, or processing, other than control unit parameter initialization, and memory storage loading, and each shall be supplied as an entity rather than in modular form:

(a) an operating programme to allow the unit to perform its normal functions;

(b) one or more diagnostic programmes to verify control or machine performance and permit localization of hardware malfunctions;

(c) a translator programme with which the end-user can programme the control-to-machine interface;

(5) programme documentation for application programmes shall not contain any of the following:

(a) listing of programme instructions (except that necessary for diagnostics for routine hardward maintenance);

(b) description of programme organization or function beyond that required for programme use and for maintenance of hardware with which these programmes operate;

(c) flow charts, logic diagrams or the algorithms employed (except those necessary for use of diagnostics for routine hardware maintenance);

(d) any reference to specific memory storage locations (except those necessary for use of diagnostics for routine hardware maintenance);

(e) any other information about the design or function of the software which would assist in the analysis or modification of all or part of it.

Note: For digital computers either incorporated in or associated with but not embedded in, controllers see, entry IL 1565 in Group 3G.

(aa)	(aa) Technology for the design and production except assembly and testing) of two-axis numerical control units with an embedded computer	D
(b)	(b) Machine-tools and dimensional-inspection machines which, according to the manufacturer's technical specifications, can bre equipped with numerical control units specified in by head (a) above	C

except—

(i) boring mills, milling machines, and machining centres having all of the following characteristics—

(1)

(a) not more than three axes capable of simultaneously co-ordinated contouring motion, ie the total number of linear plus rotary contouring axes cannot exceed three. (A secondary parallel contouring axis, is not counted in the total of three contouring axes. A secondary rotary table, the centreline of which is parallel to the primary rotary table, is also not counted in the total of three contouring axes. Machines may have non-contouring parallel or non-contouring, non-parallel rotary axes in addition to the three axes capable of simultaneously co-ordinated contouring motion. Machines having the capability of being simultaneously co-ordinated in more than three exes are not within this exception even if the numerical control unit attached to the machine limits it to three simultaneously co-ordinated contouring axes. A machine wth a control unit switchable between any three out of four contouring axes is not within this exception;) or

(b) not more than three linear axes plus one rotary axis, but no tilting axis, capable of simultaneously co-ordinated contouring motion, ie the total number of linear plus rotary contouring axes cannot exceed four. (A secondary parallel contouring exis, is not counted as an additional contouring axis. A secondary rotary table, the centreline of which is parallel to the prinary rotary table, is also not counted as an additiopnal contouring axis. Machines may have non-contouring parallel or non-contouring non-parallel rotary axes in addition to the four axes capable of simultaneously co-ordinated contouring motion. Machines having the capability of being simultaneously co-ordinated in more than four axes are not within this exception even if the numerical control unit attached to the machine linmits it to three simultaenously co-ordinated contouring axes. A machine with a control unit switchable between any three out of five contouring axes is not within this exception);

(4) maximum slide travel in any axis equal to or less than 3,000 mm;

(5) spindle drive motor power equal to or less than 35kW;

(6) single working spindle (the machine may have multiple tool heads or turrets as standard or optional, but only one working spindle may be operative at a time). a spindle capable of driving a multiple drill head is considered as a single spindle;

(7) axial and radial motion measured at the spindle axis in one revolution of

the spindle equal to or greater than D × 2 × 10^{-5} mm TIR (peak-to-peak) where D is the spindle diameter in mm;

(8) an incremental positioning accuracy equal to or greater (coarser) than ±0.002 mm in any 200 mm of travel;

(9) overall positioning accuracy in any axis equal to or greater (coarser) than:

(a) ±0.01 mm for machines with total length of axis travel equal to or less than 300 mm;

(b) ±(0.01 + (0.0025/300) × (L − 300)) mm for machines with a total length of axis travel L, greater than 300 mm and equal to or less than 3,300 mm;

(c) ±0.035 mm for machines with a total length of axis travel greater than 3,300 mm.

(ii) jig-grinders having both of the following characteristics—

(1) overall positioning accuracy in any axis equal to or greater (coarser) than:

(a) ±0.005 mm for machines with total length of axis travel equal to or less than 300 mm;

(b) ±(0.003 + (0.002/300)(L − 300)) mm for machines with total lenth of axis travel L, greater than 300 mm;

(4) not more than two axes capable of simultaneously co-ordinated contouring motion;

(iii) machine-tools (other than those meeting the requirements of exceptions (i) and (ii) above to this head) and dimensional inspection machines meeting the requirements of exception (iv) below to this head having both of the following characteristics—

(1) radial-axis motion measured at the spindle axis equal to or greater than 0.0008 mm TIR (peak-to-peak) in one revolution of the spindle (for lathes, turning machnes, contour grinding machines, etc);

(2) meeting the requirements of paragraphs (1)(a), (6) and (7) of exception (i) to this head above;

(iv) dimensional inspection machines, having all of the following characteristics—

(1) a linear positioning accuracy equal to or worse than:

(a) ±(3 + L/300) micrometre for L shorter than or equal to 3,300 mm;

(b) ±14 micrometre for L longer than 3,300 mm;

(4) a rotary accuracy of equal to or worse than 5 seconds

in every 90 degrees; and

(5) meeting the requirements of paragraph (1) of exception (i) to this head above;

(v) floor-type horizontal boring mills having all the following characteristics—

(a) maximum transverse (X-axis) travel equal to or less than 15,000 mm;

(b) maximum vertical (Y-axis) travel equal to or less than 5,ppp mm;

(c) maximum Z axis travel equal to or less than 3,000 mm;

(d) spindle-drive motor power equal to or less than 75 kW;

(e) meeting the requirements of paragraphs (1) and (4) to (7) of exception (i) to this head.

(For high precision turning machinery, see entry IL1370 in Group 3D of this Schedule.)

(c)	(c) Direct numerical control (DNC) systems consisting of a dedicated stored	C

programme computer acting as a host computer and controlling, on-line or off-line one or more numerically controlled machine-tools or inspection machines, specified in head (b) above, related software, and interface and communication equ9pment for data transfer between the host computer memory, the interpolation functions, and the numerically controlled machine-tools

(d)	(d) Specially designed sub-assemblies and software which can upgrade the capabilities of numerical control units and machine-tools specified by head (a), (b) or (c) above, including specially designed printed circuit board sub-assemblies	C

In this entry—

"Numerical control" means the automatic control of a process performed by a device that makes use of numeric data usually introduced as the operation is in progress.

"Contouring control" means two or more numerically controlled mations operating in accordance with instructions that specify the next required position

and the required feed rates to that position. These feed rates are varied in relation to each other so that a desired contour is generated.
Any term defined in IL1566 shall have the same meaning when used in this entry as it has in that entry.
A "direct numerical control system" (DNC) means a system connecting a set of numerically controlled machines to a common memory for part programme or machine programme storage with provision for on-demand distribution of data to the machnes.
Axis nomenclature shall be in accordance with international standard ISO 841, "Numerical Control Machines —Axis and Motion Nomenclature".
"Positioning accuracy" is that accuracy which would be obtained in a temperature-controlled environment of 20°C ± 2°C with any mechanical compensation techniques exported with the machine or any electronic compensation meeting the requirements in exception (iv) to head (a) above. "Positioning accuracy" of machines exported without numerical control units is that attained with a control unit used during checkout of the machine and with feedback systems identical to those that will be used with the machine, or by accuracy

	and feed back system and control unit which will be connected to the machine. The value of the positioning accuracy does not include the width of backlash. The value is determined by the usual statistical methods (random tests); ie by approaching from only one direction a minimum of 5 measuremen points up to a maximum of 25 measurement points as random tests along one axis. National standards may be used for this measuring method; eg the German standard VDI "Statistical testing of the operational and positioning accuracy of machine-tools VDI-DGQ3442, March, 1977". A tilting axis defined as an axis which alters the angular position of the rotary table centreline with respect to the spindle centreline during the machining process.	
PL7005	Machines, internal grinding, (except hand-held drills) of the kind incorporating, or specially designed for the utilisation of, grinding heads designed or rated for operation at speeds in excess of 120,000 revolutions per minute	W
IL1093	Components and specially-designed parts for machine tools and dimensional inspection machines in entry IL1091, the following—	
	(a) (a) Spindle assemblies, consisting of spindles	C

and bearings as a minimal assembly

except those assemblies with axial and radial axis motion measured along the spindle axis is one revolution of the spindle equal to or greater (coarser) than the following—

(i) 0.0008 mm TIR (peak-to-peak) for lathes and turning machines; or

(ii) $D \times 10^{-5}$ mm TIR (peak-to-peak) where D is the spindle diameter in millimetres, for milling machines, boring mills, jig grinders, and machining centres

(b) (b) Lead screws, including ball nut screws C

except those having all of the following characteristics—

(i) accuracy equal to or greater (coarser) than 0.004/300 mm

(ii) overall accuracy equal to or greater (coarser) than $(0.0025 + 5 \times 10^{-6} \times L)$ mm, where L is the effective length in millimetres of the screw;

(iii) concentricity of the centre line of the journal bearing surface and the centre line of the major diameter of the screw equal to or greater (coarser) than 0.005 mm TIR (peak-to-peak) at a distance of three times the diameter of the screw or less from the journal bearing surface.

(c) (c) Linear and rotary position feedback units including inductive type devices, graduated scales, and laser systems C

except—

(i) linear types having an accuracy equal to or greater (coarser) than (0.0004 + 13 × 10^{-6} × L) mm, for L equal to or less than 100 mm and (0.0015 + 2 × 10^{-6} × L) mm, for L greater than 100 mm, where L is the effective length in millimetres of the linear measurement; and

(ii) rotary types having an accuracy equal to or greater (coarser) than two seconds of arc.

(d) (d) Linear induction motors used as drives for slides, having all the following characteristics C

(1) stroke greater than 200 mm;

(2) nominal force rating greater than 45 N;

(3) minimum controlled incremental movement less than 0.001 mm.

GROUP 3B

Chemical and Petroleum Equipment

IL1110		Equipment for the production of liquid fluorine, and specially designed components therefor	C
IL1129		Vacuum pump systems, the following and specially designed components, controls and accessories therefor—	
	(a)	(a) Cryopump systems (ie systems in which the circulation of cooled or liquefied gas is used to achieve a vacuum, static or dynamic, by lowering the temperature of the environment) designed to operate at temperatures of less than −200°C (−328°F) measured at atmospherical pressure	C
	(b)	(b) Vacuum pump systems capable of evacuating a chamber of volume greater than one litre to pressures below 19^{-8} torr (1.3 × 10^{-6} pascals) while the temperature ;in the chamber is maintained abover 800°C	C
IL1131		Pumps (except vacuum pumps) designed to move molten metals by electromagnetic forces	C
IL1142		Reinforced tubing (including connectors and fittings for use with such tubing) incorporating coagulated dispersion grades of polytetrafluroethylene, cocopymers of	C

	tetrafluoroethylene and hexafluropropylene, or any of the flurocarbon materials specified in entry IL1754 sub-head (a)(2), and designed for operating (working) pressures of 210.9 kg/cm^2 (3,000 psi) or greater, whether or not specially processed to make the flow surfaces electrically conductive	
IL1145	Containers, jacketed only, specially designed for the storage or transportation of liquid fluorine	C

GROUP 3C

Electrical and Power-Generating Equipment

IL1203	Electric furnaces, the following and specially designed components and controls therefor, and specially designed ODMA software for such furnaces, components and controls—	
	(a) (a) Consumable electrode vacuum arc furnaces with a capacity in excess of 20,000 kg	C
	(b) (b) Skull type vacuum arc furnaces	C
	(c) (c) Vacuum induction furnaces allowing the molten metal to be poured into a mould within the same vacuum chamber without breaking the vacuum and having all of the following characteristics	C
	(1) a capacity in excess of 2,275 kg;	
	(2) designed to operate at pressures lower than 6.67 Pa (0.0667 mbar); and	

(3) designed to operate at temperatures in excess of 1,373K (1,100°C).

(d) (d) Induction furnaces having both of the following characteristics— C

(1) a diameter inside the induction coil of 155 mm or more (6.1 inches or more); and

(2) designed to heat a workpiece with a diameter or 130 mm or more (5.1 inches or more) to a temperature in excess of 2,273K (2,000°C);

There shall be excluded from this entry susceptors made of graphite not specified elsewhere in this Schedule.

Note: this entry includes vacuum furnaces capable of operating with protective atmospheres.

IL1205 Electro-chemical, semiconductor and radioactive devices for the direct conversion of chemical, solar or nuclear energy to electrical energy, the following—

(a) Electro-chemical devices, the following: and specially designed components therefor—

(1) fuel cells operating at temperatures of 523K (250°C) or less, including regenerative cells, ie cells for generating electric power, to which all the consumable components are supplied from outside the cell C

Note: the temperature of 523K or less refers to the fuel cell and not to the fuel conditioning equipment, which may be either an ancillary or an integral part of the fuel cell battery and which may operate at over 523K.

(2) primary cells and batteries having any of the following characteristics—

(i) reserve (water, electrolyte or thermally activated) batteries possessing a means of activation and having a rated unactivated storage life of three years or more at an ambient temperature of 297K (24°C) — C

(ii) utilizating lithium or calcium (including alloys in which lithium or calcium are constituents) as electrodes and having an energy density at a discharge current equal to C/24 hours (C being the nominal capacity at 297K (24°C) in ampere-hours of more than 250 watt-hours per kilogramme at 297K (24°C) and more than 80 watt-hours per kilogramme at 244K (−29°C) — C

Note: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 80% of the open-circuit voltage and dividing by the total mass of the cell (or battery) in kilogrammes;

(iii) using an air electrode together with either lithium or aluminium counter-electrodes and having a power output of 5 kilowatt or more or an energy output of 5 kilowatt-hours or more — C

(3) secondary (rechargeable) cells and batteries having any of the following characteristics after more than 20 charge/discharge cycles at a discharge current equal to C/5 hours (C being the nominal capacity in ampere-hours)—

(i) utilizing nickel and hydrogen as the active constituents and having an energy density of 55 watt-hours per kilogramme or more at 297K (24°C) — C

(ii) utilizing lithium or sodium as electrodes or reactants and having an energy density of 55 watt-hours per kilogramme or more at the rated operational temperature — C

Note: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 75% of the open-circuit voltage and divided

	by the total mass of the cell (or battery) in kilogrammes;	
(4)	molten salt electrolyte cells and batteries which normally operate at temperatures of 773K (300°C) or below	C
	(b) (b) Photo-voltaic cells and specially designed components therefor, the following—	
(1)	with a power output of 14mW or more per sq cm under 100mW per sq cm tungsten 2,800°K (2,527°C) illumination	C
(2)	all gallium arsenide photo-voltaic cells excluding those having a power output of less than 4mW measured by the above technique	C
(3)	with a power output of 450mW or more per sq cm under 10 watts per sq cm silicon carbide at 1,750K (1,477°C) illumination	C
(4)	electromagnetic (including laser) and ionized particle radiation resistant	C
	(c) (c) Power source based on radio-active materials systems other than nuclear reactors	C
	except— (i) those having an output power of less than 0.5 W and a total weight (force) more than 890 N (90.7 kg) (ii) those specially designed and developed for	

medical use within the human body.

There are excluded from heads (a) (b) and (c) cells and power source devices, the following and specially designed components therefor—

(a) fuel cells specified in sub-head (a)(1) above, provided they are not space qualified, with a maximum output power more than 10 kilowatts and which use gaseous pure hydrogen and oxygen/air reactants, alkaline electrolyte and a catalyst supported by carbon either pressed on a metal mesh electrode or attached to a conducting porous plastic;

(b) lithium primary cells or batteries specified in sub-head (a)(2)(ii) which:

(1) are specially designed for consumer applications and used in watches, pacemakers, calculators or hearing aids, or

(2) are specially designed for consumer or civil industrial applications and have a nominal capacity less than or equal to 35 ampere-hours and a discharge current of less than C/10 hours (C as defined for the purpose of subhead (a)(2)(ii)).

(c) lithium secondary (rechargeable) cells and batteries specified in sub-head (a)(3)(ii) above which:

(1) are specially designed for consumer applications;
(2) have a nominal capacity less than or equal to 0.5 ampere-hour and an energy density of less than 40 watt-hours per kilogramme at 273K (0°C) and a discharge current of less than C/10 hours (C as defined for the purpose of subhead (a)(3));

(d) sodium secondary (rechargeable) cells and batteries specified in sub-head (a)(3)(ii) above which are specially designed for consumer or civil industrial applications which are not space qwualified.

In this entry "space qualified" refers to products which are stated by the manufacturer as designed and tested to meet the special electrical, mechanical or environmental requirements for use in rockets, satellites or high-altitude flight systems operating at altitudes of 100 km or more.

IL1206 Electric arc devices (or plasma torches) and equipment, the following: and specially designed components, accessories and controls and specially designed ODMA software therefor—

(a) (a) Electric arc devices for generating a flow of ionized gas in which the arc column is constricted C

except—

(i) devices using less than 100 kW arc power for welding, melting, plating or spraying; or

(ii) devices with less than 235 kW arc power for cutting.

(b)	(b) Equipment incorporating electric arc devices with a constricted arc column and capable of having a programmable increment (for the continuous movement of the device) less (finer) than 0.01 mm	C
(c)	(c) Test equipment incorporating electric arc devices specified in head (a) above	C

There shall be excluded from this entry plasma torches for industrial gas heating which are a non-constricted arc column with an operating pressure of 1 to 15 bar inclusive.

GROUP 3D

General Industrial Equipment

IL1301 Equipment and technology for the production of superalloys, the following—

(a)	(a) Equipment specially designed for the production of superalloys including vacuum induction furnaces used in the production of superalloy powders	C

except

(i) electric arc and induction furnaces, basic oxygen furnaces and remelting equipment using other techniques for the production of carbon steels, low-alloy steels and stainless steels;
(ii) degassing equipment used for the production of carbon steels, low-alloy steels and stainless steels
(iii) hot and cold rolling mills, extrusion presses, and swaging and forging machines;
(iv) decarburizing and annealing and pickling equipment;
(v) surface finishing equipment;
(vi) slitting and cutting equipment.

(b) (b) Technology specific to the production of superalloys, regardless of the type of equipment with which it may be intended to use such technology D

except technology on the equipment specifically excluded from head (a) above, other than melting, remelting and degassing technology specific to the production of superalloys.

In this entry "superalloys" means nickel-, cobalt-, or iron-base alloys having strengths superior to the AISI 300 series (as of the 1 May

	1982) at temperatures over 922 K (649°C) under severe environmental and operating conditions. Excluded are carbon steels, low-alloy steels and stainless steels having strengths inferior to the AISI 300 series (as of 1 May 1982).	
IL1305	Metal rolling mills,m the following: and specially designed components accessories and controls and specially designed ODMA software therefor—	
	(a) (a) Isothermal rolling mills, except those capable of operating only at ambient temperatures	C
	In this head an “isothermal rolling mill” means an isothermal rolling mill in which a constant instantaneous temperature profile is maintained in the contact area between the workpiece and the rolls.	
	(b) (b) Other mills specially designed or re-designed for the rolling of metals and alloys with a melting point exceeding 1,900°C	C
IL1312	Isostatic presses the following: and specially designed dies and moulds (except those used in isostatic presses operating at amient temperatures), components, accressories and controls and specially designed ODMA software therefor—	
	(a) (a) Those capable of achieving a maximum working pressure of 138MPa (20,000 psi) or more and possessing a chamber cavity with	C

			an inside diameter in excess of 406 mm (16 inches) or	
		(b)	(b) Those having a controlled thermal environment within the closed cavity and possessing a chamber cavity with an inside diameter of 127 mm or more	C
	In this entry "isostatic presses" are equipment capable of pressurizing a closed cavity through various media (gas, liquid, solid particles, etc) to create equal pressure in all directions within the cavity upon a workpiece or material.			
IL1352	Nozzles, dies and extruder barrels specially designed for the processing of the fluorocarbon materials specified in subhead (a)(2) of the entry IL1754 in Group 31			C
IL1353	Manufacturing and testing equipment for optical fibre, optical cable and other cables, the following: and specially designed components and specially designed ODMA software therefor—			
		(a)	(a) Equipment specially designed to manufacture cable specified in heads (a) and (d) of entry IL1526 in Group 3F	C
		(b)	(b) Equipment specially designed to manufacture optical fibre or optical cable specified in entry IL1526 in Group 3F	C
		(c)	(c) Equipment specially designed to manufacture optical preforms specified	C

		in entry IL1767 in Group 3I	
	(d)	(d) Optical fibre and preform characterisation equipment using semi-conductor lasers for the testing of optical fibres or optical preforms at operting wavelengths exceeding 850 nm	C
IL1354	Equipment designed for the manufacture or testing of printed circuit boards, the following: and specially designed components and accessories and specially designed ODMA software therefor—		
	(a)	(a) Equipment specially designed for removal of resists or printed circuit board materials by dry (plasma) methods	C
	(b)	(b) Computer-aided design (CAD) equipment for printed circuit boards, having any of the following functions—	
	(1)	generation of artwork design with an interactive capability	C
	(2)	generation of test string lists for multi-layer boards	C
	(3)	generation of data or programmes for stored-programme controlled printed circuit board drilling equipment	C
	(4)	generation of data or programmes for stored-programme controlled printed circuit board shaping and profiling equipment or	C

(5)	generation of data for control of the sequencing of processes of the equipment for printed circuit board manufacture specified in head (c) below		C
	(c)	(c) High-speed automated continuous panel processors for plating capable of delivering more than or equal to 860 A/m^2 of plate current, (This does not include processors specially designed for, and restricted to, plating tab (edge) connnectors)	C
	(d)	(d) Stored-programme controlled inspection equipment for the detection of defects in printed circuit boards using optical pattern comparison or other machine scanning techniques	C
	(e)	(e) Stored-programme controlled electrical test equipment for the identification of open and short circuits on bare printed circuit boards, capable of—	
(1)	continuity testing (less than or equal to 4 ohm) at a rate of 2,500 or more measurements per second		C
(2)	high voltage testing (greater than or equal to 50 volts) at a rate of 10,000 or more measurements per minute		C

	(f) (f) Stored-programme controlled multi-spindle drills and routers having any of the following characteristics—	
	(1) absolute positioning accuracy of ±10 micrometres or better	C
	(2) minimum time needed for drill bit changes less than or equal to 5 seconds	C
	or	
	(3) X and Y positioning speeds higher than or equal to 0.125 m/sec for drilling or for routing	C
	(g) (g) Stored-programme controlled cyclic voltametric stripping equipment specially designed for printed circuit board plating bath monitoring and analysis	C
	For the purpose of this entry "stored progamme controlled" means controlled using instructions stored in an electronic storage which a processor can execute in order to direct the performance of predetermined functions.	
IL1355	Equipment for the manufacture of testing of electronic components and materials, the following: and specially designed components, accessories and specially designed ODMA software therefor—	
	(a) (a) Equipment specially designed for the manufacture or testing of electron tubes and optical	C

elements specified in entries IL1541, 1542, 1555, 1556, 1558 and 1559 in Group 3F, and specially designed components therefor

(b) (b) Equipment specially designed for the manufacture or testing of semiconductor devices, integrated circuits and assemblies, and systems incorporating or having the characteristics of such equipment, the following—

(1) equipment for the processing of materials for the manufacture of devices and components, the following—

(a) equipment for producing polycrystalline silicon specified in head (f) of entry IL1757 in Group 3I having a purity more than 99.99% in the form of rods (ingots, boules), pellets, sheets, tubes or small particles — C

(b) equipment specically designed for purifying or processing III-V and II-VI semiconductor materials specified in the entry IL1757 in Group 3I, except crystal pullers — C

(c) crystal pullers, furnaces, and gas systems, the following:

(1) types with specially designed stored programme controlled temperature, power input or gas, liquid or vapour flow	C
(2) diffusion, oxidation and annealing furnaces for operation at pressures above 1 atmosphere (nominal)	C
(3) annealing or re-crystallizing equipment other than constant temperature furnaces employing high rates of energy transfer capable of processing wafers at a rate greater than 50 cm^2 per minute	C
(4) plasma enhanced or photo-enhanced chemical reactor equipment	C
(5) equipment for automatic control of crystal taper and diameter, except taper and diameter control mechanisms using any of the following equipment techniques	C
(i) radiation pyrometers;	
(ii) thermocouples;	
(iii) RF power sensors; or	
(iv) mass weighing (without digital or anomaly control permitting the growth of semiconductors).	
(6) crystal pullers having any of the following characteristics:	
(i) rechargeable without replacing the crucible container	C

(ii) capable of operation at pressures above 2.5×10^5 pascal (2.5 atmospheres absolute) or below 1×10^5 pascal (1 atmosphere absolute)	C
(iii) capable of pulling crystals of a diameter greater than 76.2 mm	C
(iv) specially designed to minimize convection currents in the melt by the use of magnetic fields or multiple crucibles	C
or	
(v) capable of pulling sheet or ribbon crystals	C
(7) vacuum induction-heated zone-refining equipment for operation at a pressure of 0.01 pascal or less	C
(d) equipment for epitaxial growth having any of the following characteristics:	
(1) operation at pressures below 10^5 pascal (1 atmosphere absolute)	C
(2) stored programme controlled	C
(3) rotating vertical-support, radiant-heated reactors	C
(4) specially designed for processing bubble memories	C
(5) metal-organic chemical vapour deposition reactors; or	C
(6) for liquid phase epitaxy	C

(e)	molecular beam epitaxial growth equipment	C
(f)	magnitically-enhanced sputtering equipment	C
(g)	equipment designed for ion implantation, or for ion-enhanced or photo-enhanced diffusion	C
(h)	equipment for selective or non-selective removal by dry methods of passivation layers, dielectrics, semiconductor materials, resists or metals	C
	except horizontal, cylindrical plasma etchers without stored programme controlled end-point detection, automatic loading or rotating mechanisms and not having the capability for parallel plate etching as used in semiconductor device manufacture and vacuum sputtering equipment designed to operate in the sputter etch mode.	
(i)	equipment for semiconductor device fabrication operating below 10^5 pascal (1 atmosphere absolute) for the chemical vapour deposition of oxides, nitrides, metals and polysilicon except reactive sputtering equipment	C
(j)	electron beam systems (including scanning electron	

microscopes), capable of mask making or semiconductor device processing and having any of the following characteristics:	
(1) electrostatic beam deflection	C
(2) shaped, non-Gaussian beam profile	C
(3) beam blanking capability	C
except scanning electron microscopes equipped for Auger analysis;	
(4) digital-to-analogue conversion rate greater than 3MHz	C
(5) digital-to-analogue conversion accuracy greater than 12 bits, or	C
(6) target to beam position feedback control precision of 1 micrometre or finer	C
except electron beam deposition systems.	
(k) surface finishing equipment, specially designed for the processing of semiconductor wafers and having any of the following characteristics:	
(1) waxless or non-adhesive mounting	C
(2) double-sided simultaneous polishing or lapping	C
(3) capable of polishing and lapping wafers exceeding 76.2 mm in diameter, or	C

(4)	lappng or polishing in two stages on the same machine	C
(l)	interconnection equipment which, may include common single or multiple vacuum chambers, specially designed to permit the integration of equipment specified in this entry into a complete system	C
(2)	masks, mask substrates, mask-making equipment and image-transfer equipment for the manufacture of devices and components, the following—	
(a)	finished masks, and reticles and designs therefor	C
(b)	hard surface (eg chromium, silicon, iron oxide) coated substrates (eg glass, quartz, sapphire) for the preparation of masks having dimensions exceeding 76.2 × 76.2 mm	C
(c)	computer-aided design (CAD) equipment, for transforming schematic or logic diagrams into designs for producing semiconductor devices or integrated circuits, having any of the following functions:	
(1)	storage of pattern cells for subdivision of integrated circuits	C
(2)	scaling, positioning, or rotation of pattern cells	C

(3) interactive graphic capabilities	C
(4) design rule and circuit checking; or	C
(5) circuit layout modification of the arrangement of the elements	C
(Note: Software which performs any of the functions in subhead (b)(2)(c), or which can be used for transient analysis, for logic analysis or logic checking, for automatic routing or cell placement, for the generation of test vectors or for process simulation is specially designed ODMA software specified in the heading of this entry.)	
(d) mask fabrication machines using photo-optical methods, the following:	
(1) step and repeat cameras capable of producing arrays larger than 63.5 × 63.5 mm, or capable of producing a single exposure larger than 3.75 × 3.75 mm, in the focal plane, or capable of producing useful line widths of 3.5 micrometres or less	C
(2) pattern generators specially designed for the generation or manufacture of masks or the creation of patterns in photosensitive layers and with placement	C

precision finer than 10 micrometres	
(3) mask fabrication equipment containing automatic adjustment of focus or adjustment of the mask material into the focal plane	C
(4) equipment and holders for altering masks or reticles or adding pellicles to remove defects	C
(e) mask reticle or pellicle inspection equipment, the following:	
(1) equipment for comparison with a precision of 0.75 micrometre or finer over an area of 63.5 × 63.5 mm or more	C
(2) stored programme controlled equipment with a resoution of 0.25 micrometres or finer and with a precision of 0.75 micrometre or finer over a distance in one or two coordinates of 63.5 mm or more	C
(3) stored programme controlled defect inspection equipment	C
except conventional scanning electron microscopes, other than types specially designed and instrumented for automatic pattern inspection.	
(f) align and expose equipment using photo-optical methods, including projection image transfer equipment,	

	capable of performing any of the following functions:	
(1)	production of useful pattern size of less than 5 micrometres	C
(2)	alignment with a precision finer than 1 micrometre	C
(3)	field coverage exceeding 76.2 × 76.2 mm	C
(4)	wafer backside alignment	C
(5)	automatic alignment by the sensing of patterns or index marks on the substrate	C
(6)	projection image transfer for processing slices (wafers) of 50.8 mm or larger in diameter	C
	except non-contacting (proximity) image transfer equipment which does not perform any of the functions specified in subsheads (f)(1) to (f)(5) above.	
(g)	electron beam, ion beam, or X-ray equipment for projection image transfer	C
(h)	photo-optical or non-photo-optical step and repeat or partial field equipment for the transfer of the image on to the wafer	C
(i)	mask contact transfer equipment for imaging a field larger than 76.2 × 76.2 mm	C
(3)	stored programme controlled inspection	C

equipment for the detection of defects in processed wafers, substrates or chips using optical pattern comparison or other machine scanning techniques

except conventional scanning electron microscopes, other than when specially designed and instrumented for automatic pattern inspection.

(4) specially designed stored programme controlled measuring and analysis equipment, the following—

(a)	equipment specially designed for the measurement of oxygen or carbon content in semiconductor materials	C
(b)	equipment for concurrent etching and doping profile analysis (employing capacitance-voltage or current-voltage analysis techniques)	C
(c)	equipment for linewidth measurement with a resolution of 1.0 micrometre or finer	C
(d)	specially designed flatness measurement instruments capable of measuring deviations from flatness of 10 micrometres or less with a resolution of 1 micrometre or finer	C

(5) equipment for the assembly of integrated circuits, the following—	
(a) stored programme controlled die (chip) mounters and bonders with a positioning accuracy finer than 50 micrometres or incremental steps finer than 6.4 micrometres	C
(b) stored programme controlled wire bonders and welders for performing consecutive bonding operations	C
(c) equipment for producing multiple bonds in a single operation (eg beam lead bonders, chip carrier bonders, tape bonders)	C
(d) semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a higher temperature than the body of the package, specially designed for ceramic microcircuit packages specified in head (b) of entry IL1564 in Group 3F and which have a throughput equal to or greater than one package per minute except general purpose resistance type spot welders	C
(e) thermal compression bonders, also known as nailhead bonders	C
(6) stored programme controlled wafer probing equipment, the following—	

(a) equipment having positioning accuracy finer than 50 micrometres, or incremental steps finer than 6.4 micrometres	C
(b) equipment having individual die location read-out (X-Y position information) during testing	C
(c) equipment capable of testing devices having more than a total of 24 terminals	C
(d) equipment having automatic slice (wafer) alignment	C
(7) test equipment, the following—	
(i) stored programme controlled equipment specially designed for testing discrete semiconductor devices and unencapsulated dice, capable of performing any of the following functions	C
(a) measurement of time intervals of less then 10 ns;	
(b) measurement of parameters (eg ^{f}T, S-parameters, noise figure) at frequencies greater than 250 MHz;	
(c) resolution of currents of less than 100 picoamperes; or	
(d) measurements of spectral response at wavelengths outside the range from 450 to 950 nm;	
Note: discrete semiconductor devices include, for example,	

diodes, transistors, thyristors, photocells and solar cells.

(ii) stored programme controlled equipment specially designed for testing integrated circuits, and assemblies thereof, capable of performing any of the following functions C

(a) functional (truth table) testing at a pattern rate greater than 2 MHz;

(b) resolution of currents of less than 1 nonoampere;

(c) testing of integrated circuits (not mounted on circuit boards) in packages having more than a total of 24 terminals, except equipment specially designed for and dedicated to the testing of integrated circuits not specified in entry IL1564 in Group 3G; or

(d) measurement of rise times, fall times and edge placement times with a resolution of less than 20 ns;

except—

(1) test equipment which is not of a general-purpose nature and which is specially designed for, and dedicated to, testing assemblies or a class of assemblies for home and entertainment applications and

(2) test equipment which is not of a general-purpose nature and which is specially designed for, and dedicated to, testing electronic components, assemblies and integrated circuits the subject of a specific exception to IL1564 in Group 3G provided that such test equipment does not incorporate computing facilities with user-accessible programming capabilities;

(iii) equipment specially designed for determining the performance of focal-plane arrays at wavelengths more than 1,200 nm, using stored programme controlled measurements or computer aided evaluation and having any of the following characteristics C

(a) using scanning light spot diameters of less than 0.12 mm;

(b) designed for measuring photosensitive performance parameters and for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise; or

(c) designed for evaluating arrays capable of creating images of greater than 32 × 32 line elements;

(iv) specially designed for bubble memories — C

(8) Class 10 filters capable of providing an environment of 10 or less particles of 0.3 micrometre or more per $0.02832/m^3$ and filter materials therefor — C

(9) Electron-beam test systems (capable of operating at or below 3,000 eV), for non-contactive probing of powered-up semiconductor devices having any of the following— — C

(a) Stroboscopic capability with either beam blanking or detector strobing;

(b) An electron spectrometer for voltage measurements with a rsolution of less than one-half (0.5) volt; or

(c) Electrical tests fixtures for performance analysis of integrated circuits.

except—
Scanning electron microscopes, other than those specially designed and instrumented for non-contactive probing of a powered up semiconductor device, are not excluded from head (b).

In this entry—
"masks" means those used in electron beam lithography, X-ray lithography, and ultra-

	violet lithography, as well as ultra-violet and visible photolithography; “magnetically-enhanced” means equipment incorporating a cathode assembly having an integral magnetic structure for enhancing the plasma intensity; “stored programme controlled” means controlled by using instructions stored in an electronic storage which a processor can erxecute in order to direct the performance of predetermned functions.	
IL1356	Equipment specially designed or incorporating modifications for the continuous coating of polyester-base magnetic tape specified in entry IL1572 in Group 3G, and specially designed components therefor except general purpose continuous coating equipment.	C
L1357	Equipment for the production of fibres specified in the entry IL1763 in Group 3I or their composites, the following and specially designed components and accessories and specially designed ODMA software therefor—	
	(a) (a) Filament winding machines of which the motions for positioning wrapping and winding fibres are coordinated and programmed in three or more axes, specially designed to fabricate composite structures or laminates from fibrous and filamentary materials; and	C

		coordinating and programming controls therefor	
	(b)	(b) Tape-laying machines of which the motions for positioning and laying tape and sheets are coordinated and programmed in two or more axes, specially designed for the manufacture of composite airframes and missile structures	C
	(c)	(c) Multidirectional, multidimensional weaving machines and interlacing machines, including adapters and modification kits, for weaving, interlacing or braiding fibres to manufacture composite structures, except textile machinery which has not been modified for the above end-uses	C
	(d)	(d) Specially designed or adapted equipment for the production of fibrous and filamentary materials specified in head (a) or (b) in the entry IL1763 in Group 3I, the following—	
(1)	equipment for converting polymeric fibres, (such as polyacrylonitrile, rayon, or polycarbosilane) including special provision to strain the fibre during heating		C
(2)	equipment for the vapour deposition of elements		C

or compounds on heated filamentary substrates

and

(3) equipment for the wet-spinning of refractory ceramics (such as aluminium oxide) C

(e) (e) Specially designed or adapted equipment for special fibre surface treatment or for producing prepregs and preforms specified in head (c) in the entry IL1763 in Group 3I C

NOTE
Specially designed or adapted components and accessories for the machines specified in this entry include, but are not limited to, moulds, mandrels, dies, fixtures and tooling for pressing, curing, carbonising, graphitising, casting, sintering or bonding of preforms, composite structures, laminates and manufactures therefore specified in head (d) to the entry IL1763 in Group 3I.

IL1358 Equipment specially designed for the manufacture or testing of devices and assemblies thereof specified in the entry IL1588 in Group 3G or magnetic recording media specified in the entry IL1572 in Group 3G the following: and specially designed components and specially designed ODMA software therefor—

(a) Equipment for the manufacture of single and multi-aperture forms

	specified in heads (b), (c) and (d) mentioned in entry IL1588 in Group 3G, the following—	
(1)	automatic presses to produce specified types	C
(2)	press dies to produce specified types	C
(3)	automatic equipment for monitoring, grading, sorting, exercising or testing of specified types	C
(b)	(b) Equipment for the manufacture of thin film memory storage or switching devices having square hysteresis loops and automatic equipment for monitoring, grading, sorting, exercising or testing of devices specified in head (e) of entry IL1588 in Group 3G	C
(c)	(c) Automatic equipment for monitoring, exercising or testing assemblies of devices specified in heads (b), (c), (d) or (e) of the entry IL1588 in Group 3G	C
(d)	(d) Equipment which incorporates specially designed modifications for the application of magnetic coating to flexible disk recording media with a packing density exceeding 2,460 bit per cm	C
	except general purpose coating equipment.	

(e)	(e) Equipment specially designed for the application of magnetic coating to non-flexible (rigid) disk type recording madia not excepted in paragraph (vi) of head (d) of entry IL1572 in Group 3G	C
(f)	(f) Stored programme controlled equipment for monitoring, grading, exercising or testing recording media, other than tape, specified in head (d) of entry IL1572 in Group 3G	C

Note: For the purpose of this entry "single aperture forms" means single aperture forms having either of the following characteristics:

(i) switching rate of 0.3 microsecond or faster at the minimum field strength required for switching at 40°C or

(ii) a maximum dimension less than 0.45 mm except single aperture forms which have:

(a) a switching time equal to or more than 0.24 microsecond; and

(b) a maximum dimension of 0.30 mm or more.

In this entry—

"automatic" means machinery not requiring the assistance of a human operator to complete its function(s) during each complete cycle of operations;

"function" does not include the initial loading

	or final unloading of material from the machine.	
IL1359	Specially designed tooling and fixtures for the manufacture of fibre-optic connectors and couplers specified in head (e) of the entry IL1526 in Group 3F	C
IL1360	Stored programme controlled equipment capable of automatic X-ray orientation and angle correction of double-rotated stress-compensated (SC) quartz crystals specified in entry IL1587 in Group 3G, with a tolerance of 10 seconds of arc maintained simultaneously in both angles of rotation	C
	In this entry "stored programme controlled" means controlled by using instructions stored in an electronic storage which a processor can execute in order to direct the performance of predetermined functions.	
IL1361	Test facilities and equipment for the design or development of aircraft or gas turbine aero-engines, the following and specially designed components, accessories and specially designed ODMA software therefor—	
	(a) (a) Supersonic (Mach 1.4 to Mach 5), hypersonic (Mach 5 to Mach 15) and hypervelocity (above Mach 15) wind tunnels	C
	except—	
	(i) supersonic (Mach 1.4 to Mach 5) wind tunnels not specially designed for or fitted with means of, preheating the air;	

or

(ii) wind tunnels speciall;y designed for educational purposes and having a test section size (measured internally of less than 25 cm;

(Note: by test section size is understood the diameter of the circle, or the side of the square, or the longest side of the rectangle constituting possible shapes of the test section.)

(b)	(b) Devices for simulating flow-environments of Mach 5 and above, regardless of the actual Mach number at which the devices operate, including hot shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns	C
(c)	(c) Wind tunnels and devices, other than two dimensional (2-D) sections that have unique capabilities for simulating Reynolds number flow in excess of 25 × 10^6, at transonic velocities	C
(d)	(d) Automated control systems, instrumentation (including sensors) and automated date-acquisition equipment, specially designed for use with wind tunnels and	C

		devices specified in head (a), (b) or (c) above	
	(e)	(e) Models, specially designed for use with wind tunnels or with the devices specified in head (b) or (c) above, of aircraft, helicopters, airfoils, spacecraft, space-launch vehicles, rockets or surface-effect vehicles specified in the entries in Groups 1 and 3E relating thereto or of surface-effect vehicles specified in head (b) of the entry IL1416 relating to vessels	C
	(f)	(f) Specially designed electromagnetic interference and electromagnetic pulse (EMI/EMP) simulators	C
	(g)	(g) Specially designed test facilities and equipment for the development of gas turbine aero-engines and components, the following—	
(1)	special test facilities capable of applying dynamic flight loads, measuring performance or simulating the design operating environments for rotating assemblies of aero-engines		C
(2)	test facilities, test rigs and simulators for measuring combustion system and hot gas flow		C

		path performance, heat transfer and durability for static assemblies and aero-engine components	
	(3)	specially designed test rigs, equipment or modified gas turbine engines which are utilized for development of gas turbine aero-engine internal flow systems (gas path seals, air-oil seals and disc cavity flow fields)	C
IL1362	Vibration test equpment the following—		
	(a)	(a) Vibration test equipment using digital control techniques and specially designed ancillary equipment and specially designed ODMA software therefor except (i) individual exciters (thrusters) with a maximum thrust of less than 100 kN (22,500 lb); (ii) analogue equipment; (iii) mechanical and pneumatic exciters (thrusters); (iv) vibrometers;	C
	(b)	(b) High intensity acoustic test equipment capable of producing an overall sound pressure level of 140 dB or greater (referenced to 2 × 10^{-5} N/m^2) or with a rated output of 4kW or greater and specially designed ancillary equipment and specially	C

		designed ODMA software therefor	
		except analogue equipment.	
	(c)	(c) Ground vibration (including modal survey) test equipment that uses digital control techniques and specially designed ancillary equipment, and specially designed ODMA software therefor	C
		except analogue equipment. Note: vibration and acoustic test systems typically consist of one or more exciters (thrusters), or acoustic noise generators, together with ancillary equipment for instrumentation, control, data acquisition and analysis.	
IL1363	Specially designed water tunnel equipment, components, accessories and databases for the design and development of vessels, the following: and specially designed ODMA software therefor—		
	(a)	(a) Automated control systems, instrumentation (including sensors) and data acquisition equipment specially designed for water tunnels	C
	(b)	(b) Automated equipment to control air pressure acting on the surface of the water in the test section during the operation of the water tunnel	C

	(c) (c) Components and accessories for water tunnels, the following—	
	(1) balance and support systems	C
	(2) automated flow or noise measuring devices, and	C
	(3) models of hydrofoil vessels, surface-effect vehicles, SWATH vessels and specially designed equipment and components specified in heads (a), (b), (c), (e), (f), (g) and (h) in entry IL1416 in Group 3E for use in water tunnels	C
	(d) (d) Databases generated by use of equipment specified in this entry	C
	In this entry “database” shall have the same meaning as in entry IL1566 in Group 3G.	
IL1364	Machinery and equipment for the manufacture of hydrofoil vessel and surface-effect vehicle and SWATH vessel structures and components, the following: and specially designed components and accesspories therefor—	
	(a) (a) Specially designed equipment for manufacturing anisotropic, orthotropic or sandwich structures from components specified in subhead (h)(3) of the entry IL1416 in Group 3E	C
	Note: in this head— 1. “Anisotropic construction” means the use of fibre reinforcing members aligned	

so that the load-carrying ability of the structure can be primarily orientated in the direction of expected stress.

2. "Orthotropic construction" means a method of stiffening plates in which the structural members are at right angles to each other.

3. "Sandwich construction" means the use of structural members or plates which are fabricated and permanently affixed in layers to enhance their strength and reduce their weight.

(b)	(b) Specially designed equipment for the production and testing of flexible materials for skirts, seals, air curtains, bags and fingers for surface-effect vehicles	C
(c)	(c) Specially designed equipment for the production of water-screw propellers and hub assemblies and water-screw propeller systems specified in heads (c) and (f) of entry IL1416 in Group 3E	C
(d)	(d) Specially designed equipment for the production, dynamic balancing and automated testing and inspection of	C

		lift fans for surface-effect vehicles	
	(e)	(e) Specially designed equipment for the production of water-jet propulsion pumps rated at 3,000 hp or greater, or multiple-pump system equivalents thereof	C
	(f)	(f) Specially designed equipment for the production, dynamic balancing and automatic testing of AC-AC synchronous and AC-DC systems, sectored disc and concentric-drum rotors for DC momopolar machines	C
IL1365		Equipment specially designed for in-service monitoring of acoustic emissions in airborne vehicles, or underwater vehicles specified in the entry IL1418 in Group 3E, capable of discriminating acoustic emissions related to crack growth from innocuous noise sources and capable of spatial location of the crack, and specially designed components, accessories and specially designed ODMA software therefor except, general purpose acoustic emission equipment. Note: The methods used for discriminating acoustic emissions from innocuous noise sources include pattern recognition techniques.	C
IL1370		Machine-tools for generating optical quality surfaces, specially designed components and accessories the following	

and specially designed ODMA software therefor—

(a) (a) Turning machines using a single point cutting tool and having all of the following characteristics— C

(1) slide positioning accuracy less (finer) than 0.0005 mm per 300 mm of travel, TIR (peak-to-peak);

(2) slide positioning repeatability less (finer) than 0.0002 mm per 300 mm of travel, TIR (peak-to-peak);

(3) spindle run-out (radial and axial) less than 0.0004 mm TIR (peak-to-peak);

(4) angular deviation of the slide movement (yaw, pitch and roll) less (finer) than 2 seconds of arc (peak-to-peak) over full travel;

(5) slide perpendicularity less than 0.001 mm per 300 mm of travel, TIR (peak-to-peak);

(b) (b) Fly cutting machines having both of the following characteristics— C

(1) spindle run-out (radial and axial) less than 0.0004 mm TIR (peak-to-peak);

(2) angular deviation of slide movement (yaw, pitch and roll) less (finer) than 2 seconds of arc (peak-to-peak) over full travel;

(c) (c) Specially designed

	components, the following—	
	(1) spindle assemblies, consisting of spindles and bearings as a minimal assembly, except those assemblies with axial and radial axis motion measured along the spindle axis in one revolution of the spindle equal to or greater (coarser) than 0.0008 mm TIR (peak-to-peak)	C
	(2) linear induction motors used as drives for slides, having all of the following characteristics—	C
	(i) stroke greater than 200 mm;	
	(ii) nominal force rating greater than 45N;	
	(iii) minimum controlled incremental movement less than 0.001 mm;	
	(d) (d) Single point diamond cutting tool inserts having all of the following characteristics	C
	(1) flawless and chip-free cutting edge when magnified 400 times in any direction;	
	(2) cutting radius between 0.1 and 5 mm;	
	(3) cutting radius out-of-roundness less than 0.002 mm TIR (peak-to-peak).	
ILO1371	Anti-friction bearings, the following—	
	(a) Ball and roller bearings having an inner bore diameter of 10 mm or less and tolerances of ABEC 5, RBEC	

	5 or better and either of the following characteristics—	
(1)	made of special materials that is to say, with rings, balls or rollers made from any steel alloy or other material (including but not limited to high-speed tool steels, Monel metal, beryllium, metalloids, ceramics and sintered metal composites), except the following; low-carbon steel, SAE-52100 high carbon chromium steel, SAE-4615 nickel molybdenum steel, AISI-440C (SAE-51440C) stainless steel (or national equivalents), or	C
(2)	manufactured for use at normal operating temperatures over 150°C either by use of special materials or by special heat treatment	C
	(b) (b) Ball and roller bearings (exclusive of separable ball bearings and thrust ball bearings) having an inner bore diameter exceeding 10 mm and having tolerances of ABEC 7, RBEC 7 or better and either of the following characteristics—	
(1)	made of special materials, that is to say, with rings, balls or rollers made from any steel alloy or other material (including but not limited to high-speed tool steels, Monel metal, beryllium, metalloids, ceramics	C

			and sintered metal composites), except the following; low-carbon steel, SAE-52100 high carbon chromium steel, SAE-4615 nickel molybdenum steel, AISI-440C (SAE-51440C) stainless steel (or national equivalents), or	
		(2)	manufactured for use at normal operating temperatures over 150°C either by use of special materials or by special heat treatment	C
		(c)	(c) Ball and roller bearings having tolerances better than ABEC 7	C
		(d)	(d) Gas-lubricated foil bearings	C
		(e)	(e) Bearing parts usable only for bearings specified in this entry, the following: outer rings, inner rings, retainers, balls, rollers and sub-assemblies	C
	There shall be excluded from this entry hollow bearings.			
IL1372	Technology for industrial gas turbine engines, the following—			
		(a)	(a) Technology common to industrial gas turbine engines and gas turbine aero-engines specified in head (d) of the entry IL1460 in Group 3E	D
		(b)	(b) Technology common to industrial gas turbine engines and marine gas turbine engines	D

	specified in the entry IL1431 in Group 3E	
IL1385	Specially designed production equipment for compasses, gyroscopes (gyros), accelerometers and inertial equipment specified in the entry IL1485 in Group 3E Note: This entry includes— (a) For ring laser gyro equipment, the following equipment used to characterize mirrors, having the threshold accuracy shown or better: (1) Rectilinear scatterometer (10 ppm) (2) Polar scatterometer (10 ppm) (3) Reflectometer (50 ppm) (4) Profilometer (5 angströms) (b) For other inertial equipment: (1) Inertial Measurement Unit (IMU) module tester (2) IMU platform tester (3) IMU stable element handling fixture (4) IMU platform balance fixture (5) Gyro tuning test station (6) Gyro dynamic balance station (7) Gyro run-in/motor test station (8) Gyro evacuation and fill station (9) Centrifuge fixture for gyro bearings (10) Accelerometer axis align station (11) Accelerometer test station	C

IL1388 Specially designed equipment for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, for non-electric substrates by processes specified in entry IL1389 in this Group, the following: and specially designed automated handling, positioning, manipulation and control components and specially designed ODMA software therefor—

(a) (a) stored programme controlled chemical vapour deposition (CVD) production equipment with both of the following characteristics C

(1) process modified for one of the following—

(a) pulsating CVD;

(b) controlled nucleation thermal decomposition (CNTD); or

(c) plasma anhanced or plasma assisted CVD; and

(2) any of the following characateristics—

(a) incorporating high vacuum (less than or equal to 10^{-7} atm) rotating seals;

(b) operating at reduced pressure (less than 1 atm); or

(c) incorporating in situ coating

thickness control;

(b) (b) Stored programme controlled ion implantation production equipment having beam currents of 5 mA or higher C

(c) (c) Stored programme controlled electron beam physical vapour deposition (EB-PVD) production equipment with either of the following characteristics C

(i) incorporating power systems greater than 80 kW; or

(ii) (1) incorporating power systems greater than 50 kW; and

(2) having both of the following characteristics:

(a) incorporating a liquid pool level laser control system which regulates precisely the ingots feed rate; and

(b) incorporating a computer controlled rate monitor operating on the principle of photo-luminescence of the ionised atoms in the vaporant stream to control the deposition rate of a coating containing two or more elements

(d)	(d) Stored programme controlled plasma spraying production equipment having any of the following characteristics—	C

(1) operating at atmospheric pressure discharging molten or partially molten material particles into air or inert gas (shrouded torch) at nozzle exit gas velocities greater than 750 m/sec calculated at 293 K at 1 atmosphere;

(2) operating at reduced pressure controlled atmosphere (less than or equal to 100 millibar (0.1 atm) measured above and within 30 cm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 10^{-4} millibar prior to the spraying process; or

(3) incorporating in situ coating thickness control.

(e)	(e) Stored programme controlled sputter deposition production equipment capable of current densities of 5 mA/cm^2 or higher at a deposition rate of 10 micrometres/hr or higher	C
(f)	(f) Stored programme controlled cathodic arc deposition production	C

	equipment with either of the following characteristics— (1) incorporating target areas larger than 45.6 cm^2; or (2) incorporating a magnetic field steering control of the arc spot on the cathode	
	(g) (g) Deposition process or surface modification equipment for stored programme controlled production processing which enables the combining of any individual deposition processes specified in heads (a) to (f) above (inclusive) so as to enhance the capability of such individual processes	C
	For the purpose of this entry “stored programme controlled” means controlled by using instructions stored in an electronic storage which a processor can execute in order to direct the performance of perdetermined functions.	
IL1389	Technology and sp[ecially designed ODMA software therefor, the following— (a) Technology for application to non electronic devices designed to achieve—	
	by any process specified in column 1 of the Table below on any substrate specified in that part of column 2 of the Table which relates to that process any inorganic overlay coating or inorganic surface modification	D

	coating specified in that part of column 3 of the Table which relates to that substrate	
	except that this head does not include technology for single stage pack cementation of solid airfoils.	
	(b) (b) Specially designed ODMA software for the technology included in head (a)	D
	Note: The processes included in column 1 are defined in Notes A(a)-(i) below. Other terms used in the Table are defined in Notes B(1)-(8) below.	

TABLE

1. Coating process	2. Substrate	3. Resultant coating
A. chemical vapour deposition (CVD)	superalloys	aluminides for internal surfaces, alloyed aluminides or noble metal modified aluminides
	titanium or titanium alloys	carbides aluminides of alloyed aluminides
	ceramics	silicides or carbides
	carbon-carbon, carbon-ceramics, or metal matric composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or cemented tungsten carbide	carbides, tungsten, mixtures thereof or dielectric layers
B. electron-beram physical vapour deposition (EB-PVD)	superalloys	alloyed silicides, alloyed aluminides MCrA1X (except CoCrA1y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof (including mixtures

1. Coating process	2. Substrate	3. Resultant coating
		of the above with silicides or aluminides)
	ceramics	silicides or modified zirconia (except calcia-stabilized zirconia)
	aluminium alloys	MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of alumium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof
	corrosion resistant steel	MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia)
	carbon-carbon, carbon-ceramic, or metal matric composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or comented tungsten carbide	carbides, tungsten, mixtures thereof or dielectric layers
C. electro-phoretic deposition	superalloys	alloyed aluminides or noble metal modified aluminides
D. pack cementation	superalloys	alloyed aluminides or noble metal modified aluminides
(see also A above)	carbon-carbon, carbon-ceramic or metal matric composites	silicides, carbides or mixtures thereof
	aluminium alloys	aluminides or alloyed aluminides
E. plasma spraying (high velocity or low pressure only)	superalloys	MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluinium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof

1. Coating process	2. Substrate	3. Resultant coating
	aluminium alloys	MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluinium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof
	corrosion resistant steel	MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluinium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof
	titanium or titanium alloys	carbides or oxides
F. slurry deposition	refractory metals	fused silicides or fused aluminides
	carbon-carbon, carbon-ceramic or metal matrix composites	silicides, carbides or mixtures thereof
G. sputtering (high rate, reactive or radio frequency only)	superalloys	alloyed silicides, alloyed aluminides noble metal modified aluminides, MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluinium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) platinum or mixtures thereof (including mixtures of the above silicides or aluminides)
	ceramics	silicides, platinum or mixtures thereof
	aluminium alloys	MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluinium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof

1. Coating process	2. Substrate	3. Resultant coating
	corrosion resistant steels	MCrA1X (except CoCrA1Y which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluinium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), or mixtures thereof
	titanium or titanium alloys	borides or nitrides
	carbon-carbon, carbon-ceramic or metal matrix composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or cemented tungsten carbide	carbides, tungsten or dielectric layers
H. ion implantation	high temperature bearing steels	tantalum or niobium columbiun
	beryllium or berylli;um alloys	borides
	carbon-carbon, carbon-ceramic or metal matrix	silicides, carbides, mixtures thereof or dielectric layers
	titanium or titanium alloys	borides or nitrides
	silicon nitride or cemented tungsten carbide	nitrides, carbides or dielectric layers
	sensor widow materials transparent to electromagnetic waves, as follows: silica, alumina, silicon, gcermanium, zinc sulphide, sinc selenide or gallium arsenide	dielectric layers

Notes

A. The definitions of processes specified in column 1 of the Table are as follows:

(a) “Chemical Vapour Deposition” (CVD) is an overlay coating or surface modification coating process wherein a metal, alloy composite or ceramic is deposited upon a heated substrate. Gaseous reactants are reduced or combined in the vicinity of a substrate resulting in the deposition of the desired elemental, alloyed or compounded material on the substrate. Energy for this decomposition or chemical reaction process is provided by the heat of the substrate.

(1) CVD includes the following processes: out-of-pack, pulsating, controlled nucleation thermal decomposition (CNTD), plasma enhanced or plasma assisted processes.

(2) “Pack” means a substrate immersed in a powder mixture.

(3) The gaseous material utilized in an out-of-pack process is produced using the same basic reactions and parameters as the pack cementation process, except that the substrate to be coated is not in contact wth the powder mixture.

(b) "Electron beam physical vapour deposition" (EB PVD) is an overlay coating process conducted in a vacuum chamber, wherein an electron beam is directed onto the surface of a coating material causing vaporization of the material and resulting in condensation of the resultant vapours onto a substrate positioned appropriately, and includes a case where gases are added to the chamber during the processing.

(c) "Electrophoretic deposition" is a surface modification coating or overlay coating process in which finely divided particles of a coating material suspended in a liquid dielectric medium migrate under the influence of an electrostatic field and are deposited on an electronically coducting substrate.

NB:

Heat treatment of parts after coating materials have been deposited on the substrate, in order to obtain the desired coating, is an essential step in the process.

(d) "Pack cementation" is a surface modification coating or overlay coating process wherein a substrate is immersed in a powder mixture, a so-called pack, that consists of:

(1) the metallic powders that are to be deposited (usually aluminium, chromium, silicon or combinations thereof);

(2) an activator (normally a halide salt); and

(3) an inert powder, most frequently alumina.

The substrate and powder mixture is contained within a retort which is heated to between 1030 K to 1375 K for sufficient time to deposit the coating.

(e) "Plasma spraying" is an overlay coating process wherein a gun (spray torch), which produces and controls a plasma, accepts powdered coating materials, melts them and propels them towards a substrate, whereon an integrally bonded coating is formed.

For this purpose

(1) "High velocity" means more than 750 metres per second.

(2) "Low pressure" means less than ambient atmospheric pressure.

(f) "Slurry deposition" is a surface modification coating or overlay coating process wherein a metallic or ceramic powder with an organic binder is suspended in a liquid and is aaplied to a substrate by either spraying, dipping or painting; subsequently air or oven dried, and heat treated to obtain the desired coating.

(g) "Sputtering" is an overlay coating process wherein positively charged ions are accelerated by an electric field towards the surface of a target (coating material). The kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and despoited on the substrate.

NB:

Triode, magnetron or radio frequency sputtering to increase adhesion of coating and rate of despoition are included.

(h) "Ion implantation" is a surface modification coating process in which the element to be alloyed is ionized, accelerated through a potential gradient and implanted into the surface region of the substrate. The definition includes processes in which the source of the ions is a plasma surrounding the substrate and processes in which ion implantation is performed simultaneously wth electron beam physical vapour deposition or sputtering.

(i) "Cathodic arc deposition" employs a cathode which is consumable and has an arc discharge established on the surface by a momentary contact of ground trigger. Arc spots form and begin to erode randomly but uniformly the cathode surface creating a highly ionised plasma. The anode can be either a cone attached to the periphery of the cathode through an insulator or the chamber can be used as an anode. Substrates appropriately positioned receive deposits from the ionised plasma. Substrate biasing is used for non-line-of-sight deposition. A gas can be introduced in the vicinity of the substrate surface in order to react during deposition to synthesise compound coatings.

B. The definitions of other terms used in the Table are as follows—

(1) "Coating process" includes coating repair and refurbishing as well as original coating.

(2) Multiple-stage coatings in which an element or elements are desposited prior to application of the aluminide coating, even if these elements are deposited by another coating process, are included in the term "alloyed aluminide coating", but the multiple use of single-stage pack cementation processes to achieve alloyed aluminides is not included in the term "alloyed aluminide coating".

(3) Multiple-stage coatings in which the noble metal or noble metals are laid down by some other coating process prior to application of the aluminide coating are included in the term "noble metal modified aluminide coating".

(4) "Mixtures" consist of infiltrated material, graded compositions, co-deposits and multilayer deposits and are obtained by one or more of the coating processes specified in this table.

(5) "MCrA1X" refers to an alloy where M equals cobalt, iron, nickel or combinations thereof and X equals hafnium, yttrium, silicon or other minor additions in various proportions and combinations.

(6) "Aluminium alloys" as a substrate in this Table means alloys usable at temperqatures above 500 K (227°C).

(7) "Corrosion resistant steel" means such steel as complies with AISI (American Iron and Steel Institute) 300 series or equivalent national standard for steels.

(8) "Refractory metals" as a substrate in this Table means the following metals and their alloys: niobium (columbium), molybdenum, tungsten and tantalum.

There shall be excluded from this entry technology for single-stage pack cementation of solid air foils.

IL1391	Robots, robot controllers and robot end-effectors the following: and specially designed components and specially designed ODMA software therefor— Note: for the purposes of this entry specially designed components includes mechanical structures. (a) Robots having any of the following characteristics—	
	(1) capable of employing feedback information in real-time processing from one or more sensors to generate or modify programmes or to generate or modify numerical programme data	C

except—

(1.) robots capable of using only information derived from sensors which can be used to measure—

(a) the internal state of the robot, ie, velocity, position (by other than inertial position measuring systems), drive motor current or voltage, fluid or gas pressure or temperature;

(b) through-the-arc current (or voltage) for weld seam tracking; or

(c) binary or scalar values for:

(1) determing the position of the robot relative to a work piece;

(2) tool drive motor voltage or current or hydraulic/pneumatic pressure for determination of force or torque; or

(3) external safety functions.

(2.) robots capable of using only information derived from vision systems having any of the following characteristics—

(a) capable of processing no more than 100,000 pixels using an industrial television camera, or no more than 65,536 pixels using a solid-state camera;

(b) using a single scene analysis processor having neither a word size of more than 16-bit (excluding parity bits) not parallel processing for the same task;

(b) Note: Systems with a 16-bit word length and not more than a 32-bit architecture are regarded as 16-bit systems for the purposes of this exception.

(c) software not capable of full three-dimensional mathematical modelling or full three-dimensional scene analysis;

Note: Approximation of the third dimension by viewing at a given angle or limited grey scale interpretation for the perception of depth or texture (2½D) is included.

(d) having no user-accessible programmability other than by input reference images through the system's camera; or

(e) capable of no more than one scene analysis every 0.1 second.

(3.) robots capable of using only information derived from end-effectors not specified in head (c) below.

(2)	specially designed to comply with national safety standards applicable to explosive munitions environments	C
(3)	incorporating means of protecting hydraulic lines against externally induced punctures caused by ballistic fragments (e.g. incorporating self-sealing lines) and designed to use hydraulic fluids with flash points higher than 839 K (566°C)	C
(4)	specially designed for underwater use such as those incorporating special techniques or components for sealing, pressure compensation or corrosion resistance	C
(5)	operable at altitudes exceeding 30,000 metres	C
(6)	specially designed for outdoor applications and meeting military specifications therefor	C
(7)	specially designed or rated for operating in an electromagnetic pulse (EMP) environment	C
(8)	specially designed or rated as radiation-hardened beyond that necessary to withstand normal industrial (other than nuclear industry) ionising radiation	C
(9)	equipped with a robot manipulator arms which contain fibrous and filamentary materials specified in entry IL1763 in Group 3I	C
(10)	equipped with precision measuring devices	C

	specified in entry IL1532 in Group 3F	
(11)	specially designed to move autonomously its entire structure through three-dimensional space in a simultaneously co-ordinated manner, except systems in which the robot moves along a fixed path	C
	Note: This head (a) does not include robots specially designed for household use or those modified from household robots for preuniversity educational purposes not specified elsewhere in this entry	
	(b) (b) Electronic controllers for robots having any of the following characteristics—	
(1)	controllers specially designed to be part of a robot specified in sub head (a) (2) to (8), (10) or (11) above	C
(2)	minimum programmable increment less (finer) than 0.001 mm per linear axis	C
(3)	having more than one integral interface which meets or exceeds ANSI/ IEEE standard 488-1978, IEC publication 625-1 or any equivalent standard for parallel data exchange	C
(4)	capable of being programmed by means of other than lead-through, key-in (such as without processing, on-line or	C

	off-line) or teach-pendant techniques	
(5)	word size exceeds 16 bit (excluding parity bits) Note: systems with a 16-bit word length and not more than a 32-bit architecture are regarded as 16-bit systems for the purpose of this sub-head.	C
(6)	incorporating interpolation algorithms for an order of interpolation higher than two	C
(7)	generation or modification by one-line, real-time processing of the programmed path, velocity and functions other than the following—	C
	(i) manual velocity override;	
	(ii) linear, rotary or Cartesian offset;	
	(iii) manual robot path editing (including manual path compensation) excluding source language used to programme automatically the robot path, velocity or runction;	
	(iv) branching to pre-programmed modification of robot path, velocity or function;	
	(v) fixed cycles (e.g. macro instructions or pre-programmed sub-routines); or	
	(vi) keyed-in or teach-in modifications;	

except controllers limited to operations with robots included in any of the exceptions to head (a).

(c) (c) End-effectors having any of the following characteristics—

(1)	having integrated computer-aided data processing, except those using sensors used to measure the parameters or values described in exception 1 to head (a)(1) above.	C
(2)	equipped with an integral interface which meets or exceeds ANSI/IEEE Standard 488-1978, IEC publication 625-1, or any equivalent standard for parallel data exchange	C
(3)	having any of the characteristics specified in sub-heads (a)(2) to (8) and (10) above	C

In this entry—

"robot" means a manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use sensors, is multifunctional and capable of positioning or orienting material, parts, tools or special devices through variable movements in three dimensional space. It incorporates three or more closed or open loop servo-devices which may include stepping motors; and has user-accessible programmability by means of teach/playback method or by means of an electronic computer which may be a programmable logic controller, without mechanical intervention. "Robot" does not include the following devices—

(1) Manipulation mechanisms which are only manually/teleoperator controllable;

(2) Fixed sequence manipulation mechanisms which are automated moving devices, operating accordingly to mechanically fixed programmed motions, where the programme is mechanically limited by fixed stops, such as pins or cams, and the sequence of motions and the selection of paths or angles are not variable or changeable by mechanical, electronic or electrical means;

(3) Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions, where the programme is mechanically limited by fixed, but adjustable stops, such as pins or cams, or the sequence

of motions and the selection of paths or angles are variable within the fixed programme pattern, and variations or modifications of the programme pattern (eg, changes of pins or exchanges of cams) in one or more motion axes are accomplished only through mechanical operations;

(4) Non-servo-controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions and the programme is variable but the sequence proceeds only by the binary signal from mechanically fixed electrical binary devices or adjustable stops;

(5) Stacker cranes which are Cartesian coordinate manipulator systems manufactured as an integral part of a vertical array of storage bins and designed to access the contgents of those bins for storage or retrieval;

“end-effectors” include grippers, active tooling units being devices for

applying motive power, process energy or sensing to the workpiece and any other tooling that is attached to the baseplate on the end of the robot's manipulator arm(s);
"active tooling unit" is a device for applying motive power, process energy or sensing to the workpiece;
"sensor" means a detector of a physical phenomenon, the output of which (after conversion into a signal that can be interpreted by a controller) is able to generate programmes or modify programmed instructions or numerical programme data. This includes sensors with machine vision, infrared imaging, acoustical imaging, tactile feel, inertial position measuring, optical or acoustic ranging or force or torque measuring capabilities.

IL1399 Software and technology for automatically controlled industrial systems, to produce assemblies or discrete parts, the following—

(a) (a) Softward with all the following characteristics— C

(1) specially designed for automatically controlled industrial systems which include at least eight items of the following equipment in any combination—

(a) machine tools or dimensional inspection machines specified in head (b) of entry IL1091 in Group 3A or IL1370 in this Group;

(b) robots specified in entry IL1391 in this Group;

(c) digitally controlled spin-forming or flow-forming machines specified in the entry IL1075 in Group 3A;

(d) digitally controlled equipment of the type specified in entry IL1080, IL1081, IL1086 or IL1088 in Group 3A;

(e) digitally controlled electric arc devices specified in the entry IL1206 in Group 3C;

(f) digitally controlled equipment of the type specified in the entry IL1354 or IL1355 (head(b)) of this Group;

(g) digitally controlled equipment of the type specified in the entry IL1357 in this Group;

(h) digitally controlled electronic equipment of the type specified in the entry IL1529 in Group 3F;

(i) any digitally controlled measuring system specified in entry IL1529 in Group 3F

(2) integrating, in a hierarchical manner, while having access to data which may be stored outside the supervisory digital computer, the manufacturing processes with—

(i) design functions; or

(ii) planning and scheduling functions;

(3) (i) automatically generating and verifying the manufacturing data and instructions, includng selection of equipment and sequences of manufacturing operations, for the manufacturing processes, from design and manufacturing data; or

(ii) automatically reconfiguring the automatically controlled industrial system through reselecting equipment and sequences of manufacturing operation by real-time processing of data pertaining to anticipated but unscheduled events;

except—
software which only provides rescheduling of functionally identical equipment within flexible manufacturing units using prestored part programmes and a prestored strategy for the distribution of the part programmes; and
software (in machine executable form only) for industrial sectors other than nuclear, aerospace, shipbuilding, heavy vehicles, machine building, microelectronics and electronics.

(b) (b) Technology for the design of automatically controlled industrial systems which will be used with the software specified in head (a) above, whether the conditions required by subhead (a)(1) above are met D

In this entry
an "automatically controlled industrial system" is a combination of:
(1) one or more flexible manufacturing units; and
(2) a supervisory digital computer for coordination of the independent

sequences of computer instructions to, from and within the flexible manufacturing units;

a "flexible manufacturing unit" is an entity which comprises a combination of a digital computer including its own main storage and its own ralated equipment and at least one of the pieces of equipment referred to in sub-head (a)(1)(a) to (i) inclusive in this entry.

GROUP 3E

Transportation equipment

IL1401	Reciprocating diesel engine development and production technologies, including specially designed software, the following—	
	(a) (a) Development and production technology, including specially dsigned software, for reciprocating diesel engine ground vehicle propulsion systems having all of the following characteristics—	D
	(1) a box volume of $1.2m^3$ or less;	
	(2) an overall power output of more than 750 kW based on 80/1269/EEC, ISO 2534 or national equivalents;	
	(3) a power density of more than 700 kW/m^3 of box volume.	

	(b) (b) Development and production technology for solid or dry film cylinder wall lubrication permitting operation at temperatures in excess of 723 K (450°C) measured on the cylinder wall at the top limit of travel of the top ring of the piston	D
	In this entry the "box volume" means the product of three dimensions at right angles to each other measured in the following way— Length: the length of the crankshaft from front flange to flywheel face; Width: the greatest of the following: (a) the outside dimension from valve cover to valve cover; (b) the dimension of the outside edges of the cylinder heads; or (c) the diameter of the flywheel housing; Height: the greater of the following: (a) the dimension of the crankshaft centreline to the top plane of the valve cover (or cylinder head) plus 2 times the stroke; or (b) the diameter of the flywheel housing.	
IL1416	Vessels (including ships and surface-effect vehicles), water-screw propellers and hub assemblies, water-screw propeller systems, moisture and particulate separator	

	systems and specially designed components, the following—		
	(a)	(a) Hydrofoil vessels with automatically controlled foil systems which are capable of speeds of above 40 knots in rough water (Sea State Five)	S, I
	(b)	(b) Surface-effect vehicles, namely hovercraft, air cushion vehicles (both sidewall and skirted varieties) and all variations of vehicles using the wing-in-ground effect for positive lift	C
	(c)	(c) Small waterplane area twin-hull (SWATH) vessels having underwater hulls whose cross-sectional area varies along the longitudinal axis between points two major diameters from the bow and two major diameters from the stern	C
	(d)	(d) Ships and vessels fitted with any of the following—	
(1)	equipment specified in Group 1, in entry IL1485 in this Group or in entry IL1501, IL1502 or IL1510 in Group 3F		S, I
(2)	degaussing facilities		S, I
	or		
(3)	closed ventilation systems designed into the vessel which are designed to maintain		C

	air purity and positive pressure regardless of the conditions external to the vessel except where those closed ventilation systems are specially designed for and incorporated in the vessel's medical facilities only	
	(e) (e) Water-screw propellers and hub assemblies, the following—	
(1)	supercavitating propellers rated at greater than 10,000 hp	C
(2)	controllable-pitch propellers and hub assemblies rated at above 40,000 hp capacity	C
	(f) (f) Water-screw propeller systems, the following—	
(1)	contrarotating propeller systems rated at greater than 20,000 hp	C
(2)	ventilated, base-ventilated and super-ventilated propeller systems	C
(3)	systems employing pre-swirl and post-swirl techniques for smoothing the flow into a propeller so as to improve propulsive efficiency of—	
	(i) SWATH vessels, hydrofoil vessels, and surface-effect vehicles, or	C
	(ii) other vessels whose propeller rotation speed is above 200 rpm, or having propellers with a	C

	rating exceeding 50,000 hp per shaft	
(g)	(g) Moisture and particulate separator systems which are capable of removing 99.9 per cent of particles larger than 2 micrometers in diameter with a maximum pressure loss of 1.6 kPa (16 millibar) for gas turbine engine air inlets	C
(gg)	(gg) Technology for moisture and particulate separator systems specified in head (g) above only the following—	
(1)	technology for preventing water leakage around the filter stages	D
(2)	technology for integrating the components of such a system	D
(h)	(h) Specially designed components for vessels covered by heads (a), (b) and (c) above, the following—	
(1)	advanced hull forms which incorporate any of the following—	
(i)	stepped hull for hydrofoil vessels	C
(ii)	hulls for air cushion vehicles with trapezoidal platforms	C
(iii)	hulls for surface-effect vehicles with catamaran-like sidewalls	C
(iv)	hulls for wing-in-ground effect vehicles	C

(v) underwater hulls and struts for SWATH vessels	C
(2) fully submerged subcavitating or supercavitating hydrofoils	C
(3) lightweight structural components for SWATH vessels, hydrofoil vessels and surface-effect vehicles, constructed using anisotropic, orthotropic or sandwich construction methods	C

In this subhead—

1. "Anisotropic construction methods" means the use of fibre reinforcing members aligned so that the load-carrying ability of the structure can be primarily orientated in the direction of expected stress.
2. "Orthotropic construction methods" means the means of stiffening plates, in which the structural members are at right angles to each other.
3. "Sandwich construction methods" means the use of structural members or plates which are fabricated and permanently affixed in layers to enhance their strength and reduce their weight.

(4)	flexible skirts, seals and fingers for surface-effect vehicles	C
(5)	systems for automatically controlling the stability of SWATH vessels, hydrofoil vessels or surface-effect vehicles	C
(6)	power transmission shaft systems which incorporate composite material components, for SWATH vessels, hydrofoil vessels or surface-effect vehicles	C
(7)	lightweight, high capacity (K factor greater than 150) gearing (planetary, cross-connect and multiple input/output gears and bearings) for SWATH vessels, hydrofoil vessels and surface-effect vehicles	C
(8)	water-cooled electrical propulsion machinery (motor and generator), including AC-AC synchronous and AC-DC systems, sectored-disc and concentric-drum rotors for DC homopolar machines, for SWATH vessels, hydrofoil vessels and surace-effect vehicles	C
(9)	superconducting electrical propulsion machinery for SWATH vessels, hydrofoil vessels and surface-effect vehicles	C
(10)	lift fans for surface-effect vehicles, rated at greater than 400 hp	C
(11)	waterjet propulsor systems rated at 3,000 input hp or greater for	C

	hydrofoil vessels and surface-effect vehicles		
PL7009	Other vessels (including ships), the following: and specially designed components therefor—		
	(a)	(a) Vessels having special structural features for landing personnel and/or vehicles on a beach	I
	(b)	(b) Vessels capable of supporting helicopter operations and maintenance	I
	(c)	(c) Vessels capable of submerging	I
	(d)	(d) Vessels not elsewhere specified in this Part of this Schedule of below 100 tonnes GRT including inflatable craft in an inflated or uninflated state except light vessels, fire floats and dredgers	I
	(e)	(e) Ships with decks and platforms specially strengthened to receive weapons	S, L, I
IL1417	Submersible systems including those incorporated in a submersible vehicle, the following: and specially designed components therefor—		
	(a)	(a) Automatically-controlled atmosphere-regeneration systems specially designed or modified for submersible vehicles which, in a single chemical-	C

	reaction cycle, ensure carbon dioxide removal and oxygen renewal	
	(b) (b) Systems specially designed or modified for the automated control of the motion of a submersible vehicle using navigation data and having closed-loop servo-control(s) so as to–	
(1)	enable the vehicle to move within ten metres of a predetermined point in the water column	C
(2)	maintain the position of the vehicle within ten metres of a predetermined point in the water column	C
	or	
(3)	maintain the position of the vehicle within ten metres while following a cable on or under the sea bed	C
	except automated control systems incorporated in underwater bulldozers or trench-cutters not capable of operating at depths greater than 100 metres and possessing only negative buoyancy.	
	(c) (c) Underwater vision systems, the following—	
(1)	television systems (comprising camera, lights, monitor and signal transmission equipment) specially designed or modified for remote operation with a submersible vehicle, having a	C

limiting resolution, when measured in the air, more than 500 lines, using IEEE Standard 208/1960 or any equivalent standard

(2) systems specially designed or modified for remote operation with a submersible vehicle employing techniques to minimize the effects of back-scatter, such as range-gated illuminators — C

except television cameras used merely through a porthole.

(d) (d) Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles and having any of the following characteristics—

(1) systems which control the manipulator using information from sensors which measure force or torque applied to an external object, distance from an external object, or tactile sense between the manipulator and an external object — C

except systems where force or torque are only measured and then displayed to the operator.

(2) controlled by proportional master-slave techniques or by using a dedicated stored-programme computer — C

or

(3) capable of exerting a force of 250 Newtons or more or a torque of 250 Newton-metres or more and using — C

titanium based alloys or fibrous and filamentary composite materials in their structural members

(e) (e) Photographic cameras and associated equipment specially designed or modified for use underwater, having a film format of 35 mm or larger, and capable of any of the following—

(1)	film advancement of more than 5 frames per second	C
(2)	annotating the film with data provided by a source external to the camera	C
(3)	taking more than 250 full frame exposures without changing the film	C
(4)	autofocusing specially designed or modified for use underwater	C
	or	
(5)	operating at depths of more than 1,000 metres	C

(f) (f) Light systems specially designed or modified for use under water, the following—

(1) stroboscopic lights capable of—

(i)	light output energy of more than 150 joules per flash	C
	or	
(ii)	flash rates of more than 5 flashes per second at a light output energy of more than 10 joules per flash	C

	(2) other lights and associated equipment, capable of operating at depths of more than 1,000 metres	C
	In this entry "limiting resolution" in television is a measure of resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart.	
IL1418	Deep submergence vehicles, manned or unmanned, tethered or untethered, capable of operating at depths exceeding 1,000 metres, and specially designed or modified associated systems, equipment, components and materials therefor, including the following— (a) (a) pressure housings or pressure hulls; (b) propulsion motors and thrusters; (c) hull penetrators or connectors.	C
IL1425	Floating docks, and software and technology therefor, the following— (a) Floating docks specially designed for use at remote locations (i.e. without support from shore bases) incorporating all of the following facilities— (1) welding and pipe fitting repair shop(s); (2) electrical and electronic repair shop(s); (3) mechanical repair or metal working machine shop(s)	

	and containing more than 3000 kW (4,000 hp) of electrical power generation equipment		C
	(b)	(b) Floating docks specially equipped to permit the operation, maintenance or repair of nuclear reactors	C
	(c)	(c) Floating docks having both the following characteristics— (1) a lifting capacity of more than 36,364 tonnes; (2) larger than 120 metres in length and 30 metres in width, measured between the pontoons.	
	(d)	(d) Specially designed software for computer-controlled pumping and flooding systems for the above floating docks, to permit the docking of listing vessels	C
	(e)	(e) Technology, the following—	
(1)	for that portion of the design of a floating dock specified in head (a) above which relates to the incorporation of the three types of facilities specified in that head		D
(2)	for design, production and use of onboard floating dock facilities specified in head (b) above which permit the operation, maintenance		D

	and repair of nuclear reactors	
IL1431	Marine gas turbine engines (marine propulsion or shipboard power generation engines), whether originally designed as such or adapted for such use, and specially designed components therefor Note: for the purpose of this entry “shipboard power generation” does not include offshore platform applications.	C
IL1460	Aircraft and helicopters, aero-engines and aircraft and helicopter equipment, and technology therefor, the following—	
	(a) (a) Aircraft and helicopters, except those which do not contain equipment specified in Group 1 or in the entries IL1485 or IL1501 in Groups 3E and 3F and which are of types which are in bona fide normal civil use	C
	(b) (b) Technology for aircraft and helicopter airframes, for aircraft propellers, and for aircraft and helicopter airframe, aircraft-propeller and helicopter-rotor-systems components, and specially designed ODMA software therefor, the following—	
	(1) design technology using computer-aided aerodynamic analyses for integration of the fuselage, propulsion system and lifting and	D

control surfaces to optimize aerodynamic performance throughout the flight regime of an aircraft	
(2) technology for the design of active flight control, the following—	
(i) technology for configuration design for inter-connecting multiple microelectronic processing elements (on-board computers) to achieve high-speed data transfer and high-speed data integration for control law implementation	D
(ii) technology for control law compensation for sensor location and dynamic airframe loads, namely compensation for sensor vibration environment and for variation of sensor location from centre of gravity	D
(iii) technology for electronic management of systems reducdancy and data redundancy for fault detection, fault tolerance and fault isolation	D
except technology for the design of physical reducdancy in hydraulic or mechanical systems or in electrical wiring.	
(iv) technology for design of flight controls which permit in-flight reconfiguration of	D

force and moment controls

(3) design technology for integration of flight control, navigation and propulsion control data into a flight management system for flight path optimzation — D

(4) design technology for protection of avionic and electrical sub-systems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from sources external to the aircraft, the following—

- (i) technology for design of shielding systems — D
- (ii) technology for the configuration design of hardened electrical circuits and sub-systems — D
- (iii) technology for determination of hardening criteria for the above — D

(5) technology for the design, production and reconstruction of adhesively bonded airframe structural members designed to withstand operational temperatures in excess of 120°C — D

except
airframe structural members for engine nacelles and thrust reversers.

(6) technology for the design and production of propeller blades constructed wholly or partly of composite — D

	materials, and specially designed hubs therefor except technology for the production of propeller blade— (a) constructed wholly of wood or glass-fibre-reinforced plastics; or (b) which are constructed mainly of wood or glass-fibre-reinforced plastics and which use other materials only in the leading edge or tip.	
(7)	technology for the design and production of digital electronic synchrophasers specially designed for propellers; technology for the design of digital electronic controls for propellers; and technology for the production of digital electronic controls for the propeller blades and hubs described in sub-head (b)(6) above	D
(8)	technology for the design and production of active laminar flow control lifting surfaces including design data used to substantiate the design approach	D
(9)	technology for the development of helicopter multi-axis fly-by-light or fly-by-wire controllers which combine the functions of at least two of the following into one controlling element (i) collective controls; (ii) cyclic controls;	D

	(iii) yaw controls.	
(10)	technology for the development of circulation controlled anti-torque or directional control systems for helicopters Note: "Circulation-controlled anti-torque and directional control systems" utilise air blown over aerodymamic surfaces to increase or control the forces generated by the surfaces. buried fan-in-fin anti-torque designs fitted or not fitted with guide vanes such as the fenestron are excluded from this subhead.	D
(11)	technology for the development of helicopter rotor blades incorporating variable geometry airfoils utilizing trailer edge flaps or tabs or pivotted nose droop, which can be controlled in position in flight	D
(12)	technology for the development of active control of helicopter blades and other surfaces used to generate aerodynamic forces and moments Note: "Active control" (of helicopter blades and other surfaces used to generate aerodynamic forces and moments) functions to prevent undesirable helicopter vibrations, structural loads or helicopter rotor dynamic behaviour by autonomously	D

processing outputs from multiple sensors and then providing necessary preventive commands to effect automatic control.

(c) (c) Helicopter power transfer systems and technology therefor C

except—

(i) helicopter power transfer systems for use in civil helicopters only, the following—
   (1) those which have been in civil use in civil helicopters for more than eight years;
   (2) those which do not contain, and were not fabricated utilizing, any of the technologies shown in Table 2 below;
   (3) those for replacement in or servicing of specific, previously exported helicopters;

(ii) technological documents resulting from helicopter power transfer system performace and installation design studies; fabrication technology, or overhaul and refurbishing

technology for specific helicopter power transfer systems in civil use in civil helicopters for more than eight years unless listed in Table 2 below.
Note: Documents resulting from helicopter power transfer system performance and installation design studies do not include documents containing technology for: computer-aided design (CAD); computer-aided design/manufacture (CAD/CAM); or parametric performance analysis, engine analysis and selection, or component design utilizing unpublished technical data.

(d) (d) Gas turbine engines and auxiliary power units (APUs) for use in aircraft or helicopters and technology therefor— C

except

(i) those for use in civil aircraft or civil helicopters only, the following—
  (1) jet, turboprop and turboshaft aircraft engines in civil use in civil aircraft or civil helcopters

for more than eight years;

(2) gas turbine powered aircraft APUs in civil use in bona fide civil aircraft or civil helicopters for more than eight years;

(ii) technological documents resulting from aircraft performance and installation design studies; fabrication technology, or overhaul and refurbishing technology for specific gas turbine aero-engines or gas turbine powered aircraft APUs in civil use in civil aircraft or civil helicopters for more than twelve years, unless listed in Table 1 below.

Note: Aircraft performance and installation design studies does not include technology for: computer-aided design (CAD); computer-aided design/manufacturing (CAD/CAM); or parametric engine performance analysis, engine cycle analysis and selection, or component aerodynamic design utilizing unpublished technical data.

(e) (e) Specially designed components for gas turbine engines, APUs and helicopter power transfer systems specified in heads (c) and (d) above, the following—

(1)	embodying technologies listed in Tables 1 or 2 below	C
(2)	hot-section components	C
(3)	engine control system components	C
(4)	gas turbine engine or APU rotor system components (including bearings)	C

Notes:

1. The period of civil use referred to in heads (c) and (d) above begins with the date that the particular engine or helicopter power transfer system (model and specifications) or its most recent modification was certified as airworthy for commercial service or commercial navigability under the standards and requirements of the government of the country in which it was manufactured: modification does not include minor safety or operational changes which do not significantly enhance the performance of a particular gas turbine aero-engine or improve its reliability. For the purposes of this entry:

(a) A gas turbine aero-engine which is recertified as the result of incorporating any technology listed in Table 1 below is to be treated as a newly certified engine. Recertification which does not result from incorporation of such technology, or modifications which do not require recertification by national authorities, will not affect the period of civil use of the engine;

(b) Modification of a gas turbine APU by incorporation of any technology listed in Table 1 will cause it to be treated as a new APU. Other modifications will not affect the period of civil use of the APU.

(c) Modification of a helicopter power transfer system by incorporation of any technology listed in Table 2 will restart the period of civil use for the helicopter power transfer system as though it were newly certified in a helicopter. Other modifications will not affect the period of civil use of the helicopter power transfer system.

2. This entry does not include gas turbine engines, APUs and helicopter power transfer systems for civil use and modifications (and technology therefore) certified or re-certified for civil use, as described in Note 1 prior to the 1st January 1979, other than:

Helicopters over 4,530 kg empty weight, and power transmissions systems therefor.

Note: Empty weight is understood to include normal installation and normal minimum crew, but does not include fuel or payload.

Aero-engines, the following—
(i) Piston engines;
(ii) Jet engines of less than 2,625 kg thrust;
(iii) Turboprop or turboshaft engines of less than 2,500 horsepower or with a residual thrust of less than 453 kg.

3. Head (d) above does not include those engines which contain none of the technologies listed in Table 1 below for use in civil aircraft or civil helicopters.

Table 1

TECHNOLOGY RELATING TO THE FOLLOWING

I. Materials and manufacturing procedures

Ceramic, ceramic-composite or composite hot-section components (combuster, turbine blades and vanes, seals, discs, flow path)

Turbine blades on basis of directional solidification or monocrystal technology
— directional solidification
— monocrystal technology

Turbine blades consisting of several parts connected by diffusion bonding

Fibre technology in frames or in highly stressed discs, casings, blades and vanes

Protective coating technology for air-cooled turbine blades and vanes with internal and external cooling passages and their related flow paths capable of operating in high gas temperature environments (in excess of 1,499°C), irrespective of the actual gas temperature environment in which they will be used, involving applications of metallic or ceramic material by vapour, pack, plasma, electron beam, sputtering or sintering processes

Metallic coatings
— plasma sprayed
— other

Ceramic Coatings

Application of powder metallurgy for fan compressor and turbine blades or vanes; discs, wheels, reduction gears, engine main shafts and frames

— discs
— fan, compressor and turbine blades or vanes, wheels, reduction gears, engine main shafts and frames

Cooled components on basis of electrostream or laser drilling methods;
— electrostream drilling
— laser drilling

Electron beam drilling for small holes in turbine blades and vanes

Titanium or superalloy—casting on basis of centrifugal techniques

Ceramic core casting technology for casting holes in turbine blades and vanes

II. Construction methods

Adjustable flow path geometry and associated control systems for:
— fans
— gas generator turbine(s)
— fan/power turbine(s)
— propelling nozzles

(Adjustable flow path geometry and associated control systems do not include: inlet guide vanes, variable pitch fans, variable stators or bleed valves for compressors.)

Full authority or hybrid digital electronic control and respective sensor equipment

High temperature (capable of utilizing gases heated above 1,100°C) heat exchangers for preheating compressor exit air

Combustors with combustion in several stages

Maintenance of compressor or turbine tip clearance through methods employing active compensating casing technology:
— compressor alone
— turbine alone
— compressor and turbine

Ceramic bearings

Nozzles with thrust vectoring (not including reverse thrust)

Table 2

TECHNOLOGY RELATING TO THE FOLLOWING

1. Materials and manufacturing procedures

A. Rotor heads, containing:
• Hot-isostatically pressed materials

B. Gear boxes, containing:
— Novikoff-type gears
— Gears or gear support structures based on materials applying directional solidification or monocrystal technology
— High contact-ratio double-helical (arrow-shaped) gears
— Fibre technology
— Hot-isostatically pressed components
— Gear tooth surfaces hardened by vacuum carburizing or ion nitriding

C. Drive shaft systems containing super-critical drive shafts

II. Construction methods

A. Components fabricated by diffusion bonding

B. High-survivability loss-of-lubrication technology for high-speed bearings (DN equal to or greater than 2.4 million where D is expressed in millimetres and N in rpm)

	In this entry— "civil aircraft" and "civil helicopters" means only those types of civil aircraft and civil helicopters which are listed by designation in published airworthiness certification lists by the civil aviation authorities to fly commercial civil internal and external routes or for legitimate civil, private or business use. "helicopter power transfer systems" means all those components which transfer power from the engine to the main and tail rotor blade(s). Note: Aero-engines, APUs or helicopter power transfer systems which have any special feature designed for a military application are specified in the entry ML10 in Group 1.	
PL7010	Aircraft and helicopters having a maximum all up weight of 680 Kg or more	L, Z
PL7011	Specially designed components for aircraft and helicopters specified in head (a) of the entry IL1460 other than components falling within a description in Group 1 or under any other heading in Group 3 of Part II, of this Schedule	W
IL1465	Spacecraft and launch vehicles, the following—	

		(a) (a) Spacecraft, manned or unmanned (not including their payloads)	C
		except scientific mission space probes which do not contain equipment specified in head (c) below or elsewhere in this Schedule.	
		(b) (b) Launch vehicles	C
		(c) (c) Propulsion systems, guidance equipment, attitude control equipment and on-board communications equipment for remote control of the equipment specified in head (a) or (b) above	C
		(d) (d) Specially designed components for the equipment specified in heads (a), (b) and (c) above	C
	In this entry "spacecraft" means active and passive satellites and space probes.		
IL1485	Compasses, gyroscopes, (gyros), accelerometers and inertial equipment, the following: and specially designed software and specially designed components therefor—		
		(a) (a) Gyro compasses with provision for determining and transmitting ship's level reference data (roll, pitch) in addition to own ship's course data	C
		(b) (b) Integrated flight instrument	C

systems which include tyrostabilisers or automatic pilots for aircraft and specially designed integration software therefor

except—

(1) flight instrument systems integrated solely for VOR/ ILS navigation and approaches, or

(2) integrated flight instrument systems which—

(i) have been in normal civil use for more than two yhears; and

(ii) are standard equipment and software of aircraft not specified in the entry IL1460 in this Group.

Note:

An “integrated flight instrument system” is a primary instrument display system of attitude and azimuth with facilities for giving manoeuvre guidance information to the pilot and often integrated with an autopilot to the extent of embodying a common unit for setting up the required demands.

(c) (c) Gyro-astro compasses and other devices which derive position or orientation by means of automatically tracking celestial bodies C

(d)	(d) Gyro-stabilisers used for other purposes than aircraft control except— (1) those for stabilising an entire surface vessel; or (2) those which have been in normal civil use for more than two years.	C
(e)	(e) Automatic pilots used for purposes other than aircraft control and specially designed integration software therefor, except marine types for surface vessels	C
(f)	(f) Accelerometers with a threshold of 0.005 g or less or a linearity error within 0.25 per cent of full scale output or both, which are designed for use in inertial navigation systems or in guidance systems of all types	C
(g)	(g) Gyros with a rated free directional drift rate (rated free precession) of less than 0.5 degree (1 Sigma or r.m.s.) per hour in a 1 g environment	C
(h)	(h) Continuous output accelerometers which utilize servo or force balance techniques and gyros, both specified to function at acceleration levels greater than 100 g	C

	(i) (i) Inertial or other equipment using accelerometers specified in head (f) or (h) above or gyros specified in head (g) or (h) above, and systems incorporating such equipmenmt, and specially designed integration software therefor	C
	(j) (j) Specially designed test, calibration and alignment equipment for goods specified in heads (a) to (i) above	C

GROUP 3F

	Note: Goods specified in the heads of this Group may also be specified in Group 1 of this Part of this Schedule.	
	Electronic equipment including Communications, radar, and Scientific Instruments and apparatus	
PL7004	Electrical or electronic equipment, whether or not separately specified in an entry in this Schedule, in respect of which a certificate has been issued to the knowledge of the exporter by or on behalf of the Secretary of State to the effect that the equipment to which the certificate relates meets or has been modified or designed to meeet government standards concerned with the limitation of compromising electromagnetic radiation	W
IL1501	Navigation, direction finding, radar and airborne communication equipment and technology, the following—	

(a) Airborne communication equipment having any of the following characteristics, and specially designed components and specially designed ODMA software therefor,	
(1) designed to operate at frequencies greater than 156 MHz	C
(2) incorporating facilities for—	
(i) the rapid selection of more than 200 channels per equipment; or	C
(ii) equipment using frequency synthesis techniques	C
except equipment operating in the frequency range of 108 to 137 MHz with 760 channels or fewer at not less than 25 kHz spacing, and which has been in normal civil use for at least one year;	
(3) rated for continuous operation over a range of ambient temperatures extending from below −55°C to above +55°C	C
(4) designed for modulating methods employing any form of digital modulation using time and frequency redundancy such as Quantized Frequency Modulation (QFM)	C

except equipment which does not have the characteristics r4ferred to in sub-head (a)(4) above and

(a) is to equip civil aircraft, or

(b) is normal standard equipment incorporated in civil aircraft.

(b) (b) Navigation and direction finding equipment and technology, the following: and specially designed components and specially designed ODMA software and specialised testing, calibrating and training/simulating equipment therefor—

(1) airborn navigation equipment and direction finding equipment and technology, the following—

(i)	equipment designed to make use of Doppler frequency phenomena, except navigation equipment to be installed in civil aircraft or civil helicopters, and which is normal standard equipment of a type installed in civil aircraft or civil helicopters	C
(ia)	technology for navigation equipment using Doppler frequency phenomena	D
(ii)	equipment utilising the constant velocity or the rectilinear propagation charcteristics of electro-magnetic waves having frequency less than	C

4×10^{14}hz (0.75 microns)

except—

(a) standard commercial airborne equipment needed to equip civil aircraft or civil helicopters or as normal standard equipment incorporated in civil aircraft or civil helicopters being exported for civil commercial use provided such equipment is in conformity with ICAO standards and assures no function exceeding those resulting from such standards, is not designed to use satellite-broadcasted navigation signals and is not designed to make use of hyperbolic grids at frequencies greater than 3 MHz;

Note: Normal standard equipment includes Marker beacons, ILS, VOR (OMNI), Omega, Loran A and B; or

(b) Loran C equipment having all of the following characteristics:

(a) it has been in normal civil use for a period of more than one year;

(b) it is standard commercial equipment;

(1) needed to equip civil aircraft or civil helicopters; or

(2) incorporated in civil aircraft or civil helicopters;

(c) it is equivalent in all characteristics and performances to srtandard equipment of aircraft not specified in entry IL1460 in Group 3E;

(d) it is in conformity wityh ICAO standards;

(e) itis not designed to make use of hyperbolic grids at frequencies higher than 3MHz;

(f) it does not contain electronic equipment which:

(1) can compute the position of the aircraft in one coordinate system when furnished position information in another coordinate system (namely coordinate conversion equipment);

(2) is specified in entry IL1565 in Group 3G and

(3) has been in normal civil use for a period of less than one year

or

(c) direction finding equipment specially designed for search and rescue purposes and operating at a frequency of 121.5 MHz or 243 MHz, and personal locator beacons operating in this form (which may also have an additional channel selectable for voice mode only);

(iii) radio altimeters, the following—

(a) pulse modulated C

(b) frequency modulated having a displayed electrical output accuracy better than ±0.914 m over the range bertween 0 and 30.4 m or better than a7plusm;3% above 30.4 m C

except standard commercial airborne equipment needed to equip civil aircraft or civil helicopters or as normal standard equipment incorporated in civil aircraft or civil helicopters being exported for civil commercial use, provided such equipment is equivalent in all characteristics and performance to standard equipment of aircraft not specified in entry IL1460 in group 3E, and in which are frequency-modulated radio altimeters which have been in normal civil use for a period of more than one year;

(c) frequency modulated which have been in normal civil use for less than one year C

(iiia) Technology for radio altimeters referred to in sub-head (b)(1)(ii)(b) above even when D

	excluded from that sub-head	
(iv)	direction finding equipment operating at frequencies greater tha 5MHz	C
(v)	equipment rated for continuous operation over a range of ambient temperatures extending from below −55°C to above +55°C	C
(2)	Ground and marine equipment for use with airborne navigation equipment utilising the constant velocity or the rectilinear propagation characteristics of electromagnetic waves having a frequency less than 4×10^{14}Hz (0.75 micron)	C

except—

ground and marine equipment for use with airborne navigation equipment using the constant velocity or rectilinear propagation characteristics of electromagnetic waves having a frequency less than 5×10^{14}Hz (wavelength 0.75 micrometre), provided, in the case of ground equipment, it is for use at civil airports or for civil use in association with civil airborne equipment, and—

(1) is in conformity wityh ICAO

standards and assures no function exceeding those resulting from such standards;

(2) is not designed to make use of hyperbolic grids at frequencies greater than 3 MHz;

(3)	ground and marine direction finding equipment operating at frequencies greater than 30 MHz except— equipment, other than single side band equipment, operating at frequencies up to 157 MHz and employing a loop system or a system employing a number of spaced vertical aerials uniformaly disposed around the circumference of a circle, excluding electronically communicated types;	C
(4)	timing receivers whose only function is automatically providing time derived from satellite signals to within 1 millisecond of Universal Coordinate time (UCT) or better	C
(5)	ground or marine navigation and geodetic positioning systems designed for use with satellite-provided timing positioning or navigation information except— equipment which can only be used with TRANSIT satellite systems or other systems not also specified	C

elsewhere in this Schedule, and which is also specified in sub-head (b)(4) above. These shall be excluded from sub-heads (b)(4) and (5) global positioning satellite receivers which have all of the following characteristics:

(1) capable only of processing the L1 channel (also called the standard Positioning Service (SPS) channel);

(2) capable of only the Short-Term Code (Coarse Acquisition Code (C/A) code) with short term generation cycle;

(3) no decryption capabilities;

(4) including no cesium beam standards; and

(5) including no null steerable antennae

(c) (c) Radar equipment and specially designed components, specialised testing, calibrating and training/simulating equipment and specially designed software therefor, the following—

(1) airborne radar equipment C

except—
airborne civil weather-radar conforming to international stndards for civil weather radar provided it does not include any of the following characteristics—

(a) phased array antennae;
(b) frequency agility;
(c) spread spectrum; or
(d) any signal processing specially designed for tracking of vehicles.

(2) ground and marine radar equipment, the following—

(i)	equipment operating at a frequency not in normal civil use or at a frequency of more than 10.5 GHz	C
(ii)	equipment operating at a frequency of less than 1.5 GHz and having a peak output power from the transmitter greater than 2.5 MW; or operating at a frequency within the range of 1.5 to 3.5 GHz and having a peak output power from the transmitter greater than 1.5 MW; or operating at a frequency within the range of 3.5 to 6 GHz and having a peak output power from the transmitter greater than 1 MW; or operating at a frequency within the range of 6 to 10 GHz and having a peak output power from the transmitter greater than 500 kW	C
(iii)	equipment operating at a frequency of less than 3.5 GHz and having an 80 per cent or better probability of detection for a	C

	10 sq.m. target at a free space range of 250 nautical miles; or operating at a frequency within the range of 3.5 to 10.5 GHz and having an 80 per cent or better probability of detection for 10 sq.m. target at a free space range of 100 nautical miles	
(iv)	equipment utilising other than pulse modulation with a constant or staggered pulse repetition frequency, in which the carrier frequency of the transmitted signal is not changed deliberately between groups of pulses, from pulse to pulse, or within a single pulse;	C
	except commercial civil airport radar using a carrier frequency that may change from - pulse to pulse between two fixed frequencies separated in time and in frequency by constant magnitudes	
(v)	equipment utilising a Doppler technique for any purposes other than M.T.I. systems using a conventional double or triple pulse delay line cancellation technique	C
(vi)	equipment including any digital signal processing techniques used for automatic target tracking, or having a facility for electronic tracking	C

(vii) equipment including signal processing techniques (other than those specified in sub head (c)(2)(vi) above, which have been in normal civil use for a period of less than two years)	C
(viii) equipment ground radar, having been in commercial use for a period of less than one year	C

There shall be excluded from head (c), secondary radar equipment specially designed for civil air traffic identification and control purposes.

The following shall be excluded from this entry—

(a) equipment assemblies for civil marine automatic radar plotting aids or electronic relative motion analyzers designed to achieve the requirements published by the International Maritime Organization in accordance with the Safety of Life at Sea (SOLAS) converntions, provided the designed tracking speeds do not exceed relative values of greater than 150 knots (77.1 metres/second);

(b) ground radar of the hand-held and automobile-mounted type used for vehcle speed monitoring by police authorities and operating in the frequency band 10.5 to 10.55 GHz;

In this entry the terms “civil aircraft” and “civil helicopters” include only those types

	of civil aircraft and civil helicopters which are listed by designation in published airworthiness certification lists by any civil aviation authority to fly commercial civil internal and external routes or for normal civil, private or business use.	
IL1502	Communication, detection or tracking equipment of a kind using ultra-violet radiation, infrared radiation or ultrasonic waves, and specially designed components and specially designed software therefor except— ultrasonic devices which operate in contact with a controlled material to be inspected, or which are used for industrial cleaning, sorting or materials handling, industrial and civilian intrusion alarm, traffic and industrial movement control and counting systems, medical applications, emulsification, homogenisation, or simple educational or entertainment devices; For the purpose of this exception— "simple educational devices" are devices designed for use in teaching basic scientific principles and demonstrating the operation of those principles in educational institutions. underwater ultrasonic communications equipment designed for operation with amplitude modulation and having a communications range of	C

500 m or less (Sea State 1), a carrier frequency of 40 to 60 kHz and a carrier power supplied to the transducer of 1 W or less;

the following equipment—

(a) industrial equipment employing cells not specified in the entry IL1548;

(b) industrial and civilian intrusion alarm, traffic and industrial movement control and counting systems;

(c) medical equipment;

(d) industrial and civilian intrusion alarm, traffic and industrial movement control and counting systems;

(e) simple educational or entertainment devices which employ photo cells;

(f) flame detectors for industrial furnaces;

(g) equipment for non-contact temperature measurement for laboratory or industrial purposes utilsing a single detector cell with no scanning of the detector

(h) instruments capable of measuring radiated power or energy having a response time constant exceeding 10 ms;

(i) equipment designed for measuring radiated power or energy for laboratory, agricultural or industrial purposes using a single detector cell with no scanning of the detector cell assemblies or probes specially designed therefor having a response time constant exceeding 1 microsecond;

(j) infrared geodetic equipment, provided that equipment uses a lighting source other than a laser and is manually operated or uses a lighting source (other than a laser or a light emitting diode) remote from the measuring equipment;

the following equipment—

(a) infrared thermal imaging equipment having all the following characteristics:

(1) the detector is a single element;

(2) the detector is neither a charge coupled device (CCD) nor an integrate-while-scan device;

(3) the detector is either:

(i) not cooled; or

(ii) cooled by using a liquid nitrogen Dewar vessel; and

(4) the equipment is:

(i) non-ruggedised, medical equipment; or

(ii) has both of the following:

(a) a resolution not exceeding 22,500 resolvable elements; and

(b) a Noise Equivalent Temperature Diofference (NETD) (or temperature sensitivity) of no less than 0.1°C;

(b) infrared viewing equipment having all the following characteristics:

(1) the detector is a pyroelectric vidicon without reticle;

(2) the equipment is designed for fire fighting and buried body detection; and

(3) the optimal sensitivity

is in the wavelength range from 8 to 14 micrometers

Note:

This entry includes infra red or ultra-violet sensing devices not specified in Group 1 of this Schedule and which contain image intensifiers specified in entry IL1555 in this Group.

IL1510	Marine or terrestrial acoustic or ultrasonic systems or equipment specially designed for positioning surface vessels or underwater vehicles, or for detecting or locating underwater or subterranean objects or features and specially designed components of such systems or equipment, including but not limited to hydrophones, transducers, beacons, towed hydrophone arrays, beamformers and geophones and specially designed software therefor	C

except—

Marine systems or equipment, the following—

(A) active (transmitting, or transmitting and receiving) systems or equipment, including but not limited to depth sounders and fish-finders and their associated beamformers, the following:

(1) depth sounders used solely for measuring the depth of water or the

distance of submerged or buried objects vertically below the apparatus;

(2) horizontally-operated object detection or location systems having all of the following characteristics:

(a) transmitting frequency of 15 kHz or greater;

(b) sound pressure level less than 250 dB (reference 1 micropascal at 1 metre) for equipment with operating frequency between 15 and 30 kHz, with no decibel limitation for equipment operating at frequencies of 30 kHz or higher;

(c) transmission capaability limited to ±10 per cent of the dsign centre frequency;

(d) not designed to withstand pressure during normal operation at depths greater than 1,000 metres;

(e) displaying a range of 5,000 metres or less;

(3) electronic noise sources for vertically directional use only, or mechanical (eg air gun or vapour-shock gun) or chemical noise sources;

(4) acoustic systems or equipment for positioning surface vessels or underwater vehicles, provided that:

(a) their control capability is limited to release and basic transponder capabilities;

(b) they are not capable of processing responses from more than four beacons in the calculation of a single point, and have neither devices nor software for correcting automatically velocity-of-propagation errors for point calculation, nor any coherent signal processing means;

(c) they are capable only of operating within a range of less than 1,000 metres or, if capable of operating beyond the range of more than 1,000 metres, are not capable of achieving positional accuracy of better (less) than 20 metres when measured at a range of 1,000 metres;

(d) transducers, acoustic modules or hydrophones therefor are not designed to withstand pressure during normal operation at depths greater than 1,000 metres; and

(e) beacons therefor are not designed to withstand pressure during normal operation at depths greater than 1,000 metres, do not have oscillators with a stability greater than 10^{-5} over periods of 24 hours, and do not use complex codes or beamformers which have shaded or formed beams;

(B) passive (receiving, whether or not related in normal application to separate active equipment) acoustic hydrophones or transducers having all of the following characteristics:

(1) independently mounted or configured and not reasonably capable of assembly by the user into a towed hydrophone array;

(2) incorporating sensitive

elements made of piezoelectric ceramics or crystal:

(a) with a sensitivity no better than −180 dB (referenct 1 volt per micropascal) when not designed for operation at depths of more than 100 m and not acceleration compensated;

(b) with a sensitivity no better than −192 dB (reference 1 volt per micropascal) when not designed for operation at depths of more than 100 m;

(c) with a sensitivity no

better than −204 dB (reference 1 volt per micropascal) when not designed for operation at depths of more than 1000 m.

Terrestrial systems or equipment having both the following characteristics—

(a) not reasonably capable of conversion by the user to underwater or marine applications specified in this entry;

(b) not employing geophones or other transducers specified in this entry.

Moving Coil or moving magnet electromagnetic geophones.

IL1514	Pulse modulators capable of providing electric impulses of peak power exceeding 20 MW or of a duration of less than 0.1 microsecond, or with a duty cycle in excess of 0.005; and pulse transformer, pulse-forming equipment or delay lines being specially designed components for such modulators	C
IL1516	Receivers, the following: and specially designed components, accessories and	

	specially designed software therefor—	
(a)	(a) Panoramic radio receivers (which search or scan automatically a part of the electromagnetic spectrum and indicate or identify the received signals) except ancillary equipment for commercial receivers with which the frequency searched does not exceed a bandwidth of 20 MHz or does not incorporate a raster or storage display capability	C
(b)	(b) Digitally-controlled radio receivers, whether or not computer controlled, which search or scan automatically a part of the electromagnetic spectrum, in which the switching operation takes less than 10 milliseconds, and which indicate or identify the received signals, except non-ruggedized, digitally-controlled pre-set type radio receivers designed for use in civil communications which have 200 selective channels or fewer	C
(c)	(c) Receivers for spread spectrum and frequency agile systems having a total transmitted	

bandwidth which is—

(1) 100 or more items greater than the bandwidth of any one information channel; and

(2) in excess of 50 kHz C

(d) (d) Receivers which incorporate digital signal processing C

except receivers specially designed for internationally allocated civil frequency bands only and where digital signal-processing circuits are not user accessible programmable.

In this entry—

"spread spectrum" means as the technique whereby energy in a relatively narrow-band communication channel is spread over a much wider energy spectrum under the control of a random or pseudo-random bit stream. On receipt, the signal is correlated with the same bit stream to achieve the reverse process of reducing the bandwidth to its original form. By allocating different bit streams to different subscribers transmitting simultaneously, significantly greater use can be made of available bandwidth.

"Frequency agility" (or "frequency hopping") is a system in which the transmission frequency of a single communication channel is made to change by discrete steps under the control of a similar bit stream.

IL1517	Radio transmitters, the following: and specially designed components therefor—	
	(a) (a) Transmitters or transmitter-amplifiers designed to operate at output frequencies greater than 960 MHz	C
	(b) (b) Transmitters or transmitter-amplifiers designed to provide any of the following features—	
	(1) any system of pulse modulation (this does not include amplitude, frequency- or phase-modulated televisions or telegraphic transmitters or pulse-width modulated sound broadcasting transmitters)—	C
	(2) rated for operation over a range of ambient temperatures extending from below −40°C to above +60°C	C
	(c) (c) Transmitters for spread spectrum and frequency agile systems having a total transmitted bandwidth which is—	
	(1) 100 or more times greater than the bandwidth of any one information channel; and	

(2) in excess of 50 kHz;

There shall be excluded from this entry transmitters or transmitter-amplifiers, or systems containing such equipment, accessories and sub-assemblies therefor, with any of the following characteristics—

(a) specially designed for medical applications and operating at ISM frequencies;

(b) having an output power of not more than 10 W, which are specially designed for—

(1) industrial or civil intrusion detection and alarm;

(2) industrial and traffic detection, counting, speed measurement, identification and movement control;

(3) carrying information from equipment within paragraph (a) or (b)(1) or (b)(2) to this exception or the information from environmental, air or water pollution detection or measurement systems.

(c) transmitters using wideband amplifiers designed for non-frequency agile civil applications.

For the purposes of this entry "spread spectrum" and "frequency agile" are as defined in entry IL1516 above.

PL7003	Burst transmitters and associated receiving equipment	W

	(except simple on-line morse or other data signal convertors or standard items of ADP equipment) and specialised assemblies, sub-assemblies and components therefor In this entry a "burst transmitter" is any electronic equipment or device for use with radio or other communications systems, whether part of a transmitter or modulation device or ancillary to it, which has a capability to accept and store data (telegraphic, speech or other) and to transmit these at transmission speeds/bit rates which are multiples of the input keying speed/bit rates, the purpose or effect of which is to reduce total message duration time and thus to evade detection by other than the intended recipient.	
IL1518	Telemetering and telecontrol equipment suitable for use with aircraft (piloted or pilotless), space vehicles or weapons (guided or unguided), and specially designed test equipment therefor except equipment specially designed to be used for remote control of toys such as model planes and boats and having electric field strength of not more than 200 microvolts per metre at a distance of 500 metres.	C
IL1519	Telecommunication transmission equipment and measuring and test equipment, the following: and specially designed components and specifically designed software therefor— (a) Telecommunication transmission equipment employing digital techniques (including	

the digital processing of analogue signals) and having at least one of the following characteristics—

(1) designed for a total digital transfer rate which, at the highest multiplex level, exceeds—

(a) 45 million bits/s (including when designed for underwater use); or	C
(b) 8.5 million bit/s for stored programme controlled digital crossconnection equipment	C

Note:

In the case of—

(a) line terminating equipment;

(b) intermediate amplifier equipment;

(c) repeater equipment;

(d) regenerator equipment; or

(e) translation encoders (transcoders);

"90 million bit/s" shall be substituted for "45 million bit/s" in heading (a)(1)(a) above.

(2) designed for a data signalling rate which exceeds—

(a) 1,200 bit/s when:	C

(i) employing an automatic error detection and correction system; and

(ii) retransmission is not required for correction;

(b) 9,600 bit/s when using the bandwidth of one voice channel or	C
(c) 64,000 bit/s when using baseband	C
(b) (b) Electronic measuring or test equipment specially designed for the equipment specified in the sub-head (a)(1) above	C

except—

(a) telemetering, telecommand and telesignalling equipmemt designed for industrial purposes, and data transmission equipment not intended for the transmission of written or printed text;

(b) facsimile equipment other than the equipment specified in entry IL1527 in this Group;

(c) equipment employing exclusively the direct current transmission technique.

In this entry—

“bandwidth of one voice channel”—

in the case of data communication equipment designed to operate in one voice channel of 3,100 Hz, has the same meaning as in CCITT Recommendation G.151;

“data signalling rate”—

as defined in ITU Recommendation 53–56, taking into account that, for non-binary modulation "baud" and "bit per second" are not equal. Bits for coding, checking and synchronisation functions are to be included;

"telecommunication transmission equipment" means one or more of the following items of equipment:

(a) (1) line terminating equipment;
(2) intermediate amplifier equipment;
(3) repeater equipment;
(4) regenerator equipment;
(5) translation encoders (transcoders);
(6) multiplex equipment;
(7) modulators/demodulators (modems);
(8) transmultiplex equipment (see CCITT Rec. G701);
(9) stored programme controlled digital crossconnection equipment;

(b) which is designed for use in single or multi-channel communication via:
(1) wire (line);
(2) coaxial cable;
(3) optical fibre cable; or
(4) radio.

IL1520	Radio relay communication equipment, specially designed test equipment and specially

designed software, the following and specially designed components and accessories therefor—

(a) (a) Radio relay communication equipment designed for use at frequencies exceeding 960MHz excluding technology excluded from head (c) below C

except—

(i) microwave radio links for fixed civil installations operating at fixed frequencies not exceeding 19.7 GHz, employing analogue transmission with a capacity of up to 2,700 voice channels of 3 kHz each or of a television channel of 6 MHz maximum nominal bandwidth and associated sound channels;

(ii) microwave radio links for fixed civil installations operating at fixed frequencies not exceeding 19.7 GHz, employing digital transmission techniques designed for operation at a total bit rate not exceeding 8.5 million bit/s;

(iii) ground communication radio equipment for use with temporarily fixed services operated by the civilian authorities and designed to be used at fixed frequencies not exceeding 15 GHz with a power output of not more than 5 W;

(iv) TV-receive-only (TVRO) stations for satellite reception specially designed for use at fixed frequencies meeting ITU standards in civil television or sound radio systems in the following frequency ranges—

(1) S-band:	2.5–2.69 GHz
(2) C-band:	3.4–4.2 GHz
	4.5–4.8 GHz
(3) Ku- and Ka-band:	10.7–12.75 GHz

(v) equipment specially designed for the transmission of television signals

(1) between camera and studio or between studio and television transmitter; and

(2) not exceeding a line-of-site distance with respect to any one installation;

(vi) equipment specially designed to be installed and operated in communication satellite earth stations using—

(1) INTELSAT;
(2) MARISAT;
(3) EUTELSAT; or
(4) INMARSAT;

(b)	(b) Stand-alone radio transmission media simulators/ channel estimators and specially designed software therefor, specially designed for testing equipment specified in head (a) above, except those in which the adjustments are only made manually	C
(c)	(c) Technology for equipment specified in head (a) above, employing quadrature amplitude-modulation, (QAM) techniques	D

except—
technology for installation, operation or maintenance.

(d)	(d) Technology for equipment specified in the exception (vi) to head (a) above	D

except—
technology for installation, operation or maintenance.

There shall be excluded from this entry—

equipment for civil television transmission or for general commercial traffic or technology for the installation, maintenance, and operation thereof, provided—

(a) the equipment is not designed for operation at a total bit rate exceeding 45 million bits/s; and
(b) the equipment does not employ quadrature-amplitude-modulation (QAM) techniques;

equipment for civil industrial use including telephone channels for the operation of such networks and the engineering service circuits required for the maintenance of telecommunication links or technology for the installation, maintenance and operation thereof, provided that—

(a) microwave radio links employing analogue transmission techniques have a capacity not exceeding 2,700 voice channels of 4 kHz each;
(b) microwave radio links employing digital transmission techniques operate a a frequency not exceeding 19.7 GHz and are designed to operate at a total digital bit rate not exceeding 45 million bit/s; and
(c) the equipment does not employ quadrature-amplitude-modulation (QAM) techniques.

PL7008	Tropospheric scatter communication equipment using analogue or digital modulation techniques	L, I
IL1521	Solid-state amplifiers the following: and specially designed components and accessories therefor—	
	(a) (a) Amplifiers exceeding a maximunm output power of 2 kW at operating frequencies between 10 and 35 MHz inclusive	C
	(b) (b) Amplifiers exceeding a maximum output power of 50 W at operating frequencies between 35 and 400 MHz	C
	(c) (c) Amplifiers where the product of the maximum output power times the maximum operating frequency is more than 2×10^{10} WHz at operating frequencies above 400 MHz	C
	except solid state amplifiers which— are specially designed for community television distribution systems; or have a bandwidth of 10 MHz or less. In this entry “bandwidth” means the range of freuencies over which the power amplification does not drop to less than one half of its maximum value.	
IL1522	Lasers and equipment containing lasers, the following—	

(a) (a) Lasers, and specially designed components therefor, including amplification stages C

except, save when specially designed for equipment specified in head (b) below, the following—

(i) argon, krypton or non-tunable dye lasers having one of the following sets of characteristics—

(1) an output wavelength between 0.2 to 0.8 micrometre, a pulsed output energy not exceeding 0.5 joule per pulse and an average or continuous wave maximum rated single- or multi-mode output power not exceeding 20W; or

(2) an output wavelength between 0.8 and 1.0 micrometre, a pulsed output energy not exceeding 0.25 joule per pulse and an average or continuous wave maximum rated single- or multi-mode output power

not exceeding 10 watts;

(ii) helium-cadmium, nitrogen and multigas lasers not elsewhere specified in this head with both of the following characteristics—

(1) an output wavelength shorter than 0.8 micrometre;

(2) a pulsed output not exceeding 0.5 joule per pulse and an average or continuous-wave maximum rated single- or multi-mode output power not exceeding 120 watt;

(iii) helium-neon lasers with an output wavelength shorter than 0.8 micrometre;

(iv) ruby-lasers with both of the following characteristics—

(1) an output wavelength shorter than 0.8 micrometre;

(2) an energy output not exceeding 20 joules per pulse;

(v) CO_2, CO or CO/CO_2 lasers having either of the following characteristics—

(1) an output wavelength in the range of 9 to 11 micrometres and a pulsed output energy not exceeding 2 joules per pulse and a maximum rated average single- or multi-mode output power not exceeding 1.2 kW or a continuous-wave maximum rated single- or multi-mode output power not exceeding 5.0 kW; or

(2) an output wavelength in the range of 5 to 7 micrometres and having a continuous-wave maximunm rated single- or multi-mode output power not exceeding 50 watts;

(vi) Nd:YAG lasers having an output wavelength of 1.064 micrometres with any of the following characteristics—

(1) a pulsed output not exceeding 0.5 joule per pulse and maximum rated average

single- or multi-mode output power not exceeding 10 watts or a continuous-wave maximum rated single- or multi-mode output power not exceeding 50 watts;

(2) a pulsed output not exceeding 10 joules per pulse with a pulse width not less than 50 microseconds and a maximum rated average single- or multi-mode output power not exceeding 50 watts;

(3) a pulsed output not exceeding 1.5 joules per pulse, a maximum rated average single- or multi-mode output power not exceeding 25 W, and used for pumping tunable pulsed dye lasers specified in (ix) below;

(vii) Nd:Glass lasers with both of the following characteristics—

(1) an output wavelength in the range of 1.05 to 1.06 micrometres; and

(2) a pulsed output not exceeding 2 joules per pulse;

(viii) tunable CW dye lasers, with both of the following characteristics—

(1) an output wavelength shorter than 0.8 micrometre; and

(2) an output not exceeding an average or continuous-wave maximum rated single- or multi-mode output power of 1 W;

(ix) tunable pulsed lasers (for argon and krypton lasers, see exception (i) to head (a) above), including dye, having all of the following characteristics—

(1) an output wavelength between 0.15 and 0.8 micrometre;

(2) a pulse duration not exceeding 100 nanoseconds;

(3) a pulsed output energy not exceeding

0.5 jule per pulse; and

(4) an average power not exceeding 10 watts;

(x) single-element semiconductor lasers with a wavelength shorter than 1 micrometre designed for, and used in, equipment excluded by paragraph (xiii), (xiv), (xix) or (xx) to head (b) below;

(xi) secmiconductor lasers having—

(1) an output wavelength no longer than 1,000 nm; and

(2) a continuous wave (CW) output power not exceeding 100 mW;

(xii) uncooled, unsegmented mirrors with glass or dielectric substrates for use as end reflectors for laser resonators;

(b)	(b) Equipment containing lasers, and specially designed components therefor	C

except the following equipment containing lasers of the types excluded from head (a) above—

(i) specially designed for industrial and civilian intrusion detection and alarm systems;

(ii) specially designed for medical applications;
(iii) equipment for educational and laboratory purposes;
(iv) specially designed for traffic and industrial movement control and counting systems;
(v) specially designed for detection of environmental pollution;
(vi) optical spectrometers and densitometers;
(vii) equipment containing continuous-wave helium-neon gas lasers (but see head (c) below);
(viii) textile-cutting and textile-bonding equipment;
(ix) paper-cutting equipment;
(x) equipment containing lasers for drilling diamond dies for the wire drawing industry;
(xi) electronic scanning equipment with auxiliary electronic screening unit specially designed for printing processes, including such equipment when used for the production of colour separations;
(xii) laser-radar (lidar) equipment specially designed for surveying or

meteorological observation;

(xiii) consumer-type reproducers for video and audio discs, employing non-erasable media;

(xiv) price scanners (point of sale);

(xv) equipment designed for surveying purposes, provided there is no capabiity of measuring range;

(xvi) equipment specially designed for the marking of components;

(xvii) specially designed gravure (printing plate) manufacturing equipment;

(xviii) equipment specially designed for visual entertainment purposes (laser light shows) provided it has no holographic capability;

(xix) electronic printers, including those capable of being used with digital computers, which have a capacity not exceeding 2,000 lines (30 pages) per minute or 300 characters per second;

(xx) electronic copiers, including those capable of being used with digital computers, which have a capacity not exceeding 30 pages per minute and which do not include any of the following—

(1) Optical Character Recognition (OCR) equipment which is not excepted from control by exception (h)(2)(iv)(k) of the entry IL1565 in Group 3G;

(2) digitising equipment which is not excepted from control by exception (h)(2)(iv)(b) in the entry IL1565 in Group 3G;

(3) image enhancement capability;

(c) (c) Measuring systems which have both of the following characteristics C

(i) contain a laser; and

(ii) maintain for at least 48 hours, over a termperature range of ±10K around a standard temperature and at a standard pressure—

(1) a resolution over their full scale of ±0.1 micrometre or better; and

(2) an accuracy of ±1 part per million or better;

(d) (d) Particle measuring systems employing helium-neon lasers, designed C for measuring particle size and concentration in gases, which have both of the following characteristics—

(i) capable of measuring particle sizes of 0.3 micrometre or less; and

(ii) capable of characterising Class 10 clean air or better.

In this entry—

“tunable” refers to the ability of a laser to produce an output at any wavelength within its tuning range. A line-selectable laser which can operate only on discrete wavelengths is not tunable.

the term “specially designed components” includes active and passive components in semi-fabricated forms as well as in fabricated forms;

a “laser” is an assembly of components designed to produce a coherent light which is amplified by stimulated emission of radiation;

“equipment containing lasers” means that the equipment uses coherent light for a certain application.

IL1526	Optical fibres, optical cables and other cables and components and accessories, the following—	
	(a) (a) Unarmoured or single-armoured ocean cable having an attenuation of 1.62 dB/km (3.0 kB per nautical mile) or	C

	less, measured at a frequency of 600 kHz	
(b)	(b) Optical-fibre communication cable or optical fibres therefor, having any of the following characteristics—	
(1)	the optical fibre is designed for single mode light propagation	C
(2)	the optical fibre—	
	(i) is designed for multimode light propagation; and	
	(ii) has an attenuation of less than 1.0 kB/km at a wavelength of 1300 nm	C
(3)	the optical fibre is capable of withstanding a proof test tensile strength of 1.1×10^9 N/m^2 or more	C
(4)	the optical fibre is specially designed for underwater use or	C
(5)	the optical fibre is specially designed to be insensitive to nuclear radiation	C
(c)	(c) Optical fibres for sensing purposes, having any of the following characteristics—	
(1)	specially fabricated either compositionally or structurally, or modified by coating to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive	C

(2) modified structurally or by coating to have either—

(i) a beat length of more than 50 cm (low birefringence), except if designed for operation at wavelengths of less than 650 nm; or

(ii) a beat length of less than 5 cm (high birefringence) C

(d) (d) Secure communication cable, being either coaxial or multiconductor communication cable protected by mechanical or electrical means from physical damage or intrusion in such a manner that communications security is maintained between terminals without the necessity for encryption C

except cable which is armoured only by either a tough outer sheath or by an electromagnetic screen

(e) (e) Components and accessories specially designed for the optical fibres or cable specified in this entry including fibre-optic bulkhead or hull penetration connectors impervious to leakage at any depth for use in ships C

	or vessels, and multiport fibre-optic couplers (including T, star, bidirectional and wavelength division multiplexing and demultiplexing couplers)	
	except connectors for use with optical fibres or cable with a repeatable coupling loss of 0.5 dB or more.	
	In this entry— "beat length" means the distance, over which two orthogonally polarised signals, initially in phase, must pass in order to achieve 2 Pi radian(s) phase difference; "proof test" consists of on-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3 m length of fibre at a running rate of 2 to 5 m/s while passing between capstans approximately 15 cm in diameter. The ambient temperature is a nominal 20°C and relative humidity 40%	
IL1527	Cryptographic equipment designed to ensure secrecy of communications (such as telegraphy, telephony, facsimile, video, and data communications) or of stored information; and specially designed components therefor, and software controlling or computers performing the functions of such cryptographic equipment	C
	except simple cryptographic devices or equipment ensuring only the privacy	

of communications, the following—

(a) equipment for voice transmission making us of fixed frequency inversions of fixed band scrambling techniques in which the transposition changes occur not more frequently than once every 10 seconds;

(b) standard civil facsimile and video equipment designed to ensure the privacy of communications by an analogue transmission using non-standard practices for intended receivers only (video system equipment effecting the transposition of analogue data);

(c) video systems for pay televsion and similar restricted audience television, including industrial and commercial television equipment using other than standard commercial sweep systems.

Note 1. This entry includes video systems which, for secrecy purposes, use digital techniques (conversion of an analogue, ie video or facsimile signal into a digital signal).

Note 2. Digital computers and digital differential analysers (incremental computers) designed or modified for, or combined with, any cypher machines, cryptographic equipment devices or techniques including software, microprogramme control (firmware).

IL1529	Electronic equipment and instruments for testing, measuring (e.g. time interval measurement), calibrating or counting, or for microprocessor/microcomputer development, the following: and specially designed software therefor—	
	(a) Equipment, the following—	
	(1) equipment designed as reference frequency standards for laboratory use and having either of the following characteristics—	
	(i) a long-term drift (ageing) over 24 hours or more of 1 part in 10^{10} or better	C
	or	
	(ii) a short-term drift (stability) over a period from1 to 100 seconds of 1 part in 10^{12} or better	C
	(2) equipment containing frequency standards having any of the following characteristics—	
	(i) designed for mobile use and having a long-term drift (ageing) over 24 hours or more of 1 part in 10^9 or better	C
	(ii) designed for fixed ground use and having a long term drift (ageing) over 24 hours or more of 5 parts in 10^{10} or better or	C

(iii) a short-term drift (stability) over a period from 1 to 100 seconds of 1 part in 10^{12} or better	C
(b) (b) Instruments, the following—	
(1) instruments designed for use at frequencies exceeding 18 GHz	C
(2) comb frequency generators designed and rated for use at frequencies exceeding 12.5 GHz	C
(3) instruments designed for use at frequencies exceeding 1 GHz, the following—	
(i) swept-frequency network analyzers for the automatic measurement of complex equivalent circuit parameters over a range of frequencies	C
(ii) specially calibrated microwave instrumentation receivers capable of measuring amplitude and phase simultaneously	C
(iii) automatic frequency (heterodyne) converters and transfer oscillators	C
(iv) instruments in which the functions can be controlled by the injection of digitally-coded electrical signals from an external source	C
(4) instruments having both of the following characteristics—	C

(i) user-accissible programmability, and

(ii) a user-alterable programme and data storage of more than 65,536 bit

except either of the following types—

(1) instruments where the user-accessible programmabillity is limited to—

(a) the replacement of fixed storage devices (e.g. ROMs) which are not specified in this Schedule; or

(b) the selection of pre-programmed functions from a menu;

or

(2) instruments which—

(a) have been designed for nonstrategic use and by nature of design, software mocroprogramme control, specialised logic control (hardware) or performance are substantially restricted to the particular application for which they have been designed; and

(b) are not specified elsewhere in this entry.

(5) test instruments with user-accessibile programmability and having any of the following characteristics—

(i)	specially designed to examine or compare one or more binary coded streams of electrical signals	C
(ii)	a maximum sampling rate of more than 100 MHz	C
(iii)	a maximum of more than 32 channels excluding a maximum of 6 qualifier channels	C
(iv)	a figure of merit of more than 400	C
(v)	a capability of state coupled timing analysis (ie synchronized mode state/timing analysis)	C
(vi)	a total acquisition memory for word storage exceeding 32,768 bit with an acquisition memory for bit storage per channel exceeding 1,024 bit;	C

or

(vii)	a total acquisition memory for word storage exceeding 16,384 bit with an acquisition memory for bit storage per channel exceeding 2,024 bit	C

except—

(a) logic probes, logic pulsers, digital current tracers (current sniffers), signature analysers and other digital circuit testers for observing single events or providing stimuli at single test points;

(b) logic clips and logic comparators;

(c) digital word generators capable of operating at a maximum clock rate of 2 MHz or less with word lengths of 8 bit or less;

(6) microprocessor or microcomputer development instruments or systems, capable of developing software for, or capable of, programming microcircuits specified in the entry IL 1564 in this Group — C

except—

microprocessor or microcomputer development instruments or systems which can be used to develop software for, or to programme, a family of microprocessor microcomputer microcircuits not designed or produced in a country listed in Schedule 2 provided that—

(a) the instruments or systems can be used only for microprocessor or microcomputer microcircuits having an operand (data) word length of less than or equal to 8 bit and not having an arithmetic logic unit (ALU) wider than 8 bit; and

	(b) the family contains at least one microprocessor or microcomputer microcircuit and which is not specified in the entry IL 1564 in this Group.	
	(c) (c) Digital counters, the following—	
(1)	those capable of counting successive input signals with less than 5 nanoseconds time difference without prescaling (digital division) of the input signal Note: for counters or timers having a time interval measurement mode see also head (d) below	C
(2)	those employing prescaling of the input signal, in which the prescaler is capable of resolving successive input signals with less than 1 nanosecond time difference	C
(3)	those capable of measuring burst frequencies exceeding 100 MHz for a burst duration of less than 5 milliseconds	C
	(d) (d) Time interval measuring equipment employing digital techniques, capable of measuring time intervals of less than 5 nanoseconds on a single shot basis	C
	(e) (e) Testing equipment rated to	C

maintain specified operating data when operting over a range of ambient temperatures from below −25°C to above +55°C

(f) (f) Digital voltage measuring apparatus, with or without electrical outputs, irrespective of the physical units in which calibrated, with a reading speed (from zero to the measured value) faster than 25 accesses per second and having any of the following characteristics—

(1)	a digital resolution at all points on the scale greater than one part in 200,000	C
(2)	an accuracy, measured without reference to an external standard, better than 1 part in 50,000 (0.002%) of reading over an ambinet temperature range of ±5°C or more, or a stability better than 10^{-6} of reading over a period of 24 hours or more	C
(3)	capable of more than 500 independent measurements per second	C

except—

(a) visual quantization apparatus capable pof providing an average value, displayed or not, of the results of the measurement;

(b) multichannel analyzers of

all types used in nuclear experimentation;

(c) industrial telemeasuring devices in which a pre-set storage value is used as a basis for measuring.

(g)	(g) Transient recorders, utilizing analogue-to-digital conversion techniques, capable of storing transients by sequentially sampling single input signals at successive intervals of less than 50 nanoseconds	C

In this entry—

a "family" means a group of microprocessor or microcomputer microcircuits which have:

(a) the same architecture;
(b) the same basic instruction set; and
(c) the same basic technology (e.g. only NMOS or only CMOS);

"figure of merit" means the product of the maximum sampling rate in MHz and the number of input channels excluding qualifier channels;

"manufacturer" means the individual or organisation designing the instrument for the intended application (in contrast to an individual or organisation merely programming an instrument at, or in accordance with, a user's request);

"comb frequency generators" means devices which generate a spectrum of harmonics;

"swept-frequency network analyzers" means the automatic measurement of equivalent circuit parameters over a range of frequencies. This involves swept-frequency measurement techniques but not CW point-to-point measurements;

"amplitude and phase receivers" means instruments capable of measuring the amplitude of a microwave signal or the amplitude of two microwave signals and the relative phase between them. (The principal application of these instruments is the measurement of near and far zone phase and amplitude antenna patterns. They can also be used for measurement of microwave device and components characteristics. In general, they are more sophisticated and sensitive (better than −100 dBm) than phase and impedance measuring instruments such as RF vector impedance meters and vector voltmeters. They also feature wide dynamic range (80 dB) and very good linearity (approximately ±0.25 kB).);

"frequency (heterodyne) converters" means instruments which down convert an unknown frequency by mixing with an accurately known frequency. The accurately known frequency is developed by multiplication of a crystal-derived reference which is passed through a harmonic generator. By mixing the appropriate harmonic and the unknown frequencies, an accurate third frequency results;

"transfer oscillators" means instruments which can be based on the property of harmonic mixing. Differences exist in that a local oscillator is utilized whereas a crystal-derived reference frequency is utilized in the case of heterodyne converters. The unknown frequency is mixed with the local oscillator (LO) and the two are phase-locked by tuning the LO. The LO can then be measured by a counter;

"user-accessible programmability" means the facility allowing a user to insert, modify or replace programmes by means other than:

(a) a physical change in wiring or interconnections; or
(b) the setting of function controls including entry of parameters;

"burst frequency measurement" counters contain special gating circuits which start only when the input signal is present and stop counting at the completion of the burst;

"pulse frequency profiling" means the capability of measuring the changes of frequency (or phase) within a pulse as a function of time; such changes in frequency would be present in a transmitted pulse-compression radar pulse ("chirp radar"). This profiling may be achieved by internal or external gating. Pulse frequency profiling does not include frequency

	modulation tolerance while it is being frequency modulated.	
IL1531	Frequency synthesizers and equipment containing such frequency synthesizers, and specially designed components and accessories therefor, the following—	
	(a) (a) Frequency synthesizers containing frequency standards specified in head (a) in the entry IL 1529 in this Group or temperature-compensated crystal oscillators specified in head (c) to the entry IL 1587 in Group 3G	C
	(b) (b) Instrument frequency synthesizers and synthesized signal generators, and specially designed components and accessories therefor, designed for ground use, producing output frequencies whose accuracy and short and long-term stability are controlled by, derived from, or disciplined by the input frequency or internal master standard frequency, and having any of the following characteristics—	
	(1) a maximum synthesized output frequency of more than 550 MHz	C
	(2) any of the following noise characteristics—	
	(i) a single sideband (SSB) phase noise	C

	better than −120 dBc/Hz when measured at a 20 kHz offset from the carrier frequency	
(ii)	a single sideband (SSB) phase noise better than −106 dBc/Hz when measured at a 100 Hz offset from the carrier frequency	C
(iii)	an integrated phase noise better than −60 dBc/Hz referred to a 30 kHz band centred on the carrier and excluding ths 1 Hz band centred on this carrier or	C
(iv)	an integrated AM phase noise better than −70 dB/Hz referred to a 30 kHz band centred on the carrier and excluding the 1 Hz band centred on this carrier	C

except—

synthesized signal generators specified in sub-heads (b)(1) or (b)(2)(i) above having a maximum synthsized output frequency of 1,400 MHz or a single sideband phase noise of not less than −136 kBc/Hz when measured at an offset of 20 kHz from a carrier frequency of 100 MHz, provided the technology supplied is the minimum necessary for the use of such generators.

(3)	electrically programmable in	C

	frequency (in that the output frequency can be controlled or selected by the injection of digitally coded electrical signals from an external control source) with a frequency switching time of less than 10 milliseconds	
(4)	electrically programmable in phase (in that the phase of the output frequency can be varied relative to the internal or external reference standard, or selected in accordance with an externally supplied code or signal with a switching speed from one selected phase value to another of less than 10 milliseconds) except equipment incorporating pre-emphasis networks for frequency modulation	C
(5)	having a level of spurious components in the output, measured relative to the selected output frequency better than;	
	(i) −60 dB harmonic; or	C
	(ii) −92 kB non-harmonic	C
(6)	having more than three different selected synthesized output frequencies available simultaneously from one or more outputs	C
(7)	with facilities for pulse modulation of the output frequency	C
	(c) (c) Airborne communication equipment using frequency synthesizers, the following: and	

specially designed components and accessories therefor—

(1)	equipment designed to receive or transmit frequencies greater than 156 MHz	C
(2)	equipment incorporating facilities for the rapid selection of more than 200 channels per equipment, except equipment operating in the frequency range of 108 to 137 MHz incorporating facilities for the rapid selection of 760 channels or fewer at not less than 25 kHz channel spacing, which have been in normal civil use for at least one year	C
(3)	equipment with a frequency switching time of less than 10 milliseconds	C
(4)	frequency synthesizers, designed for airborne communication equipment, whether supplied separately or with the said equipment, exceeding any of the parameters referred to in head (b) above	C

(d) (d) Digitally-controlled radio receivers, whether or not computer-controlled, which search or scan automatically a part of the electromagnetic spectrum, using frequency synthesizers, the following and specially designed components and accessories therefor—

(1)	digitally-controlled receivers in which the switching operation takes less than 10 milliseconds, (except non-ruggedized digitally-controlled preset type radio receivers designed for use in civil communications, which have 200 selective channels or fewer)	C
(2)	frequency synthesizers designed for digitally controlled radio receivers whether supplied separately or with the said receiver, exceeding any of the parameters in head (b) above	C

except those specially designed for receivers excepted from sub-head (d)(1) above or those specially designed for use in tuners for entertainment type receivers.

(e) (e) Radio transmitters incorporating transmitter drive units, exciters and master oscillators using frequency synthesis, the following: and specially designed components and accessories therefor—

(1)	those having an output frequency of up to 32 MHz with a frequency resolution of better than 10 Hz and with a frequency switching	C

	time of less than 10 milliseconds	
(2)	those having an output frequency from 32 MHz to 235 MHz with a frequency resolution of better than 250 Hz and with a frequency switching time of less than 10 milliseconds	C
(3)	those having an output frequency of more than 235 MHz	C

except—

(i) television broadcasting transmitters having an output frequency from 470 MHz to 960 MHz with a frequency resolution of not better than 1 kHz and where the manually-operated frequency synthesizer incorporated in or driving the transmitter has an output frequency not greater than 120 MHz;

(ii) FM and AM ground communication equipment for use in the land mobile service and operating in the 420 to 470 MHz band, with a power output of 50 W or less for mobile units and 300 W or less for fixed units, with a frequency resolution of not better than 6.25 kHz and with a frequency switching time of more than 50 milliseconds;

(iii) portable (personal) or mobile radiotelephones for civil use, eg for use with commercial civil cellular radiocommunications systems having all of the following characteristics—

(a) operating in the 420 to 960 MHz range;

(b) a power output of 25 W or less; and

(c) a frequency switching time of 10 ms or more.

(4) those having more than three different selected synthesized output frequencies available simultaneously from one or more outputs C

(5) those with facilities for pulse modulation of the output frequency of the transmitter or of the incorporated frequency synthesizer C

(6) those frequency synthesizers designed for the above equipment, whether supplied separately or with the said equipment, exceeding any of the parameters referred to in head (b) above C

There shall be excluded from this entry—

equipment in which the output frequency is produced by the addition or subtraction of two or more crystal oscillator

	frequencies which may be followed by multiplication of the result. In this entry— "frequency synthesiser" means any kind of frequency source or signal generator, regardless of the actual technique used, providing a multiplicity of simultaneous or alternative output frequencies, from one or more outputs, controlled by, derived from or disciplined by a lesser number of standard (or master) frequencies; "frequency switching time" means the maximum time (ie delay), when switched from one selected output frequency to another selected output frequency, to reach: (a) a frequency within 100 Hz of the final frequency; or (b) an output level within 1.0 dB of the final output level.	
PL7013	Transceivers having an output frequency of up to 32 MHz and using frequency synthesis with a frequency resolution of 10 Hz or better In this entry "transceiver" means equipment which comprises a radio transmitter and a radio receiver and which uses part or all of the same circuitry in both transmit and receive modes.	X
IL1532	Precision linear and angular measuring systems, the following: and specifically designed components and specially designed ODMA software therefor— (a) Contact-type systems and linear voltage differential	

transformers (LVDT) therefor, the following—

(1)	contact type measuring systems having all of the following characteristics—	C
	(i) range equal to or less than 5 mm;	
	(ii) linearity equal to or better than ±0.1 per cent; and;	
	(iii) drift equal to or less than 0.1 per cent per day at a standard ambient test room temperature ±1K;	
(2)	linear voltage differential transformers with no compensation networks and having either of the following characteristics—	
	(i) range equal to or less than 5 mm	C
	or	
	(ii) linearity equal to or better than ±0.2 per cent	C
(b)	(b) Linear measuring machines having all of the following characteristics—	C
(1)	two or more axes;	
(2)	range in any axis greater than 200 mm;	
(3)	accuracy (including any compensation) better than ±0.0008 mm per any 300 mm segment of travel;	

except optical comparators.

(c)	(c) Angular measuring systems having an accuracy equal to or better than ±1 second of arc	C

except optical instrument, such as autocollimators, using collimated light to detect angular displacements of a mirror

(d) (d) Non-contact type measuring systems having, at a standard ambient test room temperature ±1K, either of the following pairs of characteristics—

(1) effective probe measurement diameter less than 0.5 mm and drift less than 0.5 per cent per day C

or

(2) linearity better than ±0.3 per cent and drift less than 0.5 per cent per day C

(e) (e) Contact type measuring systems specially designed for combined, simultaneous linear-angular inspection of hemishells, having both the following characteristics— C

(1) linear accuracy equal to or better than ±0.005 mm in any 5 mm; and

(2) angular accuracy equal to or better than ±1 minute in any 90° of arc.

In this entry—

"accuracy" means the maximum deviation, positive or negative, of an indicated value from an accepted standard or true value;

"linearity" means the maximum deviation of the actual characteristics (average of upscale and downscale readings), positive or negative, from a straight line so positioned as to equalise and minimise the maximum deviations.

IL1533	Signal analysers (including spectrum analysers), having any of the following characteristics: and specially designed components, accessories and specially designed ODMA software therefor—		
	(a)	(a) Non-programmable and capable of operating at frequencies over 12.5 GHz	C
	(b)	(b) Programmable and capable of operating at frequencies over 1 GHz	C
	(c)	(c) Having a display bandwidth in excess of 125 MHz	C
	(d)	(d) Including a scanning preselector for analyzing frequencies of more than 1 GHz	C
	(e)	(e) Incorporating a tracking signal generator for analyzing frequencies of more than 1 GHz	C
	(f)	(f) Radio frequency analysis having an overall display dynamic range of better than 80 dB	C
	(g)	(g) Employing time compression of the input signal	C

		(h) (h) Employing fast fourier Transform techniques	C
		except (1) optical spectrum analysers; (2) instruments specified only in head (c) above provided that the instruments are not capable of operating at frequencies over 2 GHz.	
IL1534	Flatbed microdensitometers (except cathode-ray types), having any of the following characteristics: and specially designed components therefor—		
		(a) (a) A recording or scanning rate exceeding 5,000 data points per second	C
		(b) (b) A figure of merit better (less) than 0.1, defined as the product of the density resolution (expressed in density units) and the spatial resolution (expressed in micrometres)	C
		except equipment with a spatial resolution not better (less) than 2 micrometres and a density resolution not better (less) than 0.01 density unit	
		(c) (c) An optical density range greater than 0 to 4	C
	Note: Density resolution expressed in density units is measured over the		

	optical density range of the instrument.	
IL1537	Microwave (including millimetric wave) equipment, including parametric amplifiers capable of operating at frequencies over 1 GHz the following: (other than microwave equipment specified in the entries IL1501, IL1517, IL1520 and IL1529 in this Group)—	
	(a) (a) Rigid and flexible waveguides designed for use at frequencies in excess of 18 GHz	C
	(b) (b) Waveguides having a bandwidth ratio greater than 1.7:1	C
	(c) (c) Waveguide components, the following—	
	(1) directional couplers having a bandwidth ratio greater than 1.7:1 and directivity over the band of 20 dB or more	C
	(2) rotary joints capable of transmitting more than one isolated channel or having a bandwidth greater than 5 per cent of the centre mean frequency, except those used in air traffic control equipment carrying combinations of frequencies suitable for secondary surveillance radar antennae co-mounted on a primary radar antenna and which do not have a bandwidth exceeding 5 per cent of the centre mean frequency	C

(3)	magnetic, including gyro-magnetic, waveguide components	C
(4)	diode waveguide components using diodes specified in the entry IL1544 in this Group	C
	(d) (d) Transverse electromagnetic mode (TEM) devices the following—	
(1)	those using magnetic, including gyro-magnetic, properties;	C
	or	
(2)	those using diodes specified in the entry IL1544 in this Group	C
	(e) (e) Transmit Receive (TR) and anti-TR) tubes and specially designed components therefor, except those designed for use in waveguides and which are in normal civil use for ground marine radar and having any of the following characteristics—	C
(i)	they operate at a peak power not exceeding 3 MW and at a frequency of 1.5 GHz or less;	
(ii)	they operatre at a peak power not exceeding 1.2 MW and at a frequency over the range of 1.5 to 6 GHz;	
(iii)	they operate at a peak power not exceeding 300 kW and at a frequency over the range of 6 GHz to 10.5 GHz.	
	(f) (f) Assemblies and sub-assemblies in which the isolating	C

	base material functions as a dielectric (as used in stripline, microstrip, or slotline) except for those items specifically designed for use in civil television systems to meet ITU standards and using as an isolating material paper base phenolics, glass cloth melamine, glass cloth epoxy resin, polyethylene terephthalate or other isolating material with an operating temperature not exceeding 150°C	
(g)	(g) Phased array antennae and sub-assemblies, designed to permit electronic control of beam shaping and pointing and specially designed components therefor including but not limited to duplexers, phase shifters and associated high-speed diode switches	C
	except— duplexers and phase shifters specifically designed for use in civil television systems or in other civil radar or communication systems not specified elsewhere in this Schedule.	
(h)	(h) Other antennae specially designed for operation at frequencies above 30 GHz having a diameter of less than	C

	1 metre, and specially designed components therefor	
(i)	(i) Microwave assemblies and sub-assemblies capable of being used at frequencies above 3 GHz and having circuits fabricated by the same processes used in integrated circuit technology, which include active circuit elements	C
(j)	(j) Microwave assemblies and sub-assembles which contain band-pass or band-stop filters and are capable of operating at 3 GHz or greater	C

except microwave assemblies, sub-assemblies or amplifiers or combinations therefor and technology for the use thereof, having all of the following characteristics—

(a) fixed tuned at the time of manufacture to operate only within the ITU satellite broadcasting band from 11.7 to 12.5 GHz;

(b) not capable of being retuned to a new frequency band by the user; and

(c) specially designed for use with, or in, civil television receivers

(k)	(k) Amplifiers	C

except—

(1) parametric or paramagnetic amplifiers having any of the following characteristics—

(i) they are specially designed for medical applications;

(ii) they are specially for use in simple educational devices and operate at industrial, scientific or medical (ISM) frequencies; or

(iii) they have an output power of not more than 10 W and are specially designed for:

(a) industrial or civilian instrusion detection and alarm systems;

(b) traffic or industrial movement control and counting systems;

(c) environmental pollution air or water detection systems;

(8) microwave assemblies, sub-assemblies or amplifiers or combinations therefor, having all of the following characteristics and technology for the use thereof—

(a) fixed tuned at the time of manufacture to operate only within the ITU satellite broadcasting band from 11.7 to 12.5 GHz;

	(b) not capable of being returned to a new frequency band by the user; and (c) specially designed for use with, or in, civil television receivers; (d) simple educational devices	
	(l) (l) Modulators using PIN (positive-intrinsic-negative) transistor technology	C
	In this entry "simple educational devices" are devices designed for use in teaching basic scientific principles and demonstrating the operation of those principles in educational institutions.	
IL1541	Cathode-ray tubes having any of the following characteristics—	
	(a) (a) A resolving power of 32 lines per mm or more, using the shrinking raster method of measurement	C
	(b) (b) With travelling wave or distributed deflection structure using delay lines, or incorporating other techniques to minimise mismatch of fast phenomena signals to the deflection structure, except when using segmented plate (sectioned Y-plate) structure	C
	(c) (c) Incorporating microchannel-plate electron multipliers;	C

	except— cathode-ray tubes having all of the following characteristics— (i) the microchannel plate electron multipliers have a hole pitch of 25 micrometres or more; (ii) the tubes are not ruggedised for military use; (iii) the tubes have a horizontal sweep slower than 200 ns/cm; and (iv) the electron gun is mounted parallel to the screen surface.	
	(d) (d) Technology for the design or production of microchannel electron multipliers specified in head (c) above	D
IL1542	Cold cathode tubes and switches, the following—	
	(a) (a) Triggered spark-gaps, having an anode delay time of 15 microseconds or less and rated for a peak current of 3,000 A or more; specially designed parts therefor, and equipment incorporating such devices except cold cathode relay tubes or decade counter tubes	C
	(b) (b) Cold cathode tubes (other than ignitrons) whether gas-filled or not, operating in a manner similar to a spark gap, containing three or more	C

electrodes and having all the following characteristics—

(1) rated for an anode peak voltage of 2,500 volts or more;

(2) rated for peak currents of 100A or more;

(3) having an anode delay time of 10 microseconds or less; and

(4) having an envelope diameter of less than 25.4 mm.

In this entry "triggered spark-gaps" are tubes with a structure consisting of two opposed anodes with shapes resembling flattened hemispheres, and with one or more triggering probes placed approximately in the centre of one anode. The structure is sealed and contains a mixture of gases, principally nitrogen, under less than atmospheric pressure.

IL1544	Semiconductor diodes, the following: and dice and wafers therefor—	
	(a) (a) Semiconductor diodes, designed or rated for use at input or output frequencies exceeding 12.5 GHz	C
	(b) (b) Mixer and detector diodes designed or rated for use at input or output frequencies greater than 3 GHz	C
	except— (i) point contact diodes designed or rated for use at input or output frequencies of 12.5 GHz or less; (ii) Schottky diodes designed or rated	

for mixed use at input or output frequencies of less than 12.5 GHz and having a noise figure of more than 6.5 dB;

(iii) Schottky diodes designed or rated for detector use at input or output frequencies of less than 12.5 GHz and having a minimum rated tangential sensitivity of either worse than −45 dBm under unbiased conditions or worse than −50 dBm under biased conditions.

(c) (c) Oscillator and amplifier devices such as Gunn, Impatt, Trapatt, TED and LSA, including those used for the direct conversion of dc to rf power, designed or rated for use at either—

(1) output frequencies above 1 GHz but not exceeding 4 GHz with a peak power more than 2 W or a maximum CW power more than 200 mW — C

or

(2) output frequencies above 4 GHz but not exceeding 12.5 GHz with a peak power more than 1 W or a maximum CW power more than 100 mW — C

(d) (d) Voltage variable capacitance diodes designed or rated for use at input — C

	or output frequencies greater than 1.6 GHz	
	(e) (e) Fast recovery diodes, the following—	
	(1) having a rated maximum reverse recovery time of less than 1 nanosecond	C
	(2) having both a rated forward rectified current over 5 A and a rated maximum reverse recovery time of less than 20 nanoseconds	C
	(f) (f) PIN diodes designed or rated for use at input or output frequencies above 1.7 GHz, with a peak power of greater than 5 W or a maximum CW power of greater than 500 mW	C
	There shall be excluded from this entry semiconductor diodes based upon germanium, selenium or copper oxide	
IL1545	Transistors, the following and dice and wafers therefor— (a) Transistors based upon silicon and having any of the following characteristics—	
	(1) an operating frequency exceeding 1.5 GHz	C
	(2) an operating frequency not exceeding 1.5 MHz and a maximum collector dissipation of more than 300 W	C
	(3) an operating frequency exceeding 1.5 MHz and a maximum collector dissipation of more than 250 W	C
	(4) an operating frequency exceeding 200 MHz and a product of operating	C

	frequency (in GHz) times the maximum collector dissipation (in watts) of more than 10; or	
(5)	being majority carrier-type transistors, including but not limited to junction field-effect transistors (FETs) and metal-oxide semiconductor transistors (MOS) except field-effect transistors having any of the following characteristics— (a) a maximum power dissipation of no more than 6 W and an operating frequency not exceeding 1.0 GHz; (b) a maximum power dissipation of no more than 1 W and an operating frequency not exceeding 2.0 GHz; (c) designed for audio frequency applications	C
(b)	(b) Transistors based upon gallium arsenide and having any of the following characteristics—	
(1)	an operating frequency exceeding 1 GHz	C
(2)	a maximum power dissipation of more than 1 W; or	C
(3)	a noise figure of less than 3 dB	C
(bb)	(bb) Technology unique to transistors based upon gallium arsenide	D
(c)	(c) Transistors based upon any	C

semiconductor material other than germanium, silicon or gallium arsenide

In this entry—

"maximum collector dissipation" is the continuous dissipation measured under the optimum cooling conditions specified by the manufacture;

"operating frequency" is the frequency used in measuring any of the following:

(a) output power;

(b) power gain (G_{pE}, G_{pB}, G_{pC}, G_{pS}, or G_{pD});

(c) gain bandwidth product (f_T); or

(d) noise figure

IL1547	Thyristors, the following: and dice and wafers therefor—	
	(a) (a) Designed for use in pulse modulators having a rated turn-on time of less than 1 microsecond where the rated peak current exceeds 150 A	C
	(b) (b) Having a rated turn-off time of less than 1 microsecond	C
	(c) (c) Having a rated turn-off time of from 1 microsecond to less than 2.3 microseconds, except those having a rated peak current of 50 A or less and encapsulated in non-hermetically sealed packages	C
	(d) (d) Having a rated turn-off time of from 2.3 to 10	C

microseconds and a figure of merit more than 100

In this entry—

"figure of merit" is the product of the repetitive peak off-state voltage (vdrm) in kilovolts and the repetitive peak on-state current (1 trm) in amperes as shown on the thyristor data sheets;

the "turn-off time" for gate-turn-off thyristors is the sum of the gate controlled time TDQ and the gate controlled fall time Tfq to reach 10 per cent of the initial on-state current.

IL1548	Photosensitive components, including linear and focal-plane arrays, the following: and dice and wafers therefor—	
	(a) (a) Photosensitive components, including photodiodes, phototransistors, photothyristors, photoconductive cells and similar photosensitive components, having either of the following characteristics—	
	(1) having a peak sensitivity at a wavelength longer than 1,200 nanometres or shorter than 190 nanometres	C
	or	
	(2) having a peak sensitivity at a wavelength shorter than 300 nanometres and having an efficiency of less than 0.1 per cent relative to peak response	C

at wavelengths longer than 400 nanometres

except vacuum photodiodes specially designed for use in spectrophotometry having a peak response at a wavelength shorter than 300 nanometres.

(b) (b) Semiconductor photodiodes and phototransistors with a response time constant of 95 ns or less measured at the operating temperature for which the time constant reaches a minimum C

except semiconductor photodiodes which are not space qualified with a response time constant of 0.5 ns or more and with a peak sensitivity at a wavelength neither longer than 920 nm nor shorter than 300 nm

(c) (c) Photo sensitive components specially designed or rated as electromagnetic, including laser and ionized-particle radiation resistant C

(d) (d) Linear and focal plane arrays (hybrid or monolithic) having the characteristics specified in heads (a)(1) or (2) or (b) above, and specially designed components therefor C

There shall be excluded from this entry—

(a) germanium photo devices with a peak sensitivity at a wavelength shorter than 1,750 nanometres;

(b) infrared single-element encapsulated photoconductive cells or pyroelectric detectors intended for civil applications and using any of the following—

(1) evaporated lead sulphide;

(2) trigylcine sulphate with a surface area of 20 mm2 or less;

(3) lead-lanthanum-zirconium titanate ceramic;

(c) single-element encapsulated mercury-cadmium-telluride (HgCdTe) uncooled (295 K ambient temperature operation) photo-electro-magnetic (pem) or photoconductive (pc) mode photodetectors with a peak sensitivity at a wavelength shorter than 11,000 nanometres.

In this entry—

The “time constant” is the time taken from the application of a light stimulus for the current increment to reach a value of 1-1/e times the final value (ie 63 per cent of the final value);

“space qualified” means products which are stated by the manufacturer as designed and tested to meet the special electrical, mechanical or environmental requirements for use in rockets, satellites or high-altitudes flight systems operating at altitudes of 100 km or more.

IL1549	Photomultiplier tubes, the following—	
	(a) (a) Those for which the maximum sensitivity occurs at wavelengths shorter than 300 nanometres	C
	except photomultiplier tubes specially designed for use in spectrophotometry having a peak sensitivity at a wavelength shorter than 300 nanometres.	
	(b) (b) Those having an anode pulse rise time of less than 1 nanosecond	C
	(c) (c) Those which contain microchannel-plate electron multipliers	C
IL1553	Flash discharge type X-ray systems, including tubes, having all of the following characteristics—	C
	(a) (a) Peak power greater than 500 MW;	
	(b) Output voltage greater than 500 kV;	
	(c) Pulse width less than 0.2 microsecond	
IL1555	Electron tubes, the following: and specially designed components therefor—	
	(a) (a) Electron tubes for image conversion or intensification which incorporate any of the following—	
	(1) fibre optic face plates specified in head (a) of the entry IL1556 in this Group	C
	(2) microchannel-plate electron multipliers	C

or

(3)	gallium arsenide or other epitaxially grown semi-conductor photocathodes specified in head (c) to the entry IL1556 in this Group	C
(aa)	(aa) Technology for image intensifiers or converters incorporating fibre-optic plates or microchannel plate electron multipliers, or electron tubes for cameras incorporating such intensifiers or converters	D
(b)	(b) Electron tubes for television/video cameras, having any of the following characteristics—	
(1)	incorporating fibre-optic face plates specified in head (a) of the entry IL1556 in this Group	C
(2)	incorporating microchannel-plate electron multipliers	C
	or	
(3)	coupled with electron tubes specified at head (a) above	C
(c)	(c) Ruggedised electron tubes for television/video cameras having a maximum length-to-bulb diameter ratio of 5:1 or less	C

There shall be excluded from this entry—

commercial standard television/video camera tubes not incorporating fibre-optic plates

	specified in head (a) of the entry IL1556; commercial standard X-ray amplifier tubes.	
IL1556	Optical elements and elements for optical tubes, the following—	
	(a) (a) Non-flexible fused fibre-optic plates or bundles, having all of the following characteristics—	C
	(1) a fibre pitch (centre-to-centre spacing) of less than 10 micrometres;	
	(2) a light-absorbing medium surrounding each fibre, or interstitially placed between fibres; and	
	(3) a diameter greater than 13 mm;	
	(b) (b) Microchannel-plates for electron image amplification, having both of the following characteristics—	C
	(1) 15,000 or more hollow tubes per plate; and	
	(2) hole pitch (centre-to-centre spacing) of less than 25 micro-metres	
	(c) (c) Semi-transparent photocathodes incorporating epitaxially grown layers of compound semiconductors, such as gallium arsenide	C
	(d) (d) Diffractive type optical elements specially designed for display screens, with any of the following characteristics—	

	(1) a transmission of more than 90 per cent outside the reflection band and reflection of more than 75 per cent inside the reflection band, which has less than 15 nanometres bandwidth and is matched to the frequency of the display light source	C
	(2) a rear projection screen brightness gain of more than 10 times the gain of a Lambertian scatterer with an equivalent area, and less than 10 per cent variation in brightness across the exit aperture	C
	or	
	(3) specially designed for use in helmet-mounted displays	C
IL1558	Electronic vacuum tubes (valves) and cathodes, the following: and other components specially designed for those tubes—	
	(a) (a) Tubes in which space charge control is utilized as the primary functional parameter, including triodes and tetrodes, the following	C
	(1) tubes rated for continuous wave operation having either of the following characteristics—	
	(i) those above 4 GHz at maximum rated anode dissipation	C
	or	
	(ii) those within the frequency range 0.3 to 4 GHz and for which, under any condition of	C

	cooling, the product of the maximum rated anode dissipation, expressed in watts, and the square of the maximum frequency expressed in GHz, at the maximum rated anode dissipation is greater than 10^4; except tubes specially designed for television transmitters operating in the frequency range of 0.047 to 0.96 GHz and rated for operation without a grid current, for which the product of the rated anode dissipation, expressed in watts, and the square of the maximum frequency, expressed in GHz, may reach 2×10^4	
(2)	tubes rated only for pulse operation having either of the following characteristics—	
(i)	above 1 GHz with maximum peak pulse output power greater than 45 kW	C
	or	
(ii)	between 0.3 and 1 GHz and for which, under any condition of cooling, the product of the peak pulse output power, expressed in watts, and the square of the maximum frequency, expressed in GHz, is greater than 4.5×10^4	C
(3)	tubes specially designed for use as pulse modulators for radar or similar applications, having a peak anode	C

voltage rating of 100 kV or more, or rated for a peak pulse power of 20 MW or more

(b) (b) Tubes which utilize interaction between a beam of electrons and microwave elements and in which the electrons travel in a direction perpendicular to the applied magnetic field, including but not limited to magnetrons, crossed-field amplifier tubes and crossed-field oscillator tubes C

except—

(i) fixed frequency and tunable pulsed magnetrons and crossfield amplifier tubes which are in normal civil use, the following—

(1) magnetrons designed to operate at frequencies below 3 GHz with a maximum rated peak output power of 5 MW or less, or between 3 to 12 GHz with the product of the maximum rated peak output power, expressed in kilowatts, and the frequency, expressed in Giga-hertz, less than 4,200 and a frequency tuning time of more than 100 milliseconds;

(2) crossed-field amplifier tubes designed to operate

at frequencies below 4 GHz with a maximum rated average output power of 1.2 kW or less, a bandwidth of 200 MHz or less and a gain of less than 15 dB;

(ii) fixed frequency continuous wave magnetrons designed for medial use or for industrial heating or cooking purposes operating at a frequency of 2.375 GHz ±0.05 GHz or 2.45 GHz ±0.05 GHz with a maximum rated output power not exceeding 6 kW or, at a frequency lower than 1 GHz, with a maximum rated output power not exceeding 35 kW;

(iii) magnetrons, specially designed for particle accelerators for medical radiation therapy, having all of the following characteristics—

(1) capable of operation only at a frequency of 3,000 MHz ±15 MHz or at a frequency of 2,856 MHz ±15 MHz;

(2) not capable of being tuned mechanically or electronically outside the above bands;

(3) mechanically tuned within the above bands;

(4) having a peak output power not exceeding 10 MW and an average output power not exceeding 15 kW.

The exception in paragraph (iii) above does not apply to technological documents the information in which relates to goods excluded in paragraph (iii).

(c)	(c) Tubes which utilise interaction between a beam of electrons and microwave elements or cavities and in which the electrons travel in a direction parallel to the applied magnetic field (including Klystrons or travelling wave tubes)	C

except—

(i) continuous wave tubes having all of the following characteristics—

(1) designed for use in civil ground communication;

(2) an instantaneous bandwidth of half an octave or less, ie the highest operating frequency is not higher than 1.5 times the lower operating frequency;

(3) the product of the rated output power

(expressed in W) and the maximum operating frequency (expressed in GHz) of no more than 300;

(4) an operating frequency no higher than 20 GHz;

(5) no multiple grid electron guns; and

(6) collectors with no more than two depressed stages;

(ii) pulsed tubes, having all of the following characteristics—

(1) for civil applications

(2) an instantaneous bandwidth of half an octave or less ie the highest operating frequency is not higher than 1.5 times the lowest operating frequency;

(3) collectors with no more than two depressed stages; and

(4) either of the following:

(a) a peak saturated output power not exceeding 1 kW, an average

output power not exceeding 40 W and the operating frequency not exceeding 10 GHz;
or

(b) a peak saturated output not exceeding 100 W, an average output power not exceeding 20 W and the operating frequency between 10 and 20 GHz;

(iii) pulsed tubes, having all of the following characteristics—

(1) for civil applications;

(2) designed for fixed frequency operation;

(3) operating frequencies below 3.5 GHz;

(4) a peak output power of 1.6 MW or less; and

(5) an operating bandwidth of less than 1 per cent;

(iv) tubes, having all of the following characteristics—

(1) used as fixed-frequency or voltage-tunable oscillator tubes;

(2) designed to operate at frequencies below 20 GHz; and

(3) a maximum output power of less than 3 W;

(v) klystrons specially designed for particle accelerators for medical radiation therapy, having all the following characteristics—

(1) capable of operation only at a frequency of 3,000 MHz ±15 MHz or at a frequency of 2,856 MHz ±15 MHz;

(2) not capable of being tuned mechanically or electronically outside the above bands;

(3) mechanically tuned within the above bands;

(4) having a peak output power not exceeding 10 MW and an average output power not exceeding 15 kW.

The exception in paragraph (v) above does not apply to technological documents the information in which relates to goods excluded in paragraph (v).

(d)	(d) Tubes which utilize interaction between an electron beam and microwave elements or cavities but do not require a magnetic field to control or focus the electron beam, except low power reflex oscillator klystrons designed to operate at frequencies below 20 GHz and at a maximum output power of less than 3 W	C
(e)	(e) Tubes which utilize interaction between a beam of electrons and microwaves elements or cavities in which the electrons drift in a direction parallel to the applied magnetic field but also require for their operation a large component of velocity transverse to the direction of the applied magnetic field, including gyrotrons, ubitrons and peniotrons	C
(f)	(f) Tubes designed to withstand on any axis an acceleration of short duration (shock) greater than 1,000 g	C
(g)	(g) Tubes designed for operation in ambient temperatures exceeding 200°C	C
(h)	(h) Tubes of the type specified in heads (c), (d) or (e) above, which are designed to operate	C

with no filament or cathode heating element as indicated by the absence of heating supply connections

(i) (i) Tubes which utilize a modulated bean of electrons striking one or more semiconductor diodes to provide power gain — C

(j) (j) Cathodes for electronic vacuum tubes, the following—

(1) those specially designed for tubes specified in heads (a) to (i) above (inclusive) — C

or

(2) impregnated cathodes capable of producing a current density exceeding 0.5 A/cm^2 at rated operating conditions — C

In this entry—

“frequency tuning time” is the time required to change the operating frequency from a starting frequency, through the maximum frequency, through the minimum frequency, and return to the starting frequency, ie one complete tuning cycle. (“Frequency tuning time”:

$T=(\frac{1}{2fD})$ fD: dither rate).

IL1559 Hydrogen/hydrogen isotope thyratons of ceramic-metal construction and having any of the following characteristics: and accessories therefor—

	(a)	(a) A peak pulse power output exceeding 12.5 MW	C
	(b)	(b) A peak anode voltage greater than 25 kV	C
	(c)	(c) A peak current rating greater than 1.5 kA	C
	Note. For thyratrons rated for both single-shot (crowbar) and modulator service, the figure for modulator service should be used.		
IL1560	Capacitors designed for or capable of maintaining their rated electrical and mechanical characteristics during their specified operating lifetime, and technology therefor, the following—		
	(a)	(a) Monolithic ceramic capacitors (other than boundary layered capacitors) using non-ferro-electric strontium titanate (SrTiO3) dielectric rated for operation over the whole range of ambient temperatures from below −55°C to above +85°C	C
	(b)	(b) Technology for the design and production of tantalum capacitors rated for operation at ambient temperatures exceeding 125°C, except sintered electrolytic types having a casing made of epoxy resin or which are sealed or coated with opoxy resin	D

IL1561	Materials specially designed and manufactured for use as absorbers of electromagnetic waves having frequencies greater than 2×10^8 Hz and less than 3×10^{12} Hz except, save when contained in paint, (i) hair type absorbers, whether constructed of natural or synthetic fibres, with non-magnetic loading to provide absorption; (ii) absorbers whose incident surface is non-planar in shape, including pyramids, cones, wedges and convoluted surfaces, and which have no magnetic loss; and (iii) absorbers having all of the following characteristics— (1) they are made of: (a) plastic foam materials (flexible or non-flexible) with carbon-loading to provide absorption; or (b) organic binders with magnetic material loading which do not provide broad-band absorption performance with low reflectivity; (2) the incident surface is planar; (3) their tensile strength is less than 7×10^6 N/m^2; and	C

(4) their compressive strength is less than 14×106 N/m^2; and
(5) they cannot withstand more than 450 K (177°C).

In this entry—
"Broad-band absorption performance with low reflectivity" means less than 5 per cent echo compared with metal over a bandwidth greater than ±15 per cent of the centre frequency of the incident energy.

IL1564 Assemblies of electronic components, modules, printed circuit boards with mounted components, substrates and integrated circuits, including packages therefor, the following—

NOTE:

Integrated circuits are categorized as follows:
— monolithic integrated circuits
— microcomputer microcircuits
— microprocessor microcircuits
— multichip integrated circuits
— film type integrated circuits
— hybrid integrated circuits
— optical integrated circuits

(a) (a) Substrates for printed circuit boards, including ceramic substrates and coated metal substrates (single-sided, double-sided or multilayer), and C thin copper foils therefor

except—

(1) printed circuit boards manufactured from any of the following materials—

(a) paper base phenolics;

(b) glass cloth melamine;

(c) glass epoxy resin uncoated or coated with copper foil of a thickness of 18 micrometres or more;

(d) polyethylene terephtahalate; or

(e) any other insulating material having all of the following characteristics:

(i) a maximum continuous rated operating temperature not exceeding 423 K (150°C);

(ii) a dissipation factor equal to or more than 0.009 at 1 MHz;

(iii) a relative dielectric constant equal to or less than 8 at 1 MHz; and

(iv) a coefficient of expansion

equal to or more than $\pm10^{-5}$/K over a temperature range of 273 K to 393 K (0°C to 120°C);

(2) ceramic substrates having no more than two layers of interconnections, including the ground plane; or

(3) copper foil having a thickness of 18 micrometre or more;

(b)	(b) Ceramic packages for integrated circuits which are designed for hermetically sealed pin or pad grid array, leadless carrier or surface-mounted configurations	C

except those having all of the following characteristics—

(1) single-in-line, dual-in-line or flat-pack configuration;

(2) pin, pad or lead spacings of 2.50 mm or more; and

(3) 40 leads or less;

(c)	(c) Assemblies, modules and printed circuit boards with mounted components, with any of the following characteristics—	
(1)	those which include substrates for printed circuit boards specified in head (a) above	C

(2) those which contain components specified in this Schedule except— (a) where the only components specified in this Schedule which they contain are capacitors; (b) power supply assemblies; (c) non-coherent light-emitting alphanumeric displays, which if incorporated monolithic integrated circuits have both the following characteristics:— (i) used for decoding, controlling or driving the display; and (ii) not integral with the actual display device; or (f) simple encapsulated photo-coupler (transopter) assemblies, having both of the following characteristics— (i) electrical input and output; and (ii) any incorporated light-emitting diode can only emit non-coherent light; (i) assemblies, modules or printed circuit boards with mounted components, having both of the following characteristics— (i) designed for equipment not	C

specified elsewhere in this Schedule; and

(ii) substantially restricted to the particular application for which they have been designed by nature of:

(1) design;
(2) performance;
(3) lack of user-accessible microprogrammability;
(4) lack of user-accessible programmability;
(5) software;
(6) microprogramme control; or
(7) specialized logic control.

NOTES:

(1) For assemblies, modules or printed circuit boards with mounted components which are designed for, or which have the same functional characteristics as, electronic computers or related equipment, see entry IL1565 in Group 3G.

(2) This head does not apply to assemblies, modules or printed circuit boards with mounted components which are designed for, or which have the same functional characteristics as, equipment specified elsewhere in this Schedule.

(d) (d) Monolithic integrated circuits, microcomputer C microcircuits, microprocessor microcircuits, multichip integrated circuits, film type integrated circuits, hybrid integrated circuits and optical integrated circuits

except—

(1) encapsulated passive networks save technology for the manufacture of thin film passive networks;

(2) encapsulated integrated circuits, having all of the following characteristics—

(A) not designed or rated as radiation hardened;

(B) not rated for operation at an ambient temperature below 233 K (−40°C) or above 358 K (85°C);

(C) packaged in any of the following casings:

(i) TO-5 outline cases (diameter 7.7 to 9.4mm);

(ii) hermetically sealed dual in-line cases; or

(iii) non-hermetically sealed cases; and

(D) being any of the following types:

(a) bipolar monolithic integrated circuits, having all of the following characteristics:

(1) designed to perform a single digital logic function or a combination of digital logic functions;

(2) encapsulated in packages having 24 terminals or less;

(3) a basic gate propagation delay time of no less than 3 ns;

(4) a basic gate power dissipation of no less than 2 mW; and

(5) a product of the basic gate propagation delay time and the basic gate power dissipation per gate of no less than 30 pJ for types having a basic gate propagation delay time of 3 ns or more and less than 5 ns;

(b) bipolar monolithic integrated circuits, having all of the following characteristics:

(1) designed for operation in civil applications;

(2) being either:

(a) electronic switches,

externally controlled by inductive, magnetic or optical means; or

(b) threshold value switches; and

(3) with switching times of 0.5 microsecond or more;

(c) complementary metal-oxide semiconductor (CMOS) monolithic integrated circuits, having all of the following characteristics:

(1) designed for operation as digital logic circuit elements but limited to gates, inverters, buffers, flip-flops, latches, multivibrators, bilateral switches, display drivers, fixed counters, fixed frequency dividers, storage registers, decoders, voltage translators, encoders, Schmidt triggers, delay timers, carry generators, clock generators, and any combination of the above digital logic functions;

(2) encapsulated in packages having 24 terminals or less; and

(3) a minimum value of the basic gate propagation delay time under any rated condition of no less than 10 ns;

(d) positive-channel type or negative-channel type metal-oxide semiconductor (PMOS or NMOS) monolithic integrated circuits, having all of the following characteristics:

(1) designed for and by virtue of circuit design limited to use as serial digital shift registers;

(2) a maximum clock rate of 10 MHz; and

(3) a maximum of 1,024 bit per package;

(e) silicon microcomputer microcircuits (save bit slice microcomputer microcircuits) having all of the following characteristics:

(1) mask programmed by the manufacturer for a civil

application prior to exportation;

(2) a word size to speed ratio of less than or equal to 1.1 bit per microsecond;

(3) a speed-power dissipation product of more than or equal to 1.2 microjoule;

(4) not containing on-the-chip;

(a) a read-only storage (ROM) of more than 8,192 byte (not including the storage space needed for the micro-programme);

(b) a random access storage (RAM) of more than 256 byte;

(c) a programmable read-only storage (PROM);

(d) multiplication capabilities;

(e) general purpose operating systems including CP/M; or

(f) high order languages including Tiny Basic;

(5) an operand (data) word length of less

than or equal to 8 bit;

(6) not capable of using storage off-the-chip for programme storage; and

(7) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);

(f) silicon monolithic integrated circuits, micro-computer microcircuits, microprocessor micro-circuits, multichip integrated circuits, film type integrated circuits, hybrid integrated circuits, or optical integrated circuits, having both of the following characteristics:

(1) no user-accessible microprogrammability; and

(2) designed or programmed by the manufacturer for one or more of the following applications:

(a) car electronics including entertainment, instrumentation, safety, comfort, operations or pollution;

(b) home electronics, including audio and video equipment, appliances, safety, education, comfort, remote controlled toys or amusement;

(c) timekeeping applications including watches or clocks;

(d) personal communications up to 150 MHz, including amateur radio communication and intercom;

(e) cameras not specified elsewhere in this Schedule including cine cameras but excluding imaging micro-circuits;

(f) medical electronic prostheses including cardiac pacemakers, hearing aids; or

(g) civil telephone subscriber sets providing neither ISDN functions nor encryption.

NOTE:

The temperature limits specified in exception (2)(B) to head (d) above do not apply to exception (2)(D)(f)(2)(a) or (f) to head (d) above.

(g) monolithic integrated circuits or hybrid integrated circuits, having all of the following characteristics:

(1) not capable of addressing off-the-chip storage;

(2) no user-accessible microprogrammability; and

(3) designed for and by virtue of circuit design limited to use in simple calculators, having both of the following characteristics:

(a) performing a single function in response to a keystroke; and

(b) capable of performing floating point additions of a maximum of 13 decimal digits (mantissa only) in not less than 20 ms;

(h) monolithic integrated

circuits or hybrid integrated circuits, having both of the following characteristics:

(1) no user-accessible microprogrammability; and

(2) designed for and by virtue of circuit design limited to use in simple key programmable calculators, having both of the following characteristics:

(a) capable of executing a sequence of no more than 256 programme steps introduced into a programme storage on-the-chip by a sequence of keystrokes; and

(b) capable of performing floating point additions of a maximum of 13 decimal digits (mantissa only) in not less than 20 ms;

(i) silicon microprocessor microcircuits (save bit slice microprocessor microcircuits), having all of the following characteristics:

(1) a word size to speed ratio

of less than or equal to 1.25 bit per microsecond;

(2) a speed-power dissipation product of more than or equal to 2 microjoule;

(3) not containing on-the-chip;

(a) read-only storage (ROM);

(b) programmable read-only storage (PROM);

(c) random-access storage (RAM) of more than 1,024 bit; or

(d) multiplication instructions;

(4) capable of addressing storage off-the-chip of no more than 65,536 byte;

(5) an operand (data) word length of less than or equal to 8 bit;

(6) an arithmetic logic unit (ALU) not wider than 8 bit; and

(7) not rated for operation at am ambient temperature below 253 K (−20°C) or above 348 K (75°C);

(j) storage monolithic integrated

circuits or multi-chip integrated circuits, the following:

(1) read-only memory (ROMs), having all of the following characteristics:

(a) mask programmed by the manufacturer for a civil application prior to exportation;

(b) a maximum of 8,192 bit per package;

(c) a maximum access time of no less than 450 ns; and

(d) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);

(2) positive-channel type or negative-channel type metal-oxide semiconductor read-only memory (PMOS- or NMOS-ROMs), having all of the following characteristics:

(a) mask programmed by the manufacturer for a civil application prior to exportation;

(b) a maximum of 32,768 bit per package;

(c) a maximum access time of no less than 450 ns; and

(d) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);

(3) positive-channel type or negative-channel type metal-oxide semiconductor read-only memory (PMOS- or NMOS-ROMs), having all of the following characteristics:

(a) mask programmed or designed as character generators for a standard character font;

(b) a maximum access time of not less than 250 ns; and

(c) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);

(4) programmable (non-erasable) read-only memory

(PROMs) having all of the following characteristics:

(a) programmed by the manufacturer for a civil application prior to exportation;

(b) a maximum of 2,048 bit per package;

(c) a maximum access time of not less than 250 ns; and

(d) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);

(5) programmable (non-erasable) read-only memory (PROMs) having all of the following characteristics:

(a) programmed by the manufacturer for a civil application prior to exportation;

(b) a maximum of 8,192 bit per package;

(c) a maximum access time of not less than 450 ns; and

(d) not rated for operation at an ambient temperature below 253 K (−20°C) or above 348 K (75°C);

(6) bipolar random-access memory (RAMs), having any of the following pairs of characteristics:

(a) a maximum of 64 bit per package and a maximum access time of not less than 30 ns;

(b) a maximum of 256 bit per package and a maximum access time of not less than 40 ns; or

(c) a maximum of 1,024 bit per package and a maximum access time of not less than 45 ns;

(7) metal-oxide-semiconductor dynamic random access memory (MOS-DRAMs), having all of the following characteristics:

(a) a maximum of 4,096 bit per package;

(b) a maximum access time of not less than 250 ns; and

(c) not rated for operation at an ambient temperature below 253 K

(−20°C) or above 348 K (75°C);

(8) metal-oxide semiconductor static random access memory (MOS-SRAMs), having both of the following characteristics:

(a) a maximum of 1,024 bit per package; and

(b) a maximum access time of not less than 340 ns;

(k) amplifier monolithic integrated circuits, multi-chip integrated circuits, film type integrated circuits or hybrid integrated circuits, the following:

(1) audio amplifiers:

(a) having a maximum rated continuous power output of 50 W or less at am ambient temperature of 298 K (25°C); or

(b) encapsulated in non-hermetically sealed packages;

(Note: For audio amplifiers, the 358 K (85°C) upper temperature limit specified in exception (2)(B) to head (d) above is not applicable.)

(2) instrumentation amplifiers, having all of the following characteristics:

(a) a best-case rated linearity of no better than ±0.01 per cent at a gain of 100;

(b) a maximum gain-bandwidth product of no more than 7.5 expressed in MHz (eg a maximum bandwidth of 75 kHz at −3 dB and a gain of 100); and

(c) a typical slew rate at unity-gain not exceeding 3 V/microsecond;

(3) isolation amplifiers;

(4) operational amplifiers, having all of the following characteristics:

(a) a typical unity-gain open-loop bandwidth of no more than 5 MHz;

(b) a typical open-loop voltage gain of no more than 10^6, ie 120 dB;

(c) either:

(i) a maximum intrinsic rated input offset voltage of no less than 1.0 mV; or

(ii) a maximum input offset voltage drift of no less than 5 microvolt/K;

(d) a typical slew rate at unity-gain not exceeding 6 V/microsecond; and

(e) a typical power dissipation of more than 10 mW per amplifier, if the typical slew rate at unity-gain exceeds 2.5 V/ microsecond;

(5) untuned alternating current (AC) amplifiers, having both of the following characteristics:

(a) a bandwidth of less than 3 MHz; and

(b) a maximum rated power dissipation of 5 W or less at an ambient temperature of 298 K (25°C);

(l) analogue multiplier or divider monolithic integrated circuits, multichip integrated circuits, film type integrated circuits or hybrid integrated circuits, having both of the following characteristics:

(1) a best-case rated linearity of no better than ±0.5 per cent of full scale; and

(2) a −3 dB small signal bandwidth of no more than 1 MHz;

(m) converter monolithic integrated circuits, multichip integrated circuits, film type integrated circuits or hybrid integrated circuits, the following:

(1) analogue-to-digital converters, having both of the following characteristics:

(a) a maximum conversion rate to rated accuracy of no more than 50,000 complete conversions per second, ie a conversion time to maximum resolution of no less than 20 micro-second; and

(b) an accuracy of no better than ±0.025 per cent of full scale over the specified operating temperature range;

(2) analogue-to-digital converters, having both of the following characteristics:

(a) designed for digital voltmeter applications; and

(b) permitting characteristics corresponding to those of instruments specifically excluded from head (f) of the entry IL1529 in this Group;

(3) digital-to-analogue converters, having both of the following characteristics:

(a) a maximum settling time to rated linearity of no less than:

(i) 5 microseconds for voltage output converters; or

(ii) 250 ns for current output converters; and

(b) non-linearity of equal to or worse than

±0.025 per cent of full scale over the specified operating temperature range;

(4) voltage (rms-to-DC) converters;

(5) voltage-to-frequency converters having all of the following characteristics:

(a) not employing delta or delta/sigma modulation techniques;

(b) a rated accuracy of no better than ±0.01 per cent of full scale; and

(c) a gain drift of no less than ±50 $\times 10^{-6}$/K at rated frequency;

Note: "Gain drift" means the maximum change in gain over a specified temperature range.

(n) interface monolithic integrated circuits, multichip integrated circuits, film type integrated circuits or hybrid integrated circuits, the following:

(1) line drivers and line receivers having a typical propagation delay time from data input to output of not less than 15 ns;

(2) peripheral or display drivers, having all of the following characteristics:

(a) a maximum rated output current of 500 mA or less;

(b) a typical propagation delay time from data input to output of not less than 20 ns; and

(c) a maximum rated output voltage of 80 V or less;

(3) sense amplifiers, having both of the following characteristics:

(a) a typical propagation delay time from data input to output of not less than 15 ns; and

(b) a typical input threshold voltage of not less than 10 mV;

(4) storage or clock drivers, having all of the following characteristics:

(a) a maximum rated output current of 500 mA or less;

(b) a maximum rated output voltage of 30 V or less; and

(c) a typical propagation delay time from data input to output of not less than 20 ns;

(o) peripheral positive-channel type or negative channel type metal-oxide-seminconductor (PMOS or NMOS) monolithic integrated circuits or multichip integrated circuits, designed only for:

(1) the support of microprocessor microcircuits which are excluded by exception (2)(D)(i) to head (d) above; and

(2) having any of the following functions:

(a) parallel input/output controller (PIO);

(b) serial input/output controller (SIO);

(c) dual asynchronous receiver/

transmitter (DART); or

(d) counter/timer circuit (CTC);

(p) sample and hold monolithic integrated circuits, hybrid integrated circuits, film type integrated circuits or multichip integrated circuits, having both of the following characteristics:

(1) an acquisition time of not less than 10 microseconds; and

(2) a non-linearity, of equal to or worse than ±0.01 per cent of full scale for a hold time of 1 microsecond;

(q) timing monolithic integrated circuits, hybrid integrated circuits, film type integrated circuits or multichip integrated circuits, having both of the following characteristics:

(1) a typical timing error of not less than ±0.5 per cent; and

(2) a typical rise time of not less than 100 ns;

(r) voltage monolithic integrated circuits, multichip integrated circuits, film type integrated circuits or hybrid integrated circuits, the following—

(1) voltage comparators, having both of the following characteristics:

(a) a maximum input offset voltage of not less than 2 mV; and

(b) a typical switching speed (ie typical response time) of not less than 30 ns;

(2) voltage references, having both of the following characteristics:

(a) a rated accuracy of not better than ±0.1 per cent; and

(b) a temperature coefficient of the voltage of not less than 15×10^{-6}/K;

(3) linear type voltage regulators, having both of

the following characteristics:

(a) a rated nominal output voltage of 50 V or less; and

(b) a maximum output current of 2A or less;

(4) switching type voltage regulators, having both of the following characteristics:

(a) a rated nominal output voltage of 40 V or less; and

(b) a maximum output current of 150 mA or less;

Note: For voltage regulators, the 358 K (85°C) upper temperature limit specified in exception (2)(B) to head (d) above is not applicable.

(s) non-coherent light-emitting alphanumeric displays, which do not incorporate other monolithic integrated circuits;

(t) non-coherent light-emitting alphanumeric displays, which incorporate monolithic integrated circuits having both of the following characteristics:

(1) used for decoding, controlling or driving the display; and

(2) not integral with the actual display device;

(u) simple encapsulated photocoupler (transopter) optical integrated circuits, having both of the following characteristics:

(1) electrical input and output; and

(2) any incorporated light-emitting diodes can emit only non-coherent light;

(3) unencapsulated integrated circuits, having all of the following characteristics—

(A) based exclusively upon silicon;

(B) not designed or rated as radiation hardened; and

(C) being any of the following types:

(a) bipolar monolithic

integrated circuits (save complex custom-built bipolar digital monolithic integrated circuits) having all of the following characteristics:

(1) designed to perform a single digital logic function or a combination of digital logic functions;

(2) a basic gate propagation delay time of not less than 5 ns;

(3) a product of the basic gate propagation delay time and the basic gate power dissipation per gate of net less than 70 pJ; and

(4) no more than 24 input/output pads;

(b) bipolar monolithic integrated circuits (save complex custom-built bipolar digital monolithic integrated circuits) having all of following characteristics:

(1) designed for operation in civil applications;

(2) being either:

(a) electronic switches, externally controlled by inductive, magnetic or optical means; or

(b) threshold value switches;

(3) with switching times of 0.5 microsecond or more; and

(4) having no more than 24 input/output pads;

(c) monolithic integrated circuits having all of the following characteristics:

(1) no user-accessible microprogrammability;

(2) designed for and by virtue of circuit design limited to use in civil radio or television receivers;

(3) rated for operation at 11 MHz or less;

(4) not designed for station scanning applications;

(5) not utilizing charge-coupled device (CCD) technology;

(6) not intended for beam lead bonding; and

(7) if intended for video or luminance

amplifiers, having both of the following characteristics:

(a) a maximum rated supply voltage not exceeding 30 V; and

(b) a typical bandwidth not exceeding 7.5MHz;

(d) monolithic integrated circuits having all of the following characteristics:

(1) no user-accessible microprogrammability;

(2) not utilizing charge-coupled device (CCD) technology;

(3) not intended for beam lead bonding; and

(4) designed or programmed by the manufacturer for one or more of the following applications only:

(a) timekeeping applications, including watches or clocks; or

(b) cardiac pacemakers or hearing aids;

(e) amplifier monolithic integrated circuits, the following:

(1) audio amplifiers, having a maximum rated power ouput of 25 W or less at an ambient temperature of 298 K (25°C);

(2) operational amplifiers, having all of the following characteristics:

(a) a typical unity-gain open-loop bandwidth of not more than 5 MHz;

(b) a typical open-loop voltage gain of not more than 562,000 ie 115 dB;

(c) a maximum intrinsic rated input offset voltage of not less than 2.5 mV; and

(d) a typical slew rate at unity-gain not exceeding 2.5 V/microsecond;

(f) voltage monolithic integrated circuits, the following:

(1) voltage comparators, having both of the following characteristics:

(a) a maximum input offset voltage of not less than 5 mV; and

(b) a typical switching speed (ie typical response time) of not less than 50 ns;

(2) linear type voltage regulators having both of the following characteristics:

(a) a rated nominal output voltage of 40 V or less; and

(b) a maximum output current of 1A or less;

(3) switching type voltage regulators having both of the following characteristics:

(a) a rated nominal output voltage of 40 V or less; and

(b) a maximum output current of 150 mA or less;

(4) encapsulated integrated circuits having all of the following characteristics—

(a) not designed or rated as radiation hardened;

(b) not rated for operation at an ambient temperature below 233 K (−40°C) or above 358 K (85°C);

(c) packaged in hermetically sealed ceramic packages which are specifically expected from head (b) of this entry; and

(d) containing unencapsulated integrated circuits which are specifically excepted by exception (3) of head (d) of this entry.

(dd) Technological documents the information in which relates to the manufacture of thin film passive networks D

In this entry—

"assembly" means a number of electronic components (eg circuit elements, discrete components, integrated circuits, etc) connected together to perform a specific function, replaceable as an entity and normally capable of being disassembled;

"basic gate power dissipation" means the power dissipation value corresponding to the basic gate utilized within a family of monolithic integrated circuits. This may be specified, for a given family, either as the power dissipation per typical gate or as the typical power dissipation per gate;

"basic gate propagation delay time" means the propagation delay time value corresponding to the basic gate utilized within a family of monolithic integrated circuits. This may be specified, for a given family, either as the propagation delay time per typical gate or as the typical propagation delay time per gate;

"circuit element" means a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc;

"discrete component" means a separately packaged circuit element with its own external connections;

"film type integrated circuit" means an array of circuit elements and metallic interconnections formed by deposition of a thick or thin film on an insulating substrate;

"hybrid integrated circuit" means any combination of integrated circuits, circuit elements or discrete components connected together to perform a specific function;

"manufacturer" means the individual or organization designing an integrated circuit or a programmed for an intended application, in contrast to an individual or organization merely programming an integrated circuit at, or in accordance with, a user's request;

"microcomputer microcircuit" means a monolithic integrated circuit or multichip integrated circuit containing an arithmetic logic unit (ALU) capable of executing general purpose instructions from an internal storage; on data contained in the internal storage; (the internal storage may be augmented by an external storage.)

"microprocessor microcircuit" means a monolithic integrated circuit or multichip integrated circuit containing an arithmetic logic unit (ALU) capable of executing a series of general purpose instructions from an external storage; (the microprocessor microcircuit normally does not contain integral user-accessible storage, although storage present on-the-chip may be used in performing its logic function.)

"module" means a number of electronic components (eg circuit elements, discrete components, integrated circuits etc) connected together to perform a specific function, replaceable as an entity and not normally capable of being disassembled;

"monolithic integrated circuit" means a combination of passive or active circuit elements or both which:

(a) is formed by means of diffusion processes, implantation processes or deposition processes in or on a single semiconducting piece of material, a so-called “chip”;

(b) can be considered as indivisibly associated; and

(c) perform the function of a circuit;

“multichip integrated circuit” means two or more monolithic integrated circuits bonded to a common substrate;

“optical integrated circuit” means a monolithic integrated circuit or a hybrid integrated circuit, containing one or more parts designed to function as a photosensor or photoemitter or to perform an optical or electro-optical function;

“speed” means the time to fetch an operand C and another operand D, both from an external storage outside any work register, add these operands and put the result back in storage. The addressing mode which yields the shortest execution time shall be used. The result of the add operation shall be stored in either the same location as one of the addends or in some other location. This choice shall be made to give the shortest execution time at the highest specified clock frequency;

"speed-power dissipation product" means the product of the speed and the typical power dissipation which shall be taken at the clock frequency used in the speed computation. The typical power dissipation must be the lowest of the following:

(a) the specified typical internal power dissipation;
(b) one half the maximum internal power dissipation;
(c) the product of the nominal supply voltage and typical total supply current; or
(d) one half of the product of the nominal supply voltage and maximum total supply current;

"substrate" means a sheet of base material with or without an interconnection pattern and on which or within which discrete components, integrated circuits or both can be located;

"user-accessible microprogrammability" means the facility allowing a user to insert, modify or replace microprogrammes;

"user-accessible programmability" means the facility allowing a user to insert, modify or replace programmes by means other than:

(a) a physical change in wiring or interconnections; or

(b) the setting of function controls including entry of parameters.

GROUP 3G

Electronic Equipment including Computers, Software and Telecommunications, and Photographic Equipment

IL1565	Electronic computers, related equipment, equipment or systems containing electronic computers, and technology therefor, the following: and specially designed components and accessories for such electronic computers and related equipment—	
	(a) (a) Analogue computers, and related equipment therefor, which are designed or modified for use in ariborne vehicles, missiles or space vehicles and rated for continuous operation at temperatures from below 228 K (−45°C) to above 328 K (+55°C)	C
	(b) (b) Equipment or systems containing analogue computers specified in head (a) above	C
	(c) (c) Analogue computers and related equipment therefor, other than those specified in head (a) above	C
	except— (i) those which neither— (a) are capable of containing more than 20 summers,	

integrators, multipliers or function generators; nor

(b) have facilities for readily varying the interconnections of such components;

(ii) those which have all the following characteristics—

(a) they use neither:

(1) optical computation devices; nor

(2) acoustic wave devices specified in the entry IL1586 in Group 3G;

(d) the rated errors for summers, inverters and integrators are not less than:

(1) static : 0.01%

(2) total at 1 kHz: 0.15%

(g) the rated errors for multipliers are not less than:

(1) static : 0.25%

(2) total at kHz: 0.25%

(j) the rated errors for fixed function generators (log and sine/cosine) are not less than: static : 0.1%

(k) they have no more than 350

operational amplifiers; and

(l) they have more than four integrator time scales switchable during one programme.

NOTE

1. The percentage for (ii)(b)(1) above applies to the actual output voltage; all the other percentages apply to full scale, that is from maximum negative to maximum positive reference voltages.
2. Total errors at 1 kHz for (ii)(b)(2) and (ii)(c)(2) above are to be measured with those resistors incorporated in the inverter, summer or integrator which provide the least error.
3. Total error measurements include all errors of the unit resulting from, for example, tolerances of resistors and capacitors, tolerances of input and output impedances of amplifiers, the effects of loading, the effects of phase shift or the generating of functions.

(d)	(d) Hybrid computers and related equipment therefor, having all the following characteristics—	C
(1)	the analogue section is specified in head (c) above;	
(2)	the digital section has an internal fixed or alterable storage of more than 2,048 bit; and	
(3)	facilities are included for processing numerical data from the analogue section in the digital section or vice versa;	
(e)	(e) Analogue computers specified in heads (a) to (c) above (inclusive) or digital computers containing equipment for interconnecting analogue computers with digital computers	C
(f)	(f) Digital computers and related equipment therefor, with any of the following characteristics—	
(1)	designed or modified for use in airborne vehicles, missiles or space vehicles and rated for continuous operation at temperatures from below 228 K (−45°C) to above 328 K (+55°C)	C
(2)	designed or modified to limit electromagnetic radiation to levels much less than those required by government civil interference specifications	C

(3)	designed as ruggedized or radiation-hardened equipment and capable of meeting military specifications for ruggedized or radiation-hardened equipment	C
(4)	modified for military use, or	C
(5)	designed or modified for certifiable multi-level security or certifiable user isolation applicable to government classified material or to applications requiring an equivalent level of security	C
(g)	(g) Equipment or systems containing digital computers specified in head (f) above	C
(h)	(h) Digital computers and related equipment therefor, (other than those specified in heads (e) and (f) above even when embedded in, incorporated in, or associated with equipment or systems, and other than digital computers embedded in equipment described elsewhere in this Schedule), including but not limited to the following—	C
(1)	Digital computers and related equipment designed or modified for—	
(a)	signal processing	C
(b)	image enhancement	C

(c) local area networks	C
(d) multi-data-stream processing	C
(e) combined recognition, understanding and interpretation of image, continuous (connected) speech or connected word text other than signal processing or image enhancement	C
(f) real time processing of sensor data having both of the following characteristics:	C
(1) concerning events occurring outside the computer using facility; and	
(2) provided by equipment specified in entry IL1501, IL1502, IL1510 or IL1518 in Group 3F.	
(g) microprocessor or microcomputer development systems	C
(h) fault tolerance	C
(j) user-accessible microprogrammability except where this facility is limited to—	C
except where this facility is limited to—	
(a) loading, reloading or inserting of micro-programmes provided by the supplier; or	
(b) simple loading of microprogrammes which may or may not be provided by the supplier, but which are neither designed to be accessible to the user nor accompanied by	

	training or software for user accessibility.	
(k)	data (message) switching	C
(l)	stored programme controlled circuit switching, or	C
(m)	wide area networks	C
(2)	digital computers and related equipment therefor, having both the following characteristics—	C
(a)	size, weight, power consumption and reliability or other characteristics (eg bubble memory), which allow easy application in mobile tactical military systems; and	
(b)	ruggedised above the level required for a normal commercial/ office environment, but not necessarily up to levels specified in head (f) above;	

There shall be excluded from head (h)—

(i) digital computers and related equipment therefor, provided that—

(a) they are embedded in other equipment or systems; or they do not include related equipment specified elsewhere in this Schedule other than input/ output control unit-disk drive combinations described in exception (iiA) below to this head;

(b) they are not the principal element of the other equipment or systems in which they are embedded;
(c) the other equipment or systems are not specified elsewhere in this Schedule;
(d) they have been designed and used for non-strategic applications;
(e) they are by nature of design or performance restricted to the particular application for which they have been designed;
(f) the total processing data rate of any one embedded digital computer does not exceed 54 million bit per second;
(g) the sum of the total processing data rate of each embedded digital computer does not exceed 100 million bit per second;
(h) they do not include equipment or systems specified in sub-head (a)(2) of the entry IL1519 in Group 3F or by the entry IL1567 in this Group; and
(j) they do not include equipment specified in sub-head (h)(1) other than equipment for:
(1) signal processing or image enhancement which lacks

user-accessible programmability and is embedded in medical imaging equipment; or

(2) local area networks not specified elsewhere in this Schedule.

(ii) digital computers, and related equipment therefor, provided that—

(a) they are incorporated in other equipment or systems;

(b) they are not the principal element of the other equipment or systems in which they are incorporated;

(c) the other equipment or systems are not specified elsewhere in this Schedule;

(d) the total processing data rate of any one incorporated digital computer does not exceed 28 million bit per second;

(e) the total internal storage available to the user does not exceed 9.8 million bit;

(f) they do not include related equipment specified elsewhere in this Schedule other than input/output control unit-disk drive combinations described in exception (iiA) below to this head;

(g) they do not include equipment or

systems specified in sub-head (a)(2) of the entry IL1519 in Group 3F or in entry IL1567 in this Group;

(h) they do not include equipment specified in sub-head (h)(2) above;

(j) they do not include equipment specified in sub-head (h)(1) other than equipment for:

(1) signal processing or image enhancement which lacks user-accessible programmability and is embedded in medical imaging equipment; or

(2) local area networks not specified elsewhere in this Schedule.

(iiA) digital computers or related equipment therefore, provided that—

(a) where there is incorporated or associated in input/output control unit-disk drive combination, it has all of the following characteristics:

(1) total transfer rate not exceeding 5.5 million bit per second;

(2) total connected net capacity not exceeding 320 million bit;

(3) no more than two independent drives; and

(4) total access rate not exceeding 80 accesses per second with a maximum access rate of 40 accesses per second per drive;

(b) the goods in which digital computers or related equipment are incorporated or with which digital computers or related equipment are associated are excluded from head (h) of this entry by exception (i) or (ii) above.

(iii) digital computers (other than those specified in sub-head (h)(1) above) and related equipment, having all the following characteristics—

(a) they are complete systems;

(b) they are designed and announced by the manufacturer for an identifiable civil use;

(c) they are not specially designed for any equipment specified elsewhere in this Schedule;

(d) they have a total processing data rate not exceeding 6.5 million bit per second;

(e) the total internal storage available to the user does not exceed 6.2 million bit; and

(f) they do not include a central processing unit implemented with more than two microprocessor or microcomputer micro-circuits other than any dedicated micro-processor microcircuit;

(g) they do not include a microprocessor or microcomputer microcircuit with more than 16 bit word length or a bus architecture with more than 16 bit;

(h) they do not include analogue-to-digital or digital-to-analogue converter microcircuits specified in the entry IL1568, except in the case of direct driven video monitors for normal commercial television;

(j) they do not include related equipment specified elsewhere in this Schedule other than input/output control unit-disk drive combination having all of the following characteristics:

(xlii) total transfer rate not exceeding 5.5 million bit per second;

(2) total connected net capacity not exceeding 200 million bit;

(3) no more than one independent drive; and

(4) total access rate not exceeding 40 accesses per second; and

(k) they do not include equipment specified in sub-head (a)(2) of entry IL1519 in Group 3F or in entry IL1567 in this Group.

(iv) peripheral equipment, provided it lacks user-accessible programmability, the following—

(a) card punches and readers;

(b) paper tape punches and readers;

(c) manually operated keyboards and teletype devices;

(d) manually operated graphic tablets not having more than 1,024 resolvable points along any axis;

(e) impact printers;

(f) non-impact printers, not specified in head (b) or (c) of entry IL1572 in this Group, which does not exceed:

(1) 2,000 lines (30 pages) per minute; or

(2) 600 characters per second;

(g) plotting equipment, not specified in head (b) or (c) of entry IL1572 in this Group, producing a physical record by ink, photographic, thermal, or electrostatic techniques, and which has:

(1) a linear accuracy worse than or equal to ±0.004%; and
(2) an active plotting area less than or equal to 1,700mm by 1,300mm;
(h) digitising equipment generating rectilinear co-ordinate data by manual or semi-automatic tracing of physical records, which has:
(1) a linear accuracy worse than or equal to ±0.004 per cent; and
(2) an active digitising area less than or equal to 1,700mm by 1,300mm;
(j) optical mark recognition (OMR) equipment;
(k) optical character recognition (OCR) equipment which:
(1) does not contain signal processing or image enhancement equipment; and
(2) is only for:
(i) stylised OCR characters;
(ii) other internationally standardised stylized character fonts; or
(iii) other non-stylised or hand printed numerics and up to 10 hand printed alphabetic or other characters;
(l) displays or monitors having all of the following characteristics:

(1) not including equipment specified in sub-head (h)(2) above;

(2) not containing cathode ray tubes specified in entry IL1541 in Group 4;

(3) if capable of other than alpha-numeric characters, graphs and symbols in fixed formats having all of the following characteristics:

(i) not more than 1,024 resolvable elements along any axis;

(ii) (except in the case of direct driven video monitors), not more than 16 shades of grey or colour; and

(iii) (except in the case of direct driven video monitors) the maximum bit transfer rate from the electronic computer to the display does not exceed 19,200 bit per second,

(m) displays or monitors having all of the following characteristics:

(1) they do not contain cathode ray tubes;

(2) they are not capable of displaying more than 3 levels namely off, intermediate and full on; and

(3) they do not have as an integral part

of the display device:

(a) circuitry; or

(b) non-mechanical character generation devices;

(n) displays having all of the following characteristics:

(1) not containing cathode ray tubes specified in the entry IL1541 in Group 3F;

(2) being part of industrial or medical equipment; and

(3) not specially designed for use with electronic computers;

(o) graphic displays specially designed for signature or security checking having an active display area not exceeding 150 sq cm;

(q) light gun devices or other manual graphic input devices which are:

(1) part of displays not specified elsewhere in this Schedule; and

(2) limited to 1,024 resolvable elements along any axis;

(r) disk drives for non-rigid magnetic media (floppy disks) which do not exceed:

(1) a gross capacity of 17 million bit;

(2) a maximum bit transfer rate of 0.52 million bit per second; or

(3) an access rate of 12 accesses per second;

(s) cassette/cartridge tape drives or magnetic tape drives which do not exceed:

(1) a maximum bit packing density of 131 bit per mm per track; or

(2) a maximum bit transfer rate of 2.66 million bit per second;

(xcviii) input/output interface or control units, provided that they lack user-accessible programmability, the following—

(a) designed for use with peripheral equipment excluded from head (h) by exception (iv) above;

(b) designed for use with digital recording or reproducing equipment specially designed to use magnetic card, tag, label or bank cheque recording media, excluded by exception (ii) to head (a) of entry IL1572 in this Group; or

(c) designed to meet ANSI/IEEE Standard 488-1978 or IEC Publication 625-1;

(vi) equipment for local area networks which do not have any of the following characteristics—

(a) interfaces and protocols exceeding layer 2 of the Open System Interconnection (OSI) reference model, that is ISO logical link control Draft International Standard (DIS) 8802/2, IEEE 802.2, 802.3, 802.4, 802.5, or equivalents;

(b) implementations that contain functions of, or equivalent to those provided by, CCITT X.25, Level 3, protocols or above;

(c) maximum data signalling rate on the common transmission medium of more than 2 million bits per second; or

(d) inter network gateways;

(vii) personal computers and related equipment therefor, not excluded by exclusions (i) to (vi) above, provided they meet all the following conditions—

(a) they are not specified in head (h) above;

(b) they are exported as complete systems;

(c) if they are stand-alone graphic workstations they do not have all of the following characteristics:

(i) they are stand-alone graphics workstations designed or modified for the generation, transformation, and display of 2 or 3 dimensional vectors;

(ii) they have a total processing data rate of the central processing unit exceeding 28 million bit per second;

(iii) they have a central processing unit with a word length exceeding 16-bit; and

(NOTE: Microprocessor based systems with 16-bit word-length and not more than a 32-bit architecture are regarded as 16-bit systems for the purpose of sub-paragraph (iii))

(iv) they exceed either of the following limits:

(a) block move data rate- 800,000 pixels/sec; or

(b) maximum bit transfer rate of the channel for direct access to the main storage (Direct Memory Access or DMA channel)-11 million bit per second;

NOTE: sub-paragraph (c) does not apply to workstations designed for and limited to graphic arts (eg printing, publishing).

(d) they are not ruggedized above the level required for a normal commercial/office environment;

(j) Technology, the following—

(1) technology applicable to the—

(i) development, production or use of electronic computers or related equipment, even if these electronic computers or related equipment are not specified in this entry	D

except—

(a) technology which is unique to related equipment excluded under sub-heads (h)(2)(iv)(a) to (c), (e), (f), (m), (n) or (q) above and which is not specified elsewhere in this Schedule;

(b) the minimum technology necessary for the use of electronic computers or related equipment not specified elsewhere in this entry; or

(ii) development, production or use of equipment or systems specified in head (b) or (g) of this entry	D

For the purpose of this subhead "use" means assembly, operation, maintenance or repair.

(2) technology for the integration of—

(i) electronic computers or related equipment specified in this entry into other equipment or systems whether or not the other equipment or systems are specified in this Schedule; except technology for integration which is unique to the other equipment or systems provided they are not specified elsewhere in this Schedule or — D

(ii) other electronic computers or related equipment into equipment or systems specified in this Schedule — D

In this entry—

"access rate"—

(a) of an input/output control unit-drum or disk drive combination (R_{ad}), means either the access rate of an input/output control unit (R_{ac}) or the sum of the individual access rates of all independent seek mechanisms (R_{as}), whichever is smaller;
(Thus: R_{ad} = (R_{ac}; SUM R_{as});)

(b) of an input/output control unit (R_{ac})

(1) with rotational position

sensing (rps), means the sum of the individual access rates of all independent seek mechanisms (R_{as}) connected to the control unit; (Thus R_{ac} = SUM R_{as} (with rps);)

(1) without rotational position sensing (rps), means the number (c) of independent read/write channels connected to the control unit divided by the least latency time (t_{lmin}) of any connected independent seek mechanism;

$$\left(\text{Thus: } R_{ac} = \frac{C}{t_{1min}} \text{(without rps)}\right)$$

(c) of a seek mechanism (R_{as}), means the reciprocal of the average access time (t_{aa}) of the seek mechanism;

$$\left(\text{Thus: } R_{as} = \frac{1}{t_{aa}}\right)$$

and for this purpose average access time of seek mechanism (t_{aa})—

the sum of the average seek time (t_{aa}) and the latency time ($_l$);

(Thus: $t_{aa} = t_{ss} + t_l$)

and for this purpose average seek time (t_{aa}) means

the sum of the maximum seek time (t_{smax}) and twice the minimum seek time (t_{smin}), divided by three:

$$\left(\textbf{Thus: } t_{sa} = \frac{t_{smax} + 2t_{smin}}{3}\right)$$

and for this purpose "the maximum seek time" (t_{smax})—

(1) for fixed head devices, is zero;

(2) for moving head or moving media devices, is the rates time to move between the two most widely separated tracks;

"the minimum seek time" (t_{smin})—

(1) for fixed head devices, is zero;

(2) for moving head or moving media devices, is the rated time to move from one track to an adjacent track;

"latency time" (t_l) means the rotational period divided by twice the number of independent read/write heads per track;

"analogue computer"— means equipment which can, in the form of one or more continuous variables:

(a) accept data;
(b) process data; and
(c) provide output of data;

goods which are "associated" with equipment or systems—

(a) can feasibly be either:
    (i) removed from such equipment or systems; or
    (ii) used for other purposes; and
(b) are not essential to the operation of such equipment or systems:

"block move data rate" — means the maximum number of pixels which can be moved per second from one location to another in the storage which functions as the frame buffer;

"communication channel" — means the transmission path or circuit including the terminating transmission and receiving equipment (modems) for transferring digital information between distant locations;

"computer operating area" — means the immediate contiguous and accessible area around the electronic computer where the normal operating, support and service functions take place;

"computer using facility" — means the end-users contiguous and accessible facilities:

(a) housing the computer operating area and those end-user functions which are being supported by the stated application of the electronic computer and its related equipment; and

(b) not exceeding beyond 1,500 metres in any direction from the centre of the computer operating area;

"cumulative total processing data rat" — means the sum of all total processing data rates in a given transaction;

"data device" — means equipment capable of transmitting or receiving sequences of digital information;

"data (message) switching" — means the technique including store-and-forward or packet switching, for:

(a) accepting data groups (including messages, packets, or other digital or telegraphic information groups which are transmitted as a composite whole);

(b) storing (buffering) data groups as necessary;

(c) processing part or all of the

data groups, as necessary, for the purpose of:

(1) control (routing, priority, formatting, code conversion, error control, retransmission or journaling);

(2) transmission; or

(3) mutliplexing; and

(d) retransmitting (processed) data groups when transmission or receiving or receiving facilities are available;

"data signalling rate" — means the rate as defined in ITU Recommendation 53-36, taking into account that, for non-binary modulation, baud and bit per second are not equal. Binary digits for coding, checking, and synchronization functions are included. It is the maximum one-way rate, namely the maximum rate in either transmission or reception;

"digital computer" — means equipment which can, in the form of one or more discrete variables:

(a) accept data;

(b) store data or instructions in fixed or alterable (writable) storage devices;

(c) process data by means of a stored sequence of instructions which is modifiable; and

(d) provide output of data;

and for this purpose modifications of a stored sequence of instructions include replacement of fixed storage devices, but not a physical change in wiring or interconnection;

"embedded" in equipment or systems- means that the relevant item can feasibly be neither:

(a) removed from such equipment or system; nor

(b) used for other purposes;

"equivalent multiply rate" — means the maximally achievable number of multiplication operations which can be performed per second considering that, in the case of simultaneous multiplication operations, all multiplication rates have to be summed in order to arrive at the equivalent multiply rate:

(a) assuming

(1) optional operand locations in the most immediate storage; and

(2) operand lengths at least 16 bit, or more if this allows for faster operation; and

(b) ignoring

(1) set-up operations;

(2) pipeline filling operations;
(3) initialization;
(4) interrupts; and
(5) data reordering times;

"fault tolerance" — means the capability to perform correctly without human intervention after failure of any assembly, so that there is no single point in the system the failure of which could cause catastrophic failure of the system's functioning;
and for this purpose

"assembly" — means a number of components (ie circuit elements, discrete components, microcircuits) connected together to perform a specific function or functions, replaceable as an entity and normally capable of being disassembled;

"gateway" — means the function, realised by any combination of equipment and software to carry out the conversion of conventions for representing, processing or communicating information used in one system into the corresponding but different conventions used in another system;

"gross capacity" — means the product of:

(a) the maximum number of binary digit (bit) positions per unformatted track; and
(b) the total number of tracks including spare tracks and tracks not accessible to the user;

"hybrid computer" — means equipment which can:
(a) accept data;
(b) process data, in both analogue and digital representations; and
(c) provide output at a;

"image digitiser" — means a device for directly converting an analogue representation of an image into a digital representation;

"image enhancement" — means the processing of externally derived information-bearing images by algorithms such as time compression, filtering, extraction, selection, correlation, convolution or transformations between domains (eg Fast Fourier Transform or Walsh Transform). This does not include algorithms using only linear or rotational transformation of a single image, such as translation, feature extraction, registration or false colouration;

"incorporated" in equipment or system means
(a) can feasibly be either:

(i) removed from such equipment or systems; or
(ii) used for other purposes; and

(b) is essential to the operation of such equipment or systems;

"internetwork gateway" — means a gateway for two systems which are themselves local area networks, wide area networks or both;

"local area network" — means a data communication system which:

(a) allows an arbitrary number of independent data devices to communicate directly with each other; and

(b) is confined to a geographical area of moderate size including office building, plant, campus, warehouse;

"main storage" — means the primary storage for data or instructions for rapid access by a central procession unit. It consists of the internal storage of a digital computer and any hierarchical extension thereto, such as cache storage or non-sequentially accessed extended storage;

"maximum bit packing density" — means the density of recording specified in accordance with the appropriate ANSI or ISO Standard (eg ANSI X3.14-1979, ISO 1863-1975; ANSI X3.22-1973; ISO 1873-1976; ANSI X3.39-1973; ISO 3788-1976; ANSI X3.48-1977; ISO 3407-1976; ANSI X3.56-1977; ISO 4057-1979; ANSI X3.54-1976).

"maximum bit transfer rate"—

(a) of a drum or disk drive (R_{tdmax}), is the product of:

  (1) the maximum number of binary digit (bit) positions per unformatted track; and

  (2) the number of tracks which simultaneously can be read or written, divided by the rotational period;

(b) of a magnetic tape drive (R_{ttmax}), is the product of:

  (1) the maximum bit packing density;

  (2) the number of data bits per character (ANSI) or per row (ISO); and

  (3) the maximum tape read/write speed;

"most immediate storage" — means the portion of the main storage, most directly accessible by the central processing unit;

(a) for single level main storage, this is the internal storage; or
(b) for hierarchical main storage, this is:
    (1) the cache storage;
    (2) the instruction stack; or
    (3) the data stack;

"multi-data-stream processing" — means the microprogramme or equipment architecture technique which permits processing two or more data sequences under the control of one or more instruction sequences by means such as:
(a) parallel processing;
(b) structured arrays of processing elements;
(c) single Instrumentation Multiple Data (SIMD) operations; or
(d) multiple Instruction Multiple Data (MIMD) operations;

"net capacity" — of a drum, disk or cartridge-type streamer tape drive, or a bubble memory, is the total capacity designed to be accessible to the digital computer excluding error control bits;

"non-volatile storage" — means a storage device the contents of which are not lost when power is removed;

"other peripheral device" — means a data device which is:

(a) peripheral to a central processing unit-main storage combination; and
(b) not an input/output control unit-drum, disk or magnetic tape drive or bubble memory combination;

"personal computer" — means a microprocessor based digital computer that is:
(1) designed for a commercial/office environment;
(2) designed and announced by the manufacturer for personal, home or business use; *and*
(3) available for purchase over the counter at retail stores;

"principal element" — means a digital computer or related equipment which is:
(a) either embedded or incorporated in another piece of equipment or system; and
(b) in value more than 35% of the replacement value of the total equipment or system, (including the digital computer or related equipment);

"real time processing" — means processing of data by an electronic computer in response to an external event according to time requirements imposed by the external event;

"related equipment" — means the following equipment embedded in, incorporated in or associated with electronic computers;

(a) equipment for interconnecting analogue computers with digital computers;

(b) equipment for interconnecting digital computers;

(c) equipment for interfacing electronic computers to local area networks or to wide area networks;

(d) communication control unit;

(e) other input/output (I/O) control units;

(f) recording or reproducing equipment specified in entry IL1572 in this Group;

(g) displays; or

(h) other peripheral equipment;

Note: related equipment which contains an embedded or incorporated electronic computer but which lacks user-accessible programmability does not thereby fall within the definition of electronic computer.

"signal processing" — means the processing of externally derived information-bearing signals by algorithms such as time compression, filtering, extraction, selection, correlation, convolution or transformations between domains including Fast Fourier Transform or Walsh Transform;

"stored-programme-controlled circuit switching" — means the technique for establishing, on demand and until released, a direct (space division switching) or logical (time division switching) connection between circuits based on switching control information derived from any source or circuit and processed according to the stored programme by one or more electronic computers;

"terminal device" — means a data device which:

(a) does not include process control sensing and actuating devices; and

(b) is capable of:

(1) accepting or producing a physical record;

(2) accepting a manual input; or

(3) producing a visual output;

"total access rate" (R_{atot}) —means the sum of the individual access rates of all input/output control unit—drum or disk drive combinations (R_{ad}) provided with the system which can be sustained simultaneously assuming the configuration of equipment which would

maximize this total access rate;
(Thus: R_{atot} = SUM R_{ad})

"total connected capacity" — means the storage capacity excluding error control bits, word marker bits, and flag bits;

"total data signalling rate" — means the sum of individual data signalling rates of all communication channels which:

(a) have been provided with the system; and
(b) can be sustained simultaneously;assuming the configuration of the equipment which would maximize this sum of rates;

"total internal storage available to the user" — means the sum of the individual capacities of all internal user-alterable or user-replaceable storage devices which maybe:

(a) included in the equipment at the same time; and
(b) used to store software instructions or data;

"total processing data rate"—

(a) of a single central processing unit, is its processing data rate;
(b) of multiple central processing units which do not share direct access to a common main storage, is the individual processing data

rate of each central processing unit, (ie each unit is separately treated as a single central processing unit as in (a) above);

(c) of multiple central processing units which partially or fully share direct access to a common main storage at any level, in the sum of:

(1) the highest of the individual processing data rates of all central processing units; and

(2) 0.75 times the processing data rate of each remaining central processing unit sharing the same main storage;

assuming the configuration of equipment which would maximize this sum of rates;

For the purpose of this definition:

"processing data rate" — means the maximum of either:

(a) the floating point processing data rate (R_t); or

(b) the fixed point processing data rate (R_x).

The processing data rate of a central processing unit implemented with two or more microprocessor microcircuits, not including any dedicated microprocessor microcircuit used solely for display, keyboard or input-output control, is the sum of the individual processing data rates of all these microprocessor microcircuits;

"floating point processing data rate" (R_f) is the sum of:

(1) 0.85 times the number of bits in a fixed point instruction (n_{ix}) or 0.85 times the number of bits in a floating point instruction (n_{if}), if no fixed point instructions are implemented;

(2) 0.15 times the number of bits in a floating point instruction (n_{if});

(3) 0.40 times the number of bits in a fixed point operand (n_{ox}) or 0.40 times the number of bits in a floating point operand (n_{of}) if no fixed point instructions are implemented; and

(4) 0.15 times the number of bits in a floating point operand (n_{of});

divided by the sum of:

(1) 0.85 times the execution time for a fixed point addition (t_{ax}) or

for a floating point addition (t_{af}) if no fixed point instructions are implemented;

(2) 0.09 times the execution time for a floating point addition (t_{af}); and

(3) 0.06 times the execution time for a floating point multiplication (t_{mf}) or for the fastest available subroutine (t_{msub}) to simulate a floating point multiplication instruction, if no floating point multiplication instructions are implemented;

(Thus:

$$R_f = \frac{(0.85)n_{ix} + (0.15)n_{if} + (0.40)n_{ox} + (0.15)n_{of}}{(0.85)t_{ax} + (0.09)t_{af} + (0.06)t_{mf}}$$

Or if no fixed point instructions are implemented, then:

$$R_f = \frac{(1.00)n_{if} + (0.55)n_{of}}{(0.94)t_{af} + (0.06)t_{mf}}$$

Or if no floating point multiplication instructions are implemented ($t_{mf} = t_{msub}$) then:

$$R_f = \frac{(0.85)n_{ix} + (0.15)n_{imf} + (0.40)n_{ox} + (0.15)n_{of}}{(0.85)t_{ax} + (0.09)t_{af} + (0.06)t_{msub}})$$

)

If a digital computer has neither floating point addition nor floating point multiplication instructions, then its floating point processing data rate is equal to zero.

"fixed point processing data rate" (R_x) is the sum of:

(1) 0.85 times the number of bits in a fixed point addition instruction (n_{iax});

(2) 0.15 times the number of bits in a fixed point multiplication instruction (n_{imx}); and

(3) 0.55 times the number of bits in a fixed point operand (n_{ox});

divided by the sum of:

(1) 0.85 times the execution time for a fixed point addition (t_{ax}); and

(2) 0.15 times the execution time for a fixed point multiplication (t_{mx}) or for the fastest available subroutine (t_{msub}) to simulate a fixed point multiplication instruction if no fixed point multiplication instructions are implemented;

(Thus

$$R_x = \frac{(0.85)n_{iax} + (0.15)n_{imx} + (0.55)n_{ox}}{(0.85)t_{ax} + (0.15)t_{mx}}$$

Or if no fixed point multiplication instructions are implemented ($t_{mx} = t_{msub}$) then:

$$R_x = \frac{(0.85)n_{iax} + (0.15)n_{imx} + (0.55)n_{ox}}{(0.85)t_{ax} + (0.15)t_{msub})})$$

)

If a digital computer has neither fixed point addition nor fixed point multiplication instructions, then its fixed point processing data rate is equal to zero;

The number of bits in a:

‘fixed point addition instruction (n_{iax})—
fixed point multiplication instruction (n_{imx})—
floating point addition instruction (n_{iaf})—
floating point multiplication instruction (n_{iaf})—
is the appropriate shortest single fixed or floating point instruction length which permits full direct addressing of the main storage;

NOTE:

1. When multiple instructions are required to simulate an appropriate single instruction, the number of bits in the above instructions shall be taken to be 16 bits plus the number of bits (b_{iax}, b_{imx}, bv_{iaf}, b_{imf}) which permits full direct addressing of the main storage.

   (Thus $n_{iax} = 16 + b_{iax}$; $n_{imx} = 16 + b_{imx}$; $n_{iaf} = 16 + b_{iaf}$; $n_{imf} = 16 + b_{imf}$;

2. If the addressing capability of an instruction is expanded by using a base register, then the number of bits in an instruction, fixed or floating point, addition or multiplication is the number of bits in the instruction with the standard address length including the number of bits necessary to use the base register;

The number of bits in a fixed point operand (n_{ox}) is

(a) the shorted fixed point operand length; or

(b) 16 bit;

whichever is greater;

The number of bits in a floating point operand (n_{ox}) is

(a) the shortest floating point operand length; or

(b) 30 bit;

whichever is greater;

"execution time" is

(a) the time certified or published by the manufacture for the execution of the fastest appropriate instruction, under the following conditions;

(1) no indexing or indirect operations are included;

(2) the instruction is in the most immediate storage;
(3) one operand is in the accumulator or in a location of the most immediate storage which is acting as the accumulator;
(4) the second operand is in the most immediate storage; and
(5) the result is left in the accumulator or the same location in the most immediate storage which is acting as the accumulator;

(b) if only the maximum and minimum execution times of the instructions are published, the sum of:
(1) the maximum execution time of an instruction (t_{max}); and
(2) twice the minimum execution time of this instruction (t_{min}); divided by three

(Thus; $t = \frac{t_{max} + 2t_{min}}{3}$

(t stands for any of the values (t_{ax}, t_{af}, t_{mx},) or t_{mf}));

(c) for central processing units which simultaneously fetch more than one instruction from one storage location, the average of the execution times when executing instructions fetched from all possible locations within the stored word;

(d) if the longest fixed point operand length is smaller than 16-bit, the time required for the fastest available subroutine to simulate a 16 bit fixed point operation;

NOTES:

1. If the addressing capability of an instruction is expanded by using a base register, then the execution time shall include the time for adding the content of the base register to the address part of the instruction.
2. When calculating processing data rate for computers with cache sizes smaller than 64K Bytes, the execution time of the appropriate instructions will be calculated as follows:

(cache hit rate) × (execution time when both instruction and operand are in cache storage) + (1 − cache hit rate) × (execution time when neither instruction nor operand are in cache storage)

The cache hit rate being:

1.00 for cache size of 64k Byte
0.95 for cache size of 32k Byte
0.90 for cache size of 16k Byte
0.85 for cache size of 8K Byte
0.75 for cache size of 4K Byte

"total transfer rate"—

(a) of the input/output control unit-drum, disk or cartridge-type streamer tape drive combinations (R_{tdtot}), means the sum of the individual transfer rates of all input/output control unit-drum, disk or cartridge-type streamer tape drive combinations (R_{td}) provided with the system which can be sustained simultaneously assuming the configuration of equipment which would maximize this sum of rates; (Thus: R_{tdto}; = R_{td})

(b) Of the input/ output control unit-magnetic tape drive combination (R_{tttot}), means the sum of the individual transfer rates of all input/output control unit-magnetic tape drive combinations (R_{tt}) provided with the system which can be sustained simultaneously assuming the configuration of equipment which would maximize this sum of rates; (Thus: $R_{tttot} = R_{tt}$)

(c) of the input/output or communication control unit-directly connected data channel combinations means the sum of the individual transfer rates of all data channels provided with the system which can be sustained simultaneously assuming the configuration of equipment which would maximize this sum of rates;

For the purpose of this definition—

"transfer rate"—

(1) of an input/output control unit-drum

or disk drive combination (R_{td}), is the smaller of either:

(i) the input/output control unit transfer rate (R_{tc}); or

(ii) the sum of the individual transfer rates of all independent seek mechanisms (R_{ts});

(Thus: R_{td} = min (R_{tc}; SUM R_{ts})

(1) of an input/output control unit (R_{tc}):

(i) with rotational position sensing (rps), is the product of:

(a) the number of independent read/write channels (C); and

(b) the greatest maximum bit transfer rate ($R_{tsmaxmax}$) of all independent seek mechanisms; or

(ii) without rotational position sensing (rps), is two thirds of this product.

(Thus:

R_{tc} = C. $R_{tsmaxmax}$ (with rps); or

$$R_{tc} = C.\ R_{tsmaxmax}\ \text{(with rps); or}$$

$$R_{tc} = \frac{2\ C.\ R_{tsmaxmax}}{3}\ \text{(without (rps))}$$

(1) of an independent seek mechanism (R_{ts}), is the product of:

(i) the maximum bit transfer rate (R_{tsmax}); and

(ii) the rotational period (t_r); divided by the sum of:

(i) the rotational period (t_r);

(ii) the minimum seek time (t_{smin}); and

(iii) the latency time (t_l);

$$\text{(Thus: } R_{ts} = \frac{R_{tsmax} \times t_r}{t_r + t_{smin} + t_l}\text{)}$$

)

(For this purpose—

"minimum seek time" (t_{smin}) —

(1) for fixed dead devices, is zero; or

(2) for moving head or moving media devices, is the rated time to move from

one track to an adjacent track;

"latency time" (t_l)—the rotational period divided by twice the number of independent read/write heads per track);

(1) of an input/output control unit-cartridge-type streamer or magnetic tape drive combination (R_{tt}) is the product of:

(1) the number of independent read/write channels (C); and

(2) the greatest maximum bit transfer rate ($R_{ttmaxmax}$) of all tape drives;

(Thus: $R_{tt} = C.R_{ttmaxmax}$.)

"transfer rate of any data channel" —means the sum of the individual bit transfer rates of all the other peripheral devices, excluding terminal devices, which can be sustained simultaneously on the data channel;

"user-accessible microprogrammability" — means the facility allowing a user to insert, modify or replace microprogrammes;

"user-accessible programmability" — means the facility allowing a user to insert, modify or replace programmes by means other than:

(a) a physical change in wiring or interconnections; or

(b) the setting of function controls including entry of parameters;

"virtual storage" — means the storage space that may be regarded as addressable main storage by the user of a computer system in which virtual addresses are mapped into real addresses; (The size of virtual storage is limited by the addressing scheme of the computer system and not by the actual number of main storage locations.)

“wide are network” — means a data communication system which:

(a) allows an arbitrary number of independent data devices to communicate with each other;

(b) may include local area networks; and

(c) is designed to interconnect geographically dispersed facilities;

IL1566	Software and technology therefor, the following—

NOTE:

Software for equipment described in entry IL1565 is dealt with in this entry. Specially designed ODMA software for the use of equipment described in other entries in this Schedule, except entry IL1565 is dealt with in the appropriate entry.

(a) Software, the following—

(1) software designed or modified for any computer that is part of a computer series designed and produced in any country specified in Part A of Schedule 2 to this Order except application software designed for and limited to— C

(i) accounting, general ledger, inventory control, payroll, accounts receivable, personnel records, wages calculation or invoice control;

(ii) data and text manipulation such as sort/merge, text editing, data entry or word processing;

(iii) data retrieval from established data files for purposes of report generation or inquiry for the functions described in (i) or (ii) above; or

(iv) the non real time processing of pollution sensor data at fixed sites or in civil vehicles for civil environmental monitoring purposes;

(2) software designed or modified for the design, development or production of items specified in this Schedule	C
(3) Software designed or modified for—	
(i) computers specified in entry IL1565 in this Group	C
(ii) one or more of the functions specified in sub-heads (h)(1)(i)(a) to (j) or (m) or excluded by exception (vi) to head (h) of entry IL1565 or for digital computers or related equipment designed or modified for such functions,	C
except ODMA software in machine executable form for digital computers and related equipment therefor which are excluded by exception (i) or (ii) to head (h) of the entry IL1565 and only when supplied with the equipment or systems	
NOTE:	
Software for equipment excluded by exception (vi) to head (h) of entry IL1565 which may contain file server or printer server functions above Layer 2 of the Open System Interconnection (OSI) reference model provided the protocols do not contain level 3 of CCITT X25 or equivalent function.	

(4) software for computer-aided design, manufacture, inspection or test of items specified in this Schedule	C
(5) software designed or modified to provide certifiable multilevel security or certifiable user-isolation applicable to government-classified material or to applications requiring an equivalent level of security, or software to certify such software	C
(b) (b) Categorized software, the following—	
(1) development systems the following—	
(i) development system employing high-level language and designed for or containing programmes or databases special to the development or production of:	
(a) specially designed software specified elsewhere in this Schedule	C
(b) software specified in sub-heads (a)(2) or (3) of this entry, including any subset designed or modified	C

	for use as part of such a development system	
(ii)	development systems employing high-level language and designed for or containing the software tools and databases for the development or production of software or any subset designed or modified for use as part of a development system such as, or equivalent to:	C
(a)	Ada Programming Support Environment (APSE):	C
(b)	any subset of APSE, the following:	
(1)	Kernel APSE	C
(2)	Minimal APSE	C
(3)	Ada compilers specially designed as an integrated subset of APSE or	C
(4)	any other subset of APSE	C
(c)	any superset of APSE or	C
(d)	any derivative of APSE	C
(2)	programming systems, the following—	
(i)	cross-hosted compilers and cross-hosted assemblers	C
(ii)	compilers or interpreters designed or modified for use as part of a development system specified in sub-head (1) above	C
(iii)	disassemblers, decompilers or other software which	C

convert programmes in objects or assembly language into a higher level language, except simple debugging application software such as mapping, tracing, check-point/restart, breakpoint, dumping and the display of the storage contents or their assembly language equivalent

(3)	diagnostic systems or maintenance systems designed or modified for use as part of a development system specified in sub-head (1) above	C
(4)	operating systems, the following—	
(i)	operating systems designed or modified for digital computers or related equipment exceeding any of the following limits:	C
(a)	central processing unit—main storage combinations:	
(1)	total processing data rate—48 million bit per second;	
(2)	total connected capacity of main storage—25.2 million bit;	
(3)	virtual storage capability—512 MByte;	
(b)	input/output control unit—drum, disk or cartridge-type streamer tape drive combinations:	
(1)	total transfer rate 15 million bit per second;	

(2) total access rate 320 accesses per second;

(3) total connected net capacity—7,000 million bit;

(4) maximum bit transfer rate of any drum or disk drive—10.3 million bit per second;

(c) input/output control unit—bubble memory combinations:

total connected net capacity—2.1 million bit;

(d) input/output control unit—magnetic tape drive combinations:

(1) total transfer rate —5.2 million bit per second;

(2) number of magnetic tape drives—twelve;

(3) maximum bit transfer of any magnetic tape drive—2.6 million bit per second;

(4) maximum bit packing density—63 bit per mm per track;

(5) maximum tape read/write speed—508 cm per second;

except operating systems designed or modified for digital computers or related equipment:

(a) not exceeding the above limits even when the operating systems can also be used on digital computers or related equipment exceeding the above limits; or

(b) belonging to a series containing models exceeding the above limits, if the operating

	systems are used on digital computers or related equipment of the series which do not exceed the above limits.	
(ii)	operating systems providing on-line transaction data processing which permit integrated teleprocessing and on-line updating of databases	C
(5)	application software, the following—	
(i)	software for cryptologic or cryptanalytic applications	C
(ii)	artificial intelligence software, including software, normally classified as expert systems, which enables a digital computer to perform functions that are normally associated with human perception and reasoning or learning	C
(iii)	database management systems which are designed to handle distributed databases for:	
(a)	fault tolerance by using techniques such as maintenance of duplicated databases	C
(b)	integrating data at a single site from independent remote databases	C
(iv)	software designed to adapt software resident on one digital computer for use	C

on another digital computer

(c) (c) Technology applicable to the development, production or use (namely installation, operation and maintenance) of software, whether or not such software is specified in this Schedule D

except—

(1) technology generally available to the public or

(2) the minimum technology necessary for the use of software not specified in this Schedule (NOTE: In this head, technology does not include software)

There shall be excluded from this entry

(1) software not exceeding 5,000 statements in source language, excluding data, provided—

(a) the software is neither designed or modified for use as a module of a larger software module or system which in total exceeds this limit; and

(b) the software is not specified in

sub-head (b) (5) above.

(2) software initially exported to a destination specified in Part A of Schedule 2 to this Order prior to 1st January, 1984, provided that—

(a) the software which is identical to and in the same language form (source or object) as initially exported, allowing minor updates for the correction of errors which do not modify the initially exported functions;

(b) the accompanying documentation does not exceed the level of the initial export; and

(c) the software is exported to the same destination as the initial export.

(3) software specified in sub-head (a) or (b) above which is either—

(a) standard commercially available software:

(1) designed for installation

by the user without further support by the supplier;

(2) designed for use on digital computers which do not exceed a total processing data rate of 15 million bit per second; and

(3) generally available to the public; or

(For this purpose "generally available to the public" means:

(a) available at retail selling points, other than those specialized in selling electronic computers to the general public in model series exceeding the limit in (2) above; and

(b) selling by means of over-the-counter transactions from stock.)

(c) software in the public domain.

In this entry—

"application software" —means software not falling within any of the other defined categories of software that is to say, other than development systems, diagnostic systems, maintenance systems, operating systems or programming systems;

"cross-hosted" — means, for programming systems, those which produce programmes for a model of electronic computer different from those used to run the programming system, namely they have code generators for equipment different from the host computer;

"database" — means a collection of data, defined for one or more particular applications, which is physically located and maintained in one or more electronic computers or related equipments;

"database management systems" — means application software to manager and maintain a database in one or more prescribed logical structures for use by other application software independent of the specific methods used to store or retrieve the database;

"development systems" — means software to develop or produce software and software to manage those activities. Examples of a development system are programming support environments, software development environments, and programmer-productivity aids;

"diagnostic systems" — means software to isolate or detect software or equipment malfunctions;

"digital computer" — means equipment which can, in the form of one or more discrete variables;

(a) accept data;

(b) store data or instructions in fixed or alterable (writable) storage devices;

(c) process data by means of a stored sequence of instructions which is modifiable; and

(d) provide output data;

For this purpose modification of a stored sequence of instructions include replacement of fixed storage devices, but not physical change in wiring or interconnections.

"distributed database" — means a database which is physically located and maintained in part or as a whole in two or more interconnected electronic computers or related equipment, such that inquiries from one location can involve database access in other interconnected electronic computers or related equipment;

"high-level language" — means a programming language that does not reflect the structure of any one given electronic computer or that of any one given class of electronic computers;

"maintenance systems" — means software to:

(a) modify software or its associated documentation in order to correct faults, or for other updating purposes; or

(b) maintain equipment;

"object code" or "object language"—see "programming system";

"on-line updating" — means processing in which the contents of a database can be amended within a period of time useful to interact with an external request;

"operating systems" — means software to control;

(a) the operation of a digital computer or of related equipment; or

(b) the loading or execution of programmes;

"programming systems" — means software to convert a convenient expression of one or more processes (source code or source language) into equipment executable form (object code or object language);

"related equipment" — means the following equipment embedded in, incorporated in or associated with electronic computers:

(a) equipment for interconnecting analogue computers with digital computers;

(b) equipment for interconnecting digital computers;
(c) equipment for interfacing electronic computers to local area networks or to wide area networks;
(d) communication control units;
(e) other input/output (I/O) control units;
(f) recording or reproducing equipment referred to entry IL1565 by entry IL1572;
(g) displays; or
(h) other peripheral equipment;

"self-hosted" — means for programming systems, those which produce programmes for the same model of electronic computer as that used to run the programming system, that is they only have code generators for the host computer;

"source code" or "source language"—see "programming system";

"standard commercially available" — means for software, that which is:

(a) commonly supplied to general purchasers or users of equipment outside any country specified in Schedule 2 of this Order, but not precluding the personalization of certain parameters for individual customers wherever located;

(b) designed and produced for civil application;
(c) not designed or modified for any digital computer which is part of a digital computer series designed and produced within any country specified in Schedule 2 of this Order; and
(d) supplied in a commonly distributed form.

Any term used in this entry shall bear the meaning as it has in entry IL1565 in this Group.

IL1567 Stored-programme-controlled communication switching equipment or systems and technology therefor, the following: specially designed components therefor and specially designed software for the use of these equipment or systems—

(a) (a)Communication equipment or systems for data (message) switching, including those for local area networks or for wide area networks C

except data (message switching equipment or systems provided that—

(1) the equipment or systems are designed for fixed civil use according to the requirements of either—
(i) CCITT Recommendations F.1 to F.79 for store-and-forward

systems (Volume II-Fascicle II.4, VIIth plenary assembly, 10th—21st November, 1980); or

(ii) ICAO Recommendations for store-and-forward civil aviation communication networks (Annex 10 to the Convention on International Civil Aviation, including all amendments agreed up to and including 14th December 1981);

(2) the number, type and characteristics of such equipment or systems are normal for the application;

(3) such equipment or systems are limited as follows—

(i) the maximum data signalling rate of any circuit does not exceed 4,800 bit/s; and

(ii) the sum of the individual data signalling rates of all circuits does not exceed 27,500 bit/s;

(4) the equipment or systems do not contain digital computers or related equipment specified by—

(i) head (f) to entry IL1565 in this Group;

(ii) sub-heads (h)(1)(a) to (j) (inclusive), (1) or (m) to entry IL1565 in this Group;

(iii) sub-head (h)(2) to entry IL1565 in this Group;

(5) the software supplied—

(i) is limited to:

(a) the minimum specially designed software necessary for the use of the equipment or systems; and

(b) machine-executable form; and

(ii) does not include software:

(a) specified in entry IL1527 in Group 3F, sub-head (a)(5) in entry IL1566 in this Group or entry ML11 in Group 1, or

(b) to permit user-modification of generic software or its associated documentation.

(b) (b)Communication equipment or systems for stored-programme-controlled circuit switching C

except—

(1) key telephone systems, provided that—

(i) access to an external connection is obtained by pressing a special button (key) on a telephone, rather than by dial or key-pad as on a private automatic branch exchange (PABX);

(ii) they are not designed to be upgraded to PABXs;

(iii) the software supplied:

(a) is limited to the minimum specially designed software necessary for the use of the equipment or systems; and

(b) does not include software:

(1) specified in entry IL1527, in Group 3F, sub-head (a)(5) of the entry

IL1566 in this Group or entry ML11 in Group 1, or

(2) to permit user-modification of generic software or its associated documentation;

(2) stored programme controlled circuit switching equipment or systems, provided that—

(i) the equipment or systems are designed for fixed civil use in stored programme controlled telegraph circuit switching the data;

(ii) the number, type and characteristics of such equipment or systems are normal for the application;

(iii) the equipment or systems do not contain digital computers or related equipment specified in head (f) of entry IL1565 or sub-heads (h)(1)(a) to (k) or (m) of entry IL1565 or sub-head (h)(2) of entry

IL1565 in this Group;

(iv) the equipment or systems do not have either of the following features:

(a) multi-level call pre-emption including over-riding or seizing of busy subscriber lines, trunk circuits or switches or;

(b) common channel signalling;

(vii) the maximum internal bit rate per channel does not exceed 9,600 bit/s;

(vi) the telegraph circuits, which may be telephone circuits, may carry any type of telegraph or telex signal compatible with a voice channel bandwidth of 3,100 Hz as defined in CCITT Recommendation G151; and

(vii) the software supplied:

(a) is limited to:

(1) the minimum specially designed software

necessary for the use (ie installation, operation and maintenance) of the equipment or systems; and

(2) machine-executable form; and

(b) does not include software:

(1) specified in the entry IL1527 in Group 3F or sub-head (a)(5) of the entry IL1566 in this Group or entry ML11 in Group 1;

(2) to permit user-modification of generic software or its associated documentation;

(3) stored programme controlled telephone circuit switching equipment or systems, provided that—

(i) the equipment or systems are designed for fixed civil use as space-division analogue exchanges or time-division analogue exchanges which, in either case fulfil the definition of private automatic branch exchanges (PABXs);

(ii) the equipment or systems do not contain digital computers or related equipment specified in head (f), sub-heads (h)(1)(a) to (k) or (m) or sub-head (h)(2) of entry IL1565 in this Group;

(iii) communication channels or terminal devices used for administrative and control purposes:

(a) are fully dedicated to these purposes; and

(b) do not exceed a maximum data signalling rate of 9,600 bit per second;

(iv) voice channels are limited to 3,000 Hz as defined in CCITT Recommendation G151;

(vi) the PABXs do not have either of the following features:

(a) multi-level call pre-emption including overriding or seizing of busy subscriber lines, trunk circuits or switches; or

(b) common channel signalling; and

(vii) the software supplied:

(a) is limited to:

(1) the minimum specially designed software necessary for the use (namely installation, operation and maintenance) of the equipment or systems; and

(2) machine-executable form; and

(b) does not include software:

(1) specified in entry IL1527 in Group 3F, sub-head (a)(5) in entry IL1566 in this Group or entry ML11 in Group 1; or

(2) to permit user-modification of generic software or

its associated documentation;

(c) (c) Technology applicable to the development, production or use (namely installation, operation and maintenance) of stored-programme-controlled communication switching equipment or systems, even if such equipment or systems are not specified in this entry D

except—
the minimum technical information necessary for the use of stored-programme-controlled communication switching equipment or systems which are not specified in this entry.

In this entry—

"affiliated equipment" means the following equipment:

(a) input/output (I/O) control units;
(b) recording or reproducing equipment;
(c) displays; or
(d) other peripheral equipment;

"common channel signalling" — means a signalling method in which a single channel between exchanges conveys, by means of labelled messages, signalling information relating to a multiplicity of circuits or calls and other information such as that used for network management;

"communication channel" — means the transmission part or circuit including the terminating transmission and receiving equipment (modems) for transferring digital information between distant locations;

"data device" — means equipment capable of transmitting or receiving sequences of digital information;

"data (message) switching" — means the technique, including but not limited to store-and-forward or packet switching, for:

(a) accepting data groups (including messages, packets, or other digital or telegraphic information groups which are transmitted as a composite whole);

(b) storing (buffering) data groups as necessary;

(c) processing part or all of the data groups, as necessary, for the purpose of:

  (1) control (routing, priority, formatting, code conversion, error control, retransmission or journaling);

  (2) transmission; or

  (3) multiplexing; and

(d) retransmitting (processed) data groups when transmission or receiving facilities are available;

"a signalling rate" — means the rate as defined in ITU Recommendation 53-36, taking into account that, for non-binary modulation, baud and bit per second are not equal. Binary digits for coding, checking, and synchronization functions are included; (Note: It is the maximum one-way rate, namely the maximum rate in either transmission or reception.)

"digital computer" — means equipment which can, in the form of one or more discrete variables:

(a) accept data;

(b) store data or instructions in fixed or alterable (writable) storage devices;

(c) process data by means of a stored sequence of instructions which is modifiable; and

(d) provide output of data;

"embedded" in equipment or systems means can feasibly be neither:

(a) removed from such equipment or systems; and

(b) used for other purposes;

"fast select" — means a facility applicable to virtual calls which allows a data terminal equipment to expand the possibility to transmit data in call set-up and clearing packets beyond the basic capabilities of a virtual call;

"local area network" — means a data communication system which:

(a) allows an arbitrary number of independent data devices to communicate directly with each other; and

(b) is confined to a geographical area of moderate size (eg office building, plant, campus, warehouse);

"PABX"—see "private automatic branch exchange";

"packet" means a group of binary digits including data and call control signals which is switched as a composite whole. The data, call control signals and possibly error control information are arranged in a specified format;

"packet-mode operation" means the transmission of data by means of addressed packets whereby a transmission channel is occupied for the duration of the packet only. The channel is then available for use by packets being transferred between different data terminal equipments. In certain data communication networks the data may be formatted into a packet or divided and then formatted into a number of packets (either by the data terminal equipment or be equipment within the network) for transmission and multiplexing purposes;

"private automatic branch exchange" — means an automatic telephone exchange, typically incorporating a position for an attendant, designed to provide access to the public network and serving extensions in an institution such as a business, government, public-service or similar organization;

"space-division analogue exchange" — means a space-division exchange, using an analogue (including sampled analogue) signal within the switching matrix. Such exchanges can route digital signals, subject to the bandwidth limitations of the equipment. Thus, such exchanges in public networks commonly pass digital data at rates of several kilobit per second per voice channel of 3,100 Hz as defined in CCITT Recommendation G151;

"space-division digital exchange" — means a space-division exchange which accommodate the transmission through the switching matrix of digital signals requiring a bandwidth wider than a voice channel of 3,100 Hz as defined in CCITT Recommendation G151;

"space-division exchange" — means an exchange in which different streams of data or voice signals are routed through the switching matrix along physically different paths. The signal being routed through the matrix can be analogue (eg conventional amplitude modulation, pulse amplitude modulation) or digital (eg pulse code modulation, delta modulation or data);
"stored programmed controlled circuit switching" — means the technique for establishing, on demand and until released, a direct (space-division switching) or logical (time-division switching) connection between circuits based on switching control information derived from any source or circuit and processed according to the stored programme by one or more electronic computers;
"stored programme controlled telegraph circuit switching" — means techniques essentially identical to those for stored-programme-controlled telephone circuit switching, for establishing connections between telegraph (eg telex) circuits based solely on a subscriber type of signalling information;
"stored programme controlled telephone circuit switching" —

means the technique for establishing within an exchange, on demand and until released, an exclusive direct (space-division switching) or logical (time-division switching) connection between calling and called telephone circuits):

(a) based solely on a subscriber-type of telephone signalling information, derived from the calling circuit; and

(b) processed according to the stored programmes by one or more electronic computers.

The telephone circuits may carry any type of signal, eg telephone or telex, compatable with a voice channel bandwidth of 3,1000 Hz or less;

"terminal device" — means a data device which:

(a) does not include process control sensing and actuating devices; and

(b) is capable of:

(1) accepting or producing a physical record;

(2) accepting a manual input; or

(3) producing a visual output;

(Note: Normal groupings of such equipment (eg a combination of paper tape punch/

reader and printer) connected to a single data channel or communication channel, shall be considered as a single terminal device).

"terminal exchange" — means

(a) a local exchange used for terminating subscribers' lines;
(b) a remote switching unit which performs some functions of a local exchange and operates under a measure of control from the parent exchange;
(c) a local exchange, typically 2-wire, used as a switching point for traffic between subordinate local exchanges, which may also provide 4-wire connections to and from the national long-distance network; or
(d) an exchange which performs any combination of functions in paragraphs (a), (b) and (c) above;

"time-division analogue exchange" — means a time-division exchange in which the parameter, associated with an individual segment of a stream of data or voice signals, varies continuously;

"time-division digital exchange" — means a time-division exchange in which the parameter, associated with an individual segment of a stream of data or voice signals, is one of the finite number of digitally coded values;

"time-division exchange" — means an exchange in which segments of different streams of data or voice signals are interleaved in time and routed through the switching matrix along a common physical path. The matrix may also include one or more stages of space-division switching. The signal being routed though the matrix can be analogue (eg pulse amplitude modulation) or digital (eg pulse code modulation, delta modulation or data);

"total data signalling rate" — means the sum of the individual data signalling rates of all communication channels which:

(a) have been provided with the system; and

(b) can be sustained simultaneously

assuming the configuration of the equipment which would maximize this sum of rates;

"transit exchange" — means

(a) an exchange, typically 4-wire, used as a switching point for traffic between other exchanges in the national network (historically known as a trunk exchange);

(b) a 4-wire exchange serving outgoing, incoming or transit international calls; or

(c) an exchange which performs any combination of functions in paragraph (a) or (b) above or those of a terminal exchange;

"trunk circuit" — means a circuit with associated equipment terminating in two exchanges;

"trunk exchange"—see "transit exchange";

"wide area network" — means a data communication system which:

(a) allows an arbitrary number of independent data devices to communicate with each other;

(b) may include local area networks; and

(c) is designed to interconnect geographically dispersed facilities.

IL1568	Analogue-to-digital and digital-to-analogue converters, position encoders and transducers, the following: and specially designed components and test equipment therefor— (a) Electrical input type analogue-to-digital converters having any of the following characteristics—	
	(1) a conversion rate of more than 200,000 complete conversions per second at rated accuracy	C

(2)	an accuracy in excess of 1 part in more than 10,000 of full scale over the specified operating temperature range;	C
	or	
(3)	a figure of merit of 1 × 108 or more (being the number of complete conversions per second divided by the accuracy).	C
(b)	(b) Electrical input type digital-to-analogue converters having any of the following characteristics—	
(1)	a maximum settling time of less than 3 microseconds for voltage output devices and less than 250 ns for current output devices	C
(2)	an accuracy in excess of 1 part in more than 10,000 of full scale over the specified operating temperature range or	C
(3)	a figure of merit (being the reciprocal of the product of the maximum settling time in seconds and the accuracy) of more than 2 × 109 for voltage output converters or 1 × 1010 for current output converters	C
(c)	(c) Solid-state synchro-to-digital or digital-to-synchro converters and resolver-to-digital or digital-to-resolver converters (including multipole resolvers) having a resolution of better than ±1 part in	C

	40,000 for dual speed systems	
	(d) (d) Mechanical input type position encoders and transducers, excluding complex servo-follower systems, the following—	
	(1) rotary types having—	
	(i) a resolution of better than 1 part in 265,000 of full scale or	C
	(ii) an accuracy better than ±2.5 arc-seconds	C
	(2) Linear displacement types having a resolution of better than 5 micrometres	C
	(e) (e) Any equipment specified in heads (a) to (d) above (inclusive) which is designed to operate below 218 K (−55°C) or above 398 K (+ 125°C);.	C
	In this entry— "settling-time" means the time required for the output to come within one-half bit of the final value when switching between any two levels of the converters.	
IL1570	Thermoelectric materials and devices, the following—	
	(a) (a) Thermoelectric materials with a maximum product of the figure of merit (Z) and the temperature (T in degrees K) in excess of 0.75	C
	(b) (b) Junctions and combinations of	C

			junctions using any of the materials in head (a) above	
		(c)	(c) Heat absorbing or electrical power generating devices containing any of the junctions in head (b) above	C
		(d)	(d) Other power generating devices, and specially designed components therefor, which generate in excess of 22 W per kg or of 17.70kW per cubic metre of the device's basic thermoelectric components	C
	In this entry the figure of merit (z) equals Seebeck coefficient squared divided by the product of electrical resistivity and thermal conductivity.			
IL1571	Magnetometers, magnetometer systems and related equipment, the following and specially designed components therefor—			
		(a)	(a) Magnetometers and magnetometer systems having or capable of having a sensitivity better than ±1.0 gamma (±10^{-5} oersteds), except magnetometers having sensitivities not better than ±0.1 gamma (±10^{-6} oersteds) where the reading rate capability is no faster than once per half-second	C
		(b)	(b) Magnetometer test facilities able to control magnetic	C

field values to an accuracy of 1.0 gamma (10^{-5} oersteds) or less

(c) (c) Magnetic compensation systems utilizing digital computers, non-magnetic platforms and calibration systems C

In this entry—

“sensitivity” means the visually recognized minimum sinusoidal signal in the frequency range of 0.025 Hz to 1.5 Hz when signal-to-noise ratio is higher than 1;

“specially designed components” includes non-magnetic pumping lamps and heating coils, cryogenic magnetic componentry, enhanced resonance gases, and any form of dynamic signal-processing gradient compensation provided as part of, or designed for use with, magnetometers specified in this entry. Enhanced resonance gases are gases of isotopes of cesium, rubidium and other metals which exhibit very sharp bands of response to pumping frequencies in optically pumped magnetometers;

“magnetometer systems” use magnetic sensors, including those designed to operate at cryogenic temperatures, compensation systems, displays, recorders and associated electronics for signal processing, target parameter detection, gradient compensation and dynamic range control.

IL1572 Recording or reproducing equipment, recording media and technology, the following: and specially designed components, accessories and software therefor—

(a) (a) Recording or reproducing equipment using magnetic techniques C

except—

(i) equipment specially designed for—
  (1) audio programmes on tape or disk;
  (2) analogue recording or reproducing of video programmes on tape or disk, save magnetic heads mounted on servo-mechanisms which include piezoelectric transducers and have a gap width less than 0.75 micrometre; or
  (3) digital reproducing (ie play-back only) of video programmes from tape or disk;

(ii) equipment specially designed to use magnetic card, tag, label or bank cheque recording media with a magnetic surface area not exceeding 85 cmsup2;;

(iii) analogue magnetic tape recorders, including equipment permitting the recording of digital signals (eg using a high density digital recording (HDDR) module), having all of the following characteristics—

(a) bandwidth at maximum speed not exceeding 300 kHz per track;

(b) recording density not exceeding 2,000 magnetic flux sine waves per linear cm per track;

(c) not including recording or reproducing heads designed for use in equipment with characteristics superior to those defined in (a) or (b) above;

(d) tape speed not exceeding 155 cm/s;

(e) number of recording tracks, excluding audio voice track, not exceeding 28;

(f) start-stop time not less than 25 ms;

(g) equipped with tape-derived (off-tape) servo speed control and with a time displacement (base) error, measured in accordance with applicable IRIG or EIA documents of, no less than ±5 microsecond;

(h) using only direct or FM recording;

(i) not ruggedized for military use;

(j) not rated for continuous operation in ambient temperatures from below 233 K to above 328 K (from below −40°C to above +55°C); and

(k) not specially designed for underwater use;

(iv) digital recording or reproducing equipment having all of the following characteristics—

(a) cassette/ cartridge tape drives or magnetic tape drives which do not exceed;

(1) a maximum bit packing density of 131 bit per mm per track; or

(2) a maximum bit transfer rate of 2.66 million bit per second;

(d) not ruggedized for military use;

(e) not specially designed for underwater use; and

(f) not rated for continuous operation in ambient temperatures from below 233 K to above 328 K (from below −40°C to above +55°C).

(b) (b) Recording or reproducing equipment using laser beams which produce patterns or images directly on the recording surface or reproduce from such surfaces C

except—

(i) equipment specially designed for the production of audio or video disk masters for the replication of entertainment- or education-type disks;

(ii) facsimile equipment such as used for commercial weather imagery and commercial wire photos and text;

(iii) consumer-type reproducers for audio or video disks employing non-erasable media;

(iv) when specially designed for gravure (printing plate) manufacturing.

(c)	(c) Graphics instruments capable of continuous direct recording of sine waves at frequencies exceeding 20 kHz	C
(d)	(d) Recording media used in equipment specified in head (a) or (b) above	C

except—

(i) magnetic tape having all of the following characteristics—

(a) specially designed for television recording and reproduction or for instrumentation;

(b) being a standard commercial product;

(c) not designed for use in satellite applications;

(d) been in use in quantity for at least two years;

(e) a tape width not exceeding 25.4 mm;

(f) a magnetic coating thickness not less than:

(1) 2.0 micrometres (0.079 mil) if the tape length does not exceed 1,450 m; or

(2) 5.0 micrometres (0.1975 mil) if the tape length does not exceed 6,000m;

(i) a magnetic coating material consisting of doped or undoped gamma-ferric oxide or chromium dioxide;

(j) a base material consisting only of polyester;

(k) a rated intrinsic coercivity not exceeding 64 kA/m (804 oersted); and

(l) a retentivity not exceeding 0.16 T (1,600 gauss);

(ii) magnetic tape having all of

the following characteristics—

(a) specially designed for television recording and reproduction or for instrumentation;

(b) being a standard commercial product;

(c) not designed for use in satellite applications;

(d) been in use in quantity for at least two years;

(e) a tape width not exceeding 50.8 mm;

(f) a magnetic coating material consisting of doped or undoped gamma-ferric oxide or chromium dioxide;

(g) a rated intrinsic coercivity not exceeding 64 kA/m (804 oersted); and

(h) a tape length not exceeding 1,096 m;

(iii) video or audio magnetic tape in cassette having all of the following characteristics—

(a) specially designed for television or audio recording and reproduction;

(b) being a standard commercial product;

(c) a rated intrinsic coercivity not exceeding 1220 kA/m (1,500 oersted);

(d) a retentivity not exceeding 0.30 T (3,000 gauss);

(e) a tape length not exceeding 550 m; and

(f) a magnetic coating thickness not less than 2.0 micrometers;

(iv) computer magnetic tape having all of the following characteristics—

(a) designed for digital recording and reproduction;

(b) a magnetic coating certified for a maximum packing density of 2,460 bit per cm or 3,560 flux changes per cm along the length of the tape;

(c) a magnetic coating thickness not less than 3.6 micro-metres;

(d) a tape width not exceeding 25.4 mm;

(e) a tape length not exceeding 1,1000 m;

(f) been in civil use for at least two years; and

(g) the base material consists only of polyester;

(v) computer flexible disk cartridges having both of the following characteristics—

(a) designed for digital recording and reproduction; and

(b) not exceeding a gross capacity of 17 million bit;

(vi) rigid magnetic disk recording media having all of the following characteristics—

(a) being a standard commercial product;

(b) non servo-written;

(c) a packing density not exceeding 866 bit per cm;

(d) not exceeding 80 tracks per cm; and

(e) conforming to any of the following specifications:

(1) unrecorded single disk cartridges (from loading (2315-type))

designed to meet ANSI X3.52 1976);

(2) unrecorded single disk cartridges (top loading (5440-type)) designed to meet International Standard ISO 3562-1976;

(3) unrecorded six-disk packs (2311 type) designed to meet ANSI X3.46-1974) or International Standard ISO 2864-1974(e); or

(4) unrecorded eleven-disk packs (2316 type) designed to meet ANSI X3.58-1977 or International Standard ISO 3564-1976.

(e)	(e) Technology for the development, production or use of recording or reproducing equipment specified in this entry	D

except—

(i) technology which is unique to equipment excluded by exceptions to head (a)(i)(1), (i)(2) or (ii), or specifically excluded from heads (b) or (c) of this entry other than technology for the design or production of—

(a) cylindrical structures used to record or reproduce video signals in a helical scan system recorder or reproducer; or

(b) recorded alignment tapes used in the production of recording or reproducing equipment;

(ii) the minimum technology necessary for the use of equipment which is excluded under this entry.

(f) (f) Technology for continuous coating of magnetic tape whether specified or not in this entry, the following—

(1) technology for the formulation of coating material	D
(2) technology for the application of coating material to the backing	D

(g) (g) Technology for the manufacture of flexible disk recording media whether specified or not in this entry, the following—

(1) technology for the formulation of coating material	D

	(2) technology for the application of coating material to the flexible backing	D
	(h) (h) Technology for the development or production of rigid disk recording media described whether specified or not in this entry	D
	In this entry— "recording media" — means all types and forms of specialised media used in recording techniques, including but not limited to tapes, drums, disks and matrices; "recording density" for direct recorders-means the recording bandwidth divided by the tape speed; "recording density" for FM recorders-means the sum of the carrier frequency and the deviation divided by the tape speed; "packing density" for digital recorders-means the number of bits per second per track divided by the tape speed.	
IL1573	Superconductive electromagnets and solenoids, the following—	
	(a) (a) Those which have a non-uniform distribution of current-carrying windings, measured along the axis of symmetry when specially designed for gyrotron application	C
	except those rated for both—	

(1) magnetic induction of less than 1 tesla; and
(2) overall current density in the windings of less than 10,000 A/cm^2;

(b) (b) Those which are specially designed to be fully charged or discharged in less than one minute, provided that C

(1) the maximum energy delivered during discharge divided by the duration of the discharge is more than 500 kJ per minute;
(2) the inner diameter of the current-carrying windings is more than 6 cm; and
(3) they are rated for magnetic induction of more than 8 tesla or overall current density in the windings of more than 10,000 A/cm^2.

In this entry "overall current density" means the total number of ampereturns in the coil (ie the sum of the number of turns multiplied by the maximum current carried by each turn) divided by the total cross-section of the coil (comprising the superconducting filaments, the

	metallic matrix in which the superconducting filaments are embedded, the encapsulating material, any cooling channels, etc.).	
IL1574	Electronic devices, circuits and systems specially designed for or capable of operation at temperatures below 103 K (−170°C) and containing components manufactured from superconducting materials which perform functions such as electromagnetic sensing and amplification, current switching, frequency selection or electromagnetic energy storage at resonant frequencies above 1 MHz, including the following (a) (a) Josephson-effect devices (b) Dayem bridges (c) Weak-link devices (d) Proximity-effect devices (e) Phase slip devices (f) SNS (super-normal-super) bridges (g) SIS (Superconductor-insulator-superconductor) devices (h) Quasiparticle devices or detectors In this entry— “Dayem bridges” are superconducting thin film devices with a reduced section area which acts as a conductive weak link. This weak link has a much lower critical current than the areas it joins. Dayem bridges can act as superconducting	C

	quantum interference devices (squids); “proximity-effect devices” are superconducting weak link devices whose low critical current is due to an overlay of normal metal rather than a small area. These devices can be used for the same purpose as Dayem bridges.		
IL1584	Cathode-ray oscilloscopes and specially designed components therefor, including associated plug-in units, external amplifiers, pre-amplifiers and sampling devices, having any of the following characteristics—		
	(a)	(a) An amplifier or system bandwidth greater than 250 MHz, where the band of frequencies over which the deflection on the cathode-ray tube does not fall below 70.7 per cent of that at maximum point measured with a constant input voltage to the amplifier	C
	(b)	(b) A horizontal sweep speed faster than 1 nanosecond per cm with an accuracy (linearity) better than 2 per cent	C
	(c)	(c) Containing or designed for use with cathode-ray tubes specified in head (c) of the entry IL1541 in Group 3F	C
	(d)	(d) Ruggedized to meet a military specification	C

	(e) (e) Rated for operation over an ambient temperature range of from below −25°C to above +55°C	C
	(f) (f) Using sampling techniques for the analysis of recurring phenomena which increases the effective bandwidth of an oscilloscope or time-domain reflectometer to a frequency greater than 4 GHz	C
	(g) (g) Digital oscilloscopes with sequential sampling of the input signal at an interval of less than 50 nanoseconds	C
	(h) (h) Technology, other than for maintenance, repair and operation, relating to oscilloscopes not specified in subhead (a) above which—	
	(1) Use cathode-ray tubes specified in head (b) of entry IL1541 in Group F, or	D
	(2) Exceed an amplifier bandwidth of 200 MHz	D
IL1585	Photographic equipment and film, the following—	
	(a) High speed cinema recording cameras and equipment the following—	
	(1) cameras in which the film is continuously advanced through-out the recording period, and which are capable of recording at framing	C

		rates exceeding 13,150 frames per second, using any camera and film combination from the standard 8mm to the 90mm size inclusive	
	(2)	special optical or electronic devices which supplement, replace or are interchangeable with standard camera components for the purpose of increasing the number of frames per second	C
(b)		(b) High speed cameras in which the film does not move, and which are capable of recording at rates exceeding 1,000,000 frames per second for the full framing height of standard 35mm wide photographic film, or at proportionately higher rates for lesser frame heights or at proportionately lower rates for greater frame heights	C
(c)		(c) Cameras incorporating electron tubes specified in head (a) to the entry IL1555 in Group 3F	C
(d)		(d) Streak cameras having writing speeds of 10mm/microsecond and above	C
(e)		(e) Camera shutters with speeds of 50 nanoseconds or less per operation, and specialized parts and accessories therefor	C

	(f) (f) Film, the following—	
	(1) having an intensity dynamic range of 1,000,000:1 or more	C
	(2) having a speed of ASA 10,000 (or its equivalent) or better or	C
	(3) colour film having a spectral sensitivity extending beyond 7,200 Angstroms or below 2,000 Angstroms	C
	(g) (g) High speed plates having an intensity dynamic range of 1,000,000:1 or more	C
IL1586	Acoustic wave devices, the following: and specially designed components therefor— (a) Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (namely signal-processing devices employing elastic waves in materials, including but not limited to lithium niobate, lithium tantalate, bismuth germanium oxide, silicon, quartz, zinc oxide, aluminium oxide (sapphire), gallium arsenide and alpha-aluminium phosphate (berlinite)), which permit direct processing of signals, (including but not limited to convolvers, correlators (fixed, programmable and memory), oscillators, bandpass filters, delay lines (fixed and tapped) and non-linear devices) having either of the following characteristics—	

	(1) a carrier frequency of greater than 400 MHz	C
	(2) a carrier frequency of 400 MHz or less (except those specially designed for home electronics and entertainment type applications) having any of the following characteristics—	C
	(i) a side-lobe rejection of greater than 45 dB;	
	(ii) a product of the maximum delay time and the bandwidth (time in microseconds and bandwidth in MHz) greater than 100;	
	(iii) a dispersive delay of greater than 10 microseconds	
	(iv) an insertion loss of less than 10 dB;	
(b)	(b) Bulk (volume) acoustic wave devices (i.e. signal processing devices employing elastic waves in the various materials described in head (a) above which permit direct processing of signals at frequencies over 1GHz), including fixed delay lines, non-linear and pulse compression devices	C
(c)	(c) Acousto-optic signal-processing devices employing an interaction between acoustic waves (bulk wave or surface wave) and light waves which permit the direct processing of signals or images,	C

	including but not limited to spectral analysis, correlation and convolution	
	In this entry "acoustic wave devices" means signal processing devices employing elastic waves made from acousto-optic materials, including lithium niobate, bismuth germanium oxide, bismuth silicon oxide, gallium arsenide, gallium phosphide, tellurium oxide and lead molybdenate.	
IL1587	Quartz crystals and assemblies thereof, in worked, semi-finished or mounted form, except optical grade quartz crystals, the following—	
	(a) Those for use as filter elements, and having either of the following characteristics—	
	(1) designed for operation over a temperature range wider than 125°C	C
	or	
	(2) crystals or assemblies of crystals which use the trapped energy phenomenon and which have more than three series or parallel resonances on a single quartz element	C
	except quartz crystals for use as filter elements which have either of the following characteristics—	
	(i) designed for operation as intermediate frequency filters operating from 10.5 to 11 MHz or from 21 to 22 MHz with 3 dB bandwidths not exceeding 40 kHz; or	
	(ii) designed for operation as single side-band filters operating at from	

	1 to 10 mHz with 3 dB bandwidths not exceeding 4 kHz.	
	(b) (b) For use as oscillator elements specially designed for temperature-controlled crystal ovens of for TCXO's specified in head (c) below, and having an average ageing rate of ±1 × 10^{-9} per day or better (less)	C
	(c) (c) Temperature-compensated crystal oscillators (TCXO) having any of the following characteristics—	
(1)	a stability with respect to temperature of better than ±0.00015 per cent over their operating temperature range	C
(2)	an operating temperature range wider than 120°C	C
(3)	capable of reaching to within 1 × 10^{-7} of normal operating frequency or better in 3 minutes or less from switch-on at an ambient temperature of 25°C	C
(4)	rated to have an acceleration sensitivity of less than 1 × 10^{-9} of the operating frequency per g (where g = 981 cm/sec^2) over a vibration test frequency range from 10 to 2,000 Hz sine wave and with a maximum level of acceleration not exceeding 20 g	C
(5)	designed to withstand a shock greater than 10,000 g (where g = 981 cm/	C

	sec^2) over a period of 1 millisecond	
	(6) radiation hardened to better than $10^{-1}0$ of the operating frequency per gray (1 rad = 10^{-2} gray)	C
	For the purpose of this entry "quartz crystals" means quartz crystals having piezoelectric qualities. Ageing rate shall be measured over a longer period than 1 × 10^{-9} per day at a constant temperature of +60°C or higher +2°C.	
IL1588	Materials composed of crystals having spinel, hexagonal, orthorhombic, or garnet crystal structures, thin film devices, assemblies of the foregoing and devices containing them, the following—	
	(a) (a) Monocrystals of ferrites and garnets, synthetic only	C
	(b) (b) Single aperture forms having either of the following characteristics—	
	(1) switching rate of 0.3 microsecond or faster at the minimum field strength required for switching at 40°C, or	C
	(2) a maximum dimension less than 0.45mm except single aperture forms which have— (a) a switching time equal to or more than 0.24 microsecond; and (b) a maximum dimension of 0.30 mm or more.	C

(c)	(c) Multi-aperture forms with fewer than 10 apertures having either of the following characteristics—	
(1)	switching rate of 1 microsecond or faster at the minimum field strength required for switching at 40°C, or	C
(2)	a maximum dimension less than 2.54 mm	C
(d)	(d) Multi-aperture forms having 10 or more apertures	C
(e)	(e) Memory storage or switching devices, the following—	
(1)	thin film, including plated wire and plated rods	C
(2)	single crystal or amorphous film magnetic bubble	C
(3)	moving domain or	C
(4)	crosstie	C
(f)	(f) Magnetic ferrite materials having square loop characteristics, suitable for operations above 1 GHz and having all of the following characteristics—	C
(1)	a saturation magnetization of greater than—	
(i)	0.2 T (2,000 gauss) for lithium-based ferrites	
(ii)	0.3 T (3,000 gauss) for other	

	than lithium-based ferrites; (2) a dielectric loss tangent of less than 0.001 measured at a frequency of 1 GHz or greater; (3) a ratio of the remanent magnetization (B_r) to the saturation magnetization ($4piM_s$) equal to or greater than 0.7. (g) (g) Rod forms having any of the following characteristics—	
	(1) switching rate of 0.3 microsecond or faster at the minimum field strength required for switching at 40°C	C
	(2) a minimum dimension less than 0.254 mm	C
IL1595	Gravity meters (gravimeters), gravity gradiometers and specially designed components therefor except— (a) Gravity meters for land use having either of the following characteristics— (1) static accuracies of not less than 100 microgal; or (2) being of the Worden type; (b) Marine gravimetric systems having either of the following characteristics— (1) static accuracy of 1 milligal or more; or (2) an in-service (operational) accuracy of 1 milligal or more with a time to steady state registration of	C

two minutes or greater under any combination of attendant corrective compensations and motional influences.

GROUP 3H

Metals, Minerals and their Manufactures

In this Group, the following definitions apply—

“Crude forms” means anodes, balls, bars (including notched bars and wire bars), billets, blocks, blooms, brickets, cakes, cathodes, crystals, cubes, dice, grains, granules, ingots, lumps, pellets, pigs, powder, rondelles, shot, slabs, slugs, sponge, sticks.

“Semi-fabricated forms” means (whether or not coated, plated, drilled or punched)—

(i) in the form of wrought or worked materials fabricated by rolling, drawing, extruding or grinding, (i.e. angles, channels, circles, discs, dust, flakes, foils and leaf, forging, plate, powder, pressings and stampings, ribbons, rings, rods (including bare welding rods, wire rods, and rolled wire). Sections, shapes, sheets, strip, pipe and tubes (including tube rounds, squares, and hollows),

		(ii)	drawn or extruded wire);	
		(ii)	cast material produced by casting in sand, die, metal, plaster or other types of moulds, including high pressure castings, sintered forms and forms made by powder metallurgy.	
IL1601	Inert gas and vacuum atomizing technology to achieve sphericity and uniform size of particles in metal powders regardless of the type of metal and regardless of whether or not this powder is specified in this Schedule			D
IL1602	Pyrolitic deposition technology and specially designed components related thereto the following—			
		(a)	(a) Technology for producing pyrolitically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,573 K (1,300°C) to 3,173 K (2,900°C) temperature range at pressures of 133.3 Pa to 19.995 kPa (including the composition of precursor gases, flow rates, and process control schedules and parameters)	D
		(b)	(b) Specially nozzles for the above processes	C
IL1631	Magnetic metals of all types and of whatever form			

having any of the following characteristics—

(a) (a) Initial permeability: 0.15 henry/m (120,000 gauss/oersteds) or more calculated at induction 0 and magnetic field strength 0 or the equivalent. C

Note: Measurement of initial permeability must be carried out on materials which:

(a) have a thickness between 0.076 mm and 2.54 mm; and

(b) are fully annealed.

(b) (b) Remanence: 98.5% or over of maximum magnetic flux for materials having magnetic permeability C

(c) (c) Capable of an energy product of 200,000 J/m^3 (25 × 10^6 gauss-oersteds) or more C

(d) (d) Grain-oriented iron alloy sheets or strips of a thickness of 0.1mm or less C

(e) (e) Magnetostrictive alloy having either of the following characteristics—

(1) saturation magnetostriction more than 5 × 10^{-4} or C

(2) magnetomechanical coupling factor (k) more than 0.8 C

(f) (f) Amorphous alloy strips having C

	both of the following characteristics (1) composition having a minimum 75 weight per cent of one or more of the elements iron, cobalt and nickel; and (2) saturation magnetic induction (Bs) of 1.6 tesla or more, and either— (i) strip thickness of 0.020 mm or less; or (ii) electrical resistivity of 2 × 10^{-4} ohm —cm or more.	
IL1635	Steel alloys in crude or semi-fabricated form, which contain all of the following major alloy elements in the amounts listed by weight— (a) (a) 4.5 to 5.95% nickel; (b) 0.3 to 1.0% chromium; (c) 0.2 to 0.75% molybdenum; (d) 0.04 to 0.15% vanadium; (e) Less than 0.19% carbon.	C
IL1648	Cobalt-based alloys (i.e. containing a higher percentage by weight of cobalt than of any other element), the following— (a) (a) Those which are dispersion strengthened and contain more than 1% of oxides of thorium, aluminium, yttrium zirconiun or cerium	C

		(b) (b) Those containing 0.05% or more of scandium, yttrium, didymium, cerium, lanthanum, neodymium, or praseodymium	C
IL1661	Nickel-based alloys (i.e. containing a higher percentage by weight of nickel than of any other element), the following—		
		(a) (a) Those which are dispersion strengthened and contain more than 1% of oxides of thorium, aluminium, yttrium, zirconium, cerium, or lanthanum	C
		(b) (b) Those containing 0.05% or more scandium, yttrium, didymium, cerium, lanthanum, neodymium, or praseodymium	C
		(c) (c) Those containing 10% or more by weight of aluminium in the form of nickel aluminide, in crude or semi-fabricated forms, and scrap thereof	C
IL1672	Titanium-based alloys containing 12% or more by weight of aluminium in the forms of titanium aluminide, in crude or semi-fabricated forms, and scrap thereof		C
IL1675	Superconductive materials of all types and processed conductors containing at least one superconducting constituent, which are designed for operation at temperatures below 103 K (−170°C)		C

except

Processed conductors having superconducting filaments embedded in a copper or copper-based mixture matrix and either of the following sets of characteristics—

either:

(a) (i) the superconducting constituent, when evaluated in sample lengths of less than one metre, does not remain in the superconducting state when exposed to a magnetic induction in excess of 12T at a temperature of 4.2 K (−268°C);

(ii) the superconducting constituent or filament has a cross-section area greater than 3.14×10^{-4} mm^2 (20-micrometre diameter for circular filaments); and

(iii) the conductor is either non-coated or insulated with varnish, glass fibre, polyamide or polyimide;

or

(b) (i) containing niobium-titanium wire;

(ii) having a filament cross-sectional area of more than 9.5×10^{-5} mm^2 (11-micrometre diameter for

	circular filaments) or greater; and (iii) a mass of each processed conductor including the matric not exceeding 10 kg. (Note: Superconductive materials are metals, alloys and compounds which lose electrical resistance near absolute zero of temperature, i.e. they have infinite electrical conductivity and can carry very large electrical currents without Joule heating. The superconducting state for each material is individually characterised by a critical temperature, a critical magnetic field (which is a function of temperature) and a critical current density (which is a function of both magnetic field and temperature). Materials remain in the superconducting state provided temperature, magnetic field and current density are all less than the critical values.)	
PL7001	Aluminium alloys, the following: tubes, bars or forged forms having an outside diameter greater than 75mm and less than 400mm and a tensile strength of 460×10^6 N/m^2 or greater	W
PL7002	Maraging steel alloy capable of ultimate tensile strength of 2.050 × 109 N/m^2 or greater, whether or not finally heat treated, in crude, semi-fabricated or fabricated form	W
PL7012	Tantalum (or Tantalum lined) crucibles for casting actinide metals	W

GROUP 3I

Chemicals, Metalloids and Petroleum Products

IL1702	Hydraulic fluids which contain as the principal ingredient petroleum (mineral) oils, synthetic hydrocarbon oils, non-fluorinated silicones or fluorocarbons and which have all of the following characteristics— (a) (a) a flash point of greater than 477 K (204°C); (b) a pour point of 239 K (−34°C) or lower; (c) a viscosity index of 75 or greater; and (d) thermally stable at 616 K (343°C). Notes “Flash point” is determined using the “Cleveland Open Cup Method” as shown in ASTM D—92 or national equivalents. The following is the test procedure for determining thermal stability: Twenty cc of the fluid under test shall be placed in a 46 cc type 317 stainless steel chamber containing one each of 0.25 cm (nominal) diameter balls of M—10 tool steel, 52100 steel and naval bronze (60% Cu, 39% Zn, 0.75% Sn). The chamber shall be purged with nitrogen, sealed at atmospheric pressure and	C

the temperature raised to 644 ±6 K (371 ±6°C), and maintained at this temperature for six hours.

The specimen will be considered thermally stable if at the completion of the above procedure all of the following conditions are met:

(1) the loss in weight of each ball is less than 0.1 mg/sq cm of ball surface;

(2) the change in original viscosity as determined at 38°C is less than 25% when measured in the centistokes system of units;

(3) the total acid or base number is less than 0.40.

The viscosity index is a term used to express the ratio of the viscosity values measured at 311 K (37.8°C) and 372 K (98.9°C) in accordance with ASTM Standard 168.

IL1715 Boron, the following—

(a) (a) Boron element (metal) in all forms C

(b) (b) Boron compounds, mixtures, and composites

	containing 5% or more of boron (except pharmaceutical preparations packaged for retail sale), the following—	
	(1) non-ceramic boron-nitrogen compounds (e.g. borazanes, borazines and boropyrazoyls)	C
	(2) boron hydrides (e.g. boranes), except sodium boron hydride, potassium boron hydride, monoborane, diborane and triborane	C
	(3) organoboron compounds, including metallo-organoboron compounds	C
PL7006	Boron compounds and mixtures in which the boron—10 isotope comprises more than 20% of the total boron content	W
IL1733	Base materials, non-composite ceramic materials, ceramic-ceramic composite materials and precursor materials for the manufacture of high temperature fine technical ceramic products, the following—	
	(a) (a) Base materials having all the following characteristics—	C
	(1) any of the following compositions—	
	(i) single or complex oxides of zirconium, and complex oxides of silicon and aluminium;	
	(ii) single or complex borides of zirconium;	

(iii) single or complex carbides of silicon or boron; or

(iv) single or complex nitrides of silicon, boron, aluminium, or zirconium;

(2) total metallic impurities, excluding intentional additions, of less than—

(i) 1,000 ppm for single oxides or carbides;

(ii) 5,000 ppm for complex compounds, single borides or single nitrides; and

(3) average particle size less than or equal to 5 micrometers and no more than 10% of the particles larger than 10 micrometers except for zirconia where these limits are 1 micrometre and 5 micrometres respectively.

(b)	(b) Non-composite ceramic materials, in crude or semi-fabricated form, composed of any material specified in head (a) above, except abrasives	C
(c)	(c) Ceramic-ceramic composite materials containing finely dispersed particles or phases or any non-metallic fibrous or whisker-like materials, whether externally introduced or grown	

in situ during processing, where the following materials form the host matrix—

(1)	all oxides, including glasses	C
(2)	carbides or nitrides of silicon or boron	C
(3)	borides or nitrides of zirconium or boroides, carbides or nitrides of hafnium	C
(4)	any combination of the materials specified in subheads (c)(1) to (3) above	C

except manufactured products or components not specified elsewhere in this Schedule

(d) Precursor materials, (i.e., special-purpose polymeric or metallo-organic materials for producing any base or phases of the materials specified in heads (b) or (c) above), the following—

(1)	polycarbosilanes and polydiorganosilanes (for producing silicon carbide)	C
(2)	polysilazanes (for producing silicon nitride)	C
(3)	polycarbosilazines for producing ceramics with silicon, carbon and nitrogen components	C

In this entry—

(a) a "matrix" means a substantially continuous phase that fills the space between particles, whiskers or fibres;

(b) a "composite" means a matrix and an additional phase or additional

	phases consisting of particles, whiskers, fibres or any combination thereof, present for a specific purpose or purposes.	
IL1734	Low density rigid, carbon-bonded, fibrous or non-fibrous carbon thermal insulating materials having all of the following characteristics— (a) (a) a capability of operating at temperatures greater than 2273 K (2000°C); (b) a density greater than 100 kg/m3 and less than 300 kg/m3; (c) a compressive strength greater than 0.1Mpa and less than 1.0 Mpa; (d) a flexural strength greater than 1.0 Mpa; and (e) a carbon content of greater than 99.9% of total solids.	C
IL1746	Polymeric substances, the following: and manufactures thereof—	
	(a) (a) Polyimides (including maleimides) except in the following forms— fully cured polyimide or polyimide-based film, sheet, tape or ribbon having a maximum thickness of 0.254mm whether or not coated or laminated with heat or pressure-sensitive resinous	C

substances of an adhesive nature, which contain no fibrous reinforcing materials and which have not been coated or laminated with carbon, graphite, metals or magnetic substances.

(b)	(b) Polybenzimidazoles	C
(c)	(c) Aromatic polyamides, including heterocyclic aromatic polyamides characterised as aromatic due to the presence of a benzene ring	C

except—

(i) filament yarns, staple fibres, chopped fibres, spun yarns or threads, having both of the following characteristics—
  (1) a fibre modulus of 22.075 N per tex or less; and
  (2) a tenacity of 0.970 N per tex or less;

(ii) pulp made from materials described under exception (i) above.

(d)	(d) Polyabenzothiazoles	C
(e)	(e) Polyoxadiazoles	C
(f)	(f) Polyphosphazenes (Polyphosphonitriles)	C
(g)	(g) Polystyrylpyridine (PSP)	C

(h)	(h) Thermopolastic liquid crystal copolyesters, the following—	
(1)	ethylene copolyesters of terephthalic acid and parahydroxy-benzoic acid except manufactures thereof, having both of the following characteristics— (i) a tensile modulus of less than 15 Gpa; and (ii) specially designed for non-aerospace, non-electronic civil applications;	C
(2)	phenylene or biphenylene copolyesters of terephthalic acid and parahydroxybenzoic acid	C
(i)	(i) Polybenzoxozoles	C
(j)	(j) Aromatic polyether ether ketones (PEEK)	C
(k)	(k) Butadiene polymers, the following—	
(1)	carboxyl terminated polybutadienes (CTPB); hydroxyl terminated polybutadienes (HTPB); thiol terminated polybutadienes (TTPB); vinyl terminated polybutadiene (VTPB) cyclised 1-2 polybutadiene	C
(2)	mouldable copolymers of butadiene and acrylic acids	C
(3)	mouldable terpolymers of butadiene, acrylonitrile, acrylic acid or any of the homologues of acrylic acid	C

	(l) (l) Carboxyl terminated polyisoprene	C
	There shall be excluded from this entry manufactured articles where the value of the polymeric component together with materials specified elsewhere in this Schedule is less than 50% of the total. In this entry— "tenacity" means tensile stress expressed as force per unit linear density of the unstrained specimen, namely, Newton per tex; "fibre modulus" (secant modulus) means the ratio of change in stress to change in strain between two points on a stress-strain curve, particularly the points of zero stress and breaking stress, and is express in Newton per tex and tex is the number of grams in 1,000 metres of material.	
IL1749	Polycarbonate sheet of 1.5 mm to 25.4 mm thickness, having no major defects and having all of the following optical characteristics— (a) (a) less than 2% haze as determined by method ASTM D1003; (b) an angular deviation, as determined by method ASTM D637, as follows— (1) not more than 12 minutes at any location more than 25.4 mm from the edge of the sheet for sheet thickness of 1.5	C

mm to 9.5 mm; or

(2) not more than 20 minutes at any location more than 25.4 mm from the edge of the sheet for sheet thickness over 9.5 mm to 25.4 mm;

(c) total number of minor optical defects (excluding those within 25.4 mm of the sheet edge) as follows—

(1) not exceeding 1 per 0.368 m^2 for sheet which is 12.7 mm or less in thickness; or

(2) not exceeding 2 per 0.092 m^2 for sheet over 12.7 mm in thickness.

In this entry—

“major defects” means variations in the material which cause angular deviations either side of the undeviated position in excess of those listed in (b) above. “Minor defects” include any embedded particles, bubbles, scratches or internal inhomogeneity with a major dimension of at least 0.250 mm, and those localized imperfections which cause a variation in angular deviation of more than 5 minutes within a distance of not more than 508 mm on

	the screen when tested by method ASTM D637.	
IL1754	Fluorinated compounds, materials and manufactures thereof, the following—	
	(a) Compounds, the following—	
	(1) dibromotetrafluoroethane, except when having a purity of 99.8% or less and containing at least 25 particles, of 200 micrometres or larger in size per 100 ml	C
	(2) perfluoroalkylamines	C
	(b) (b) Polymeric materials and intermediates, unprocessed, the following—	
	(1) polychlorotrifluoroethylene, oily and waxy modifications only	C
	except polychlorotrifluoroethylene-based lubricating oils in quantities of 19 litres or less;	
	(2) fluoroelastomeric compounds composed of at least 95% of a combination of two or more of the following monomers: tetrafluoroethylene, chlorotrifluoroethylene vinylidene fluoride, hexafluoropropylene, bromotrifluoroethylene, iodotrifluoroethylene, perfluoromethylvingylether and perfluoropropoxypropylvinylether	C
	(3) polybromotrifluoroethylene	C
	(4) copolymers of vinylidene fluoride having 75% or more beta crystalline	C

		structure without stretching	
	(5)	fluorinated silicone rubber and intermediates for their production containing 10% or more of combined fluorine	C
		(c) (c) Manufactures, the following—	
	(1)	greases, lubricants and dielectric, damping and flotation fluids made of at least 85% of any of the materials specified in head (a) or (b) above	C
	(2)	electric wire and cable coated with or insulated with any of the materials specified in sub head (b)(2) above, except oil well logging cable	C
	(3)	seals, gaskets, rods, sheets, sealants or fuel bladders made of more than 50% of any of the materials specified in subhead (b)(2) above and specially designed for aerospace and aircraft use	C
	(4)	piezoelectric polymers and copolymers made from vinylidene fluoride having both of the following characteristics—	C
		(i) in sheet or film form; and	
		(ii) with a thickness of more than 200 micrometres.	
IL1755	Silicone fluids and greases, the following—		
		(a) (a) Fluorinated silicone fluids, except those with kinematic viscosity of 5,000	C

centistokes or higher measured at 25°C

(b) (b) Silicone and fluorinated silicone lubricating greases capable of operating at temperature of 478 K (205°C) or higher and having a drop point (method of test being ASTM D2265) of 493 K (220°C) or higher C

IL1757 Compounds and materials, the following—

(a) (a)Monocrystalline silicon C

except—

(i) metallurgical-grade monocrystalline silicon having a purity not better than 99.97%; or
(ii) monocrystalline silicon having a purity not better than 99.999% and containing at least 0.5 part in 10^6 each of iron, carbon, boron and phosphorus, plus other impurities.

(b) (b) Gallium of a purity equal to or greater than 99.9999% and gallium III/V compounds of any purity level C

except—

(i) gallium phosphide; or
(ii) other gallium III/V compounds having a dislocation density (etch pit density-EPD)

	greater than 500,000 per cm^2.	
(c)	(c) Indium of a purity greater than 99.9995% and III-V indium compounds containing more than 1% indium	C
(d)	(d) Hetero-epitaxial materials consisting of a monocrystalline insulating substrate epitaxially layered with silicon, compounds of gallium or compounds of indium	C
(e)	(e) Elemental Cd and Te of purity levels equal to or more than 99.9995% CdTe compounds of a purity level equal to or more than 99.99% and single crystals of CdTe of any purity level	C
(f)	(f) Polycrystalline silicon, (except polycrystalline silicon having a purity not better than 99.99% and containing at least 0.5 part in 10^6 each of iron, carbon, boron and phosphorus, plus other impurities)	C
(g)	(g) $SiCl_2H_2$ with a purity level of 97.0 per cent or better and compounds having a purity level based upon the amount of the primary constituents of 99.5% or better and used in the synthesis of the materials specified	C

		in head (f) above, or used as the silicon source in the deposition of epitaxial layers of silicon, silicon oxide or silicon nitride	
	(h)	(h) Single crystals sapphire substrates	C
	(i)	(i) B_2O_3 with a purity of 99.9% or greater, containing 1,000 parts per million of H_2O or less, in powder or cast form	C
	(j)	(j)Monocrystalline germanium with a resistivity greater than 100 ohm cm	C
	(k)	(k) Resist, materials, the following—	
(1)	negative resists whose spectral response has been adjusted for use below 350 nanometres		C
(2)	all positive resists		C
(3)	all resists for use with E-beams or ion beams with a sensitivity of 100 microcoulomb/cm^2 or better		C
(4)	all resists for use with X-rays with a sensitivity of 500 millijoules/cm^2 or better		C
(5)	all resists specified or optimized for dry development		C
	(l)	(l) Single-crystal forms of bismuth germanium oxide having piezoelectric properties and single-crystal forms of lithium niobate, of	C

		lithium tantalate and of aluminium phosphate	
	(m)	(m) Metal-organic or hydride compounds of beryllium and magnesium (Group IIA), zinc, cadmium and mercury (Group IIB), aluminium, gallium and indium (Group IIIA), phosphorus, arsenic and antimony (Group VA) and selenium and tellurium (Group VIA) having a purity (metal basis) of 99.999% or better	C
IL1759	Syntactic foam for under water use formulated for applications at depths greater than 1000 metres or with a density of 0.561g/cm^3 (specific gravity 0.561) or less In this entry— "syntactic foam" consists of hollow plastic or glass spheres less than 100 micrometers in diameter uniformly embedded in a resin matrix		C
IL1760	Tantalates and niobates having a purity of 99% or better except fluorotantalates		C
IL1763	Fibrous and filamentary materials which may be used in organic matrix, metallic matrix or carbon matrix composite structures or laminates, and such composite structures and laminates and technology therefor, the following and specially ODMA software therefor—		
	(a)	(a) Fibrous and filamentary materials with specific modulus greater than	C

3.18×10^6m and specific tensile strength greater than 7.62×10^4m except silicate glass fibres

(b) (b) Fibrous and filamentary materials having both of the following characteristics— C

(1) specific modulus greater than 2.54×10^6m and;

(2) melting or sublimation point higher than 1,992 K (1.649°C) in an inert environment;

except—

(i) carbon fibres having a specific modulus less than 5.08×10^6m and a specific tensile strength less than 2.54×10^4m;

(ii) discontinuous, multiphase, polycrystalline alumina fibres in chopped fibre or random mat form, containing 3% by weight or more silica, having a specific modulus less than 10×10^6m

(iii) molybdenum and molybdenum alloy fibres;

There shall be excluded from heads (a) and (b) carbon fibres having both of the following characteristics:

(a) specific modulus less than 11.43×10^6m and

(b) specific tensile strength less than 10.16×10^4m.

(c) (c) Resin or pitch-impregnated fibres C

		(prepregs), metal or carbon-coated fibres (preforms) or carbon fibre preforms made with materials specified in head (a) or (b) above	
	(d)	(d) Composite structures, laminates and manufactures thereof for products and components made either with an organic matrix, a carbon matrix or a metal matrix utilising materials specified in head (a), (b) or (c) above	C
	except manufactured products or composites not specified elsewhere in this Schedule.		
	(e)	(e) Technology for fibrous and filamentary materials and for composite structures and laminates, the following—	
(1)	technology which is unique to the spinning and subsequent treatment of precursor materials into fibres specially designed for processing into carbon filamentary materials specified in head (a) or (b) above		D
(2)	technology for the production of fibrous and filamentary materials specified in head (a) or (b) above		D
(3)	technology for the production of prepregs specified in head (c) above using pressure impregnation or chemical		D

	vapour deposition, and for preforms specified in head (c) above using vacuum or pressure impregnation of chemical vapour deposition	
(4)	technology for the development and production of composite structures, laminates and manufactures specified in head (d) above	D
(5)	technology for rigidisation and densification processes specially designed for the manufacture of carbon-carbon composite materials, the following—	
(i)	for impregnation, infiltration or deposition into carbon fibre preforms	D
(ii)	for carbonisation	D
(iii)	for graphitisation	D
(iv)	for hot isostatic pressing	D

In this entry—

the term "fibrous and filamentary materials" includes:

(a) continuous monofilaments;

(b) continuous yarns and rovings;

(c) tapes, fabrics, random mats and braids;

(d) chopped fibres, staple fibres and coherent fibre blankets;

(e) whiskers, either monocrystalline or polycrystalline, of any length;

"specific modulus" is Young's modulus

	in pascals, equivalent to N/m^2 divided by specific weight in N/m3 measured at a temperature of (296 ± 2) K (23 ± 2) C) and a relative humidity of (50 ± 5)%; “specific tensile” strength is ultimate tensile strength in pascals, equivalent to N/m^2 divided by specific weight in N/m3 measured at a temperature of (296 ± 2) K ((23 ± 2) C) and a relative humidity of (50 ± 5)%; “carbon fibre preform” means an ordered arrangement of uncoated or coated fibres intended to constitute a framework of a part before the matrix is introduced to form a composite; “matrix” means a substantially continuous phase that fills the space between particles, whiskers or fibres; “composite” means a matrix and an additional phase or additional phases consisting of particles, whiskers, fibres or any combination thereof, present for a specific purpose or purposes.	
IL1767	Preforms of glass or of any other material specially designed for the fabrication of optical fibres specified in heads (b) or (c) in entry IL1526 in Group 3F relating to cable and wire In this entry “optical fibre preforms” means bars, ingots, or rods of glass, plastic or	C

	other materials which have been specially processed for use in fabricating optical fibres.	
IL1781	Synthetic lubicating oils and greases which are or which contain, as their principal ingredient, the following—	
	(a) (a) Monomeric and polymeric forms of perfluorotriazines, perfluoroaromatic ethers and esters, and perfluoroaliphatic ethers and esters	C
	(b) (b) Polyphenyl ethers or thio ethers containing more than three phenyl or alkyl phenyl groups	C
PL7007	Chemicals, the following—	
	(a) (a) Chloroethanl	W, L, I, Y
	(b) (b) Dimethylamine	W, L, I, Y
	(c) (c) Dimethylamine hydrochloride	W, L, I, Y
	(d) (d) Dimethyl methylphosphate	W, L, I, Y
	(e) (e) Dimethylphosphite	W, L, I, Y
	(f) (f) Hydrogen fluoride	L, I, Y
	(g) (g) Methyl phosphonyl dichloride	W, L, I, Y
	(h) (h) Methyl phosphonyl difluoride	W, L, I, Y
	(i) (i) Phosphorus oxychloride	W, L, I, Y
	(j) (j) Phosphorus trichloride	W, L, I, Y
	(k) (k) Potassium fluoride	W, L, I, Y
	(l) (l) Thiodiglycol	W, L, I, Y

(m)	(m) Thionyl chloride	W, L, I, Y
(n)	(n) Trimethylphosphite	W, L, I, Y
(o)	(o) Tris-ethanolamine	W, L, I, Y

INDEX

MUNITION LIST—GROUP 1

Dibenzoxazepine	ML 7
Dibromodiemthyl ether	ML 7
Dichlorodiethyl sulphide	ML 7
Dichlorodimethyl ether	ML 7
2:2'-Dichlorotriethylamine	ML 7
Diphenylaminechloroarsine	ML 7
Diphenylchloroarsine	ML 7
Diphenylcyanoarsine	ML 7
Directed energy weapons	ML 23
Diving apparatus	ML 17
Electronic equipment, military	ML 11
Electrified riot control vehicles	PL 5001
Environmental chambers	ML 19
Ethyl NN-dimethylphosphoramidocyanidate	ML 7
Ethyldibromoarsine	ML 7
Ethyldichloroarsine	ML 7
Explosives	PL 5009
Fire bombs	ML 4 a
Fire control equipment	ML 5
Flame throwers	ML 2
Fuels	PL 5009
Fuel thickeners	ML 4 c
Gas projectors	ML 2 b
Grenades	ML 4 a
Guns	ML 2 a
Gun-carriers	ML 6
Half-tracks	ML 6
Helmets	ML 13 c
Howitzers	ML 2 a
Image intensifiers	ML 15
Imaging equipment	ML 12
Incendiary bombs	ML 4 a
Infrared equipment	ML 12 and ML 15
Large calibre armaments	ML 2
Lasers	ML 23

Leg irons	PL 5001
Lewisite	ML 7
Machine guns	ML 1 a
Machine pistols	ML 1 a
Methyldichloroarsine	ML 7
Microwave weapon systems	ML 23
Military aircraft	ML 10 a
Military helicopters	ML 10 a
Mines	ML 4 a
Missiles, guided or unguided	ML 4 a
Mobile repair shops	ML 6
MonoChloromethylchloroformate	ML 7
Mortars	ML 2 a
Mustard gas	ML 7
Naval equipment	ML 9
oChlorobenzylidenealononitrile (oChlorobenzalmalononitrile)	ML 7
Parachutes	PL 5012
Particle beam systems	ML 23
Phenylcarbylamine chloride (phenylaminocarbonyl chloride)	ML 7
Phenylacyl chloride (w-Chloroacetophenone)	ML 7
Phenyldibromarsine	ML 7
Phenyldichloroarsine	ML 7
Photographic equipment	ML 12
Pinacolyl methylphosphonofluoridate	ML 7
Pistols	ML 1 a
Precursors, explosives	PL 5009
Pressure suits	PL 5012
Production equipment, military	ML 18
Production technology, military	ML 18
Projectile launchers	ML 2 a
Propellants	PL 5009
IsoPropyl methylphosphonofluoridate	ML 7
Pyrotechnics	PL 5009
Pyrotechnic flare signals	ML 4 a

Pyrotechnic projectors	ML 2 b
Range finders	ML 5
Recoilless rifles	ML 2 a
Recovery vehicles	ML 6
Refuelling	ML 10 c
Revolvers	ML 1 a
Rifles	ML 1 a
Riot control equipment	PL 5001
Riot control vehicles, electrified	PL 5001
Rockets	ML 4 a
Rocket launchers	ML 2 a
Searchlights	ML 17 c
Self-propelled guns	ML 6
Shackles	PL 5001
Shutters, electronically triggered	ML 22
Silencers, firearm	ML 17 b
Smoke canisters	ML 4 a
Smoke grenades	ML 4 a
Smoke projectors	ML 2 b
Small arms	ML 1
Smooth bore weapons	ML 1
Software	ML 24
Stabilisers, explosives	PL 5009
Submarines	ML 9
Submarine nets	ML 9
Superconductive equipment	ML 20
Surface vessels	ML 9
Tanks	ML 6
Tank destroyers	ML 2 a
Tear gas	ML 7
Telescopic sights	PL 5002
Thermal imaging equipment	ML 15
Torpedoes	ML 4 a
Torpedo nets	ML 9
Toxicological agents	ML 7

INDEX

ATOMIC AND NUCLEAR LISTS-GROUP 2

INDEX

INDUSTRIAL LIST-GROUP 3

Disc cartridges	IL 1572 d
Disc drives	IL 1565 h and IL 1572a
Disc packs	IL 1572 d
Display drivers	IL 1564 d
Displays	IL 1564 c and d
Doping profile analysis	IL 1355 b 4
Doppler systems	IL 1501 b and c
Drills (PCB)	IL 1354 f
Drivers	IL 1564 d
Dry etchers	IL 1355 b 1
Dynamic random access memories	IL 1564 d
Electrical, electronic equipment	PL 7004
Electric arc devices	IL 1206
Electro-chemical devices	IL 1205 a
Electrolyte cells	IL 1205 a
Electron beam deposition systems	IL 1355 b 1 and IL 1388 c
Electron beam microfabrication systems	IL 1355 b 1
Electron tubes	IL 1555
Electron tubes for electron streak cameras	IL 1555
Electron tubes for framing cameras	IL 1555
Electron tubes for image conversion	IL 1555 a
Electron tubes for image intensification	IL 1555 a
Electron tubes for television cameras	IL 1555 b
Electron tubes for video cameras	IL 1555 b
Electronic assemblies	IL 1564
Electronic components	IL 1564
Electronic components, manufacture and test	IL 1355
Electronic equipment (with certificate concerned with the limitation of compromising electromagnetic radiation)	PL 7004
Electronic instruments	IL 1529
Electronic material, manufacture and test	IL 1355
Electronic vacuum tubes	IL 1558
Elements for optical tubes	IL 1556
Embedded digital computers	IL 1565 h 2
Encapsulated passive networks	IL 1564 d

Encoders	IL 1568 d
Encryption	IL 1527, IL 1565, IL 1566 and PL 7003
End effectors, robot	IL 1391 c
Epitaxial growth equipment	IL 1355 b 1
Etchers, plasma	IL 1355 b 1
Etching equipment (PCB)	IL 1354 a
Exchanges	IL 1567
Expert systems	IL 1566 b
FET	IL 1545 a
FFT analysers	IL 1533
Facsimile equipment	IL 1519 and IL 1572
Fast fourier transform analysers	IL 1533
Fast recovery diodes	IL 1544 e
Fault tolerance	IL 1565 h 1
Fibre-optic bundles	IL 1556 a
Fibre-optic cable	IL 1526 c and d
Fibre-optic connector manufacture	IL 1359
Fibre-optic connectors	IL 1526 e
Fibre-optic couplers	IL 1526 e
Fibre-optic manufacturing equipment	IL 1353
Fibre-optic plates	IL 1556 a
Fibre-optics	IL 1526 b and c
Fibrous and filamentary production	IL 1357
Fibrous and filamentary materials	IL 1763
Field-effect transistors	IL 1545 a
Filament winding machines	IL 1357
Film type integrated circuits	IL 1564
Flash discharge type X-ray systems	IL 1553
Flash discharge type X-ray tubes	IL 1553
Flatbed microdensitometers	IL 1534
Flatbed measurement instruments	IL 1355 b 4
Flexible disc drives	IL 1565 h and IL 1572 a
Flexible disc media	IL 1572 d
Flight data recorders	IL 1572 a
Flight instrument systems	IL 1485

Floating docks	IL 1425
Floppy disc drives	IL 1565 h and IL 1572 a
Floppy disc media	IL 1572 d
Flow-forming machines	IL 1075
Fluorinated silicone fluids	IL 1755 a
Fluorinated silicon lubricating greases	IL 1755 b
Fluorine production equipment	IL 1110
Fluorine, containers for	IL 1145
Fluorocarbon coated electric wire and cable	IL 1754 c
Fluorocarbon compounds and manufacturers	IL 1754
Fluorocarbon greases, lubricants and dielectric	IL 1754 c
Fluorocarbon processing equipment	IL 1352
Fluorocarbon tubing	IL 1142
Focal plane array	IL 1548 d
Frequency agile radio systems	IL 1516 c
Frequency generators	IL 1529 b
Frequency network analysers	IL 1529 b
Frequency standards	IL 1529 a
Frequency synthesizers	IL 1531
Frequency (heterodyne) converters	IL 1529 b
Fuel cells	IL 1205 a
Function generators	IL 1529 b
Functional testers	IL 1355 b 7
Furnaces, electric vacuum	IL 1203
Gallium	IL 1757 b
Gas turbine blade manufacture	IL 1080
Gas turbine engine inspection	IL 1086
Gas turbine engine manufacture	IL 1086
Gas turbine engine technology	IL 1372
Gas turbine engines	IL 1431
Gate arrays	IL 1564
Gear making machinery	IL 1088
Geodetic equipment	IL 1502
Geophones	IL 1510
Germanium	IL 1757 j

Optical quality surface manufacture	IL 1370
Optical Spectrum Analysers	IL 1533
Oscillators, crystal	IL 1587
Oscilloscopes	IL 1584
Oxidation furnaces	IL 1355 b 1
Oxygen/carbon content measuring equipment	IL 1355 b 4
PABX	IL 1567 b
PCB	IL 1354 b
PCB CAD	IL 1354 b
PCB manufacture and test	IL 1354
PCM testers	IL 1519 d
PIN diodes	IL 1544 f
PIN modulators	IL 1537 1
PLA	IL 1537 1
PMOS monolithic integrated circuits	IL 1564 d
PROM	IL 1564 d
PROM programmers	IL 1529 b
Packages	IL 1564
Packet switching	IL 1567
Panel processors, PCB	IL 1354 c
Panoramix radio receivers	IL 1516 a
Parametric amplifiers	IL 1537
Pattern generators	IL 1355 b 2
Pellicles	IL 1355 b 2
Peniotrons	IL 1558 e
Peripheral drivers	IL 1564 d
Peripheral equipment	IL 1565 h 2
Phase slip devices	IL 1574
Phased array antenna	IL 1537 g
Phosphorus oxychloride	PL 7007
Phosphorus trichloride	PL 7007
Photo-enhanced reactors	IL 1355 b 1
Photo-voltaic cells	IL 1205 b
Photocathodes	IL 1556 c
Photoconductive cells	IL 1548

Spread spectrum receivers	IL 1516 c
Sputtering equipment	IL 1355 b 1 and IL 1388 e
Static random access memories	IL 1564 d
Statistical multiplexers	IL 1519 and IL 1567
Steel and iron alloys	IL 1635
Step and repeat cameras	IL 1355 b 2
Storage drivers	IL 1564 d
Storage integrated circuits	IL 1564 d
Store and forward	IL 1567
Stored programme controlled circuit switching	IL 1565 h 1 and IL 1567
Stored programme controlled communications	IL 1567
Streak cameras	IL 1585
Streamer tape drives	IL 1565 h and IL 1572 a
Submersible systems	IL 1417
Submersibles	IL 1418
Substrates	IL 1564
Substrates for printed circuit board	IL 1564 a
Superalloy production equipment	IL 1301 a
Superalloy production technology	IL 1301 b
Superconducting materials	IL 1574
Superconductive electromagnets	IL 1573
Superconductive materials	IL 1675
Superconductive solenoids	IL 1573
Support integrated circuits	IL 1564 d
Surface acoustic wave devices	IL 1586
Surface-effect vehicle manufacture	IL 1364
Surface-effect vehicles	IL 1416 b
Switches, electronic	IL 1564 d
Switching type voltage regulators	IL 1564 d
Syntactic foam	IL 1759
Synthesized signal generators	IL 1531 b
Synthetic lubricating oils	IL 1781
TCXOs	IL 1587
TEM mode devices	IL 1537 d
TR) tubes	IL 1537 e

Time-division digital exchange	IL 1567
Timing integrated circuits	IL 1564 d
Titanium aluminides	IL 1672
Titanium-based alloys	IL 1672
Towed hydrophone arrays	IL 1510
Tracking equipment	IL 1502
Transducers	IL 1510 and IL 1568
Transfer oscillators	IL 1529 b
Transient recorders	IL 1529 g
Transistors	IL 1545
Transit exchange	IL 1567
Transmission equipment	IL 1519
Transmission media simulators	IL 1520 b
Transmitter-amplifiers	IL 1517
Transmitters	IL 1517
Transopters	IL 1564 c and d
Trappatt diodes	IL 1544 c
Travelling wave tubes	IL 1558 c
Triggered spark gaps	IL 1542
Trimethylphosphite	PL 7007
Tris-ethanolamine	PL 7007
Triodes	IL 1558 a
Tropospheric scatter communication equipment	PL 7008
Tubes	IL 1558
Tubing, fluorocarbon	IL 1142
Ubitrons	IL 1558 e
Ultrasonic equipment	IL 1502
Underwater cameras	IL 1417 e
Underwater communication Cable	IL 1526 e
Underwater vehicles	IL 1418
Underwater vision systems	IL 1417 c
Unencapsulated integrated circuits	IL 1564 d
Untuned alternating current amplifiers	IL 1564 d
Vacuum photodiodes	IL 1548 a
Vacuum pump systems	IL 1129

Varactor diodes	IL 1544 d
Vessels models	IL 1363
Vessels	IL 1416
Vibration test equipment	IL 1362
Video recorders	IL 1572 a
Video tape	IL 1572 a and d
Vision systems, robot	IL 1391
Voltage (rms-to-DC) converters	IL 1564 d
Voltage comparators	IL 1564 d
Voltage references	IL 1564 d
Voltage to frequency converters	IL 1564 d
Voltage variable capacitance diodes	IL 1544 d
Wafer defect inspection equipment	IL 1355 b 3
Wafer polishers	IL 1355 b 1
Wafer probers	IL 1355 b 6
Water tunnels	IL 1363
Waveguides	IL 1537 a
Weak-link devices	IL 1574
Weaving machines	IL 1357
Wide area networks	IL 1565 h 1 and IL 1567 a
Wideband amplifiers	IL 1521
Winchester disc drives	IL 1565 h and IL 1572 a
Wind tunnel, instrumentation	IL 1361
Wind tunnel, models	IL 1361
Wind tunnels	IL 1361
Wire bonders	IL 1355 b 5
X-ray systems	IL 1553
X-ray tubes	IL 1553
Zone-refining equipment	IL 1355 b 1

SCHEDULE 2

List of countries referred to in Article 2:–

Afghanistan

Albania

Bulgaria
China
Czechoslovakia
German Democratic Republic
Hungary
North Korea
People's Republic of Mongolia
Poland
Romania
Socialist Republic of Vietnam
Union of Socialist Soviet Republics

SCHEDULE 3

Export of Goods (Control) Order 1987 (S.I.1987/2070)
Export of Goods (Control) (Amendment) Order 1988 (S.I. 1988/1487
Export of Goods (Control) (Amendment No. 2) Order 1989 (S.I. 1989/246)
Export of Goods (Control) (Amendment No. 3) Order 1989 (S.I. 1989/354)
Export of Goods (Control) (Amendment No. 4) Order 1989 (S.I. 1989/1270)
Export of Goods (Control) (Amendment No. 5) Order 1989 (S.I. 1989/1914)
Export of Goods (Control) (Amendment No. 6) Order 1989 (S.I. 1989/2327)

EXPLANATORY NOTE

(This note is not part of the Order)

This Order revokes and replaces the Export of Goods (Control) Order 1987 and the subsequent amendment thereto. The changes (apart from minor or drafting changes) it effects are as follows:—

1. Export control is

(a) lifted on certain jig grinders, certain floor-type horizontal boring mills, certain pumps, valves, cocks and pressure regulators, unreinforced tubing, manufactur ing and testing equipment for coxial cable, certain wind tunnels for educational purposes or not specially designed or fitted with means for preheating the air, general purpose acoustic emission equipment for discriminating acoustic emissions related to crack growth, certain integrated flight instrument systems, certain gyrostabilisers, certain specially designed test calibration and diagnostic equipment for compasses, gyros, accelerometers and inertial equipment, certain airborne communication equipment, certain Doppler navigation equipment, certain radio altimeters, certain Loran-C navigation equipment, certain ground and marine navigation equipment, certain airborne civil weather radar, certain global positioning satellite receivers, certain specialised testing or calibrating equipment for navigation direction finding, radar and airborne communication equipment, certain infrared thermal equipment and infrared viewing equip ment, telecommunication transmission equipment using analogue techniques, certain equipment for radio relay transmission of television signals, certain communication satellite earth station equipment, certain industrial radio relay communication equipment, certain semiconductor lasers, reversed-twist double-armoured underwater communication cable, coaxial cables, certain programmable electronic instruments, certain programmable signal analysers (spectrum analysers), certain flatbed microdensitometers, certain parametric or paramagnetic amplifiers, certain cathode ray tubes, certain cold cathode tubes, non-coherent light emitting diodes, field effect transistors designed for audio frequency applications, certain semiconductor photodiodes, certain magne trons and klystrons, certain electronic or magnetic amplifiers, induction potentiometers, induction rate (tachometer) generators, servo-motors, precision potentiometers, direct current and alternating current torquers, electro-optical devices designed to monitor relative rotation of remote surfaces, synchronous motors, semiconductor Hall field probes, cylindrical structures for analogue video recording and reproducing equipment, certain single aperture forms, seamless tube and pipe, cobalt-based alloys containing 5% or more tantalum, niobium (columbium), molybdenum alloys, tantalum and tantalum alloys, vanadium and vanadium alloys, certain superconductive alloys, certain lubricating oils, and where the exportation was prohibited only by virtue of an import certificate having been issued;

(b) reduced in scope on equipment for milling aircraft skins or spars, numerical control units, crystal pullers, robots and robot controllers, passive acoustic hydrophones or transducers, telecommunication transmission equipment using digital techniques, electronic measuring and test equipment for telecommunica tion transmission equipment, digital microwave radio links, equipment containing Nd: YAG or Nd: Glass lasers, Nd: YAG lasers, optical fibre communication cable or optical fibre, optical fibres for sensing purposes, frequency standards for fixed ground use, portable (personal) or mobile radio telephones, microwave assemblies and sub-assemblies, encapsulated integrated circuits having hermetically sealed dual-in-line cases, silicon microcomputers microcircuits, embedded electronic computers, disc drives, displays for elec tronic computers, local area networks, software, communication equipment for data (message) switching, stored programme controlled telegraph circuit switching, analogue private automatic branch exchanges, mechanical input type position encoders and transducers, gravity meters, iron and steels, nickel-based alloys, titanium-based alloys, tantalates and niobates, certain carbon fibres, nuclear power generating equipment, tantalum, and on a range of personal computer systems up to specified levels;

(c) extended in scope on toxicological agents and tear gas, and directed energy weapons;

(d) amended in scope on technical data and procedures for the production of fibrous and filamentary materials, weaving and interlacing machines, robot controllers and end-effectors, technology for reciprocating diesel engines, cryptographic equipment, instrument frequency synthesizers and synthesized signal generators, stored programme controlled communication switching equipment or systems, technology for the design and production of cylindrical structures for analogue video recording and reproducing equipment, base materials, non-composite ceramic materials, ceramic-ceramic composite materials and precursor materials, polymeric substances, fibrous and filamen tary materials, nuclear materials;

(e) introduced on equipment for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, technology for the application of coatings to non-electronic devices, biocatalysts for decontamina tion and degradation of chemical warfare agents, thionyl chloride, dimethylam ine hydrochloride and riot control vehicles specially designed to be electrified to repel boarders.

2 The structural drafting of each entry has been amended and updated to reflect the format used in other publications apertaining to export controls published nationally and internationally to simplify the correlation for UK exporters. This has resulted in a number of minor changes to the coverage of various entries throughout the Order.

3 Non COCOM items are prefixed PL and allocated an identification number. They have been included in Schedule 1 where they relate to COCOM items or in the most appropriate place in the Group and are not necessarily in numerical sequence.

They are as follows:

	page
PL5001	15
PL5002	13
PL5003	9
PL5004	9
PL5005	9
PL5006	9
PL5007	10
PL5008	10
PL5009	11
PL5010	11
PL5011	12
PL5012	12
PL5013	12
PL5014	12
PL5016	13
PL5017	13
PL6001	16
PL6002	17
PL6003	17
PL6005	17
PL6006	17
PL6007	19
PL6008	19
PL6009	19
PL6010	19
PL6011	16

	page
PL6012	16
PL7001	142
PL7002	143
PL7003	70
PL7004	63
PL7005	27
PL7006	143
PL7007	149
PL7008	73
PL7009	55
PL7010	62
PL7011	62
PL7012	143
PL7013	83

4 Whenever goods are indicated in Schedule 1 by more than one letter each prohibition in article 2 relates to the relevant letter applying to the export of the goods.

5 Any particular goods may fall within more than one description in Schedule 1 to the Order. In such a case each prohibition (taking effect by such inclusion in that Schedule and the related provisions of Article 2) applies to the export of the goods.This may mean that different entries prohibit the export of the goods to different countries.

6 Copies of the British Standards referred to in these Regulations may be obtained from any of the sales outlets operated by the British Standards Institution (BSI), or by post from the BSI at 3 Lindford Wood, Milton Keynes, MK14 6LE.

7 Copies of the economic and control rules of the International Cocoa Agreement can be obtained from the International Cocoa Organisation, 22 Berners Street, London W7.