



LEGAL
COUNSEL
WORLDWIDE

Export Jurisdiction and Classification for Micro and Nano Technology Used to Aerospace Applications

DDTC and BIS are watching MNT closely but have very little experience in classifying or licensing the technology at this point.

Development Technologies	CCL	USML
Semiconductor devices or materials	3E001-003	XI(d)
Aircraft Inertial systems and specially designed components	7E001	VIII(i)
Spacecraft components or materials	NA	XV(f)
Launch vehicle / guided missile components	NA	IV(i)

U.S. Approval Requirement for MNT Collaboration

When can development technology be exported without Government prior approval?

Development Technologies	CCL	USML
Semiconductor devices or materials	Canada + TSR	NA
Aircraft Inertial systems and specially designed components	Canada	NA
Spacecraft components or materials	NA	NA
Launch vehicle / guided missile components	NA	NA

Country Group B		
Afghanistan	Eritrea	Nicaragua
Algeria	Estonia	Niger
Andorra	Ethiopia	Nigeria
Angola	Fiji	Norway
Antigua and Barbuda	Finland	Oman
Argentina	France	Pakistan
Aruba	Gabon	Palau
	Gambia, The	Panama
	Germany	Papua New Guinea

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Australia	Ghana	Paraguay
Austria	Greece	Peru
The Bahamas	Grenada	Philippines
Bahrain	Guatemala	Poland
Bangladesh	Guinea	Portugal
Barbados	Guinea-Bissau	Qatar
Belgium	Guyana	Romania
Belize	Haiti	Rwanda
Benin	Honduras	Saint Kitts & Nevis
Bhutan	Hong Kong	Saint Lucia
Bolivia	Hungary	Saint Vincent and the Grenadines
Bosnia & Herzegovina	Iceland	Samoa
Botswana	India	San Marino
Brazil	Indonesia	Sao Tome & Principe
Brunei	Ireland	Saudi Arabia
Bulgaria	Israel	Senegal
Burkina Faso	Italy	Serbia and Montenegro
Burma	Jamaica	Seychelles
Burundi	Japan	Sierra Leone
Cameroon	Jordan	Singapore
Canada	Kenya	Slovakia
Cape Verde	Kiribati	Slovenia
Central African Republic	Korea, South	Solomon Islands
Chad	Kuwait	Somalia
Chile	Latvia	South Africa
Colombia	Lebanon	Spain
Comoros	Lesotho	Sri Lanka
Congo (Democratic Republic of the)	Liberia	Surinam
Congo (Republic of the)	Liechtenstein	Swaziland
Costa Rica	Lithuania	Sweden
Cote d'Ivoire	Luxembourg	Switzerland
Croatia	Macedonia, The Former Yugoslav Republic of	Taiwan
Cyprus	Madagascar	Tanzania
Czech Republic	Malawi	Thailand
Denmark	Malaysia	Togo
Djibouti	Maldives	Tonga
Dominica	Mali	Trinidad & Tobago
Dominican Republic	Malta	Tunisia
East Timor	Marshall Islands	Turkey
Ecuador	Mauritania	Tuvalu
Egypt	Mauritius	Uganda
El Salvador	Mexico	United Arab Emirates
Equatorial Guinea	Micronesia, Federated States of	United Kingdom
Eritrea	Monaco	United States
Estonia	Morocco	Uruguay
Ethiopia	Mozambique	Vanuatu
Fiji	Namibia	Vatican City
Finland	Nauru	Venezuela
Equatorial Guinea	Nepal	Western Sahara
Eritrea	Netherlands	Yemen
Estonia	Netherlands Antilles	Zambia
Equatorial Guinea	New Zealand	Zimbabwe

COMMERCE CONTROL LIST

3B001 Equipment for the manufacturing of semiconductor devices or materials, as follows (see List of Items Controlled), and specially designed components and accessories therefor.

Items:

a. Equipment designed for epitaxial growth, as follows:

a.1. Equipment capable of producing any of the following:

a.1.a. A silicon layer with a thickness uniform to less than $\pm 2.5\%$ across a distance of 200 mm or more; or

a.1.b. A layer of any material other than silicon with a thickness uniform to less than $\pm 2.5\%$ across a distance of 75 mm or more;

a.2. Metal organic chemical vapor deposition (MOCVD) reactors specially designed for compound semiconductor crystal growth by the chemical reaction between materials controlled by 3C003 or 3C004;

a.3. Molecular beam epitaxial growth equipment using gas or solid sources;

b. Equipment designed for ion implantation, having any of the following:

b.1. A beam energy (accelerating voltage) exceeding 1MeV;

b.2. Being specially designed and optimized to operate at a beam energy (accelerating voltage) of less than 2 keV;

b.3. Direct write capability; or

b.4. A beam energy of 65 keV or more and a beam current of 45 mA or more for high energy oxygen implant into a heated semiconductor material "substrate";

c. Anisotropic plasma dry etching equipment, as follows:

c.1. Equipment with cassette-to-cassette operation and load-locks, and having any of the following:

c.1.a. Designed or optimized to produce critical dimensions of 180 nm or less with $\pm 5\%$ 3 sigma precision; or

c.1.b. Designed for generating less than 0.04 particles/cm² with a measurable particle size greater than 0.1 μm in diameter;

c.2. Equipment specially designed for equipment controlled by 3B001.e. and having any of the following:

c.2.a. Designed or optimized to produce critical dimensions of 180 nm or less with $\pm 5\%$ 3 sigma precision; or

c.2.b. Designed for generating less than 0.04 particles/cm² with a measurable particle size greater than 0.1 [μ]m in diameter;

d. Plasma enhanced CVD equipment, as follows:

d.1. Equipment with cassette-to-cassette operation and load-locks, and designed according to the manufacturer's specifications or optimized for use in the production of semiconductor devices with critical dimensions of 180 nm or less;

d.2. Equipment specially designed for equipment controlled by 3B001.e. and designed according to the manufacturer's specifications or optimized for use in the production of semiconductor devices with critical dimensions of 180 nm or less;

e. Automatic loading multi-chamber central wafer handling systems, having all of the following:

e.1. Interfaces for wafer input and output, to which more than two pieces of semiconductor processing equipment are to be connected; and

e.2. Designed to form an integrated system in a vacuum environment for sequential multiple wafer processing;

Note: 3B001.e. does not control automatic robotic wafer handling systems not designed to operate in a vacuum environment.

f. Lithography equipment, as follows:

f.1. Align and expose step and repeat (direct step on wafer) or step and scan (scanner) equipment for wafer processing using photo-optical or X-ray methods, having any of the following:

f.1.a. A light source wavelength shorter than 245 nm; or

f.1.b. Capable of producing a pattern with a minimum resolvable feature size of 180 nm or less;

Technical Note: The minimum resolvable feature size is calculated by the following formula:

$$\text{MRF} = \frac{(\text{an exposure light source wavelength in } \mu\text{m}) \times (\text{K factor})}{\text{numerical aperture}}$$

f.2. Equipment specially designed for mask making or semiconductor device processing using deflected focused electron beam, ion beam or "laser" beam, having any of the following:

f.2.a. A spot size smaller than 0.2 [μ]m;

f.2.b. Being capable of producing a pattern with a feature size of less than 1 [μ]m; or

f.2.c. An overlay accuracy of better than 0.20 [μ]m (3 sigma);

g. Masks and reticles designed for integrated circuits controlled by 3A001;

h. Multi-layer masks with a phase shift layer.

Note: 3B001.h. does not control multi-layer masks with a phase shift layer designed for the fabrication of memory devices not controlled by 3A001.

3C002 Resist material and "substrates" coated with controlled resists.

Items:

a. Positive resists designed for semiconductor lithography specially adjusted (optimized) for use at wavelengths below 350 nm;

b. All resists designed for use with electron beams or ion beams, with a sensitivity of 0.01 $\mu\text{coulomb}/\text{mm}^2$ or better;

c. All resists designed for use with X-rays, with a sensitivity of 2.5 mJ/mm^2 or better;

d. All resists optimized for surface imaging technologies, including silylated resists.

3E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials controlled by 3A (except 3A292, 3A980, 3A981, 3A991 or 3A992), 3B (except 3B991 or 3B992) or 3C.

NS Col. 1 applies to "technology" for items controlled by 3A001, 3A002, 3B001, 3B002, or 3C001 to 3C004

TSR: Yes, except N/A for MT, and "technology" specially designed for the "development" or "production" of Traveling Wave Tube Amplifiers described in 3A001.b.8 having operating frequencies exceeding 18 GHz.

Items: The list of items controlled is contained in the ECCN heading.

Note 1: 3E001 does not control "technology" for the "development" or "production" of integrated circuits controlled by 3A001.a.3 to a.12, having all of the following:

(a) Using "technology" of 0.5 μm or more; and

(b) Not incorporating multi-layer structures.

Technical Note: The term multi-layer structures in Note b does not include devices incorporating a maximum of three metal layers and three polysilicon layers.

Note 2: 3E001 does not control "technology" for the "production" of equipment or components controlled by 3A003

3E002 "Technology" according to the General Technology Note other than that controlled in 3E001 for the "development" or "production" of "microprocessor microcircuits", "micro-computer microcircuits" and microcontroller microcircuits having a "composite

theoretical performance" ("CTP") of 530 million theoretical operations per second (MTOPS) or more and an arithmetic logic unit with an access width of 32 bits or more.

NS Col. 1

TSR: Yes.

3E003 Other "Technology" for the "Development" or "Production" of Items Described in the List of Items Controlled

NS Col. 1

TSR: Yes, except .f and .g.

Items:

- a. Vacuum microelectronic devices;
- b. Hetero-structure semiconductor devices such as high electron mobility transistors (HEMT), hetero-bipolar transistors (HBT), quantum well and super lattice devices;

Note: 3E003.b does not control technology for high electron mobility transistors (HEMT) operating at frequencies lower than 31.8 GHz and hetero-junction bipolar transistors (HBT) operating at frequencies lower than 31.8 GHz.

- c. "Superconductive" electronic devices;
- d. Substrates of films of diamond for electronic components;
- e. Substrates of silicon-on-insulator (SOI) for integrated circuits in which the insulator is silicon dioxide;
- f. Substrates of silicon carbide for electronic components;
- g. Electronic vacuum tubes operating at frequencies of 31.8 GHz or higher.

7A003 Inertial Systems and specially designed components therefore

Items:

a. Inertial Navigation Systems (INS) (gimballed or strapdown) and inertial equipment designed for "aircraft", land vehicles, vessels (surface or underwater) or "spacecraft" for attitude, guidance or control, having any of the following characteristics, and specially designed components therefor:

- a.1. Navigation error (free inertial) subsequent to normal alignment of 0.8 nautical mile per hour (nm/hr) Circular Error Probable (CEP) or less (better); or
- a.2. Specified to function at linear acceleration levels exceeding 10 g.

b. Hybrid Inertial Navigation Systems embedded with Global Navigation Satellite System(s) (GNSS) or with "Data-Based Referenced Navigation" ("DBRN") System(s) for attitude, guidance or control, subsequent to normal alignment, having an INS navigation position accuracy, after

loss of GNSS or "DBRN" for a period of up to 4 minutes, of less (better) than 10 meters Circular Error Probable (CEP).

c. Inertial Equipment for Azimuth, Heading, or North Pointing having any of the following characteristics, and specially designed components therefor:

c.1. Designed to have an Azimuth, Heading, or North Pointing accuracy equal to, or less (better) than 6 arc minutes RMS at 45 degrees latitude; or

c.2. Designed to have a non-operating shock level of 900 g or greater at a duration of 1-msec, or greater.

Note 1: The parameters of 7A003.a and 7A003.b are applicable with any of the following environmental conditions:

1. Input random vibration with an overall magnitude of 7.7 g rms in the first half hour and a total test duration of one and one half hour per axis in each of the three perpendicular axes, when the random vibration meets the following:

a. A constant power spectral density (PSD) value of $0.04 \text{ g}^2/\text{Hz}$ over a frequency interval of 15 to 1,000 Hz; and

b. The PSD attenuates with frequency from $0.04 \text{ g}^2/\text{Hz}$ to $0.01 \text{ g}^2/\text{Hz}$ over a frequency interval from 1,000 to 2,000 Hz;

2. A roll and yaw rate of equal to or more than $+2.62 \text{ rad/s}$ (150 deg/s); or

3. According to national standards equivalent to 1. or 2. of this note.

Note 2: 7A003 does not control inertial navigation systems that are certified for use on "civil aircraft" by civil authorities of a country in Country Group A:1.

Note 3: 7A003.c.1 does not control theodolite systems incorporating inertial equipment specially designed for civil surveying purposes.

Technical Notes:

1. 7A003.b refers to systems in which an INS and other independent navigation aids are built into a single unit (embedded) in order to achieve improved performance.

2. "Circular Error Probable" ("CEP")--In a circular normal distribution, the radius of the circle containing 50 percent of the individual measurements being made, or the radius of the circle within which there is a 50 percent probability of being located.

7E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" controlled by 7A (except 7A994), 7B (except 7B994) or 7D (except 7D994).

NS Col. 1; MT Col. 1

TSR: NA

**Category IV -- Launch Vehicles, Guided Missiles,
Ballistic Missiles, Rockets, Torpedoes, Bombs and Mines**

- * (a) Rockets (including but not limited to meteorological and other sounding rockets), bombs, grenades, torpedoes, depth charges, land and naval mines, as well as launchers for such defense articles, and demolition blocks and blasting caps. (See § 121.11.)
- * (b) Launch vehicles and missile and anti-missile systems including but not limited to guided, tactical and strategic missiles, launchers, and systems.
- (c) Apparatus, devices, and materials for the handling, control, activation, monitoring, detection, protection, discharge, or detonation of the articles in paragraphs (a) and (b) of this category. (See § 121.5.)
- * (d) Missile and space launch vehicle power plants.
- * (e) Military explosive excavating devices.
- * (f) Ablative materials fabricated or semi-fabricated from advanced composites (*e.g.*, silica, graphite, carbon, carbon/carbon, and boron filaments) for the articles in this category that are derived directly from or specifically developed or modified for defense articles.
- * (g) Non-nuclear warheads for rockets and guided missiles.
- (h) All specifically designed or modified components, parts, accessories, attachments, and associated equipment for the articles in this category.
- (i) Technical data (as defined in § 120.21 [sic]¹ of this subchapter) and defense services (as defined in § 120.8 [sic]² of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (h) of this category. (See § 125.4 of this subchapter for exemptions.) Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

Category VIII -- Aircraft and Associated Equipment

- * (a) Aircraft, including but not limited to helicopters, non-expansive balloons, drones, and lighter-than-air aircraft, which are specifically designed, modified, or equipped for military purposes. This includes but is not limited to the following military purposes: Gunnery, bombing, rocket or missile launching, electronic and other surveillance, reconnaissance, refueling, aerial mapping, military liaison, cargo carrying or dropping, personnel dropping, airborne warning and control, and military training. (See § 121.3.)
- * (b) Military aircraft engines, except reciprocating engines, specifically designed or modified for the aircraft in paragraph (a) of this category.
- * (c) Cartridge-actuated devices utilized in emergency escape of personnel and airborne equipment (including but not limited to airborne refueling equipment) specifically designed or modified for use with the aircraft and engines of the types in paragraphs (a) and (b) of this category.
- (d) Launching and recovery equipment for the articles in paragraph (a) of this category, if the equipment is specifically designed or modified for military use. Fixed land-based arresting gear is not included in this category.

¹ Error in original. Should be "§ 120.10".

² Error in original. Should be "§ 120.9".

*(e) Inertial navigation systems, aided or hybrid inertial navigation systems, Inertial Measurement Units (IMUs), and Attitude and Heading Reference Systems (AHRS) specifically designed, modified, or configured for military use and all specifically designed components, parts and accessories. For other inertial reference systems and related components refer to Category XII(d).

NOTE:

(1) Category XII(d) or Category VIII(e) does not include quartz rate sensors if such items:

(i) Are integrated into and included as an integral part of a commercial standby instrument system for use on civil aircraft prior to export or exported solely for integration into such a commercial standby instrument system, and

(ii) When the exporter has been informed in writing by the Department of State that a specific quartz rate sensor or a quartz rate sensor integrated into a commercial standby instrument system has been determined to be subject to the licensing jurisdiction of the Department of Commerce in accordance with this section.

(2) For controls in these circumstances, see the Commerce Control List. In all other circumstances, quartz rate sensors remain under the licensing jurisdiction of the Department of State under Category XII(d) or Category VIII(e) of the U.S. Munitions List and subject to the controls of the ITAR.

(f) Developmental aircraft, engines, and components thereof specifically designed, modified, or equipped for military uses or purposes, or developed principally with U.S. Department of Defense funding, excluding such aircraft, engines, and components subject to the jurisdiction of the Department of Commerce.

NOTE: Developmental aircraft, engines, and components thereof, having no commercial application at the time of this amendment and which have been specifically designed for military uses or purposes, or developed principally with U.S. Department of Defense funding, will be considered eligible for a CCL license when actually applied to a commercial aircraft or commercial aircraft engine program. Exporters may seek to establish commercial application either on a case-by-case basis through submission of documentation demonstrating application to a commercial program in requesting an export license application from Commerce in respect of a specific export or, in the case of use for broad categories of aircraft, engines, or components, a commodity jurisdiction from State.

*(g) Ground effect machines (GEMS) specifically designed or modified for military use, including but not limited to surface effect machines and other air cushion vehicles, and all components, parts, and accessories, attachments, and associated equipment specifically designed or modified for use with such machines.

(h) Components, parts, accessories, attachments, and associated equipment (including ground support equipment) specifically designed or modified for the articles in paragraphs (a) through (e) of this category, excluding aircraft tires and propellers used with reciprocating engines.

(i) Technical data (as defined in § 120.10) and defense services (as defined in § 120.9) directly related to the defense articles enumerated in paragraphs (a) through (h) of this category (see § 125.4 for exemptions), except for hot section technical data associated with commercial aircraft engines. Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

Category X--Protective Personnel Equipment and Shelters

(a) Protective personnel equipment specifically designed, developed, configured, adapted, modified, or equipped for military applications. This includes but is not limited to:

- (1) Body armor;
- (2) Clothing to protect against or reduce detection by radar, infrared (IR) or other sensors at wavelengths greater than 900 nanometers, and the specially treated or formulated dyes, coatings, and fabrics used in its design, manufacture, and production;
- (3) Anti-Gravity suits (G-suits);
- (4) Pressure suits capable of operating at altitudes above 55,000 feet sea level;
- (5) Atmosphere diving suits designed, developed, modified, configured, or adapted for use in rescue operations involving submarines controlled by this subchapter;
- (6) Helmets specially designed, developed, modified, configured, or adapted to be compatible with military communication hardware or optical sights or slewing devices;
- (7) Goggles, glasses, or visors designed to protect against lasers or thermal flashes discharged by an article subject to this subchapter.

(b) Permanent or transportable shelters specifically designed and modified to protect against the effect of articles covered by this subchapter as follows:

- (1) Ballistic shock or impact;
- (2) Nuclear, biological, or chemical contamination.

(c) Tooling and equipment specifically designed or modified for the production of articles controlled by this category.

(d) Components, parts, accessories, attachments, and associated equipment specifically designed, modified, configured, or adapted for use with the articles in paragraphs (a) through (c) of this category.

(e) Technical data (as defined in § 120.10 of this subchapter) and defense services (as defined in § 120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (d) of this category.

(f) The following interpretations explain and amplify the terms used in this category and throughout this subchapter:

- (1) The body armor covered by this category does not include Type 1, Type 2, Type 2a, or Type 3a [sic]³ as defined by the National Institute of Justice classification;
- (2) The articles in this category include any end item, components, accessory, attachment, part, firmware, software or system that has been designed or manufactured using technical data and defense services controlled by this category;
- (3) Pressure suits in paragraph (a) (4) of this category include full and partial suits used to simulate normal atmospheric pressure conditions at high altitude.

History: 69 FR 2922, May 21, 2004

³ Error in original. Per NIJ specifications (document 0101.03), the correct syntax is "Type I, Type II, Type II-A, and Type III-A."

Category XI -- Military Electronics

(a) Electronic equipment not included in Category XII of the U.S. Munitions List which is specifically designed, modified or configured for military application. This equipment includes but is not limited to:

*(1) Underwater sound equipment to include active and passive detection, identification, tracking, and weapons control equipment.

*(2) Underwater acoustic active and passive countermeasures and counter-countermeasures.

(3) Radar systems, with capabilities such as:

*(i) Search,

*(ii) Acquisition,

*(iii) Tracking,

*(iv) Moving target indication,

*(v) Imaging radar systems,

(vi) Any ground air traffic control radar which is specifically designed or modified for military application.

*(4) Electronic combat equipment, such as:

(i) Active and passive countermeasures,

(ii) Active and passive counter-countermeasures, and

(iii) Radios (including transceivers) specifically designed or modified to interfere with other communication devices or transmissions.

*(5) Command, control and communications systems to include radios (transceivers), navigation, and identification equipment.

(6) Computers specifically designed or developed for military application and any computer specifically modified for use with any defense article in any category of the U.S. Munitions List.

(7) Any experimental or developmental electronic equipment specifically designed or modified for military application or specifically designed or modified for use with a military system.

*(b) Electronic systems or equipment specifically designed, modified, or configured for intelligence, security, or military purposes for use in search, reconnaissance, collection, monitoring, direction-finding, display, analysis and production of information from the electromagnetic spectrum and electronic systems or equipment designed or modified to counteract electronic surveillance or monitoring. A system meeting this definition is controlled under this subchapter even in instances where any individual pieces of equipment constituting the system may be subject to the controls of another U.S. Government agency. Such systems or equipment described above include, but are not limited to, those:

(1) Designed or modified to use cryptographic techniques to generate the spreading code for spread spectrum or hopping code for frequency agility. This does not include fixed code techniques for spread spectrum.

(2) Designed or modified using burst techniques (*e.g.*, time compression techniques) for intelligence, security or military purposes.

(3) Designed or modified for the purpose of information security to suppress the compromising

emanations of information-bearing signals. This covers TEMPEST suppression technology and equipment meeting or designed to meet government TEMPEST standards. This definition is not intended to include equipment designed to meet Federal Communications Commission (FCC) commercial electro-magnetic interference standards or equipment designed for health and safety.

(c) Components, parts, accessories, attachments, and associated equipment specifically designed or modified for use with the equipment in paragraphs (a) and (b) of this category, except for such items as are in normal commercial use.

(d) Technical data (as defined in § 120.21 [sic]⁴) and defense services (as defined in § 120.8 [sic]⁵) directly related to the defense articles enumerated in paragraphs (a) through (c) of this category. (See § 125.4 for exemptions.) Technical data directly related to the manufacture or production of any defense articles enumerated elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated as SME.

Category XV -- Spacecraft Systems and Associated Equipment

*(a) Spacecraft, including communications satellites, remote sensing satellites, scientific satellites, research satellites, navigation satellites, experimental and multi-mission satellites.

NOTE TO PARAGRAPH (a): Commercial communications satellites, scientific satellites, research satellites and experimental satellites are designated as SME only when the equipment is intended for use by the armed forces of any foreign country.

(b) Ground control stations for telemetry, tracking and control of spacecraft or satellites, or employing any of the cryptographic items controlled under category XIII of this subchapter.

(c) Global Positioning System (GPS) receiving equipment specifically designed, modified or configured for military use; or GPS receiving equipment with any of the following characteristics:

- (1) Designed for encryption or decryption (*e.g.*, Y-Code) of GPS precise positioning service (PPS) signals;
- (2) Designed for producing navigation results above 60,000 feet altitude and at 1,000 knots velocity or greater;
- (3) Specifically designed or modified for use with a null steering antenna or including a null steering antenna designed to reduce or avoid jamming signals;
- (4) Designed or modified for use with unmanned air vehicle systems capable of delivering at least a 500 kg payload to a range of at least 300 km.

(NOTE: GPS receivers designed or modified for use with military unmanned air vehicle systems with less capability are considered to be specifically designed, modified or configured for military use and therefore covered under this paragraph (d)(4).)

Any GPS equipment not meeting this definition is subject to the jurisdiction of the Department of Commerce (DOC). Manufacturers or exporters of equipment under DOC jurisdiction are advised that the U.S. Government does not assure the availability of the GPS P-Code for civil navigation. It is the policy of the Department of Defense (DOD) that GPS receivers using P-Code without clarification as to whether or not those receivers were designed or modified to

⁴ Error in original. Should be "§ 120.10".

⁵ Error in original. Should be "§ 120.9".

use Y-Code will be presumed to be Y-Code capable and covered under this paragraph. The DOD policy further requires that a notice be attached to all P-Code receivers presented for export. The notice must state the following: “ADVISORY NOTICE: This receiver uses the GPS P-Code signal, which by U.S. policy, may be switched off without notice.”

(d) Radiation-hardened microelectronic circuits that meet or exceed all five of the following characteristics:

- (1) A total dose of 5×10^5 [sic]⁶ Rads (SI);
- (2) A dose rate upset of 5×10^8 [sic]⁷ Rads (SI)/Sec;
- (3) A neutron dose of 1×10^{14} N cm² [sic]⁸;
- (4) A single event upset of 1×10^{-7} [sic]⁹ or less error/bit/day;
- (5) Single event latch-up free and having a dose rate latch-up of 5×10^8 [sic]¹⁰ Rads (SI)/sec or greater.

(e) All specifically designed or modified systems or subsystems, components, parts, accessories, attachments, and associated equipment for the articles in this category, including the articles identified in section 1516 of Public Law 105-261: satellite fuel, ground support equipment, test equipment, payload adapter or interface hardware, replacement parts, and non-embedded solid propellant orbit transfer engines (see also Categories IV and V in this section).

NOTE: This coverage by the U.S. Munitions List does not include the following unless specifically designed or modified for military application (see § 120.3 of this subchapter): (For controls on these items see the Export Administration Regulations, Commerce Control List (15 CFR parts 730 through 799).)

- (1) Space qualified traveling wave tubes (also known as helix tubes or TWTs), microwave solid state amplifiers, microwave assemblies, and traveling wave tube amplifiers operating at frequencies equal to or less than 31GHz.
- (2) Space qualified photovoltaic arrays having silicon cells or having single, dual, triple junction solar cells that have gallium arsenide as one of the junctions.
- (3) Space qualified tape recorders.
- (4) Atomic frequency standards that are not space qualified.
- (5) Space qualified data recorders.
- (6) Space qualified telecommunications systems, equipment and components not designed or modified for satellite uses.
- (7) Technology required for the development or production of telecommunications equipment specifically designed for non-satellite uses.
- (8) Space qualified focal plane arrays having more than 2048 elements per array and having a peak response in the wavelength range exceeding 300nm but not exceeding 900nm.

⁶ Error in original. Should be “ 5×10^5 Rads (SI).” (SI indicates the *Système International d’Unités*, or International System of Units, maintained by the International Bureau of Weights and Measures.

⁷ Error in original. Should be “ 5×10^8 Rads (SI).”

⁸ Error in original. Should be “ 1×10^{14} N cm² (SI).”

⁹ Error in original. Should be “ 1×10^{-7} ”.

¹⁰ Error in original. Should be “ 5×10^8 ”.

(9) Space qualified laser radar or Light Detection and Ranging (LIDAR) equipment.

(f) Technical data (as defined in § 120.10 of this subchapter) and defense services (as defined in § 120.9 of this subchapter) directly related to the articles enumerated in paragraphs (a) through (e) of this category, as well as detailed design, development, manufacturing or production data for all spacecraft and specifically designed or modified components for all spacecraft systems. This paragraph includes all technical data, without exception, for all launch support activities (*e.g.*, technical data provided to the launch provider on form, fit, function, mass, electrical, mechanical, dynamic, environmental, telemetry, safety, facility, launch pad access, and launch parameters, as well as interfaces for mating and parameters for launch.) (See § 124.1 for the requirements for technical assistance agreements before defense services may be furnished even when all the information relied upon by the U.S. person in performing the defense service is in the public domain or is otherwise exempt from the licensing requirements of this subchapter.) Technical data directly related to the manufacture or production of any article enumerated elsewhere in this category that is designated as Significant Military Equipment (SME) shall itself be designated SME. Further, technical data directly related to the manufacture or production of all spacecraft, notwithstanding the nature of the intended end-use (*e.g.*, even where the hardware is not SME), is designated SME.

NOTE TO PARAGRAPH (f): The special export controls contained in § 124.15 of this subchapter are always required before a U.S. person may participate in a launch failure investigation or analysis and before the export of any article or defense service in this category for launch in, or by nationals of, a country that is not a member of the North Atlantic Treaty Organization or a major non-NATO ally of the United States. Such special export controls also may be imposed with respect to any destination as deemed appropriate in furtherance of the security and foreign policy of the United States.