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Part II

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**15 CFR Parts 740, 743, 772, and 774
December 2002 Wassenaar Arrangement
Plenary Agreement Implementation:
Categories 1, 2, 3, 4, 5, 6, and 7 of the
Commerce Control List, and Reporting
Requirements; Final Rule**

DEPARTMENT OF COMMERCE**Bureau of Industry and Security****15 CFR Parts 740, 743, 772, and 774**

[Docket No. 031017263–3263–01]

RIN 0694–AC85

December 2002 Wassenaar Arrangement Plenary Agreement Implementation: Categories 1, 2, 3, 4, 5, 6, and 7 of the Commerce Control List, and Reporting Requirements**AGENCY:** Bureau of Industry and Security, Commerce.**ACTION:** Final rule.

SUMMARY: The Bureau of Industry and Security (BIS) maintains the Commerce Control List (CCL), which identifies items subject to Department of Commerce export controls. This final rule revises certain entries controlled for national security reasons in Categories 1, 2, 3, 4, 5 Part I (telecommunications), 5 Part II (information security), 6, and 7 to conform with changes in the List of Dual-Use Goods and Technologies maintained and agreed to by governments participating in the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (Wassenaar Arrangement). The Wassenaar Arrangement controls strategic items with the objective of improving regional and international security and stability.

The purpose of this final rule is to make the necessary changes to the Commerce Control List to implement revisions to the Wassenaar List that were agreed upon in the December 2002 meeting, to make necessary revisions to reporting requirements and License Exception GOV restrictions, and to add a statement of understanding for medical equipment.

EFFECTIVE DATE: This rule is effective: December 10, 2003.

FOR FURTHER INFORMATION CONTACT: Patricia Muldonian, Office of Strategic Trade and Foreign Policy Controls, Bureau of Industry and Security, U.S. Department of Commerce at (202) 482–5400.

SUPPLEMENTARY INFORMATION:**Background**

In July 1996, the United States and thirty-two other countries gave final approval to the establishment of a new multilateral export control arrangement, called the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (Wassenaar Arrangement). The

Wassenaar Arrangement contributes to regional and international security and stability by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus preventing destabilizing accumulations of such items. Participating states have committed to exchange information on exports of dual-use goods and technologies to non-participating states for the purposes of enhancing transparency and assisting in developing common understandings of the risks associated with the transfers of these items.

This rule revises a number of national security controlled entries on the Commerce Control List (CCL) to conform with December 2002 revisions to the Wassenaar List of Dual-Use Goods and Technologies. This rule also revises language to provide a complete or more accurate description of controls. A detailed description of the revisions to the CCL is provided below.

Specifically, this rule makes the following amendments to the Commerce Control List:

Category 1—Materials, Chemical, “Microorganisms,” and Toxins

- ECCN 1B001 is amended by adding a technical note for 1B001.c.
- ECCN 1C006 is amended by revising paragraph 1C006.a.1 to make an editorial correction, *i.e.*, removing the “or” in the phrase “Synthetic or silahydrocarbon oils”, so that it reads “Synthetic silahydrocarbon oils”.

Category 2—Materials Processing

- ECCN 2B006 is amended by:
 - (a) Removing the ECCN Controls paragraph from the List of Items Controlled;
 - (b) Adding new text to 2B006.a; and
 - (c) Adding a new note to 2B006.c.

Category 3—Electronics

- ECCN 3A001 is amended by:
 - (a) Adding a new paragraph 3A001.a.1.c that adds a new parameter for integrated circuits, designed or rated as radiation hardened, and adding a note for this paragraph;
 - (b) Revising the parameters of 3A001.a.5.a.2 and 3A001.a.5.a.3 for analog-to-digital and digital-to-analog converter integrated circuits; and
 - (c) Adding a new paragraph 3A001.a.5.a.4 to add a new parameter for analog-to-digital converter integrated circuits.

Note: For commodities no longer controlled under ECCN 3A001, there is a license requirement under ECCN 3A991 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCN 3A002 is amended by:
 - (a) Adding a new abbreviation ETSI to the note for 3A002.a.2;
 - (b) Adding a new paragraph 3A002.a.6 for digital instrumentation data recorders; and
 - (c) Revising the parameters for 3A002.c.1, d.1, e, and f.1.

Note: For commodities no longer controlled under ECCN 3A002, there is a license requirement under ECCN 3A992 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCN 3A991 is amended by:
 - (a) Revising the parameter for batteries in the note for 3A991.j from 26 cm³ to 27 cm³ for consistency with the note in 3A001.e.1; and
 - (b) Revising the parameters and reformatting 3A991.c for analog-to-digital converter integrated circuits, to continue controls for antiterrorism (AT) reasons for these commodities that were liberalized as a result of changes to the Wassenaar List of Dual-Use Goods and Technologies.

- ECCN 3B001 is amended by revising the parameter for 3B001.f.1.b for minimum resolvable feature size from 0.5 μm to 0.35 μm for “stored program controlled” lithography equipment.

Note: For commodities no longer controlled under ECCN 3B001, there is a license requirement under ECCN 3B991 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCNs 3E001 and 3E002 are amended by revising the parameter in paragraph b.1 of the Note from 0.7 μm to 0.5 μm.

Category 4—Computers

- ECCN 4A002 is amended by making an editorial change to 4A002.b.2—revising “bits” to “bit”.

- ECCN 4A003 is amended by:
 - (a) Revising the “composite theoretical performance” (CTP) parameter in 4A003.b from 28,000 millions of theoretical operations per seconds (MTOPS) to 190,000 MTOPS;
 - (b) Making conforming changes of the revised CTP parameter to the AT and XP controls and the Note in the License Requirements section; and
 - (c) Removing the phrase “or digital-to-analog” in the CTP paragraph of the License Exception section, because 4A003.e and 3A001.a.5.a only refer to analog-to-digital.

Note: For commodities no longer controlled under ECCN 4A003, there is a license requirement under ECCN 4A994 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCN 4D001 is amended by:

(a) Making conforming changes of the revised CTP parameter in 4A003.b to the XP control in the License Requirements section;

(b) Making the existing heading paragraph (a) in the items paragraph of the List of Items Controlled section; and

(c) Adding a new paragraph for other "software".

- ECCN 4D994 is amended by revising the heading to prevent an overlap of controls between 4D001 and 4D994.

- ECCN 4E001 is amended by:

(a) Making conforming changes of the revised CTP parameter in 4A003.b to the XP control in the License Requirements section;

(b) Making the existing heading paragraph (a) in the items paragraph of the List of Items Controlled section; and

(c) Adding a new paragraph for other "technology".

- ECCN 4E992 is amended by revising the heading to prevent an overlap of controls between 4E001 and 4E992.

Category 5—Part I—Telecommunications

- ECCN 5A001 is amended by:

(a) Adding new text regarding frequency range and output power in 5A001.b.2.b.2;

(b) Adding "output" after "voice coding" in 5A001.b.6; and

(c) Adding a new technical note after 5A001.b.6.

- ECCN 5A991 is amended by correcting the numbering of the paragraphs in 5A991.b.6.

- ECCN 5B001 is amended by:

(a) Revising the parameter for radio equipment employing quadrature-amplitude-modulation (QAM) techniques from "above level 128" to "above level 256" in 5B001.b.4; and

(b) Revising text regarding equipment employing "common channel signaling" in 5B001.b.5.

Note: For commodities no longer controlled under ECCN 5B001, there is a license requirement under ECCN 5B991 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCN 5D001 is amended by:

(a) Correcting a paragraph citation in the CIV and TSR eligibility paragraphs of the License Exceptions section from "5A001.b.4" to read "5A001.b.5"; and

(b) Revising the parameter for radio equipment employing quadrature-amplitude-modulation (QAM) techniques from "above level 128" to "above level 256" in 5D001.d.4.

Note: For commodities no longer controlled under ECCN 5D001, there is a license requirement under ECCN 5D991 for

exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCN 5E001 is amended by:

(a) Revising the parameter for radio equipment employing quadrature-amplitude-modulation (QAM)

techniques from "above level 128" to "above level 256" in 5E001.c.4.a; and

(b) Revising text regarding equipment employing "common channel signaling" in 5E001.c.5.

Note: For commodities no longer controlled under ECCN 5E001, there is a license requirement under ECCN 5E991 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

Category 5—Part II—Information Security

- ECCN 5A002 is amended by:

(a) Moving and rearranging the text that describes what is not controlled in this entry from the Related Controls paragraph of the List of Items Controlled section to a Note in the beginning of the Item paragraph of the List of Items Controlled section;

(b) Dividing the existing text in paragraph (a) of the note (regarding "personalized smart cards") into subparagraph 1 and a N.B.; and

(c) Moving the related control note in paragraph 2 of the Related Definitions paragraph of the List of Items Controlled section to a N.B. following 5A002.a.

Category 6—Sensors

- ECCN 6A001 is amended by:

(a) Removing from LVS eligibility, because these items have been added to Annex 2 of the Wassenaar List:

(1) 6A001.a.1.b.1 object detection and location systems having a transmitting frequency below 5 kHz or a sound pressure level exceeding 210 dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band from 30 kHz to 2 kHz inclusive; and

(2) 6A001.a.2.a.4 hydrophones when designed to operation at depths exceeding 35 m with acceleration compensation.

(b) Removing paragraph 6A001.a.2.a.2.b piezoelectric polymers, and redesignating paragraph 6A001.a.2.a.2.c flexible piezoelectric ceramic materials as 6A001.a.2.a.2.b.

Note: For commodities no longer controlled under ECCN 6A001, there is a license requirement under ECCN 6A991 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCN 6A002 is amended by:

(a) Revising the parameter for image intensifier tubes in 6A002.a.2.a.2 from 15 μ m to 12 μ m;

(b) Clarifying the text of 6A002.a.2.a.3 regarding photocathodes;

(c) Revising the parameter for photocathodes in 6A002.a.2.a.3.a from 240 μ A/lm to 350 μ A/lm;

(d) Deleting the word "control" and inserting "apply to" in the note for 6A002.a.2.a.3.c;

(e) Revising the parameter for specially designed components for image intensifier tubes in 6A002.a.2.b.1 from 15 μ m to 12 μ m;

(f) Adding a new technical note 2 for 6A002.a.3 to define "cross scan direction" and "scan direction";

(g) Revising the text of 6A002.a.3.c to apply only to 2-dimensional arrays;

(h) Adding new paragraphs 6A002.a.3.d and .e to control non-"space-qualified" linear (1-dimensional) "focal plane arrays"

Fixing the abbreviation for milliradians to read "mrad" instead of "mr" in 6A002.b.1 and 6A002.b.2.b.2.

Note: For commodities no longer controlled under ECCN 6A002, there is a license requirement under ECCN 6A992 for exports and reexports to AT Column 1 countries of the Commerce Country Chart.

- ECCN 6A003 is amended by:

(a) Adding a new parameter "peak response" in 6A003.b.1 for video cameras incorporating solid state sensors; and

(b) Redesignating paragraphs 6A003.b.2.a and b.2.b as b.2.b and b.2.c. and adding a new parameter "peak response" in 6A003.b.2.a for scanning cameras and scanning camera systems.

- ECCNs 6A004 and 6A008 are amended by fixing the abbreviation for radian to read "rad" instead of "r" in 6A004.d.2, .d.3.c, .d.3.d.1, .d.3.d.2, and 6A008.j.2.

- ECCN 6A992 is amended to add a paragraph for "direct view imaging equipment operating in the visible or infrared spectrum, incorporating image intensifier tubes having the characteristics listed in 6A992.a.1." to assure that this technology is not decontrolled, but retains an AT control.

- ECCNs 6E001 and 6E002 are amended by removing License Exception TSR eligibility for exports and reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "technology" for the "development" of 6A001.a.2.a.4.

Category 7—Navigation and Avionics

- ECCN 7A003 is amended by:

(a) Removing the "or" from the end of Note 1, paragraph 1.b; and

(b) Fixing the abbreviation for radian to read "rad" instead of "r" in 7A003, Note 1, paragraph 2.

All items removed from national security (NS) controls as a result of changes to the Wassenaar List of Dual-Use Goods and Technologies will continue to be controlled for antiterrorism (AT) reasons.

- This rule amends part 772 of the EAR by adding a technical note to the definition of “microcomputer microcircuit” that was inadvertently not inserted in previous regulatory updates. The new technical note reads, “Technical Note 2: The internal storage may be augmented by an external storage.”

- This rule clarifies the scope of Wassenaar reporting requirements that apply to License Exception GOV, and makes the following amendments to the Wassenaar Reporting Requirements in section 743.1 of the EAR to conform with changes made to the Wassenaar Arrangement’s Annex 1 of the List of Dual-Use Goods and Technologies.

—This rule removes Wassenaar reporting requirements from part 743 for the following: 2B003; 6A001.a.1.b.1, a.2.c and .a.2.e (because these commodities are not eligible for License Exceptions LVS, GBS, or CIV); and 9D001, 9D002, 9D004.a and .c, 9E001, 9E002, 9E003.a.1., .a.2., .a.3., .a.4., .a.5., .a.8, and .a.9 (because these software and technology entries are not eligible for License Exceptions TSR or CIV).

—The Note to paragraph (c)(1)(ii) has also been modified to address the scope of reports required for 2D001 and 2E001.

—Paragraph (c)(2) has been modified to more closely harmonize with Annex 1 text for 4E001 and 4D001.

—This rule adds Wassenaar reporting requirements from part 743 for 5A001.b.5

- This rule makes the following amendments to the list of items ineligible for export or reexport under License Exception GOV, to conform with revisions to the Wassenaar Arrangement’s Annex 2 of the List of Dual-Use Goods and Technologies:

- For exports and reexports of commodities and software to the International Atomic Energy Agency (IAEA) and the European Atomic Energy Community (EURATOM), reexports by IAEA and EURATOM for official international safeguard use:

(1) The following items are added to the list of ineligible commodities:

(a) 6A001.a.1.b.1: object detection and location systems having a transmitting frequency below 5 kHz or a sound pressure level exceeding 224 dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band from 5 kHz to 10 kHz inclusive; and

(b) 6A001.a.2.a.4: Hydrophones when designed to operate at depths exceeding 35 m with acceleration compensation.

(2) In Supplement No. 1 to section 740.11, paragraph (a)(3), the following items are removed from the list of ineligible items:

(a) 6A003, 7D001, 7E001, 7E002, and 7E101 are removed because these items do not appear on Annex 2;

(b) The scope of 6A002 has been narrowed to 6A002.a.1.c, because this is the only paragraph in 6A002 that is on Annex 2;

(c) The scope of 6E001 and 6E002 have been narrowed to only exclude from eligibility technology according to the General Technology Note for the “development” and “production” of equipment in 6A002.a.1.c, because only this technology is both controlled for RS and listed on Annex 2. However, other technology under 6E001 and 6E002 are made ineligible for this license exception under other paragraphs in this supplement.

- For exports or reexports of items for official use within national territory by agencies of cooperating governments, and exports and reexports of items for diplomatic and consular missions of a cooperating government located in any country in Country Group B:

(1) The following items are added to the list of ineligible commodities:

(a) 6A001.a.1.b.1: object detection and location systems having a transmitting frequency below 5 kHz or a sound pressure level exceeding 224 dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band from 5 kHz to 10 kHz inclusive; and

(b) 6A001.a.2.a.4: Hydrophones when designed to operate at depths exceeding 35 m with acceleration compensation.

(2) In Supplement No. 1 to section 740.11, paragraph (b)(3), the following items are removed from the list of ineligible items:

(a) 6A003, 7D001, 7E001, 7E002, and 7E101 are removed because these items do not appear on Annex 2;

(b) The scope of 6A002 has been narrowed to 6A002.a.1.c, because this is the only paragraph in 6A002 that is on Annex 2; and

(c) The scope of 6E001 and 6E002 have been narrowed to only exclude from eligibility technology according to the General Technology Note for the “development” and “production” of equipment in 6A002.a.1.c, because only this technology is both controlled for RS and listed on Annex 2. However, other technology under 6E001 and 6E002 are made ineligible for this license exception under other paragraphs in this supplement.

This rule also adds a new Supplement No. 3, Statements of Understanding, to part 774 (the existing Supplement No. 3 is removed). This supplement will be used to place understandings affecting export controls that have been agreed upon in multilateral regimes or among agencies within the United States.

The first understanding to be placed in this supplement is a Wassenaar Arrangement statement of understanding concerning medical equipment. It states that commodities that are “specially designed for medical end-use” that “incorporate” commodities or software on the Commerce Control List in Supplement No. 1 to part 774 of the EAR that do not have a reason for control of Nuclear Nonproliferation (NP), Missile Technology (MT), or Chemical & Biological Weapons (CB), are classified as EAR99. This understanding has been a longstanding agreement in the Wassenaar Arrangement, and does not represent a policy or interpretation change under the EAR. BIS has implemented this understanding into decisions on classification requests and license applications, consistent with interpretation 2 in paragraph (b) of section 770.2, *i.e.*, the classification of the assembled machine also covers its component parts.

The statement of understanding has been modified from the original text as it appears in the Wassenaar Dual Use List of 2002, in order to harmonize the language with existing language in the EAR. BIS is providing guidance in notes to the medical statement of understanding to assist the public in determining what is considered “specially designed for medical end-use” and what “incorporate” means. The guidance provided for these terms only applies to the newly added Statement of Understanding for medical equipment.

Although the Export Administration Act expired on August 20, 2001, Executive Order 13222 of August 17, 2001 (66 FR 44025, August 22, 2001), as extended by the Notice of August 7, 2003, (68 FR 47833, 2003 WL 21877490), continues the Regulations in effect under the International Emergency Economic Powers Act

Saving Clause

Shipments of items removed from eligibility for export or reexport without a license, under a particular License Exception authorization or the designator NLR, as a result of this regulatory action, may continue to be exported or reexported under that License Exception authorization or designator until January 9, 2004. In

addition, this rule revises the numbering and structure of certain entries on the Commerce Control List. For items under such entries and until March 9, 2004, BIS will accept license applications for items described either by the entries in effect immediately before December 10, 2003, or the entries described in this rule.

Rulemaking Requirements

1. This final rule has been determined to be not significant for purposes of E.O. 12866.

2. Notwithstanding any other provision of law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with a collection of information, subject to the requirements of the Paperwork Reduction Act, unless that collection of information displays a currently valid Office of Management and Budget Control Number. This rule involves a collection of information subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 *et seq.*). This collection has been approved by the Office of Management and Budget under control number 0694-0088, "Multi-Purpose Application," which carries a burden hour estimate of 45 minutes for a manual submission and 40 minutes for an electronic submission.

3. This rule does not contain policies with Federalism as that term is defined under E.O. 13132.

4. The provisions of the Administrative Procedure Act (5 U.S.C. 553) requiring notice of proposed rulemaking, the opportunity for public participation, and a delay in effective date, are inapplicable because this regulation involves a military and foreign affairs function of the United States (5 U.S.C. 553(a)(1)). Further, no other law requires that a notice of proposed rulemaking and an opportunity for public comment be given for this interim rule. Because a notice of proposed rulemaking and an opportunity for public comment are not required to be given for this rule under the Administrative Procedure Act or by any other law, the analytical requirements of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) are not applicable. Therefore, this regulation is issued in final form. Although there is no formal comment period, public comments on this regulation are welcome on a continuing basis. Comments should be submitted to Sharron Cook, Office of Exporter Services, Bureau of Industry and Security, Department of Commerce, P.O. Box 273, Washington, DC 20044.

List of Subjects

15 CFR Parts 740 and 743

Administrative practice and procedure, Exports, Foreign trade, Reporting and recordkeeping requirements.

15 CFR Part 772

Exports and Foreign trade.

15 CFR Part 774

Exports, Foreign Trade, Reporting and recordkeeping requirements.

■ Accordingly, parts 740, 743, 772, and 774 of the Export Administration Regulations (15 CFR parts 730-799) are amended as follows:

PART 740—[AMENDED]

■ 1. The authority citation for part 740 is revised to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; Sec. 901-911, Pub. L. 106-387; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783; Notice of August 7, 2003, 68 FR 47833, August 11, 2003.

■ 2. Section 740.11 is amended by revising:

- (a) The introductory paragraph to (a)(2), to read as set out below, and
- (b) The phrase "Controlled by 9D001, specially designed for the" to read "Controlled by 9D001, specially designed or modified for the" in paragraph (a)(2)(vi)(G).

§ 740.11 Governments, international organizations, and international inspections under the Chemical Weapons Convention (GOV).

* * * * *

(a) * * *

(2) The following items controlled for national security (NS) reasons under Export Control Classification Numbers (ECCNs) identified on the Commerce Control List may not be exported or reexported under this License Exception to destinations other than Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom: 1C001, 5A001.b.5, 6A001.a.1.b.1 object detection and location systems having a sound pressure level exceeding 210 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 30 Hz to 2 kHz inclusive, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.e, 6A002.a.1.c, 6A008.l.3, 6B008, 8A001.b, 8A001.d, 8A002.o.3.b; and

* * * * *

■ 3. Supplement Number 1 to § 740.11 is amended by revising

- (a) The introductory paragraph to (a)(1), paragraphs (a)(1)(vii)(D) and (E), (a)(3), the introductory paragraph to (b)(1), paragraphs (b)(1)(vii)(D) and (E), and (b)(3), to read as set forth below; and
- (b) The phrase "Controlled by 9D001, specially designed for the" to read "Controlled by 9D001, specially designed or modified for the" in paragraphs (a)(1)(vi)(G) and (b)(1)(vi)(G).

Supplement No. 1 to § 740.11—Additional Restrictions on Use of License Exception Gov

(a) *Items for official use within national territory by agencies of a Cooperating Government.* * * *

(1) Items identified on the Commerce Control List as controlled for national security (NS) reasons under Export Control Classification Numbers (ECCNs) as follows for export or reexport to destinations other than Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom: 1C001, 5A001.b.5, 6A001.a.1.b.1 object detection and location systems having a sound pressure level exceeding 210 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 30 Hz to 2 kHz inclusive, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.e, 6A002.a.1.c, 6A008.l.3, 6B008, 8A001.b, 8A001.d, 8A002.o.3.b; and

* * * * *

(vii) "Technology", as follows: * * *
(D) Controlled by 6E001 for the "development" of equipment or "software" in 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.4, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.l.3, or 6B008, as described in paragraph (a)(1) of this Supplement; and

(E) Controlled by 6E002 for the "production" of equipment controlled by 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.l.3, or 6B008, as described in paragraph (a)(1) of this Supplement; and

* * * * *

(3) Regional stability items controlled under Export Control Classification Numbers (ECCNs) 6A002.a.1.c, 6E001 technology according to the General Technology Note for the "development" of equipment in 6A002.a.1.c, and 6E002 technology according to the General Technology Note for the "production" of equipment in 6A002.a.1.c; or

* * * * *

(b) *Diplomatic and consular missions of a cooperating government.* * * *

(1) Items identified on the Commerce Control List as controlled for national security (NS) reasons under Export Control Classification Numbers (ECCNs) as follows for export or reexport to destinations other than Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland,

Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom: 1C001, 5A001.b.5, 6A001.a.1.b.1 object detection and location systems having a sound pressure level exceeding 210 dB (reference 1 µPa at 1 m) for equipment with an operating frequency in the band from 30 Hz to 2 kHz inclusive, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.e, 6A002.a.1.c, 6A008.l.3, 6B008, 8A001.b, 8A001.d, 8A002.o.3.b; and

* * * * *

(vii) "Technology", as follows: * * *

(D) Controlled by 6E001 for the "development" of equipment or "software" in 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.l.3, or 6B008, as described in paragraph (a)(1) of this Supplement; and

(E) Controlled by 6E002 for the "production" of equipment controlled by 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.l.3, or 6B008, as described in paragraph (a)(1) of this Supplement; and

* * * * *

(3) Regional stability items controlled under Export Control Classification Numbers (ECCNs) 6A002.a.1.c, 6E001 technology according to the General Technology Note for the "development" of equipment in 6A002.a.1.c, and 6E002 technology according to the General Technology Note for the "production" of equipment in 6A002.a.1.c; or

* * * * *

PART 743—[AMENDED]

■ 4. The authority citation for part 743 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; Pub. L. 106–508; 50 U.S.C. 1701 *et seq.*; E.O. 13206, 66 FR 18397, April 9, 2001.

■ 5. Section 743.1 is amended by:

■ (a) Revising paragraphs (c)(1)(ii), (c)(1)(vi), (c)(1)(viii), and (c)(2) as set forth below; and

■ (b) Revising all references to "5A001.b.3;" to read "5A001.b.3 or b.5" in paragraph (c)(1)(v).

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* * * * *

(c) *Items for which reports are required.* (1) * * *

(ii) *Category 2:* 2D001 (certain items only; see Note to this paragraph), 2E001 (certain items only; see Note to this paragraph), and 2E002 (certain items only; see Note to this paragraph);

Note to paragraph (c)(1)(ii): *Reports for 2D001*, for "software", other than that controlled by 2D002, specially designed for the "development" or "production" of the equipment in 2B003 or 2B001.a or .b (changing 6 µm to 5.1 µm in 2B001.a.1 and

2B001.b.1.a; and adding "a positioning accuracy with "all compensations available" equal to or less (better) than 5.1 µm along any linear axis" to the existing text for 2B001.b.2) of the Commerce Control List (CCL).

Reports for 2E001, are for "technology" according to the General Technology Note for "development" of "software" as described in this paragraph for 2D001, or for the equipment in 2B003 or 2B001.a or .b (changing 6µm to 5.1µm in 2B001.a.1 and 2B001.b.1.a; and adding "a positioning accuracy with "all compensations available" equal to or less (better) than 5.1 µm along any linear axis" to the existing text for 2B001.b.2) of the CCL.

Reports for 2E002, are for "technology" according to the General Technology Note for "production" of the equipment in 2B003 or 2B001.a or .b (changing 6 µm to 5.1 µm in 2B001.a.1 and 2B001.b.1.a; and adding "a positioning accuracy with "all compensations available" equal to or less (better) than 5.1 µm along any linear axis" to the existing text for 2B001.b.2) of the CCL.

* * * * *

(vi) *Category 6:* 6A001.a.1.b (changing 10 kHz to 5 kHz and adding the text "or a sound pressure level exceeding 224 dB (reference 1 µPa at 1 m) for equipment with an operating frequency in the band from 5kHz to 10 kHz inclusive" to the existing text in 6A001.a.1.b.1), and .a.2.d; 6A002.b; 6A004.c and d; 6A006.g (excluding compensators which provide only absolute values of the earth's magnetic field as output (*i.e.*, the frequency bandwidth of the output extends from DC to at least 0.8 Hz) and h; 6A008.d, .h, and .k; 6D001 (for 6A004.c and .d and 6A008.d, .h, and .k); 6D003.a; 6E001 (for equipment and software listed in this paragraph); and 6E002 (for equipment listed in this paragraph);

* * * * *

(viii) *Category 9:* 9B001.b.

(2) Reports for "software" controlled by 4D001 (that is specially designed), and "technology" controlled by 4E001 (according to the General Technology Note in Supplement No. 2 to part 774 of the EAR) are required for the "development" or "production" of computers controlled under 4A001.a.2, or for the "development" or "production" of "digital computers" having a CTP exceeding 75,000 MTOPS. For the calculation of CTP, see the Technical Note for Category 4 in the Commerce Control List (Supplement No. 2 to part 774 of the EAR).

* * * * *

PART 772—[AMENDED]

■ 6. The authority citation for part 772 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; E.O. 13222, 66 FR 44025,

3 CFR, 2001 Comp., p. 783; Notice of August 7, 2003, 68 FR 47833, August 11, 2003.

■ 7. In section 772.1, the definition for "microcomputer microcircuit" is revised to read as follows:

§ 772.1 Definitions of terms as used in the Export Administration Regulations (EAR).

* * * * *

Microcomputer microcircuit. (Cat 3) 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 internal storage, on data contained in the internal storage.

Technical Note 1: 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.

Technical Note 2: The internal storage may be augmented by an external storage.

Note: This definition includes chip sets which are designed to operate together to provide the function of a "microprocessor microcircuit."

* * * * *

PART 774—[AMENDED]

■ 8. The authority citation for part 774 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; 10 U.S.C. 7420; 10 U.S.C. 7430(e); 18 U.S.C. 2510 *et seq.*; 22 U.S.C. 287c, 22 U.S.C. 3201 *et seq.*, 22 U.S.C. 6004; 30 U.S.C. 185(s), 185(u); 42 U.S.C. 2139a; 42 U.S.C. 6212; 43 U.S.C. 1354; 46 U.S.C. app. 466c; 50 U.S.C. app. 5; Sec. 901–911, Pub. L. 106–387; Sec. 221, Pub. L. 107–56; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783; Notice of August 7, 2003, 68 FR 47833, August 11, 2003.

Category 1—Materials, Chemicals, "Microorganisms," and Toxins

■ 9. In Supplement No. 1 to part 774 (the Commerce Control List), Category 1—Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1B001 is amended by revising the *items* paragraph in the List of Items Controlled section, to read as follows:

1B001 Equipment for the production of fibers, prepreps, preforms or "composites" controlled by 1A002 or 1C010, and specially designed components and accessories therefor.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. Filament winding machines of which the motions for positioning, wrapping and winding fibers are coordinated and programmed in three or more axes, specially designed for the manufacture of "composite" structures or laminates from "fibrous or filamentary materials";

b. Tape-laying or tow-placement machines of which the motions for positioning and laying tape, tows or sheets are coordinated and programmed in two or more axes, specially designed for the manufacture of "composite" airframe or "missile" structures;

c. Multidirectional, multidimensional weaving machines or interlacing machines, including adapters and modification kits, for weaving, interlacing or braiding fibers to manufacture "composite" structures;

Technical Note: For the purposes of 1B001.c the technique of interlacing includes knitting.

Note: 1B001.c does not control textile machinery not modified for the above end-uses.

d. Equipment specially designed or adapted for the production of reinforcement fibers, as follows:

d.1. Equipment for converting polymeric fibers (such as polyacrylonitrile, rayon, pitch or polycarbosilane) into carbon fibers or silicon carbide fibers, including special equipment to strain the fiber during heating;

d.2. Equipment for the chemical vapor deposition of elements or compounds on heated filamentary substrates to manufacture silicon carbide fibers;

d.3. Equipment for the wet-spinning of refractory ceramics (such as aluminum oxide);

d.4. Equipment for converting aluminum containing precursor fibers into alumina fibers by heat treatment;

e. Equipment for producing prepregs controlled by 1C010.e by the hot melt method;

f. Non-destructive inspection equipment capable of inspecting defects three dimensionally, using ultrasonic or X-ray tomography and specially designed for "composite" materials.

■ 10. In Supplement No. 1 to part 774 (the Commerce Control List), Category 1—Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1C006 is amended by revising the *items* paragraph in the List of Items Controlled section, to read as follows:

1C006 Fluids and lubricating materials, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Hydraulic fluids containing, as their principal ingredients, any of the following compounds or materials:

a.1. Synthetic silahydrocarbon oils, having all of the following:

Technical Note: For the purpose of 1C006.a.1, silahydrocarbon oils contain exclusively silicon, hydrogen and carbon.

a.1.a. A flash point exceeding 477 K (204 °C);

a.1.b. A pour point at 239 K (& − 34 °C) or less;

a.1.c. A viscosity index of 75 or more; *and*

a.1.d. A thermal stability at 616 K (343 °C); or

a.2. Chlorofluorocarbons, having all of the following:

Technical Note: For the purpose of 1C006.a.2, chlorofluorocarbons contain exclusively carbon, fluorine and chlorine.

a.2.a. No flash point;

a.2.b. An autogenous ignition temperature exceeding 977 K (704 °C);

a.2.c. A pour point at 219 K (− 54 °C) or less;

a.2.d. A viscosity index of 80 or more; *and*

a.2.e. A boiling point at 473 K (200 °C) or higher;

b. Lubricating materials containing, as their principal ingredients, any of the following compounds or materials:

b.1. Phenylene or alkylphenylene ethers or thio-ethers, or their mixtures, containing more than two ether or thio-ether functions or mixtures thereof; *or*

b.2. Fluorinated silicone fluids with a kinematic viscosity of less than 5,000 mm²/s (5,000 centistokes) measured at 298 K (25 °C);

c. Damping or flotation fluids with a purity exceeding 99.8%, containing less than 25 particles of 200 μm or larger in size per 100 ml and made from at least 85% of any of the following compounds or materials:

c.1. Dibromotetrafluoroethane;

c.2. Polychlorotrifluoroethylene (oily and waxy modifications only); *or*

c.3. Polybromotrifluoroethylene;

d. Fluorocarbon electronic cooling fluids, having all of the following characteristics:

d.1. Containing 85% by weight or more of any of the following, or mixtures thereof:

d.1.a. Monomeric forms of perfluoropolyalkylether-triazines or perfluoroaliphatic-ethers;

d.1.b. Perfluoroalkylamines;

d.1.c. Perfluorocycloalkanes; *or*

d.1.d. Perfluoroalkanes;

d.2. Density at 298 K (25 °C) of 1.5 g/ml or more;

d.3. In a liquid state at 273 K (0 °C); *and*

d.4. Containing 60% or more by weight of fluorine.

Technical Note: For the purpose of 1C006:

a. Flash point is determined using the Cleveland Open Cup Method described in ASTM D-92 or national equivalents;

b. Pour point is determined using the method described in ASTM D-97 or national equivalents;

c. Viscosity index is determined using the method describe in ASTM D-2270 or national equivalents;

d. Thermal stability is determined by the following test procedure or national equivalents:

Twenty ml of the fluid under test is placed in a 46 ml type 317 stainless steel chamber containing one each of 12.5 mm (nominal) diameter balls of M-10 tool steel, 52100 steel and naval bronze (60% Cu, 39% Zn, 0.75% Sn);

The chamber is purged with nitrogen, sealed at atmospheric pressure and the temperature raised to and maintained at 644 ± 6 K (371 ± 6 °C) for six hours;

The specimen will be considered thermally stable if, on completion of the above procedure, all of the following conditions are met:

1. The loss in weight of each ball is less than 10 mg/mm² of ball surface;

2. The change in original viscosity as determined at 311 K (38 °C) is less than 25%; *and*

3. The total acid or base number is less than 0.40;

e. Autogenous ignition temperature is determined using the method described in ASTM E-659 or national equivalents.

Category 2—Materials Processing

■ 11. In Supplement No. 1 to part 774 (the Commerce Control List), Category 2—Materials Processing, Export Control Classification Number (ECCN) 2B006 is amended by removing the *ECCN Controls* paragraph and revising the *items* paragraph in the List of Items Controlled section, to read as follows:

2B006 Dimensional inspection or measuring systems and equipment, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Computer controlled, "numerically controlled" or "stored program controlled" co-ordinate measuring machines (CMM), having a three dimensional length (volumetric) maximum permissible error of indication (MPE_E) at any point within the operating range of the machine (*i.e.*, within the length of axes) equal to or less (better) than (1.7 + L/1,000) μm (L is the measured length in mm) tested according to ISO 10360-2 (2001);

b. Linear and angular displacement measuring instruments, as follows:

b.1. Linear displacement measuring instruments having any of the following:

Technical Note: For the purpose of 2B006.b.1 "linear displacement" means the

change of distance between the measuring probe and the measured object.

b.1.a. Non-contact type measuring systems with a "resolution" equal to or less (better) than 0.2 μm within a measuring range up to 0.2 mm;

b.1.b. Linear voltage differential transformer systems having all of the following characteristics:

b.1.b.1. "Linearity" equal to or less (better) than 0.1% within a measuring range up to 5 mm; *and*

b.1.b.2. Drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature ± 1 K; *or*

b.1.c. Measuring systems having all of the following: b.1.c.1. Containing a "laser"; *and*

b.1.c.2. Maintaining, for at least 12 hours, over a temperature range of ± 1 K around a standard temperature and at a standard pressure, all of the following:

b.1.c.2.a. A "resolution" over their full scale of 0.1 μm or less (better); *and*

b.1.c.2.b. A "measurement uncertainty" equal to or less (better) than $(0.2 + L/2,000)$ μm (L is the measured length in mm);

Note: 2B006.b.1 does not control measuring interferometer systems, without closed or open loop feedback, containing a "laser" to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.

b.2. Angular displacement measuring instruments having an "angular position deviation" equal to or less (better) than 0.00025°;

Note: 2B006.b.2 does not control optical instruments, such as autocollimators, using collimated light to detect angular displacement of a mirror.

c. Equipment for measuring surface irregularities, by measuring optical scatter as a function of angle, with a sensitivity of 0.5 nm or less (better).

Note: Machine tools that can be used as measuring machines are controlled by this entry if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.

Category 3—Electronics

■ 12. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3A001 is amended revising the "items" paragraph in the List of Items Controlled section, to read as follows:

3A001 Electronic components, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. General purpose integrated circuits, as follows:

Note 1: The control status of wafers (finished or unfinished), in which the function has been determined, is to be evaluated against the parameters of 3A001.a.

Note 2: Integrated circuits include the following types:

- "Monolithic integrated circuits";
- "Hybrid integrated circuits";
- "Multichip integrated circuits";
- "Film type integrated circuits", including silicon-on-sapphire integrated circuits;
- "Optical integrated circuits".

a.1. Integrated circuits, designed or rated as radiation hardened to withstand any of the following:

- a.1.a. A total dose of 5×10^3 Gy (Si), or higher;
- a.1.b. A dose rate upset of 5×10^6 Gy (Si)/s, or higher; *or*
- a.1.c. A fluence (integrated flux) of neutrons (1 MeV equivalent) of 5×10^{13} n/cm² or higher on silicon, or its equivalent for other materials;

Note: 3A001.a.1.c does not apply to Metal Insulator Semiconductors (MIS).

a.2. "Microprocessor microcircuits", "microcomputer microcircuits", microcontroller microcircuits, storage integrated circuits manufactured from a compound semiconductor, analog-to-digital converters, digital-to-analog converters, electro-optical or "optical integrated circuits" designed for "signal processing", field programmable logic devices, neural network integrated circuits, custom integrated circuits for which either the function is unknown or the control status of the equipment in which the integrated circuit will be used is unknown, Fast Fourier Transform (FFT) processors, electrical erasable programmable read-only memories (EEPROMs), flash memories or static random-access memories (SRAMs), having any of the following:

- a.2.a. Rated for operation at an ambient temperature above 398 K (125°C);
- a.2.b. Rated for operation at an ambient temperature below 218 K (-55°C); *or*
- a.2.c. Rated for operation over the entire ambient temperature range from 218 K (-55°C) to 398 K (125°C);

Note: 3A001.a.2 does not apply to integrated circuits for civil automobile or railway train applications.

a.3. "Microprocessor microcircuits", "micro-computer microcircuits" and microcontroller microcircuits, having any of the following characteristics:

Note: 3A001.a.3 includes digital signal processors, digital array processors and digital coprocessors.

- a.3.a. [RESERVED]
- a.3.b. Manufactured from a compound semiconductor and operating at a clock frequency exceeding 40 MHz; *or*
- a.3.c. More than one data or instruction bus or serial communication port that provides a direct external interconnection between parallel "microprocessor microcircuits" with a transfer rate exceeding 150 Mbyte/s;
- a.4. Storage integrated circuits manufactured from a compound semiconductor;

a.5. Analog-to-digital and digital-to-analog converter integrated circuits, as follows:

- a.5.a. Analog-to-digital converters having any of the following:
 - a.5.a.1. A resolution of 8 bit or more, but less than 12 bit, with a total conversion time of less than 5 ns;

- a.5.a.2. A resolution of 12 bit with a total conversion time of less than 20 ns;
- a.5.a.3. A resolution of more than 12 bit but equal to or less than 14 bit with a total conversion time of less than 200 ns; *or*
- a.5.a.4. A resolution of more than 14 bit with a total conversion time of less than 1 μs;
- a.5.b. Digital-to-analog converters with a resolution of 12 bit or more, and a "settling time" of less than 10 ns;

Technical Note: 1. A resolution of n bit corresponds to a quantization of 2ⁿ levels.
2. Total conversion time is the inverse of the sample rate.

a.6. Electro-optical and "optical integrated circuits" designed for "signal processing" having all of the following:

- a.6.a. One or more than one internal "laser" diode;
- a.6.b. One or more than one internal light detecting element; *and*
- a.6.c. Optical waveguides;
- a.7. Field programmable logic devices having any of the following:
 - a.7.a. An equivalent usable gate count of more than 30,000 (2 input gates);
 - a.7.b. A typical "basic gate propagation delay time" of less than 0.1 ns; *or*
 - a.7.c. A toggle frequency exceeding 133 MHz;

Note: 3A001.a.7 includes: Simple Programmable Logic Devices (SPLDs), Complex Programmable Logic Devices (CPLDs), Field Programmable Gate Arrays (FPGAs), Field Programmable Logic Arrays (FPLAs), and Field Programmable Interconnects (FPICs).

N.B.: Field programmable logic devices are also known as field programmable gate or field programmable logic arrays.

- a.8. [RESERVED]
- a.9. Neural network integrated circuits;
- a.10. Custom integrated circuits for which the function is unknown, or the control status of the equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:
 - a.10.a. More than 1,000 terminals;
 - a.10.b. A typical "basic gate propagation delay time" of less than 0.1 ns; *or*
 - a.10.c. An operating frequency exceeding 3 GHz;
- a.11. Digital integrated circuits, other than those described in 3A001.a.3 to 3A001.a.10 and 3A001.a.12, based upon any compound semiconductor and having any of the following:
 - a.11.a. An equivalent gate count of more than 3,000 (2 input gates); *or*
 - a.11.b. A toggle frequency exceeding 1.2 GHz;
- a.12. Fast Fourier Transform (FFT) processors having a rated execution time for an N-point complex FFT of less than $(N \log_2 N)/20,480$ ms, where N is the number of points;

Technical Note: When N is equal to 1,024 points, the formula in 3A001.a.12 gives an execution time of 500 μs.

- b. Microwave or millimeter wave components, as follows:
 - b.1. Electronic vacuum tubes and cathodes, as follows:

Note 1: 3A001.b.1 does not control tubes designed or rated for operation in any frequency band which meets all of the following characteristics:

(a) Does not exceed 31 GHz; and

(b) Is "allocated by the ITU" for radio-communications services, but not for radio-determination.

Note 2: 3A001.b.1 does not control non-"space-qualified" tubes which meet all the following characteristics:

(a) An average output power equal to or less than 50 W; and

(b) Designed or rated for operation in any frequency band which meets all of the following characteristics:

(1) Exceeds 31 GHz but does not exceed 43.5 GHz; and

(2) Is "allocated by the ITU" for radio-communications services, but not for radio-determination.

b.1.a. Traveling wave tubes, pulsed or continuous wave, as follows:

b.1.a.1. Operating at frequencies exceeding 31 GHz;

b.1.a.2. Having a cathode heater element with a turn on time to rated RF power of less than 3 seconds;

b.1.a.3. Coupled cavity tubes, or derivatives thereof, with a "fractional bandwidth" of more than 7% or a peak power exceeding 2.5 kW;

b.1.a.4. Helix tubes, or derivatives thereof, with any of the following characteristics:

b.1.a.4.a. An "instantaneous bandwidth" of more than one octave, and average power (expressed in kW) times frequency (expressed in GHz) of more than 0.5;

b.1.a.4.b. An "instantaneous bandwidth" of one octave or less, and average power (expressed in kW) times frequency (expressed in GHz) of more than 1; or

b.1.a.4.c. Being "space qualified";

b.1.b. Crossed-field amplifier tubes with a gain of more than 17 dB;

b.1.c. Impregnated cathodes designed for electronic tubes producing a continuous emission current density at rated operating conditions exceeding 5 A/cm²;

b.2. Microwave integrated circuits or modules having all of the following:

b.2.a. Containing "monolithic integrated circuits" having one or more active circuit elements; and

b.2.b. Operating at frequencies above 3 GHz;

Note 1: 3A001.b.2 does not control circuits or modules for equipment designed or rated to operate in any frequency band which meets all of the following characteristics:

(a) Does not exceed 31 GHz; and

(b) Is "allocated by the ITU" for radio-communications services, but not for radio-determination.

Note 2: 3A001.b.2 does not control broadcast satellite equipment designed or rated to operate in the frequency range of 40.5 to 42.5 GHz.

b.3. Microwave transistors rated for operation at frequencies exceeding 31 GHz;

b.4. Microwave solid state amplifiers, having any of the following:

b.4.a. Operating frequencies exceeding 10.5 GHz and an "instantaneous bandwidth" of more than half an octave; or

b.4.b. Operating frequencies exceeding 31 GHz;

b.5. Electronically or magnetically tunable band-pass or band-stop filters having more than 5 tunable resonators capable of tuning across a 1.5:1 frequency band (f_{\max}/f_{\min}) in less than 10 μ s having any of the following:

b.5.a. A band-pass bandwidth of more than 0.5% of center frequency; or

b.5.b. A band-stop bandwidth of less than 0.5% of center frequency;

b.6. Microwave "assemblies" capable of operating at frequencies exceeding 31 GHz;

b.7. Mixers and converters designed to extend the frequency range of equipment described in 3A002.c, 3A002.e or 3A002.f beyond the limits stated therein;

b.8. Microwave power amplifiers containing tubes controlled by 3A001.b and having all of the following:

b.8.a. Operating frequencies above 3 GHz;

b.8.b. An average output power density exceeding 80 W/kg; and

b.8.c. A volume of less than 400 cm³;

Note: 3A001.b.8 does not control equipment designed or rated for operation in any frequency band which is "allocated by the ITU" for radio-communications services, but not for radio-determination.

c. Acoustic wave devices, as follows, and specially designed components thereof:

c.1. Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (*i.e.*, "signal processing" devices employing elastic waves in materials), having any of the following:

c.1.a. A carrier frequency exceeding 2.5 GHz;

c.1.b. A carrier frequency exceeding 1 GHz, but not exceeding 2.5 GHz, and having any of the following:

c.1.b.1. A frequency side-lobe rejection exceeding 55 dB;

c.1.b.2. A product of the maximum delay time and the bandwidth (time in μ s and bandwidth in MHz) of more than 100;

c.1.b.3. A bandwidth greater than 250 MHz; or

c.1.b.4. A dispersive delay of more than 10 μ s; or

c.1.c. A carrier frequency of 1 GHz or less, having any of the following:

c.1.c.1. A product of the maximum delay time and the bandwidth (time in μ s and bandwidth in MHz) of more than 100;

c.1.c.2. A dispersive delay of more than 10 μ s; or

c.1.c.3. A frequency side-lobe rejection exceeding 55 dB and a bandwidth greater than 50 MHz;

c.2. Bulk (volume) acoustic wave devices (*i.e.*, "signal processing" devices employing elastic waves) that permit the direct processing of signals at frequencies exceeding 1 GHz;

c.3. Acoustic-optic "signal processing" devices employing interaction between acoustic waves (bulk wave or surface wave) and light waves that permit the direct processing of signals or images, including spectral analysis, correlation or convolution;

d. Electronic devices and circuits containing components, manufactured from "superconductive" materials specially designed for operation at temperatures below the "critical temperature" of at least one of

the "superconductive" constituents, with any of the following:

d.1. Current switching for digital circuits using "superconductive" gates with a product of delay time per gate (in seconds) and power dissipation per gate (in watts) of less than 10^{-14} J; or

d.2. Frequency selection at all frequencies using resonant circuits with Q-values exceeding 10,000;

e. High energy devices, as follows:

e.1. Batteries and photovoltaic arrays, as follows:

Note: 3A001.e.1 does not control batteries with volumes equal to or less than 27 cm³ (*e.g.*, standard C-cells or R14 batteries).

e.1.a. Primary cells and batteries having an energy density exceeding 480 Wh/kg and rated for operation in the temperature range from below 243 K (-30° C) to above 343 K (70° C);

e.1.b. Rechargeable cells and batteries having an energy density exceeding 150 Wh/kg after 75 charge/discharge cycles at a discharge current equal to C/5 hours \odot being the nominal capacity in ampere hours) when operating in the temperature range from below 253 K (-20° C) to above 333 K (60° C);

Technical 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 divided by the total mass of the cell (or battery) in kg.

e.1.c. "Space qualified" and radiation hardened photovoltaic arrays with a specific power exceeding 160 W/m² at an operating temperature of 301 K (28° C) under a tungsten illumination of 1 kW/m² at 2,800 K ($2,527^{\circ}$ C);

e.2. High energy storage capacitors, as follows:

e.2.a. Capacitors with a repetition rate of less than 10 Hz (single shot capacitors) having all of the following:

e.2.a.1. A voltage rating equal to or more than 5 kV;

e.2.a.2. An energy density equal to or more than 250 J/kg; and

e.2.a.3. A total energy equal to or more than 25 kJ;

e.2.b. Capacitors with a repetition rate of 10 Hz or more (repetition rated capacitors) having all of the following:

e.2.b.1. A voltage rating equal to or more than 5 kV;

e.2.b.2. An energy density equal to or more than 50 J/kg;

e.2.b.3. A total energy equal to or more than 100 J; and

e.2.b.4. A charge/discharge cycle life equal to or more than 10,000;

e.3. "Superconductive" electromagnets and solenoids specially designed to be fully charged or discharged in less than one second, having all of the following:

Note: 3A001.e.3 does not control "superconductive" electromagnets or solenoids specially designed for Magnetic Resonance Imaging (MRI) medical equipment.

e.3.a. Energy delivered during the discharge exceeding 10 kJ in the first second;

e.3.b. Inner diameter of the current carrying windings of more than 250 mm; and

e.3.c. Rated for a magnetic induction of more than 8 T or "overall current density" in the winding of more than 300 A/mm²;
 f. Rotary input type shaft absolute position encoders having any of the following:
 f.1. A resolution of better than 1 part in 265,000 (18 bit resolution) of full scale; or
 f.2. An accuracy better than ± 2.5 seconds of arc.

■ 13. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3A002 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

3A002 General purpose electronic equipment, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *
 Related Controls: * * *
 Related Definitions: * * *
 Items:

a. Recording equipment, as follows, and specially designed test tape therefor:
 a.1. Analog instrumentation magnetic tape recorders, including those permitting the recording of digital signals (e.g., using a high density digital recording (HDDR) module), having any of the following:
 a.1.a. A bandwidth exceeding 4 MHz per electronic channel or track;
 a.1.b. A bandwidth exceeding 2 MHz per electronic channel or track and having more than 42 tracks; or
 a.1.c. A time displacement (base) error, measured in accordance with applicable IRIG or EIA documents, of less than ± 0.1 µs;
Note: Analog magnetic tape recorders specially designed for civilian video purposes are not considered to be instrumentation tape recorders.
 a.2. Digital video magnetic tape recorders having a maximum digital interface transfer rate exceeding 360 Mbit/s;
Note: 3A002.a.2 does not control digital video magnetic tape recorders specially designed for television recording using a signal format, which may include a compressed signal format, standardized or recommended by the ITU, the IEC, the SMPTE, the EBU, the ETSI, or the IEEE for civil television applications.
 a.3. Digital instrumentation magnetic tape data recorders employing helical scan techniques or fixed head techniques, having any of the following:
 a.3.a. A maximum digital interface transfer rate exceeding 175 Mbit/s; or
 a.3.b. Being "space qualified";
Note: 3A002.a.3 does not control analog magnetic tape recorders equipped with HDDR conversion electronics and configured to record only digital data.
 a.4. Equipment, having a maximum digital interface transfer rate exceeding 175 Mbit/s, designed to convert digital video magnetic tape recorders for use as digital instrumentation data recorders;

a.5. Waveform digitizers and transient recorders having all of the following:
N.B.: See also 3A292.
 a.5.a. Digitizing rates equal to or more than 200 million samples per second and a resolution of 10 bits or more; and
 a.5.b. A continuous throughput of 2 Gbit/s or more;

Technical Note: For those instruments with a parallel bus architecture, the continuous throughput rate is the highest word rate multiplied by the number of bits in a word. Continuous throughput is the fastest data rate the instrument can output to mass storage without the loss of any information while sustaining the sampling rate and analog-to-digital conversion.

a.6. Digital instrumentation data recorders, using magnetic disk storage technique, having all of the following:

a.6.a. Digitizing rate equal to or more than 100 million samples per second and a resolution of 8 bits or more; and

a.6.b. A continuous throughput of 1 Gbit/s or more;

b. "Frequency synthesizer", "electronic assemblies" having a "frequency switching time" from one selected frequency to another of less than 1 ms;

c. Radio frequency "signal analyzers", as follows:

c.1. "Signal analyzers" capable of analyzing frequencies exceeding 31.8 GHz but less than 37.5 GHz or exceeding 43.5 GHz;

c.2. "Dynamic signal analyzers" having a "real-time bandwidth" exceeding 500 kHz;

Note: 3A002.c.2 does not control those "dynamic signal analyzers" using only constant percentage bandwidth filters (also known as octave or fractional octave filters).

d. Frequency synthesized signal generators producing output frequencies, the accuracy and short term and long term stability of which are controlled, derived from or disciplined by the internal master frequency, and having any of the following:

d.1. A maximum synthesized frequency exceeding 31.8 GHz;

d.2. A "frequency switching time" from one selected frequency to another of less than 1 ms; or

d.3. A single sideband (SSB) phase noise better than $-(126 + 20 \log_{10} F - 20 \log_{10} f)$ in dBc/Hz, where F is the off-set from the operating frequency in Hz and f is the operating frequency in MHz;

Note: 3A002.d does not control equipment in which the output frequency is either produced by the addition or subtraction of two or more crystal oscillator frequencies, or by an addition or subtraction followed by a multiplication of the result.

e. Network analyzers with a maximum operating frequency exceeding 43.5 GHz;

f. Microwave test receivers having all of the following:

f.1. A maximum operating frequency exceeding 43.5 GHz; and

f.2. Being capable of measuring amplitude and phase simultaneously;

g. Atomic frequency standards having any of the following:

g.1. Long-term stability (aging) less (better) than 1×10^{-11} /month; or

g.2. Being "space qualified".

Note: 3A002.g.1 does not control non-"space qualified" rubidium standards.

■ 14. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3A991 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

3A991 Electronic devices and components not controlled by 3A001.

* * * * *

List of Items Controlled

Unit: * * *
 Related Controls: * * *
 Related Definitions: * * *
 Items:

a. "Microprocessor microcircuits", "microcomputer microcircuits", and microcontroller microcircuits having any of the following:

a.1. A "composite theoretical performance" ("CTP") of 6,500 million theoretical operations per second (MTOPS) or more and an arithmetic logic unit with an access width of 32 bit or more;

a.2. A clock frequency rate exceeding 25 MHz; or

a.3. More than one data or instruction bus or serial communication port that provides a direct external interconnection between parallel "microprocessor microcircuits" with a transfer rate of 2.5 Mbyte/s.

b. Storage integrated circuits, as follows:

b.1. Electrical erasable programmable read-only memories (EEPROMs) with a storage capacity;

b.1.a. Exceeding 16 Mbits per package for flash memory types; or

b.1.b. Exceeding either of the following limits for all other EEPROM types:

b.1.b.1. Exceeding 1 Mbit per package; or

b.1.b.2. Exceeding 256 kbit per package and a maximum access time of less than 80 ns;

b.2. Static random access memories (SRAMs) with a storage capacity:

b.2.a. Exceeding 1 Mbit per package; or

b.2.b. Exceeding 256 kbit per package and a maximum access time of less than 25 ns;

c. Analog-to-digital converters having any of the following:

c.1. A resolution of 8 bit or more, but less than 12 bit, with a total conversion time of less than 10 ns;

c.2. A resolution of 12 bit with a total conversion time of less than 200 ns;

c.3. A resolution of more than 12 bit but equal to or less than 14 bit with a total conversion time of less than 2 µs; or

c.4. A resolution of more than 14 bit with a total conversion time of less than 2 µs;

d. Field programmable logic devices having either of the following:

d.1. An equivalent gate count of more than 5000 (2 input gates); or

d.2. A toggle frequency exceeding 100 MHz;

e. Fast Fourier Transform (FFT) processors having a rated execution time for a 1,024 point complex FFT of less than 1 ms.

f. Custom integrated circuits for which either the function is unknown, or the control status of the equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:

- f.1. More than 144 terminals; *or*
- f.2. A typical "basic propagation delay time" of less than 0.4 ns.
- g. Traveling wave tubes, pulsed or continuous wave, as follows:
 - g.1. Coupled cavity tubes, or derivatives thereof;
 - g.2. Helix tubes, or derivatives thereof, with any of the following:
 - g.2.a. An "instantaneous bandwidth" of half an octave or more; *and*
 - g.2.b. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 0.2;
 - g.2.c. An "instantaneous bandwidth" of less than half an octave; *and*
 - g.2.d. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 0.4;
 - h. Flexible waveguides designed for use at frequencies exceeding 40 GHz;
 - i. Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (*i.e.*, "signal processing" devices employing elastic waves in materials), having either of the following:
 - i.1. A carrier frequency exceeding 1 GHz; *or*
 - i.2. A carrier frequency of 1 GHz or less; *and*
 - i.2.a. A frequency side-lobe rejection exceeding 55 Db;
 - i.2.b. A product of the maximum delay time and bandwidth (time in microseconds and bandwidth in MHz) of more than 100; *or*
 - i.2.c. A dispersive delay of more than 10 microseconds.
 - j. Batteries, as follows:

Note: 3A991.j does not control batteries with volumes equal to or less than 27 cm³ (*e.g.*, standard C-cells or UM-2 batteries).

- j.1. Primary cells and batteries having an energy density exceeding 350 Wh/kg and rated for operation in the temperature range from below 243 K (−30°C) to above 343 K (70°C);
- j.2. Rechargeable cells and batteries having an energy density exceeding 150 Wh/kg after 75 charge/discharge cycles at a discharge current equal to C/5 hours © being the nominal capacity in ampere hours) when operating in the temperature range from below 253 K (−20°C) to above 333 K (60°C);

Technical 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 percent of the open circuit voltage divided by the total mass of the cell (or battery) in kg.

k. "Superconductive" electromagnets or solenoids specially designed to be fully charged or discharged in less than one minute, having all of the following:

Note: 3A991.k does not control "superconductive" electromagnets or solenoids designed for Magnetic Resonance Imaging (MRI) medical equipment.

- k.1. Maximum energy delivered during the discharge divided by the duration of the discharge of more than 500 kJ per minute;
- k.2. Inner diameter of the current carrying windings of more than 250 mm; *and*
- k.3. Rated for a magnetic induction of more than 8T or "overall current density" in the winding of more than 300 A/mm².
- l. Circuits or systems for electromagnetic energy storage, containing components manufactured from "superconductive" materials specially designed for operation at temperatures below the "critical temperature" of at least one of their "superconductive" constituents, having all of the following:
 - l.1. Resonant operating frequencies exceeding 1 MHz;
 - l.2. A stored energy density of 1 MJ/M³ or more; *and*
 - l.3. A discharge time of less than 1 ms;
 - m. Hydrogen/hydrogen-isotope thytrons of ceramic-metal construction and rate for a peak current of 500 A or more;
 - n. Digital integrated circuits based on any compound semiconductor having an equivalent gate count of more than 300 (2 input gates).

■ 15. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3B001 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

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

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

- a. "Stored program controlled" equipment designed for epitaxial growth, as follows:
 - a.1. Equipment capable of producing a layer thickness uniform to less than ±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. "Stored program controlled" 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. Being capable of high energy oxygen implant into a heated semiconductor material "substrate";

c. "Stored program controlled" 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 0.3 μm or less with ±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 0.3 μm or less with ±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 μm in diameter;
- d. "Stored program controlled" plasma enhanced CVD equipment, as follows:
 - d.1. Equipment with cassette-to-cassette operation and load-locks, and having any of the following:
 - d.1.a. Designed or optimized to produce critical dimensions of 0.3 μm or less with ±5% 3 sigma precision; *or*
 - d.1.b. Designed for generating less than 0.04 particles/cm² with a measurable particle size greater than 0.1 μm in diameter;
 - d.2. Equipment specially designed for equipment controlled by 3B001.e. and having any of the following:
 - d.2.a. Designed or optimized to produce critical dimensions of 0.3 μm or less with ±5% 3 sigma precision; *or*
 - d.2.b. Designed for generating less than 0.04 particles/cm² with a measurable particle size greater than 0.1 μm in diameter;

e. "Stored program controlled" 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. "Stored program controlled" 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 350 nm; *or*
 - f.1.b. Capable of producing a pattern with a minimum resolvable feature size of 0.35 μm or less;

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

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

Where the K factor = 0.7.

MRF = minimum resolvable feature size.

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 μm;
- f.2.b. Being capable of producing a pattern with a feature size of less than 1 μm; or
- f.2.c. An overlay accuracy of better than ±0.20 μm (3 sigma);
- g. Masks and reticles designed for integrated circuits controlled by 3A001;
- h. Multi-layer masks with a phase shift layer.

■ 16. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3E001 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

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 and 3B992) or 3C.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definition: * * *
Items:
 The list of items controlled is contained in the ECCN heading.

Note: 3E001 does not control "technology" for the "development" or "production" of:

- (a) Microwave transistors operating at frequencies below 31 GHz;
- (b) Integrated circuits controlled by 3A001.a.3 to a.12, having all of the following:
 - (b.1) Using "technology" of 0.5 μm or more; and

(b.2) Not incorporating multi-layer structures.

Technical Note: The term multi-layer structures in Note b.2 does not include devices incorporating a maximum of three metal layers and three polysilicon layers.

■ 17. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3E002 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

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.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:
 The list of items controlled is contained in the ECCN heading.

Note: 3E002 does not control "technology" for the "development" or "production" of:

- (a) Microwave transistors operating at frequencies below 31 GHz;
- (b) Integrated circuits controlled by 3A001.a.3 to a.12, having all of the following:
 - (b.1) Using "technology" of 0.5 μm or more; and
 - (b.2) Not incorporating multi-layer structures.

Technical Note: The term multi-layer structures in Note b.2 does not include

devices incorporating a maximum of three metal layers and three polysilicon layers.

■ 18. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4A002 is amended by revising the "Items" paragraph in the List of Items Controlled section, to read as follows:

4A002 "Hybrid computers" and "electronic assemblies" and specially designed components therefor.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

- a. Containing "digital computers" controlled by 4A003;
- b. Containing analog-to-digital converters having all of the following characteristics:
 - b.1. 32 channels or more; and
 - b.2. A resolution of 14 bit (plus sign bit) or more with a conversion rate of 200,000 conversions/s or more.

■ 19. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4A003, is amended by revising the "Heading", the License Requirements section, the "CTP" paragraph in the License Exceptions section, and the "items" paragraph in the List of Items Controlled section, to read as follows:

4A003 "Digital computers", "electronic assemblies", and related equipment therefor, as follows, and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, CC, AT, NP, XP

Control(s)	Country chart
NS applies to 4A003.b and .c	NS Column 1.
NS applies to 4A003.a, .e, and .g	NS Column 2.
MT applies to digital computers used as ancillary equipment for test facilities and equipment that are controlled by 9B005 or 9B006	MT Column 1.
CC applies to "digital computers" for computerized finger-print equipment	CC Column 1.
AT applies to entire entry (refer to 4A994 for controls on "digital computers" with a CTP ≥ 6 but ≤ 190,000 MTOPS)	AT Column 1.

NP applies, unless a License Exception is available. See § 742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to "digital computers" with a CTP greater than 190,000 MTOPS, unless a License Exception is available. XP controls vary according to destination and end-user and end-use; however, XP does not apply to

Canada. See § 742.12 of the EAR for additional information.

Note: For all destinations, except Cuba, Iran, Iraq, Libya, North Korea, Sudan, Syria, no license is required (NLR) for computers with a CTP not greater than 190,000 MTOPS and for "electronic assemblies" described in 4A003.c that are not capable of exceeding a CTP greater than 190,000 MTOPS in

aggregation. Computers controlled in this entry for MT reasons are not eligible for NLR.

License Exceptions

LVS: * * *
GBS: * * *

CTP: Yes, for computers controlled by 4A003.a or .b, and "electronic assemblies" controlled by 4A003.c, to the exclusion of other technical parameters, with the

exception of parameters specified as controlled for Missile Technology (MT) concerns and 4A003.e (equipment performing analog-to-digital conversions exceeding the limits of 3A001.a.5.a). See § 740.7 of the EAR.

CIV: * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

Note 1: 4A003 includes the following:

- a. Vector processors;
- b. Array processors;
- c. Digital signal processors;
- d. Logic processors;
- e. Equipment designed for “image enhancement”;
- f. Equipment designed for “signal processing”.

Note 2: The control status of the “digital computers” and related equipment described in 4A003 is determined by the control status of other equipment or systems provided:

- a. The “digital computers” or related equipment are essential for the operation of the other equipment or systems;
- b. The “digital computers” or related equipment are not a “principal element” of the other equipment or systems; and

N.B. 1: The control status of “signal processing” or “image enhancement” equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the “principal element” criterion.

N.B. 2: For the control status of “digital computers” or related equipment for telecommunications equipment, see Category 5, Part 1 (Telecommunications).

c. The “technology” for the “digital computers” and related equipment is determined by 4E.

a. Designed or modified for “fault tolerance”;

Note: For the purposes of 4A003.a., “digital computers” and related equipment are not considered to be designed or modified for “fault tolerance” if they utilize any of the following:

1. Error detection or correction algorithms in “main storage”;

2. The interconnection of two “digital computers” so that, if the active central processing unit fails, an idling but mirroring central processing unit can continue the system’s functioning;

3. The interconnection of two central processing units by data channels or by use of shared storage to permit one central processing unit to perform other work until the second central processing unit fails, at which time the first central processing unit takes over in order to continue the system’s functioning; or

4. The synchronization of two central processing units by “software” so that one central processing unit recognizes when the other central processing unit fails and recovers tasks from the failing unit.

b. “Digital computers” having a “composite theoretical performance”

(“CTP”) exceeding 190,000 million theoretical operations per second (MTOPS);

c. “Electronic assemblies” specially designed or modified to be capable of enhancing performance by aggregation of “computing elements” (“CEs”) so that the “CTP” of the aggregation exceeds the limit in 4A003.b.;

Note 1: 4A003.c applies only to “electronic assemblies” and programmable interconnections not exceeding the limit in 4A003.b. when shipped as unintegrated “electronic assemblies”. It does not apply to “electronic assemblies” inherently limited by nature of their design for use as related equipment controlled by 4A003.d, or 4A003.e.

Note 2: 4A003.c does not control “electronic assemblies” specially designed for a product or family of products whose maximum configuration does not exceed the limit of 4A003.b.

d. [RESERVED]

e. Equipment performing analog-to-digital conversions exceeding the limits in 3A001.a.5;

f. [RESERVED]

g. Equipment specially designed to provide external interconnection of “digital computers” or associated equipment that allows communications at data rates exceeding 1.25 Gbyte/s.

Note: 4A003.g does not control internal interconnection equipment (e.g., backplanes, buses) passive interconnection equipment, “network access controllers” or “communication channel controllers”.

■ 20. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4D001 is amended by revising the “Heading”, License Requirements section, and the “items” paragraph in the List of Items Controlled section, to read as follows:

4D001 “Software” specially designed or modified for the “development”, “production” or “use” of equipment or “software” controlled by 4A001 to 4A004, or 4D (except 4D980, 4D993 or 4D994), and other specified software, see List of Items Controlled.

License Requirements

Reason for Control: NS, CC, AT, NP, XP.

Control(s)	Country chart
NS applies to “software” for commodities or software controlled by 4A001 to 4A004, 4D001 to 4D003.	NS Column 1.
CC applies to “software” for computerized finger-print equipment controlled by 4A003 for CC reasons.	CC Column 1.
AT applies to entire entry	AT Column 1.

NP applies, unless a License Exception is available. See § 742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to “software” for computers with a CTP greater than 190,000 MTOPS, unless a License Exception is available. XP

controls vary according to destination and end-user and end-use; however, XP does not apply to Canada. See § 742.12 of the EAR for additional information.

License Requirement Notes: See § 743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. “Software” specially designed or modified for the “development”, “production” or “use” of equipment or “software” controlled by 4A001 to 4A004, or 4D (except 4D980, 4D993 or 4D994).

b. “Software”, other than that controlled by the heading, specially designed or modified for the “development” or “production” of:

b.1. “Digital computers” having a “composite theoretical performance” (“CTP”) exceeding 28,000 MTOPS; or

b.2. “Electronic assemblies” specially designed or modified for enhancing performance by aggregation of “computing elements” (“CEs”) so that the “CTP” of the aggregation exceeds the limit in 4D001.b.1.

■ 21. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4D994 is amended by revising the “Heading”, to read as follows:

4D994 “Software” other than that controlled in 4D001 specially designed or modified for the “development”, “production”, or “use” of equipment controlled by 4A101, 4A994, 4B994, and materials controlled by 4C994.

* * * * *

■ 22. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4E001 is amended by revising the “Heading”, License Requirements section, and the “items” paragraph in the List of Items Controlled section, to read as follows:

4E001 “Technology” according to the General Technology Note, for the “development”, “production” or “use” of equipment or “software” controlled by 4A (except 4A980, 4A993 or 4A994) or 4D (except 4D980, 4D993, 4D994), and other specified technology, see List of Items Controlled.

License Requirements

Reason for Control: NS, MT, CC, AT, NP, XP.

Control(s)	Country chart
NS applies to “technology” for commodities or software controlled by 4A001 to 4A004, 4D001 to 4D003.	NS Column 1.
MT applies to “technology” for items controlled by 4A001.a and 4A101 for MT reasons.	MT Column 1.

Control(s)	Country chart
CC applies to "technology" for computerized fingerprint equipment controlled by 4A003 for CC reasons.	CC Column 1.
AT applies to entire entry	AT Column 1.

NP applies, unless a License Exception is available. See § 742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to "technology" for computers with a CTP greater than 190,000 MTOPS, unless a License Exception is available. XP controls vary according to destination and end-user and end-use; however, XP does not apply to Canada. See § 742.12 of the EAR for additional information.

License Requirement Notes: See § 743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. "Technology" according to the General Technology Note, for the "development," "production," or "use" of equipment or "software" controlled by 4A (except 4A980, 4A993 or 4A994) or 4D (except 4D980, 4D993, 4D994).

b. "Technology", other than that controlled by 4E001.a, specially designed or modified for the "development" or "production" of:

b.1. "Digital computers" having a "composite theoretical performance" ("CTP") exceeding 28,000 MTOPS; or

b.2. "Electronic assemblies" specially designed or modified for enhancing performance by aggregation of "computing elements" ("CEs") so that the "CTP" of the aggregation exceeds the limit in 4E001.b.1.

■ 23. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4E992 is amended by revising the "Heading", to read as follows:

4E992 "Technology" other than that controlled in 4E001 for the "development", "production", or "use" of performance controlled by 4A994 and 4B994, materials controlled by 4C994, or "software" controlled by 4D993 or 4D994.

* * * * *

■ 24. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and "Information Security", Part I—Telecommunications, Export Control Classification Number (ECCN) 5A001 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

5A001 Telecommunications systems, equipment, and components.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. Any type of telecommunications equipment having any of the following characteristics, functions or features:
 a.1. Specially designed to withstand transitory electronic effects or electromagnetic pulse effects, both arising from a nuclear explosion;
 a.2. Specially hardened to withstand gamma, neutron or ion radiation; or
 a.3. Specially designed to operate outside the temperature range from 218 K (−55° C) to 397 K (124° C).

Note: 5A001.a.3 applies only to electronic equipment.

Note: 5A001.a.2 and 5A001.a.3 do not apply to equipment on board satellites.

b. Telecommunication transmission equipment and systems, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:
 b.1. Being underwater communications systems having any of the following characteristics:

b.1.a. An acoustic carrier frequency outside the range from 20 kHz to 60 kHz;

b.1.b. Using an electromagnetic carrier frequency below 30 kHz; or

b.1.c. Using electronic beam steering techniques;

b.2. Being radio equipment operating in the 1.5 MHz to 87.5 MHz band and having any of the following characteristics:

b.2.a. Incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal; or

b.2.b. Having all of the following:

b.2.b.1. Automatically predicting and selecting frequencies and "total digital transfer rates" per channel to optimize the transmission; and

b.2.b.2. Incorporating a linear power amplifier configuration having a capability to support multiple signals simultaneously at an output power of 1 kW or more in the frequency range of 1.5 MHz or more but less than 30 MHz, or 250 W or more in the frequency range of 30 MHz or more but not exceeding 87.5 MHz, over an "instantaneous bandwidth" of one octave or more and with an output harmonic and distortion content of better than −80 dB;

b.3. Being radio equipment employing "spread spectrum" techniques, including "frequency hopping" techniques, having any of the following characteristics:

b.3.a. User programmable spreading codes; or

b.3.b. A total transmitted bandwidth which is 100 or more times the bandwidth of any one information channel and in excess of 50 kHz;

Note: 5A001.b.3.b does not control radio equipment specially designed for use with civil cellular radio-communications systems.

Note: 5A001.b.3 does not control equipment operating at an output power of 1.0 Watt or less.

b.4. Being radio equipment employing "time-modulated ultra-wideband"

techniques, having user programmable channelizing or scrambling codes;

b.5. Being digitally controlled radio receivers having all of the following:
 b.5.a. More than 1,000 channels;
 b.5.b. A "frequency switching time" of less than 1 ms;

b.5.c. Automatic searching or scanning of a part of the electromagnetic spectrum; and
 b.5.d. Identification of the received signals or the type of transmitter; or

Note: 5A001.b.5 does not control radio equipment specially designed for use with civil cellular radio-communications systems.

b.6. Employing functions of digital "signal processing" to provide voice coding output at rates of less than 2,400 bit/s.

Technical Note: For variable rate voice coding, 5A001.b.6 applies to the voice coding output of continuous speech.

c. Optical fiber communication cables, optical fibers and accessories, as follows:

c.1. Optical fibers of more than 500 m in length specified by the manufacturer as being capable of withstanding a proof test tensile stress of 2 × 109 N/m² or more;

Technical Note: Proof Test: on-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3 m length of fiber at a running rate of 2 to 5 m/s while passing between capstans approximately 150 mm in diameter. The ambient temperature is a nominal 293 K (20° C) and relative humidity 40%. Equivalent national standards may be used for executing the proof test.

c.2. Optical fiber cables and accessories designed for underwater use.

Note: 5A001.c.2 does not control standard civil telecommunication cables and accessories.

N.B. 1: For underwater umbilical cables, and connectors thereof, see 8A002.a.3.

N.B. 2: For fiber-optic hull penetrators or connectors, see 8A002.c.

d. "Electronically steerable phased array antennae" operating above 31 GHz.

Note: 5A001.d does not control "electronically steerable phased array antennae" for landing systems with instruments meeting ICAO standards covering microwave landing systems (MLS).

■ 25. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and "Information Security", Part I—Telecommunications, Export Control Classification Number (ECCN) 5A991 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

5A991 Telecommunication equipment, not controlled by 5A001.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. Any type of telecommunications equipment, not controlled by 5A001.a,

specially designed to operate outside the temperature range from 219 K (−54 °C) to 397 K (124 °C).

b. Telecommunication transmission equipment and systems, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:

Note: Telecommunication transmission equipment:

a. Categorized as follows, or combinations thereof:

1. Radio equipment (*e.g.*, transmitters, receivers and transceivers);
2. Line terminating equipment;
3. Intermediate amplifier equipment;
4. Repeater equipment;
5. Regenerator equipment;
6. Translation encoders (transcoders);
7. Multiplex equipment (statistical multiplex included);
8. Modulators/demodulators (modems);
9. Transmultiplex equipment (see CCITT Rec. G701);
10. "Stored program controlled" digital crossconnection equipment;
11. "Gateways" and bridges;
12. "Media access units"; and

b. Designed for use in single or multi-channel communication via any of the following:

1. Wire (line);
 2. Coaxial cable;
 3. Optical fiber cable;
 4. Electromagnetic radiation; or
 5. Underwater acoustic wave propagation.
- b.1. Employing digital techniques, including digital processing of analog signals, and designed to operate at a "digital transfer rate" at the highest multiplex level exceeding 45 Mbit/s or a "total digital transfer rate" exceeding 90 Mbit/s;

Note: 5A991.b.1 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.

b.2. Modems using the "bandwidth of one voice channel" with a "data signaling rate" exceeding 9,600 bits per second;

b.3. Being "stored program controlled" digital cross connect equipment with "digital transfer rate" exceeding 8.5 Mbit/s per port.

b.4. Being equipment containing any of the following:

- b.4.a. "Network access controllers" and their related common medium having a "digital transfer rate" exceeding 33 Mbit/s; or
- b.4.b. "Communication channel controllers" with a digital output having a "data signaling rate" exceeding 64,000 bit/s per channel;

Note: If any uncontrolled equipment contains a "network access controller", it cannot have any type of telecommunications interface, except those described in, but not controlled by 5A991.b.4.

b.5. Employing a "laser" and having any of the following characteristics:

- b.5.a. A transmission wavelength exceeding 1,000 nm; or
- b.5.b. Employing analog techniques and having a bandwidth exceeding 45 MHz;

Note: 5A991.b.5.b does not control commercial TV systems.

b.5.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);

b.5.d. Employing wavelength division multiplexing techniques; or

b.5.e. Performing "optical amplification";

b.6. Radio equipment operating at input or output frequencies exceeding:

b.6.a. 31 GHz for satellite-earth station applications; or

b.6.b. 26.5 GHz for other applications;

Note: 5A991.b.6. does not control equipment for civil use when conforming with an International Telecommunications Union (ITU) allocated band between 26.5 GHz and 31 GHz.

b.7. Being radio equipment employing any of the following:

b.7.a. Quadrature-amplitude-modulation (QAM) techniques above level 4 if the "total digital transfer rate" exceeds 8.5 Mbit/s;

b.7.b. QAM techniques above level 16 if the "total digital transfer rate" is equal to or less than 8.5 Mbit/s; or

b.7.c. Other digital modulation techniques and having a "spectral efficiency" exceeding 3 bit/s/Hz;

Notes: 1. 5A991.b.7 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.

2. 5A991.b.7 does not control radio relay equipment for operation in an ITU allocated band:

a. Having any of the following:

- a.1. Not exceeding 960 MHz; or
- a.2. With a "total digital transfer rate" not exceeding 8.5 Mbit/s; and

b. Having a "spectral efficiency" not exceeding 4 bit/s/Hz.

b.8. Providing functions of digital "signal processing" as follows:

b.8.a. Voice coding at rates less than 2,400 bit/s;

b.8.b. Employing circuitry that incorporates "user-accessible programmability" of digital "signal processing" circuits exceeding the limits of 4A003.b.

c. "Stored program controlled" switching equipment and related signaling systems, having any of the following characteristics, functions or features, and specially designed components and accessories therefor:

Note: Statistical multiplexers with digital input and digital output which provide switching are treated as "stored program controlled" switches.

c.1. "Data (message) switching" equipment or systems designed for "packet-mode operation" and assemblies and components therefor, *n.e.s.*

c.2. Containing "Integrated Services Digital Network" (ISDN) functions and having any of the following:

c.2.a. Switch-terminal (*e.g.*, subscriber line) interfaces with a "digital transfer rate" at the highest multiplex level exceeding 192,000 bit/s, including the associated signaling channel (*e.g.*, 2B+D); or

c.2.b. The capability that a signaling message received by a switch on a given channel that is related to a communication on another channel may be passed through to another switch.

Note: 5A991.c does not preclude the evaluation and appropriate actions taken by the receiving switch or unrelated user message traffic on a D channel of ISDN.

c.3. Routing or switching of "datagram" packets;

c.4. Routing or switching of "fast select" packets;

Note: The restrictions in 5A991.c.3 and c.4 do not apply to networks restricted to using only "network access controllers" or to "network access controllers" themselves.

c.5. Multi-level priority and pre-emption for circuit switching;

Note: 5A991.c.5 does not control single-level call preemption.

c.6. Designed for automatic hand-off of cellular radio calls to other cellular switches or automatic connection to a centralized subscriber data base common to more than one switch;

c.7. Containing "stored program controlled" digital cross connect equipment with "digital transfer rate" exceeding 8.5 Mbit/s per port.

c.8. "Common channel signaling" operating in either non-associated or quasi-associated mode of operation;

c.9. "Dynamic adaptive routing"

Note: 5A991.c.10 does not control packet switches or routers with ports or lines not exceeding the limits in 5A991.c.10.

c.10. Being packet switches, circuit switches and routers with ports or lines exceeding any of the following:

c.10.a. A "data signaling rate" of 64,000 bit/s per channel for a "communications channel controller"; or

Note: 5A991.c.10.a does not control multiplex composite links composed only of communication channels not individually controlled by 5A991.b.1.

c.10.b. A "digital transfer rate" of 33 Mbit/s for a "network access controller" and related common media;

c.11. "Optical switching";

c.12. Employing "Asynchronous Transfer Mode ("ATM") techniques.

d. Optical fibers and optical fiber cables of more than 50 m in length designed for single mode operation;

e. Centralized network control having all of the following characteristics:

- e.1. Receives data from the nodes; *and*
- e.2. Process these data in order to provide control of traffic not requiring operator decisions, and thereby performing "dynamic adaptive routing";

Note: 5A991.e does not preclude control of traffic as a function of predictable statistical traffic conditions.

f. Phased array antennae, operating above 10.5 GHz, containing active elements and distributed components, and designed to permit electronic control of beam shaping and pointing, except for landing systems with instruments meeting International Civil Aviation Organization (ICAO) standards (microwave landing systems (MLS)).

g. Mobile communications equipment, *n.e.s.*, and assemblies and components therefor; or

h. Radio relay communications equipment designed for use at frequencies equal to or

exceeding 19.7 GHz and assemblies and components therefor, n.e.s.

■ 26. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and “Information Security”, Part I—Telecommunications, Export Control Classification Number (ECCN) 5B001 is amended by revising the “items” paragraph in the List of Items Controlled section, to read as follows:

5B001 Telecommunication test, inspection and production equipment, as follows (See List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definition: * * *
Items:

a. Equipment and specially designed components or accessories therefor, specially designed for the “development”, “production” or “use” of equipment, functions or features controlled by 5A001, 5D001 or 5E001.

Note: 5B001.a. does not control optical fiber characterization equipment.

b. Equipment and specially designed components or accessories therefor, specially designed for the “development” of any of the following telecommunication transmission or “stored program controlled” switching equipment:

b.1. Equipment employing digital techniques, including “Asynchronous Transfer Mode” (“ATM”), designed to operate at a “total digital transfer rate” exceeding 1.5 Gbit/s;

b.2. Equipment employing a “laser” and having any of the following:

b.2.a. A transmission wavelength exceeding 1750 nm;

b.2.b. Performing “optical amplification”;

b.2.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques); or

b.2.d. Employing analog techniques and having a bandwidth exceeding 2.5 GHz;

Note: 5B001.b.2.d. does not include equipment specially designed for the “development” of commercial TV systems.

b.3. Equipment employing “optical switching”;

b.4. Radio equipment employing quadrature-amplitude-modulation (QAM) techniques above level 256; or

b.5. Equipment employing “common channel signaling” operating in non-associated mode of operation.

■ 27. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and “Information Security”, Part I—Telecommunications, Export Control Classification Number (ECCN) 5D001 is amended by revising the License Exceptions section, and the “items” paragraph in the List of Items Controlled section, to read as follows:

5D001 “Software”, as described in the List of Items Controlled.

* * * * *

License Exceptions

CIV: Yes, except for “software” controlled by 5D001.a and specially designed for the “development” or “production” of items controlled by 5A001.b.5
 TSR: Yes, except for exports and reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of “software” controlled by 5D001.a and specially designed for items controlled by 5A001.b.5.

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. “Software” specially designed or modified for the “development”, “production” or “use” of equipment, functions or features controlled by 5A001 or 5B001.

b. “Software” specially designed or modified to support “technology” controlled by 5E001.

c. Specific “software” as follows:

c.1. “Software” specially designed or modified to provide characteristics, functions or features of equipment controlled by 5A001 or 5B001;

c.2. [Reserved];

c.3. “Software”, other than in machine-executable form, specially designed for “dynamic adaptive routing”.

d. “Software” specially designed or modified for the “development” of any of the following telecommunication transmission or “stored program controlled” switching equipment:

d.1. Equipment employing digital techniques, including “Asynchronous Transfer Mode” (“ATM”), designed to operate at a “total digital transfer rate” exceeding 1.5 Gbit/s;

d.2. Equipment employing a “laser” and having any of the following:

d.2.a. A transmission wavelength exceeding 1750 nm; or

d.2.b. Employing analog techniques and having a bandwidth exceeding 2.5 GHz;

Note: 5D001.d.2.b. does not control “software” specially designed or modified for the “development” of commercial TV systems.

d.3. Equipment employing “optical switching”; or

d.4. Radio equipment employing quadrature-amplitude-modulation (QAM) techniques above level 256.

■ 28. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and “Information Security”, Part I—Telecommunications, Export Control Classification Number (ECCN) 5E001 is amended by revising the “items” paragraph in the List of Items Controlled section, to read as follows:

5E001 “Technology”, (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. “Technology” according to the General Technology Note for the “development”, “production” or “use” (excluding operation) of equipment, functions or features or “software” controlled by 5A001, 5B001 or 5D001.

b. Specific “technologies”, as follows:

b.1. “Required” “technology” for the “development” or “production” of telecommunications equipment specially designed to be used on board satellites;

b.2. “Technology” for the “development” or “use” of “laser” communication techniques with the capability of automatically acquiring and tracking signals and maintaining communications through exoatmosphere or sub-surface (water) media;

b.3. “Technology” for the “development” of digital cellular radio base station receiving equipment whose reception capabilities that allow multi-band, multi-channel, multi-mode, multi-coding algorithm or multi-protocol operation can be modified by changes in “software”;

b.4. “Technology” for the “development” of “spread spectrum” techniques, including “frequency hopping” techniques.

c. “Technology” according to the General Technology Note for the “development” or “production” of any of the following telecommunication transmission or “stored program controlled” switching equipment, functions or features:

c.1. Equipment employing digital techniques, including “Asynchronous Transfer Mode” (“ATM”), designed to operate at a “total digital transfer rate” exceeding 1.5 Gbit/s;

c.2. Equipment employing a “laser” and having any of the following:

c.2.a. A transmission wavelength exceeding 1750 nm;

c.2.b. Performing “optical amplification” using praseodymium-doped fluoride fiber amplifiers (PDFFA);

c.2.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);

c.2.d. Employing wavelength division multiplexing techniques exceeding 8 optical carriers in a single optical window; or

c.2.e. Employing analog techniques and having a bandwidth exceeding 2.5 GHz;

Note: 5E001.c.2.e. does not control “technology” for the “development” or “production” of commercial TV systems.

c.3. Equipment employing “optical switching”;

c.4. Radio equipment having any of the following:

c.4.a. Quadrature-amplitude-modulation (QAM) techniques above level 256; or

c.4.b. Operating at input or output frequencies exceeding 31 GHz; or

Note: 5E001.c.4.b. does not control “technology” for the “development” or

“production” of equipment designed or modified for operation in any frequency band which is “allocated by the ITU” for radio-communications services, but not for radio-determination.

c.5. Equipment employing “common channel signaling” operating in non-associated mode of operation.

■ 29. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and “Information Security”, Part II—“Information Security”, Export Control Classification Number (ECCN) 5A002 is amended by revising the “Related Controls”, “Related Definitions”, and “Items” paragraphs in the List of Items Controlled section, to read as follows:

5A002 Systems, equipment, application specific “electronic assemblies”, modules and integrated circuits for “information security”, as follows (see List of Items Controlled), and other specially designed components therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: 5A002 does not control the items listed in paragraphs (a) through (f) in the Note in the items paragraph of this entry. These items are instead controlled under ECCN 5A992.

Related Definitions: N/A

Items:

Note: 5A002 does not control the following. However, these items are instead controlled under 5A992:

- (a) “Personalized smart cards”:
 - (1) Where the cryptographic capability is restricted for use in equipment or systems excluded from control paragraphs (b) through (f) of this Note; or
 - (2) For general public-use applications where the cryptographic capability is not user-accessible and it is specially designed and limited to allow protection of personal data stored within.
- N.B.: If a “personalized smart card” has multiple functions, the control status of each function is assessed individually.
- (b) Receiving equipment for radio broadcast, pay television or similar restricted audience broadcast of the consumer type, without digital encryption except that exclusively used for sending the billing or program-related information back to the broadcast providers.
- (c) Equipment where the cryptographic capability is not user-accessible and which is specially designed and limited to allow any of the following:
 - (1) Execution of copy-protected “software”;
 - (2) Access to any of the following:
 - (a) Copy-protected contents stored on read-only media; or
 - (b) Information stored in encrypted form on media (e.g., in connection with the protection of intellectual property rights) where the media is offered for sale in identical sets to the public; or
 - (3) Copying control of copyright protected audio/video data.

- (d) Cryptographic equipment specially designed and limited for banking use or money transactions;
- (e) Portable or mobile radiotelephones for civil use (e.g., for use with commercial civil cellular radio communications systems) that are not capable of end-to-end encryption.

N.B.: The term “money transactions” includes the collection and settlement of fares or credit functions.
- (f) Cordless telephone equipment not capable of end-to-end encryption where the maximum effective range of unboosted cordless operation (e.g., a single, unrelayed hop between terminal and home base station) is less than 400 meters according to the manufacturer’s specifications.

Technical Note: Parity bits are not included in the key length.

a. Systems, equipment, application specific “electronic assemblies”, modules and integrated circuits for “information security”, as follows, and other specially designed components therefor:

N.B.: For the control of global navigation satellite systems receiving equipment containing or employing decryption (e.g., GPS or GLONASS) see 7A005.

a.1. Designed or modified to use “cryptography” employing digital techniques performing any cryptographic function other than authentication or digital signature having any of the following:

Technical Notes:

- 1. Authentication and digital signature functions include their associated key management function.
- 2. Authentication includes all aspects of access control where there is no encryption of files or text except as directly related to the protection of passwords, Personal Identification Numbers (PINs) or similar data to prevent unauthorized access.
- 3. “Cryptography” does not include “fixed” data compression or coding techniques.

Note: 5A002.a.1 includes equipment designed or modified to use “cryptography” employing analog principles when implemented with digital techniques.

- a.1.a. A “symmetric algorithm” employing a key length in excess of 56-bits; or
- a.1.b. An “asymmetric algorithm” where the security of the algorithm is based on any of the following:
 - a.1.b.1. Factorization of integers in excess of 512 bits (e.g., RSA);
 - a.1.b.2. Computation of discrete logarithms in a multiplicative group of a finite field of size greater than 512 bits (e.g., Diffie-Hellman over Z/pZ); or
 - a.1.b.3. Discrete logarithms in a group other than mentioned in 5A002.a.1.b.2 in excess of 112 bits (e.g., Diffie-Hellman over an elliptic curve);
 - a.2. Designed or modified to perform cryptanalytic functions;
 - a.3. [RESERVED]
 - a.4. Specially designed or modified to reduce the compromising emanations of information-bearing signals beyond what is necessary for health, safety or electromagnetic interference standards;
 - a.5. Designed or modified to use cryptographic techniques to generate the

- spreading code for “spread spectrum” systems, including the hopping code for “frequency hopping” systems;
 - a.6. Designed or modified to use cryptographic techniques to generate channelizing or scrambling codes for “time-modulated ultra-wideband” systems;
 - a.7. Designed or modified to provide certified or certifiable “multilevel security” or user isolation at a level exceeding Class B2 of the Trusted Computer System Evaluation Criteria (TCSEC) or equivalent;
 - a.8. Communications cable systems designed or modified using mechanical, electrical or electronic means to detect surreptitious intrusion.

■ 30. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A001 is amended by revising the License Exceptions section, and the “items” paragraph in the List of Items Controlled section, to read as follows:

6A001 Acoustics.

* * * * *

License Exceptions

LVS: \$3000; N/A for 6A001.a.1.b.1 object detection and location systems having a transmitting frequency below 5 kHz or a sound pressure level exceeding 210 dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band from 30 kHz to 2 kHz inclusive; 6A001.a.2.a.1, a.2.a.2, a.2.a.4, a.2.a.5, 6A001.a.2.b; processing equipment controlled by 6A001.a.2.c, and specially designed for real time application with towed acoustic hydrophone arrays; a.2.e.1, a.2.e.2; and bottom or bay cable systems controlled by 6A001.a.2.f and having processing equipment specially designed for real time application with bottom or bay cable systems.

GBS: Yes for 6A001.a.1.b.4.
CIV: Yes for 6A001.a.1.b.4.

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

- a. Marine acoustic systems, equipment and specially designed components therefor, as follows:
 - a.1. Active (transmitting or transmitting-and-receiving) systems, equipment and specially designed components therefor, as follows:

Note: 6A001.a.1 does not control:

 - a. Depth sounders operating vertically below the apparatus, not including a scanning function exceeding $\pm 20^\circ$, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding;
 - b. Acoustic beacons, as follows:
 - 1. Acoustic emergency beacons;
 - 2. Pingers specially designed for relocating or returning to an underwater position.
 - a.1.a. Wide-swath bathymetric survey systems designed for sea bed topographic mapping, having all of the following:

a.1.a.1. Being designed to take measurements at an angle exceeding 20° from the vertical;

a.1.a.2. Being designed to measure depths exceeding 600 m below the water surface; *and*

a.1.a.3. Being designed to provide any of the following:

a.1.a.3.a. Incorporation of multiple beams any of which is less than 1.9°; *or*

a.1.a.3.b. Data accuracies of better than 0.3% of water depth across the swath averaged over the individual measurements within the swath;

a.1.b. Object detection or location systems having any of the following:

a.1.b.1. A transmitting frequency below 10 kHz;

a.1.b.2. Sound pressure level exceeding 224dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive;

a.1.b.3. Sound pressure level exceeding 235 dB (reference 1 μ Pa at 1 m) for equipment with an operating frequency in the band between 24 kHz and 30 kHz;

a.1.b.4. Forming beams of less than 1° on any axis and having an operating frequency of less than 100 kHz;

a.1.b.5. Designed to operate with an unambiguous display range exceeding 5,120 m; *or*

a.1.b.6. Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers with any of the following:

a.1.b.6.a. Dynamic compensation for pressure; *or*

a.1.b.6.b. Incorporating other than lead zirconate titanate as the transduction element;

a.1.c. Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination, having any of the following:

Notes: 1. The control status of acoustic projectors, including transducers, specially designed for other equipment is determined by the control status of the other equipment.

2. 6A001.a.1.c does not control electronic sources that direct the sound vertically only, or mechanical (e.g., air gun or vapor-shock gun) or chemical (e.g., explosive) sources.

a.1.c.1. An instantaneous radiated acoustic power density exceeding 0.01 mW/mm²/Hz for devices operating at frequencies below 10 kHz;

a.1.c.2. A continuously radiated acoustic power density exceeding 0.001 Mw/mm²/Hz for devices operating at frequencies below 10 kHz; *or*

Technical Note: Acoustic power density is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation.

a.1.c.3. Side-lobe suppression exceeding 22 dB;

a.1.d. Acoustic systems, equipment and specially designed components for determining the position of surface vessels or underwater vehicles designed to operate at a range exceeding 1,000 m with a positioning

accuracy of less than 10 m rms (root mean square) when measured at a range of 1,000 m;

Note: 6A001.a.1.d includes:

a. Equipment using coherent “signal processing” between two or more beacons and the hydrophone unit carried by the surface vessel or underwater vehicle;

b. Equipment capable of automatically correcting speed-of-sound propagation errors for calculation of a point.

a.2. Passive (receiving, whether or not related in normal application to separate active equipment) systems, equipment and specially designed components therefor, as follows:

a.2.a. Hydrophones having any of the following characteristics:

Note: The control status of hydrophones specially designed for other equipment is determined by the control status of the other equipment.

a.2.a.1. Incorporating continuous flexible sensors or assemblies of discrete sensor elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm;

a.2.a.2. Having any of the following sensing elements:

a.2.a.2.a. Optical fibers; *or*

a.2.a.2.b. Flexible piezoelectric ceramic materials;

a.2.a.3. A hydrophone sensitivity better than -180dB at any depth with no acceleration compensation;

a.2.a.4. When designed to operate at depths exceeding 35 m with acceleration compensation; *or*

a.2.a.5. Designed for operation at depths exceeding 1,000 m;

Technical Note: Hydrophone sensitivity is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic field with an rms pressure of 1 μ Pa. For example, a hydrophone of -160 dB (reference 1 V per μ Pa) would yield an output voltage of 10⁻⁸ V in such a field, while one of -180 dB sensitivity would yield only 10⁻⁹ V output. Thus, -160 dB is better than -180 dB.

a.2.b. Towed acoustic hydrophone arrays having any of the following:

a.2.b.1. Hydrophone group spacing of less than 12.5 m;

a.2.b.2. Designed or “able to be modified” to operate at depths exceeding 35m;

Technical Note: “Able to be modified” in 6A001.a.2.b.2 means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.

a.2.b.3. Heading sensors controlled by 6A001.a.2.d;

a.2.b.4. Longitudinally reinforced array hoses;

a.2.b.5. An assembled array of less than 40 mm in diameter;

a.2.b.6. Multiplexed hydrophone group signals designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; *or*

a.2.b.7. Hydrophone characteristics controlled by 6A001.a.2.a;

a.2.c. Processing equipment, specially designed for towed acoustic hydrophone arrays, having “user accessible programmability” and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

a.2.d. Heading sensors having all of the following:

a.2.d.1. An accuracy of better than $\pm 0.5^\circ$; *and*

a.2.d.2. Designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m;

a.2.e. Bottom or bay cable systems having any of the following:

a.2.e.1. Incorporating hydrophones controlled by 6A001.a.2.a; *or*

a.2.e.2. Incorporating multiplexed hydrophone group signal modules having all of the following characteristics:

a.2.e.2.a. Designed to operate at depths exceeding 35 m or having an adjustable or removal depth sensing device in order to operate at depths exceeding 35 m; *and*

a.2.e.2.b. Capable of being operationally interchanged with towed acoustic hydrophone array modules;

a.2.f. Processing equipment, specially designed for bottom or bay cable systems, having “user accessible programmability” and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

b. Correlation-velocity sonar log equipment designed to measure the horizontal speed of the equipment carrier relative to the sea bed at distances between the carrier and the sea bed exceeding 500 m.

■ 31. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A002 is amended by revising the “items” paragraph in the List of Items Controlled section, to read as follows:

6A002 Optical sensors.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Optical detectors, as follows:

Note: 6A002.a does not control germanium or silicon photodevices.

a.1. “Space-qualified” solid-state detectors, as follows:

a.1.a. “Space-qualified” solid-state detectors, having all of the following:

a.1.a.1. A peak response in the wavelength range exceeding 10 nm but not exceeding 300 nm; *and*

a.1.a.2. A response of less than 0.1% relative to the peak response at a wavelength exceeding 400 nm;

a.1.b. "Space-qualified" solid-state detectors, having all of the following:

a.1.b.1. A peak response in the wavelength range exceeding 900 nm but not exceeding 1,200 nm; *and*

a.1.b.2. A response "time constant" of 95 ns or less;

a.1.c. "Space-qualified" solid-state detectors having a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

a.2. Image intensifier tubes and specially designed components therefor, as follows:

a.2.a. Image intensifier tubes having all of the following:

a.2.a.1. A peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm;

a.2.a.2. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of 12 μm or less; *and*

a.2.a.3. Any of the following photocathodes:

a.2.a.3.a. S-20, S-25 or multialkali photocathodes with a luminous sensitivity exceeding 350 $\mu\text{A}/\text{lm}$;

a.2.a.3.b. GaAs or GaInAs photocathodes; *or*

a.2.a.3.c. Other III-V compound semiconductor photocathodes;

Note: 6A002.a.2.a.3.c does not apply to compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.

a.2.b. Specially designed components, as follows:

a.2.b.1. Microchannel plates having a hole pitch (center-to-center spacing) of 12 μm or less;

a.2.b.2. GaAs or GaInAs photocathodes;

a.2.b.3. Other III-V compound semiconductor photocathodes;

Note: 6A002.a.2.b.3 does not control compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.

a.3. Non-"space-qualified" "focal plane arrays", as follows:

Technical Notes:

1. Linear or two-dimensional multi-element detector arrays are referred to as "focal plane arrays".

2. For the purposes of 6A002.a.3. "cross scan direction" is defined as the axis parallel to the linear array of detector elements and the "scan direction" is defined as the axis perpendicular to the linear array of detector elements.

Note 1: 6A002.a.3 includes photoconductive arrays and photovoltaic arrays.

Note 2: 6A002.a.3 does not control:

a. Silicon "focal plane arrays";

b. Multi-element (not to exceed 16 elements) encapsulated photoconductive cells using either lead sulphide or lead selenide;

c. Pyroelectric detectors using any of the following:

c.1. Triglycine sulphate and variants;

c.2. Lead-lanthanum-zirconium titanate and variants;

c.3. Lithium tantalate;

c.4. Polyvinylidene fluoride and variants;

or

c.5. Strontium barium niobate and variants.

a.3.a. Non-"space-qualified" "focal plane arrays", having all of the following:

a.3.a.1. Individual elements with a peak response within the wavelength range exceeding 900 nm but not exceeding 1,050 nm; *and*

a.3.a.2. A response "time constant" of less than 0.5 ns;

a.3.b. Non-"space-qualified" "focal plane arrays", having all of the following:

a.3.b.1. Individual elements with a peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,200 nm; *and*

a.3.b.2. A response "time constant" of 95 ns or less;

a.3.c. Non-"space-qualified" non-linear (2-dimensional) "focal plane arrays", having individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

a.3.d. Non-"space-qualified" linear (1-dimensional) "focal plane arrays", having all of the following:

a.3.d.1. Individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 2,500 nm; *and*

a.3.d.2. Any of the following:

a.3.d.2.a. A ratio of scan direction dimension of the detector element to the cross-scan direction dimension of the detector element of less than 3.8; *or*

a.3.d.2.b. Signal processing in the element (SPRITE);

a.3.e. Non-"space-qualified" linear (1-dimensional) "focal plane arrays", having individual elements with a peak response in the wavelength range exceeding 2,500 nm but not exceeding 30,000 nm.

b. "Monospectral imaging sensors" and "multispectral imaging sensors" designed for remote sensing applications, having any of the following:

b.1. An Instantaneous-Field-Of-View (IFOV) of less than 200 μrad (microradians); *or*

b.2. Being specified for operation in the wavelength range exceeding 400 nm but not exceeding 30,000 nm and having all the following:

b.2.a. Providing output imaging data in digital format; *and*

b.2.b. Being any of the following:

b.2.b.1. "Space-qualified"; *or*

b.2.b.2. Designed for airborne operation, using other than silicon detectors, and having an IFOV of less than 2.5 mrad (milliradians).

c. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating any of the following:

c.1. Image intensifier tubes having the characteristics listed in 6A002.a.2.a; *or*

c.2. "Focal plane arrays" having the characteristics listed in 6A002.a.3.

Technical Note: "Direct view" refers to imaging equipment, operating in the visible or infrared spectrum, that presents a visual image to a human observer without converting the image into an electronic signal for television display, and that cannot record

or store the image photographically, electronically or by any other means.

Note: 6A002.c does not control the following equipment incorporating other than GaAs or GaInAs photocathodes:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;

b. Medical equipment;

c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;

d. Flame detectors for industrial furnaces;

e. Equipment specially designed for laboratory use.

d. Special support components for optical sensors, as follows:

d.1. "Space-qualified" cryocoolers;

d.2. Non-"space-qualified" cryocoolers, having a cooling source temperature below 218 K (-55°C), as follows:

d.2.a. Closed cycle type with a specified Mean-Time-To-Failure (MTTF), or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;

d.2.b. Joule-Thomson (JT) self-regulating minicoolers having bore (outside) diameters of less than 8 mm;

d.3. Optical sensing fibers specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive.

e. "Space qualified" "focal plane arrays" having more than 2,048 elements per array and having a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm.

■ 32. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A003 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

6A003 Cameras.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Instrumentation cameras and specially designed components therefor, as follows:

Note: Instrumentation cameras, controlled by 6A003.a.3 to 6A003.a.5, with modular structures should be evaluated by their maximum capability, using plug-ins available according to the camera manufacturer's specifications.

a.1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously advanced throughout the recording period, and that are capable of recording at framing rates exceeding 13,150 frames/s;

Note: 6A003.a.1 does not control cinema recording cameras designed for civil purposes.

a.2. Mechanical high speed cameras, in which the film does not move, capable of

recording at rates exceeding 1,000,000 frames/s for the full framing height of 35 mm film, or at proportionately higher rates for lesser frame heights, or at proportionately lower rates for greater frame heights;

a.3. Mechanical or electronic streak cameras having writing speeds exceeding 10 mm/ μ s;

a.4. Electronic framing cameras having a speed exceeding 1,000,000 frames/s;

a.5. Electronic cameras, having all of the following:

a.5.a. An electronic shutter speed (gating capability) of less than 1 μ s per full frame; *and*

a.5.b. A read out time allowing a framing rate of more than 125 full frames per second.

a.6. Plug-ins, having all of the following characteristics:

a.6.a. Specially designed for instrumentation cameras which have modular structures and that are controlled by 6A003.a; *and*

a.6.b. Enabling these cameras to meet the characteristics specified in 6A003.a.3, 6A003.a.4 or 6A003.a.5, according to the manufacturer's specifications.

b. Imaging cameras, as follows:

Note: 6A003.b does not control television or video cameras specially designed for television broadcasting.

b.1. Video cameras incorporating solid state sensors, having a peak response in the wavelength range exceeding 10nm, but not exceeding 30,000 nm and any of the following:

b.1.a. More than 4×10^6 "active pixels" per solid state array for monochrome (black and white) cameras;

b.1.b. More than 4×10^6 "active pixels" per solid state array for color cameras incorporating three solid state arrays; *or*

b.1.c. More than 12×10^6 "active pixels" for solid state array color cameras incorporating one solid state array;

Technical Note: For the purposes of this entry, digital video cameras should be evaluated by the maximum number of "active pixels" used for capturing moving images.

b.2. Scanning cameras and scanning camera systems, having all of the following:

b.2.a. A peak response in the wavelength range exceeding 10 nm, but not exceeding 30,000 nm;

b.2.b. Linear detector arrays with more than 8,192 elements per array; *and*

b.2.c. Mechanical scanning in one direction;

b.3. Imaging cameras incorporating image intensifier tubes having the characteristics listed in 6A002.a.2.a;

b.4. Imaging cameras incorporating "focal plane arrays" having the characteristics listed in 6A002.a.3.

Note: 6A003.b.4 does not control imaging cameras incorporating linear "focal plane arrays" with twelve elements or fewer, not employing time-delay-and-integration within the element, designed for any of the following:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;

b. Industrial equipment used for inspection or monitoring of heat flows in buildings, equipment or industrial processes;

c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;

d. Equipment specially designed for laboratory use; *or*

e. Medical equipment.

■ 33. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A004 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

6A004 Optics.

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List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Optical mirrors (reflectors), as follows:

a.1. "Deformable mirrors" having either continuous or multi-element surfaces, and specially designed components therefor, capable of dynamically repositioning portions of the surface of the mirror at rates exceeding 100 Hz;

a.2. Lightweight monolithic mirrors having an average "equivalent density" of less than 30 kg/m² and a total mass exceeding 10 kg;

a.3. Lightweight "composite" or foam mirror structures having an average "equivalent density" of less than 30 kg/m² and a total mass exceeding 2 kg;

a.4. Beam steering mirrors more than 100 mm in diameter or length of major axis, that maintain a flatness of $\lambda/2$ or better (λ is equal to 633 nm) having a control bandwidth exceeding 100 Hz.

b. Optical components made from zinc selenide (ZnSe) or zinc sulphide (ZnS) with transmission in the wavelength range exceeding 3,000 nm but not exceeding 25,000 nm and having any of the following:

b.1. Exceeding 100 cm³ in volume; *or*

b.2. Exceeding 80 mm in diameter or length of major axis and 20 mm in thickness (depth).

c. "Space-qualified" components for optical systems, as follows:

c.1. Lightweighted to less than 20% "equivalent density" compared with a solid blank of the same aperture and thickness;

c.2. Substrates, substrates having surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or having protective films;

c.3. Segments or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 m in diameter;

c.4. Manufactured from "composite" materials having a coefficient of linear thermal expansion equal to or less than 5×10^{-6} in any coordinate direction.

d. Optical control equipment, as follows:

d.1. Specially designed to maintain the surface figure or orientation of the "space-qualified" components controlled by 6A004.c.1 or 6A004.c.3;

d.2. Having steering, tracking, stabilization or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 μ rad (microradians) or less;

d.3. Gimbals having all of the following:

d.3.a. A maximum slew exceeding 5°;

d.3.b. A bandwidth of 100 Hz or more;

d.3.c. Angular pointing errors of 200 μ rad (microradians) or less; *and*

d.3.d. Having any of the following:

d.3.d.1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 2 rad (radians)/s²; *or*

d.3.d.2. Exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 0.5 rad (radians)/s²;

d.4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more.

e. Aspheric optical elements having all of the following characteristics:

e.1. The largest dimension of the optical-aperture is greater than 400 mm;

e.2. The surface roughness is less than 1 nm (rms) for sampling lengths equal to or greater than 1 mm; *and*

e.3. The coefficient of linear thermal expansion's absolute magnitude is less than $3 \times 10^{-6}/K$ at 25° C;

Technical Notes:

1. An "aspheric optical element" is any element used in an optical system whose imaging surface or surfaces are designed to depart from the shape of an ideal sphere.

2. Manufacturers are not required to measure the surface roughness listed in 6A004.e.2 unless the optical element was designed or manufactured with the intent to meet, or exceed, the control parameter.

Note: 6A004.e does not control aspheric optical elements having any of the following:

a. A largest optical-aperture dimension less than 1 m and a focal length to aperture ratio equal to or greater than 4.5:1;

b. A largest optical-aperture dimension equal to or greater than 1 m and a focal length to aperture ratio equal to or greater than 7:1;

c. Being designed as Fresnel, flyeye, stripe, prism or diffractive optical elements;

d. Being fabricated from borosilicate glass having a coefficient of linear thermal expansion greater than $2.5 \times 10^{-6}/K$ at 25° C; *or*

e. Being an x-ray optical element having inner mirror capabilities (e.g., tube-type mirrors).

N.B.: For aspheric optical elements specially designed for lithographic equipment, see 3B001.

■ 34. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A008 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

6A008 Radar systems, equipment and assemblies having any of the following characteristics (see List of Items

Controlled), and specially designed components therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Operating at frequencies from 40 GHz to 230 GHz and having an average output power exceeding 100 mW;

b. Having a tunable bandwidth exceeding $\pm 6.25\%$ of the center operating frequency;

Technical Note: The center operating frequency equals one half of the sum of the highest plus the lowest specified operating frequencies.

c. Capable of operating simultaneously on more than two carrier frequencies;

d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode;

e. Incorporating "electronically steerable phased array antennae";

f. Capable of heightfinding non-cooperative targets;

Note: 6A008.f does not control precision approach radar (PAR) equipment conforming to ICAO standards.

g. Specially designed for airborne (balloon or airframe mounted) operation and having Doppler "signal processing" for the detection of moving targets;

h. Employing processing of radar signals using any of the following:

h.1. "Radar spread spectrum" techniques;

h.2. "Radar frequency agility" techniques;

i. Providing ground-based operation with a maximum "instrumented range" exceeding 185 km;

Note: 6A008.i does not control:

a. Fishing ground surveillance radar;

b. Ground radar equipment specially designed for en route air traffic control, provided that all the following conditions are met:

1. It has a maximum "instrumented range" of 500 km or less;

2. It is configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centers;

3. It contains no provisions for remote control of the radar scan rate from the en route ATC center; and

4. It is to be permanently installed;

c. Weather balloon tracking radars.

j. Being "laser" radar or Light Detection and Ranging (LIDAR) equipment, having any of the following:

j.1. "Space-qualified"; or

j.2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 μ rad (microradians);

Note: 6A008.j does not control LIDAR equipment specially designed for surveying or for meteorological observation.

k. Having "signal processing" sub-systems using "pulse compression", with any of the following:

k.1. A "pulse compression" ratio exceeding 150; or

k.2. A pulse width of less than 200 ns; or
l. Having data processing sub-systems with any of the following:

l.1. "Automatic target tracking" providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage;

Note: 6A008.l.1 does not control conflict alert capability in ATC systems, or marine or harbor radar.

l.2. Calculation of target velocity from primary radar having non-periodic (variable) scanning rates;

l.3. Processing for automatic pattern recognition (feature extraction) and comparison with target characteristic data bases (waveforms or imagery) to identify or classify targets; or

l.4. Superposition and correlation, or fusion, of target data from two or more "geographically dispersed" and "interconnected radar sensors" to enhance and discriminate targets.

Note: 6A008.l.4 does not control systems, equipment and assemblies designed for marine traffic control.

■ 35. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A992 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

6A992 Optical Sensors, not controlled by 6A002.

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List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Image intensifier tubes and specially designed components therefor, as follows:

a.1. Image intensifier tubes having all the following:

a.1.a. A peak response in wavelength range exceeding 400 nm, but not exceeding 1,050 nm;

a.1.b. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of less than 25 micrometers; and

a.1.c. Having any of the following:

a.1.c.1. An S-20, S-25 or multialkali photocathode; or

a.1.c.2. A GaAs or GaInAs photocathode;

a.2. Specially designed microchannel plates having both of the following characteristics:

a.2.a. 15,000 or more hollow tubes per plate; and

a.2.b. Hole pitch (center-to-center spacing) of less than 25 micrometers.

b. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating image intensifier tubes having the characteristics listed in 6A992.a.1.

■ 36. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E001 is

amended by revising the "TSR" paragraph in the License Exceptions section, to read as follows:

6E001 "Technology" according to the General Technology Note for the "development" of equipment, materials or "software" controlled by 6A (except 6A018, 6A991, 6A992, 6A994, 6A995, 6A996, 6A997, or 6A998), 6B (except 6B995), 6C (except 6C992 or 6C994), or 6D (except 6D991, 6D992, or 6D993).

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License Exceptions

CIV: * * *

TSR: Yes, except for the following:

(1) Items controlled for MT reasons;

(2) "Technology" for commodities controlled by 6A002.e, 6A004.e, or 6A008.j.1;

(3) "Technology" for "software" specially designed for "space qualified" "laser" radar or Light Detection and Ranging (LIDAR) equipment defined in 6A008.j.1 and controlled by 6D001 or 6D002;

(4) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "technology" for the "development" of the following: (a) Items controlled by 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, 6A001.a.2.e., 6A002.a.1.c, 6A008.l.3, 6B008, 6D003.a; (b) Equipment controlled by 6A001.a.2.c or 6A001.a.2.f when specially designed for real time applications; or (c) "Software" controlled by 6D001 and specially designed for the "development" or "production" of equipment controlled by 6A008.l.3 or 6B008; or

(5) Exports or reexports to Rwanda.

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■ 37. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E002 is

amended by revising the "TSR" paragraph in the License Exceptions section, to read as follows:

6E002 "Technology" according to the General Technology Note for the "production" of equipment or materials controlled by 6A (except 6A018, 6A991, 6A992, 6A994, 6A995, 6A996, 6A997 or 6A998), 6B (except 6B995) or 6C (except 6C992 or 6C994).

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■ 37. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E002 is

amended by revising the "TSR" paragraph in the License Exceptions section, to read as follows:

6E002 "Technology" according to the General Technology Note for the "production" of equipment or materials controlled by 6A (except 6A018, 6A991, 6A992, 6A994, 6A995, 6A996, 6A997 or 6A998), 6B (except 6B995) or 6C (except 6C992 or 6C994).

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License Exceptions

CIV: * * *

TSR: Yes, except for the following:

(1) Items controlled for MT reasons;

(2) "Technology" for commodities controlled by 6A002.e, 6A004.e, 6A008.j.1;

(3) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of "technology" for the "development" of the following: (a) Items controlled by 6A001.a.2.a.1, 6A001.a.2.a.2,

6A001.a.2.a.4, 6A001.a.2.a.5, 6A001.a.2.b, and 6A001.a.2.c; and (b) Equipment controlled by 6A001.a.2.e and 6A001.a.2.f when specially designed for real time applications; or (c) "Software" controlled by 6D001 and specially designed for the "development" or "production" of equipment controlled by 6A002.a.1.c, 6A008.1.3 or 6B008; or

(4) Exports or reexports to Rwanda.

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■ 38. In Supplement No. 1 to part 774 (the Commerce Control List), Category 7—Navigation and Avionics, Export Control Classification Number (ECCN) 7A003 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

7A003 Inertial Navigation Systems (INS) and specially designed components therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Inertial navigation systems (gimballed or strapdown) and inertial equipment designed for "aircraft", land vehicle 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).

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 g²/Hz over a frequency interval of 15 to 1,000 Hz; and

b. The PSD attenuates with frequency from 0.04 g²/Hz to 0.01 g²/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 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.

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.

■ 39. Part 774 is amended by revising Supplement No. 3, to read as follows:

Supplement No. 3 to Part 774—Statements of Understanding

Statement of Understanding—medical equipment: Commodities that are "specially

designed for medical end-use" that "incorporate" commodities or software on the Commerce Control List (Supplement No. 1 to part 774 of the EAR) that do not have a reason for control of Nuclear Nonproliferation (NP), Missile Technology (MT), or Chemical & Biological Weapons (CB) are designated by the number EAR99 (i.e., are not elsewhere specified on the Commerce Control List).

Notes applicable to State of Understanding related to Medical Equipment:

(1) "Specially designed for medical end-use" means designed for medical treatment or the practice of medicine (does not include medical research).

(2) "Incorporate" into medical equipment means to integrate with, or work indistinguishably into such equipment.

(3) Except for such software that is made publicly available consistent with § 734.3(b)(3) of the EAR, commodities and software "specially designed for medical end-use" remain subject to the EAR.

(4) See also § 770.2(b) interpretation 2, for other types of equipment that incorporate items on the Commerce Control List that are subject to the EAR.

(5) For computers used with medical equipment, see also ECCN 4A003 note 2 regarding the "principal element" rule.

(6) For commodities and software specially designed for medical end-use that incorporate an encryption or other "information security" item subject to the EAR, see also Note 1 to Category 5, Part II of the Commerce Control List.

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Peter Lichtenbaum,
Assistant Secretary.

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