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**15 CFR Parts 740, 743, 772, and 774
Implementation of the 2002 Wassenaar
Arrangement List of Dual-Use Items:
Revisions to Categories 2, 3, 4, 5, 6, 7, 8,
and 9 of the Commerce Control List,
General Software Note, and Reporting
Requirements; Final Rule**

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

[Docket No. 030127020-3020-01]

RIN 0694-AC65

Implementation of the 2002 Wassenaar Arrangement List of Dual-Use Items: Revisions to Categories 2, 3, 4, 5, 6, 7, 8, and 9 of the Commerce Control List, General Software Note, 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 2, 3, 4, 5 Part I (telecommunications), 5 Part II (information security), 6, 7, 8, and 9 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 February 2002 meeting (and finalized in May 2002) and to make necessary revisions to reporting requirements, definitions, and the General Technology and Software Notes. The changes that affected microprocessors were published in a separate rule on January 14, 2003 (68 FR 1796).

EFFECTIVE DATE: This rule is effective: March 5, 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 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 removed from the list of ineligible commodities and software: 1C012 (because commodities classified as 1C012 are under Department of State jurisdiction and must comply with the International Traffic in Arms Regulations (ITAR)), 9A011 (because commodities classified as 9A011 are under Department of State jurisdiction and must comply with the ITAR), 9D002 (because the ineligible software is under State Department jurisdiction as it pertains to production software for 9A011, which is under Department of State jurisdiction and must comply with ITAR), and 9D004 (because this software has been removed from Annex 2 of the Wassenaar Arrangement List of Dual-Use Goods and Technologies List);

(2) The following items are revised within the list of ineligible commodities and software:

(a) Narrowed the scope of 4D001 to only include software specially designed for the development or production of digital computers controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS;

(b) Added Note that applies to paragraph 740.11(a)(2)(iii) that reads as follows: "Nationals of countries in Country Group E:1 may not physically or computationally access computers that have been enhanced by "electronic

assemblies", which have been exported or reexported under License Exception GOV and have been used to enhance such computers by aggregation of "computing elements" so that the CTP of the aggregation exceeds the CTP parameter set forth in ECCN 4A003.b. of the Commerce Control List in Supplement No. 1 to part 774 of the EAR, without prior authorization from the Bureau of Industry and Security."

(c) Revised references to 5A001.b.4 to read 5A001.b.5, because the paragraph was redesignated in 5A001;

(d) Clarified the scope of 5D001.a; and

(e) Clarified the scope of 9D001 to harmonize with those items removed from the list of ineligible items.

(3) Added processing equipment, specially designed for real time application bottom or bay cable systems controlled by 6A001.a.2.f to the list of ineligible commodities.

- 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 removed from the list of ineligible commodities and software: 1C012 (because commodities classified as 1C012 are under Department of State jurisdiction and must comply with the International Traffic in Arms Regulations (ITAR)), 9A011 (because commodities classified as 9A011 are under Department of State jurisdiction and must comply with the ITAR), 9D002 (because the ineligible software is under State Department jurisdiction as it pertains to production software for 9A011, which is under Department of State jurisdiction and must comply with ITAR), and 9D004 (because this software has been removed from Annex 2 of the Wassenaar Arrangement List of Dual-Use Goods and Technologies List);

(2) The following items are revised within the list of ineligible commodities and software:

(a) Narrowed the scope of 4D001 to only include software specially designed for the development or production of digital computers controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS;

(b) Revised references to 5A001.b.4 to read 5A001.b.5, because the paragraph was redesignated in 5A001;

(c) Clarified the scope of 5D001.a;

(d) Clarified the scope of 9D001 to harmonize with those items removed from the list of ineligible items;

(e) Narrowed the scope of 1E001 by removing 1C012; and

(f) Narrowed the scope of 9E001 by removing 9A011 and 9D002.

(3) Added processing equipment, specially designed for real time application bottom or bay cable systems controlled by 6A001.a.2.f to the list of ineligible commodities.

(4) Added 4E001, specially designed for the “development” or “production” of “digital computers” controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS to the list of ineligible technology; and

(5) Removed 9E002 from the list of ineligible technology.

- 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.

(1) This rule removes Wassenaar reporting requirements from part 743 for the following: 2B001.a, .b., .d, and .f; 4A001.b; and 4A003.b and .c.

(2) This rule revises the scope of Wassenaar reporting requirements under part 743 for the following: 1D002, 1E001, 2D001, 2E001, 2E002, 3D001, 3E001, 4D001, 4E001, 5B001, 5D001.a, 5D001.b, 5E001.a, 6A001.a.1.b, 6A006.g, 6D001, 6E001, 6E002, 8A002.b, 8A002.o.3, 8D001, 8E001, 9D001, and 9D002.

(3) This rule adds Wassenaar reporting requirements under part 743 for 9E003.a.1.

- This rule amends section 772.1 by:

(1) Adding new entries for: “Circulation-controlled, anti-torque or circulation-controlled direction control systems” and “Time-modulated ultra-wideband”;

(2) Removing the entries “Assembly”, “Beat length”, “Circulation”, “Global interrupt latency time”, “Fluoride fibers”, “Gateway”, “ISDN”, “Integrated Services Digital Network”, “Network access controller”, “Optical fiber preforms”, and “Sputtering”, and adding them to the Related Definitions sections of the appropriate ECCNs within the CCL;

(3) Revising the phrase “Only those” to read “those” in the entry “civil aircraft”;

(4) Revising the phrase “arithmetic logic” to read “arithmetic or logic” in the entry “computing element”;

(5) Revising the entry for “electronically steerable phased array antenna” to harmonize with the definition in the Wassenaar Arrangement List;

(6) Revising the phrase “End-effectors” include grippers,” to read

“Grippers,” in the entry for “end-effectors”;

(7) Revising the phrase “(f₂—f₁)” to read “(f₂—f₁) in the entry “noise level”;

(8) Revising the entry heading “Systems tracks” to read “System tracks”; and

(9) Revising the phrase “product “X” that does not operate” to read “product “X” that operates”, and the word “extending” to read “exceeding” in the entry “Required”.

This rule revises a number of national security controlled entries on the Commerce Control List (CCL) to conform with February 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 2—Materials Processing

- ECCN 2A001 is amended by revising:

(a) Paragraph 2A001.a in the List of Items Controlled section to:

(1) Add “all” before “tolerances”;

(2) Add “both” before “rings”; and

(3) Replace “balls or rollers” with “and rolling elements (ISO 5593)”;

(b) Paragraph 2A001.b in the List of Items Controlled section to add “all” before “tolerances”.

- ECCN 2B001 is amended by:

(a) Removing the License Requirements Notes referring to the Wassenaar reporting requirement in the License Requirements section; and

(b) Revising the Notes for 2B001.c by removing notes 3 and 4, and renumbering subsequent paragraphs.

- ECCN 2B003 is amended by revising the word “controllers” to read “controls” in the heading.

- ECCN 2B006 is amended by:

(a) Revising paragraph 2B006.b.1 in the List of Items Controlled section to add “displacement” after “linear”;

(b) Adding a Technical Note after paragraph 2B006.b.1 that defines “linear displacement”; and

(c) Revising paragraph 2B006.b.2 in the List of Items Controlled section to add “displacement” after “angular”.

Category 3—Electronics

- ECCN 3A001 is amended by:

(a) Revising the parameter for paragraph 3A001.a.7.b (basic gate propagation delay time) from 0.40 ns to .1 ns; and

(b) Adding a Note 2 after 3A001.b.1 that explains that 3A001.b.1 does not control non-“space-qualified” tubes

which meet all of the characteristics in the new note.

- ECCN 3A002 is amended by:

(a) Adding a clarification note in the Related Definitions paragraph of the List of Items Controlled section; and

(b) Adding the words “radio frequency” before “signal analyzers” in paragraph 3A002.c.

- ECCN 3B001 (this change is from the Wassenaar 2000 agreements) is amended by:

(a) Revising the heading to add the phrase “as follows (see List of Items Controlled)”;

(b) Modifying 3B001.c controls over etch equipment in order to control such equipment based on its capabilities rather than its characteristics.

Specifically, for 3B001.c.1 and c.2, paragraph a. and b. have been redefined.

(c) Modifying 3B001.d controls for CVD equipment in order to control such equipment based on its capabilities rather than its characteristics.

- ECCN 3B991 is amended by moving the definition for “sputtering” from section 772.1 of the EAR to the Related Definitions section of this entry, and exchanging the double quotes around the term to single quotes in the list of items controlled.

- ECCN 3C004 is amended by revising and moving the related control note to the list of items controlled section of this entry to harmonize with the Wassenaar Dual-Use List.

- ECCNs 3E001 and 3E002 are amended by revising the parameter in the Technical Note from “two metal layers” to “three metal layers” and from “two polysilicon layers” to “three polysilicon layers”. In addition, the heading to 3E002 is revised to harmonize with Wassenaar.

- ECCN 3E003 is amended by adding a new paragraph 3E003.g to control electronic vacuum tubes operating at frequencies of 31 GHz or higher; and adding a sentence in the Related Controls paragraph of the List of Items Controlled section to read: Technology for the “development” or “production” of “space qualified” electronic vacuum tubes operating at frequencies of 31 GHz or higher, described in 3E003.g, is under the export license authority of the Department of State, Office of Defense Trade Controls (22 CFR part 121)

Category 4—Computers

- ECCN 4A003 is amended by removing paragraph 4A003.d, graphics accelerators and graphics coprocessors; and removing the License Requirements Note that referred to a Wassenaar reporting requirement.

- ECCN 4D003 is amended by removing paragraph 4D003.d, operating

systems specially designed for “real time processing” equipment; and removing the License Requirements Note that referred to a Wassenaar reporting requirement.

- ECCN 4D993 is amended by revising the heading and paragraph 4D993.c to harmonize with the revisions made to 4D003, including revising the “global interrupt latency time” from “less than 30” to “less than 20 microseconds” to maintain AT controls on this software. In addition, the definition for “global interrupt latency time” has been moved from section 772.1 of the EAR to the Related Definition section of this ECCN.

Category 5—Part I—Telecommunications

- ECCN 5A001 is amended by adding a new paragraph 5A001.b.4, to add “radio equipment employing “time-modulated ultra-wideband” techniques, having user programmable channelizing or scrambling codes” to the list of items controlled under 5A001; and redesignate paragraphs 5A001.b.4 through 5A001.b.5 as paragraphs 5A001.b.5 through 5A001.b.6.

- ECCN 5A991 is amended by moving the definitions for “integrated services digital network” (ISDN) and “gateway” from section 772.1 of the EAR to the Related Definitions section of this entry, and exchanging double quotes for single quotes around these terms in this entry.

- ECCN 5B001 is amended by removing the words “not using semiconductor ‘lasers’” from the note for 5B001.a.

- ECCN 5E001 is amended by harmonizing the TSR License Exception paragraph to harmonize with revisions made to 5A001.b; and revising the control language in 5E001.b.3 for the “technology” for the “development” of digital cellular radio systems.

- ECCN 5E991 is amended by adding definitions for ‘Synchronous digital hierarchy’ (‘SDH’) and ‘Synchronous optical network’ (‘SONET’) to the Related Definitions paragraph of the List of Items Controlled section; and changing the double quotes to single quotes around these terms in 5E991.a.2.

Category 5—Part II—Information Security

- ECCN 5A002 is amended by:
 - (1) Revising the Heading to add “as follows (see List of Items Controlled)”;
 - (2) Revising the Related Controls paragraph in the List of Items Controlled section to add the phrase “contents stored on” to (d)(2)(a);

- (3) Adding a new paragraph 5A002.a.6, to control “Systems, equipment, application specific

“electronic assemblies”, modules and integrated circuits for “information security,” and other specially designed components that are designed or modified to use cryptographic techniques to generate channelizing or scrambling codes for “time-modulated ultra-wideband” systems; and by redesignating paragraphs 5A002.a.6 and 5A002.a.7 as 5A002.a.7 and 5A002.a.8;

- ECCN 5B002 is amended by removing the License Requirement Note referencing a Wassenaar reporting requirement.

- ECCN 5E002 is amended by removing the License Requirement Note referencing a Wassenaar reporting requirement.

Category 6—Sensors

- ECCN 6A001 is amended by:

- (1) Fixing the abbreviations for the various units of measurement in 6A001.a.1.b, a.1.c., a.2.a.3, and the technical note after a.2.a.5; and

- (2) Removing the “or” at the end of 6A001.a.1.d.

- ECCN 6A005 is amended by:

- (1) Revising the text “having all” to read “having any” in 6A005.b.1;

- (2) Revising the text in 6A005.b.1.a that reads “A wavelength of less than” to read “A wavelength equal to or less than”;

- (3) Revising the text in 6A005.b.1.a that describes the parameter for wavelength: from “950 nm” to “1500 nm”; and

- (4) Revising the text in 6A005.b.1.a “or more than 2000 nm; and” to read “and having an average or CW output power exceeding 1.5 W; or”.

- (5) Revising the text in 6A005.b.1.b “An average or CW output power exceeding 100 mW” to read “A wavelength greater than 1510 nm, and having an average or CW output power exceeding 500 mW”

- ECCN 6A008 is amended by revising the phrase “any of the characteristics” to read “any of the following characteristics” in the heading.

- ECCN 6C992 has been revised by moving the definition for “beat length” from section 772.1 of the EAR to the Related Definition section of this ECCN and exchanging the double quotes for single quotes around this term as it appears in this entry.

- ECCN 6C994 has been revised by moving the definition for “fluoride fibers” and “optical fiber preforms” from section 772.1 of the EAR to the Related Definitions section of this ECCN, and exchanging the double quotes for single quotes around these terms as they appear in this entry.

- ECCN 6D003 is amended by:

- (1) Harmonizing the text of 6D003.a.3 with that of the Wassenaar Arrangement; and

- (2) Adding paragraph 6D003.a.4, “source code” for the “real time processing” of acoustic data for passive reception using bottom or bay cable systems.

Category 7—Navigation and Avionics

- ECCN 7A003 is amended by:
 - (1) Adding the abbreviation (INS) after Inertial Navigation Systems in the heading and removing the detailed description of INS from the heading;

- (2) Adding the definition for “Data-Based Referenced Navigation” (“DBRN”) to the Related Definitions section;

- (3) Reformatting paragraphs 7A003.a and 7A003.b.;

- (4) Adding Technical Notes 1 and 2 after Note 2.

- ECCN 7D002 is amended by harmonizing the heading text with that of the Wassenaar Arrangement.

- ECCN 7D003 is amended by:
 - (1) Adding the definition for “Data-Based Referenced Navigation” (“DBRN”) to the Related Definitions section;

- (2) Removing the text “navigation data” from the end of paragraph 7D003.b;

- (3) Adding the word “data” after the word “velocity” in paragraph 7D003.b.1; and

- (4) Revising paragraph 7D003.b.3 from reading “Terrain data from data bases” to read “Data from “Data-Based Referenced Navigation” (“DBRN”)”.

Category 8—Marine

- ECCN 8A002 is amended by:
 - (1) Revising the Related Controls paragraph of the List of Items Controlled section to include “8A002 does not control closed and semi-closed circuit (rebreathing) apparatus that is controlled under 8A018.a. See also 8A992 for self-contained underwater breathing apparatus that is not controlled by 8A002 or released for control by the 8A002.q Note.”

- (2) Adding paragraph 8A002.q and the 8A002.q Note to harmonize with the Wassenaar Arrangement List.

- ECCN 8A018 is amended by:
 - (1) Revising the Related Controls paragraph of the List of Items Controlled section to include a reference to 8A002 and 8A992.

- (2) Revising the phrase in paragraph 8A018.a “Closed and semi-closed circuit (rebreathing) apparatus for diving and underwater swimming” to read “Closed and semi-closed circuit (rebreathing) apparatus specially designed for military use”, to harmonize with the Wassenaar Arrangement.

- ECCN 8A992 is amended by revising the Related Controls paragraph of the List of Items Controlled section to include a reference to 8A002 and 8A018.

Category 9—Propulsion Systems

- Adding a new entry: ECCN 9A012 “Unmanned aerial vehicles * * *”.

- ECCN 9A120 is deleted and incorporating it into ECCN 9A012.

- ECCNs 9D001 and 9D002 are amended by:

- (1) Revising the phrase “Software required for” to read “Software specially designed or modified for” in the heading to harmonize with Wassenaar Arrangement text; and

- (2) Revising the License Requirement section of to harmonize with the incorporation of 9A120 into 9A012.

- ECCN 9D003 is amended by Revising the phrase “Software required for” to read “Software specially designed or modified for” in the heading to harmonize with Wassenaar Arrangement text.

- ECCN 9D102 is amended by revising the heading to harmonize with the incorporation of 9A120 into 9A012.

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.

In addition, this rule makes revisions to the Supplement No. 2 to part 774, General Technology and Software Notes to harmonize with the Wassenaar’s Arrangements General Technology and Software Notes.

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 14, 2002 (67 FR 53721, August 16, 2002), 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 April 4, 2003. In addition, this rule revises the numbering and structure of certain entries on the Commerce Control List. For items under such entries and for June 3, 2003, BIS will accept license applications for items described either by the entries in effect immediately

before March 5, 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, PO 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, 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 continues 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 14, 2002, 67 FR 53721, August 16, 2002.

2. Section 740.11 is amended by revising paragraph (a)(2), to read as follows:

§ 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.2.a.1, 6A001.a.2.a.2, 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

- (i) “Composite” structures or laminates controlled by 1A002.a, having an organic “matrix” and made from materials listed under 1C010.c or 1C010.d; and

- (ii) “Digital” computers controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS; and

- (iii) “Electronic assemblies” controlled by 4A003.c and capable of enhancing performance by aggregation of “computing elements” so that the CTP of the aggregation exceeds 190,000 MTOPS; and

Note to paragraph 740.11(a)(2)(iii): Nationals of countries in Country Group E:1 may not physically or computationally access computers that have been enhanced by “electronic assemblies”, which have been exported or reexported under License Exception GOV and have been used to enhance such computers by aggregation of “computing elements” so that the CTP of the

aggregation exceeds the CTP parameter set forth in ECCN 4A003.b. of the Commerce Control List in Supplement No. 1 to part 774 of the EAR, without prior authorization from the Bureau of Industry and Security.

(iv) Processing equipment controlled by 6A001.a.2.c and specially designed for real time application with towed acoustic hydrophone arrays; and

(v) Processing equipment, specially designed for real time application bottom or bay cable systems controlled; by 6A001.a.2.f; and

(vi) "Software", as follows:

(A) Controlled by 4D001, specially designed for the "development" or "production" of "digital computers" controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS; and

(B) Controlled by 5D001.a, specially designed for the "development" or "production" of equipment, functions or features controlled by 5A001.b.5; and

(C) Controlled by 6D001 for items controlled by 6A008.l.3 or 6B008; and

(D) Controlled by 6D003.a; and

(E) Controlled by 7D003.a or 7D003.b; and

(F) Controlled by 8D001, specially designed for the "development" or "production" of equipment controlled by 8A001.b, 8A001.d, or 8A002.o.3.b; and

(G) Controlled by 9D001, specially designed for the "development" of "technology" controlled by 9E003.a.1 or 9E003.a.3.a.

* * * * *

3. Supplement Number 1 to § 740.11 is revised to read as follows:

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.* License Exception GOV is available for all items consigned to and for the official use of any agency of a cooperating government within the territory of any cooperating government, except:

(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.2.a.1, 6A001.a.2.a.2, 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

(i) "Composite" structures or laminates controlled by 1A002.a, having an organic "matrix" and made from materials listed under 1C010.c or 1C010.d; and

(ii) [Reserved]

(iii) [Reserved]

(iv) Processing equipment controlled by 6A001.a.2.c and specially designed for real

time application with towed acoustic hydrophone arrays; and

(v) Processing equipment, specially designed for real time application bottom or bay cable systems controlled by 6A001.a.2.f; and

(vi) "Software", as follows:

(A) Controlled by 4D001, specially designed for the "development" or "production" of "digital computers" controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS; and

(B) Controlled by 5D001.a, specially designed for the "development" or "production" of equipment, functions or features controlled by 5A001.b.5; and

(C) Controlled by 6D001 for items controlled by 6A008.l.3 or 6B008; and

(D) Controlled by 6D003.a; and

(E) Controlled by 7D003.a or 7D003.b; and

(F) Controlled by 8D001, specially designed for the "development" or "production" of equipment controlled by 8A001.b, 8A001.d, or 8A002.o.3.b; and

(G) Controlled by 9D001, specially designed for the "development" of "technology" controlled by 9E003.a.1 or 9E003.a.3.a.

(vii) "Technology", as follows:

(A) Controlled by 1E001 for items controlled by 1A002.a as described by paragraph (a)(1)(i) of this Supplement, or 1C001; and

(B) Controlled by 4E001, specially designed for the "development" or "production" of "digital computers" controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS; and

(C) Controlled by 5E001.a for the "development" or "production" of digitally controlled radio receivers controlled by 5A001.b.5; or 5D001.a for "software" specially designed for the "development" or "production" of digitally controlled radio receivers controlled by 5A001.b.5; and

(D) Controlled by 6E001 for the "development" of equipment or "software" in 6A001.a.2.a.1, 6A001.a.2.a.2, 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.2.a.1, 6A001.a.25.a.2, 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

(F) Controlled by 8E001 for items controlled by 8A001.b, 8A002.o.3.b, or 8A001.d; and

(G) Controlled by 9E001 for items controlled by 9D001; and

(H) [Reserved]

(I) Controlled by 9E003.a.1; and

(J) Controlled by 9E003.a.3.a;

(2) Items identified on the Commerce Control List as controlled for missile technology (MT), chemical and biological warfare (CB), or nuclear nonproliferation (NP) reasons;

(3) Regional stability items controlled under Export Control Classification Numbers (ECCNs) 6A002, 6A003, 6E001, 6E002, 7D001, 7E001, 7E002, and 7E101 as described in § 742.6(a)(1) of the EAR; or

(4) Encryption items controlled for EI reasons as described in the Commerce Control List.

(b) *Diplomatic and consular missions of a cooperating government.* License Exception GOV is available for all items consigned to and for the official use of a diplomatic or consular mission of a cooperating government located in any country in Country Group B (see Supplement No. 1 to part 740), except:

(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.2.a.1, 6A001.a.2.a.2, 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

(i) "Composite" structures or laminates controlled by 1A002.a, having an organic "matrix" and made from materials listed under 1C010.c or 1C010.d; and

(ii) [Reserved]

(iii) [Reserved]

(iv) Processing equipment controlled by 6A001.a.2.c and specially designed for real time application with towed acoustic hydrophone arrays; and

(v) Processing equipment, specially designed for real time application bottom or bay cable systems controlled by 6A001.a.2.f; and

(vi) "Software", as follows:

(A) Controlled by 4D001, specially designed for the "development" or "production" of "digital computers" controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS; and

(B) Controlled by 5D001.a, specially designed for the "development" or "production" of equipment, functions or features controlled by 5A001.b.5; and

(C) Controlled by 6D001 for items controlled by 6A008.l.3 or 6B008; and

(D) Controlled by 6D003.a; and

(E) Controlled by 7D003.a or 7D003.b; and

(F) Controlled by 8D001, specially designed for the "development" or "production" of equipment controlled by 8A001.b, 8A001.d, or 8A002.o.3.b; and

(G) Controlled by 9D001, specially designed for the "development" of "technology" controlled by 9E003.a.1 or 9E003.a.3.a.

(vii) "Technology", as follows:

(A) Controlled by 1E001 for items controlled by 1A002.a as described by paragraph (a)(1)(i) of this Supplement, or 1C001; and

(B) Controlled by 4E001, specially designed for the "development" or "production" of "digital computers"

controlled by 4A003.b and having a CTP exceeding 190,000 MTOPS; and

(C) Controlled by 5E001.a for the "development" or "production" of digitally controlled radio receivers controlled by 5A001.b.5; or 5D001.a for "software" specially designed for the "development" or "production" of digitally controlled radio receivers controlled by 5A001.b.5; and

(D) Controlled by 6E001 for the “development” of equipment or “software” in 6A001.a.2.a.1, 6A001.a.2.a.2, 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.2.a.1, 6A001.a.2.a.2, 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

(F) Controlled by 8E001 for items controlled by 8A001.b, 8A002.o.3.b, or 8A001.d; and

(G) Controlled by 9E001 for items controlled by 9D001; and

(H) [Reserved]

(I) Controlled by 9E003.a.1; and

(J) Controlled by 9E003.a.3.a;

(2) Items identified on the Commerce Control List as controlled for missile technology (MT), chemical and biological warfare (CB), or nuclear nonproliferation (NP) reasons;

(3) Regional stability items controlled under Export Control Classification Numbers (ECCNs) 6A002, 6A003, 6E001, 6E002, 7D001, 7E001, 7E002, and 7E101 as described in § 742.6(a)(1) of the EAR; or

(4) Encryption items controlled for EI reasons as described in the Commerce Control List.

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 revising paragraphs (b)(1) and (c), and removing and reserving paragraph (e)(2), to read as follows:

§ 743.1 Wassenaar Arrangement.

* * * * *

(b) * * *

(1) Exports authorized under License Exceptions GBS, CIV, TSR, LVS, CTP, and the cooperating government portions (§§ 740.11(b)(2)(iii) and 740.11(b)(2)(iv) of the EAR) of GOV (see part 740 of the EAR). Note that exports of technology and source code under License Exception TSR to foreign nationals located in the U.S. should not be reported; and

* * * * *

(c) *Items for which reports are required.* (1) You must submit reports to BIS under the provisions of this section only for exports of items controlled under the following ECCNs:

(i) *Category 1:* 1A002; 1C007.c and .d; 1C010.c and .d; 1D002 for “development” of 1A002, 1C007.c and .d, and 1C010.c and .d; 1E001 for “development” and “production” of

1A002, 1C007.c and .d, and 1C010.c and .d; 1E002.e and .f;

(ii) *Category 2:* 2B003, 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, are 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 6µm to 5.1µm in 2B001.a.1 and 2B001.b.1.a) of the Commerce Control List (CCL). Reports for 2E001, are for “technology” according to the General Technology Note for “development” of the equipment in 2B003 or 2B001.a or .b (changing 6µm to 5.17µm in 2B001.a.1 and 2B001.b.1.a), or “software” in 2D001 of the CCL for the “development” or “production” of the equipment in 2B003. 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 6µm to 5.1µm in 2B001.a.1 and 2B001.b.1.a) of the CCL.

(iii) *Category 3:* 3A002.g.2, 3B001.a.2, 3D001 for “development” or “production” of 3A002.g.2 or 3B001.a.2, and 3E001 for “development” or “production” of 3A002.g.2 or 3B001.a.2;

(iv) *Category 4:* 4A001.a.2; 4D001 (see paragraph (c)(2) of this section); and 4E001 (see paragraph (c)(2) of this section);

(v) *Category 5:* 5A001.b.3; 5B001.a (items specially designed for 5A001.b.3); 5D001.a (specially designed for the “development” or “production” of equipment, function, or features in 5A001.b.3) and 5D001.b (specially designed or modified to support “technology” under 5E001.a); and 5E001.a (for the “development” or “production” of equipment, function, features, or “software” in 5A001.b.3, 5B001.a, 5D001.a and .b);

(vi) *Category 6:* 6A001.a.1.b (changing 10 kHz to 5 kHz in a.1.b.1 and a.1.b.2), .a.2.c, .a.2.d, and .a.2.e; 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); 6D003.a; 6E001 (for equipment and software listed in this paragraph); and 6E002 (for equipment and software listed in this paragraph);

(vii) *Category 8:* 8A001.c; 8A002.b (for 8A001.c), .h, .j, .o.3, and .p; 8D001 (for commodities listed in this paragraph); 8D002; 8E001 (for commodities listed in this paragraph); and 8E002.a; and

(viii) *Category 9:* 9B001.b; 9D001 (for 9B001.b and 9E003 (as described in this

paragraph)); 9D002 (for 9B001.b); 9D004.a and .c; 9E001; 9E002; 9E003.a.1., .a.2, .a.3, .a.4, .a.5, .a.8, and .a.9.

(2) Reports for “software” controlled by 4D001 and “technology” controlled by 4E001 are required if specially designed 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 14, 2002, 67 FR 53721, August 16, 2002.

7. Section 772.1 is amended by:

(a) Adding new entries: “Circulation-controlled, anti-torque or circulation-controlled direction control systems” and “Time-modulated ultra-wideband” in alphabetical order, to read as follows;

(b) Removing the entries “Assembly”, “Beat length”, “Circulation”, “Global interrupt latency time”, “Fluoride fibers”, “Gateway”, “ISDN”, “Integrated Services Digital Network”, “Network access controller”, “Optical fiber preforms”, and “Sputtering”;

(c) Revising the phrase “Only those” to read “those” in the entry “civil aircraft”;

(d) Revising the phrase “arithmetic logic” to read “arithmetic or logic” in the entry “computing element”;

(e) Revising the entry “electronically steerable phased array antenna”, to read as follows;

(f) Revising the phrase “End-effectors” include grippers,” to read “Grippers,” in the entry for “end-effectors”;

(g) Revising the phrase “(f_2-f_1)” to read “(f_2-f_1)” in the entry “noise level”;

(h) Revising the phrase “product “X” that does not operate” to read “product “X” that operates”, and the word “extending” to read “exceeding” in the entry “Required”;

(i) Revising the entry heading “Systems tracks” to read “System tracks”.

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

* * * * *

“Circulation-controlled, anti-torque or circulation-controlled direction control

systems” (Cat 7)—Control systems using air blown over aerodynamic surfaces to increase or control the forces generated by the surfaces.

* * * * *

“Electronically steerable phased array antenna”. (Cat 6)—An antenna that forms a beam by means of phase coupling (*i.e.*, the beam direction is controlled by the complex excitation coefficients of the radiating elements) and the direction of that beam can be varied (both in transmission and reception) in azimuth or in elevation, or both, by application of an electrical signal.

* * * * *

“Time-modulated ultra-wideband”. (Cat 5 part 1 and Cat 5 part 2) The technique in which very short precisely time-controlled RF pulses are modulated in accordance with communications data by shifting pulse positions (usually called Pulse Position Modulation, PPM) channelized or scrambled in accordance with pseudo-random noise codes by PPM, then transmitted and received in the direct pulse form without using any carrier frequencies, consequently having extremely low power density over ultra-wide frequency bands. It is also known as Impulse Radio.

* * * * *

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 14, 2002, 67 FR 53721, August 16, 2002.

9. In Supplement No. 1 to part 774 (the Commerce Control List), Category 2—Materials Processing, the following Export Control Classification Numbers (ECCNs) are amended:

(a) Revise the Heading of product group A at the beginning of Category 2 from “Equipment, Assemblies and Components” to read “Systems, Equipment and Components”;

(b) Revising the *Items* paragraph in the List of Items Controlled section of ECCNs 2A001 and 2B006;

(c) Revising the Heading, removing the *License Requirement Notes* paragraph at the end of the License requirements section, and revising the

Items paragraph of the List of Items Controlled section of ECCN 2B001; and (d) Revising the Heading of 2B003, to read as follows:

* * * * *

2A001 Anti-friction bearings and bearing systems, as follows, (see List of Items Controlled) and components therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

Note: 2A001 does not control balls with tolerance specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse.

a. Ball bearings and solid roller bearings having all tolerances specified by the manufacturer in accordance with ISO 492 Tolerance Class 4 (or ANSI/ABMA Std 20 Tolerance Class ABEC–7 or RBEC–7, or other national equivalents), or better, and having both rings and rolling elements (ISO 5593) made from monel or beryllium;

Note: 2A001.a does not control tapered roller bearings.

b. Other ball bearings and solid roller bearings having all tolerances specified by the manufacturer in accordance with ISO 492 Tolerance Class 2 (or ANSI/ABMA Std 20 Tolerance Class ABEC–9 or RBEC–9, or other national equivalents), or better;

Note: 2A001.b does not control tapered roller bearings.

c. Active magnetic bearing systems using any of the following:

c.1. Materials with flux densities of 2.0 T or greater and yield strengths greater than 414 MPa;

c.2. All-electromagnetic 3D homopolar bias designs for actuators; or

c.3. High temperature (450 K (177°C) and above) position sensors.

2B001 Machine tools (see List of Items Controlled) and any combination thereof, for removing (or cutting) metals, ceramics or “composites”, which, according to the manufacturer’s technical specification, can be equipped with electronic devices for “numerical control”.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

Note 1: 2B001 does not control special purpose machine tools limited to the manufacture of gears. For such machines, see 2B003.

Note 2: 2B001 does not control special purpose machine tools limited to the manufacture of any of the following parts:

a. Crank shafts or cam shafts;

b. Tools or cutters;

c. Extruder worms;

d. Engraved or faceted jewellery parts.

a. Machine tools for turning, having all of the following characteristics:

a.1. Positioning accuracy with “all compensations available” of less (better) than 6 µm along any linear axis; and

a.2. Two or more axes which can be coordinated simultaneously for “contouring control”;

Note: 2B001.a does not control turning machines specially designed for the production of contact lenses.

b. Machine tools for milling, having any of the following characteristics:

b.1. Having all of the following:

b.1.a. Positioning accuracy with “all compensations available” of less (better) than 6 µm along any linear axis; and

b.1.b. Three linear axes plus one rotary axis which can be coordinated simultaneously for “contouring control”;

b.2. Five or more axes which can be coordinated simultaneously for “contouring control”;

b.3. A positioning accuracy for jig boring machines, with “all compensations available”, of less (better) than 4 µm along any linear axis; or

b.4. Fly cutting machines, having all of the following characteristics:

b.4.a. Spindle “run-out” and “camming” less (better) than 0.0004 mm TIR; and

b.4.b. Angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over 300 mm of travel.

c. Machine tools for grinding, having any of the following characteristics: c.1. Having all of the following:

c.1.a. Positioning accuracy with “all compensations available” of less (better) than 4 µm along any linear axis; and

c.1.b. Three or more axes which can be coordinated simultaneously for “contouring control”; or

c.2. Five or more axes which can be coordinated simultaneously for “contouring control”;

Notes: 2B001.c does not control grinding machines, as follows:

1. Cylindrical external, internal, and external-internal grinding machines having all the following characteristics:

a. Limited to cylindrical grinding; and

b. Limited to a maximum workpiece capacity of 150 mm outside diameter or length.

2. Machines designed specifically as jig grinders having any of following characteristics:

a. The c-axis is used to maintain the grinding wheel normal to the work surface; or

b. The a-axis is configured to grind barrel cams.

3. Surface grinders.

d. Electrical discharge machines (EDM) of the non-wire type which have two or more rotary axes which can be coordinated simultaneously for “contouring control”;

e. Machine tools for removing metals, ceramics or “composites” having all of the following characteristics:

e.1. Removing material by means of any of the following:

e.1.a. Water or other liquid jets, including those employing abrasive additives;

- e.1.b. Electron beam; *or*
 e.1.c. "Laser" beam; *and*
 e.2. Having two or more rotary axes which:
 e.2.a. Can be coordinated simultaneously for "contouring control"; *and*
 e.2.b. Have a positioning accuracy of less (better) than 0.003°;
 f. Deep-hole-drilling machines and turning machines modified for deep-hole-drilling, having a maximum depth-of-bore capability exceeding 5,000 mm and specially designed components therefor.

2B003 "Numerically controlled" or manual machine tools, and specially designed components, controls and accessories therefor, specially designed for the shaving, finishing, grinding or honing of hardened ($R_c = 40$ or more) spur, helical and double-helical gears with a pitch diameter exceeding 1,250 mm and a face width of 15% of pitch diameter or larger finished to a quality of AGMA 14 or better (equivalent to ISO 1328 class 3).

* * * * *

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

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

ECCN Controls: * * *

Items:

a. Computer controlled, "numerically controlled" or "stored program controlled" dimensional inspection machines, having a three dimensional length (volumetric) "measurement uncertainty" equal to or less (better) than $(1.7 + L/1,000) \mu\text{m}$ (L is the measured length in mm) tested according to ISO 10360-2;

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 $0.2 \mu\text{m}$ 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 $\pm 1 \text{ K}$; *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 $\pm 1 \text{ K}$ 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 $0.1 \mu\text{m}$ or less (better); *and*

b.1.c.2.b. A "measurement uncertainty" equal to or less (better) than $(0.2 + L/2,000) \mu\text{m}$ (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).

10. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, the following Export Control Classification Numbers (ECCNs) are amended by:

(a) Revising the *Items* paragraph in the List of Items Controlled section of ECCN 3A001;

(b) Revising the *Related Definitions* and the *Items* paragraphs in the List of Items Controlled section of ECCN 3A002;

(c) Revising the heading, and the *Items* paragraph in the List of Items Controlled section of ECCN 3B001;

(d) Revising the *Related Definitions* and the *Items* paragraphs in the List of Items Controlled section of 3B991;

(e) Revising the *Related Controls* and the *Items* paragraphs in the List of Items Controlled section of 3C004;

(f) Revising the *Items* paragraph in the List of Items Controlled section of 3E001;

(g) Revising the heading and the *Items* paragraph in the List of Items Controlled section of 3E002; *and*

(h) Revising the *TSR* paragraph in the License Exceptions section and revising the *Related Controls* and the *Items* paragraphs in the List of Items Controlled section of 3E003, 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 $5 \times 10^3 \text{ Gy}$ (Si), or higher; *or*

a.1.b. A dose rate upset of $5 \times 10^6 \text{ Gy}$ (Si)/s, or higher;

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 in 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); *or*

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 200 ns; *or*

a.5.a.3. A resolution of more than 12 bit with a total conversion time of less than 2 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 2 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 μ s.

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 therefor:

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 (C 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° 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.

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

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: Constant percentage bandwidth filters are also known as octave or fractional octave filters.

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 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.

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 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 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 40 GHz;

f. Microwave test receivers having all of the following:

f.1. A maximum operating frequency exceeding 40 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.

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 0.3µm 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 0.3µm 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 0.3µm 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 0.5 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.

3B991 Equipment not controlled by 3B001 for the manufacture of electronic components and materials, and specially designed components and accessories therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: 'Sputtering' is an overlay coating process wherein positively charged ions are accelerated by an electric field towards the surface of a target (coating material). The kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on the substrate. (**NOTE:** Triode, magnetron or radio frequency sputtering to increase adhesion of coating and rate of deposition are ordinary modifications of the process.)

Items: a. Equipment specially designed for the manufacture of electron tubes, optical

elements and specially designed components therefor controlled by 3A001 or 3A991;

b. Equipment specially designed for the manufacture of semiconductor devices, integrated circuits and "electronic assemblies", as follows, and systems incorporating or having the characteristics of such equipment:

Note: 3B991.b also controls equipment used or modified for use in the manufacture of other devices, such as imaging devices, electro-optical devices, acoustic-wave devices.

b.1. Equipment for the processing of materials for the manufacture of devices and components as specified in the heading of 3B991.b, as follows:

Note: 3B991 does not control quartz furnace tubes, furnace liners, paddles, boats (except specially designed caged boats), bubblers, cassettes or crucibles specially designed for the processing equipment controlled by 3B991.b.1.

b.1.a. Equipment for producing polycrystalline silicon and materials controlled by 3C001;

b.1.b. Equipment specially designed for purifying or processing III/V and II/VI semiconductor materials controlled by 3C001, 3C002, 3C003, or 3C004, except crystal pullers, for which see 3B991.b.1.c below;

b.1.c. Crystal pullers and furnaces, as follows:

Note: 3B991.b.1.c does not control diffusion and oxidation furnaces.

b.1.c.1. Annealing or recrystallizing equipment other than constant temperature furnaces employing high rates of energy

transfer capable of processing wafers at a rate exceeding 0.005 m² per minute;

b.1.c.2. "Stored program controlled" crystal pullers having any of the following characteristics:

b.1.c.2.a. Rechargeable without replacing the crucible container;

b.1.c.2.b. Capable of operation at pressures above 2.5x10⁵ Pa; or

b.1.c.2.c. Capable of pulling crystals of a diameter exceeding 100 mm;

b.1.d. "Stored program controlled" equipment for epitaxial growth having any of the following characteristics:

b.1.d.1. Capable of producing a layer thickness uniformity across the wafer of equal to or better than +3.5%; or

b.1.d.2. Rotation of individual wafers during processing;

b.1.e. Molecular beam epitaxial growth equipment;

b.1.f. Magnetically enhanced 'sputtering' equipment with specially designed integral load locks capable of transferring wafers in an isolated vacuum environment;

b.1.g. Equipment specially designed for ion implantation, ion-enhanced or photo-enhanced diffusion, having any of the following characteristics:

b.1.g.1. Patterning capability;

b.1.g.2. Beam energy (accelerating voltage) exceeding 200 keV;

b.1.g.3. Optimized to operate at a beam energy (accelerating voltage) of less than 10 keV; or

b.1.g.4. Capable of high energy oxygen implant into a heated "substrate";

b.1.h. "Stored program controlled" equipment for the selective removal (etching) by means of anisotropic dry methods (e.g., plasma), as follows:

b.1.h.1. Batch types having either of the following:

b.1.h.1.a. End-point detection, other than optical emission spectroscopy types; *or*
b.1.h.1.b. Reactor operational (etching) pressure of 26.66 Pa or less;

b.1.h.2. Single wafer types having any of the following:

b.1.h.2.a. End-point detection, other than optical emission spectroscopy types;
b.1.h.2.b. Reactor operational (etching) pressure of 26.66 Pa or less; *or*

b.1.h.2.c. Cassette-to-cassette and load locks wafer handling;

Notes: 1. "Batch types" refers to machines not specially designed for production processing of single wafers. Such machines can process two or more wafers simultaneously with common process parameters, *e.g.*, RF power, temperature, etch gas species, flow rates.

2. "Single wafer types" refers to machines specially designed for production processing of single wafers. These machines may use automatic wafer handling techniques to load a single wafer into the equipment for processing. The definition includes equipment that can load and process several wafers but where the etching parameters, *e.g.*, RF power or end point, can be independently determined for each individual wafer.

b.1.i. "Chemical vapor deposition" (CVD) equipment, *e.g.*, plasma-enhanced CVD (PECVD) or photo-enhanced CVD, for semiconductor device manufacturing, having either of the following capabilities, for deposition of oxides, nitrides, metals or polysilicon:

b.1.i.1. "Chemical vapor deposition" equipment operating below 10⁵ Pa; *or*

b.1.i.2. PECVD equipment operating either below 60 Pa (450 millitorr) or having automatic cassette-to-cassette and load lock wafer handling; 9

Note: 3B991.b.1.i does not control low pressure "chemical vapor deposition" (LPCVD) systems or reactive "sputtering" equipment.

b.1.j. Electron beam systems specially designed or modified for mask making or semiconductor device processing having any of the following characteristics:

b.1.j.1. Electrostatic beam deflection;
b.1.j.2. Shaped, non-Gaussian beam profile;
b.1.j.3. Digital-to-analog conversion rate exceeding 3 MHz;

b.1.j.4. Digital-to-analog conversion accuracy exceeding 12 bit; *or*

b.1.j.5. Target-to-beam position feedback control precision of 1 micrometer or finer;

Note: 3B991.b.1.j does not control electron beam deposition systems or general purpose scanning electron microscopes.

b.1.k. Surface finishing equipment for the processing of semiconductor wafers as follows:

b.1.k.1. Specially designed equipment for backside processing of wafers thinner than 100 micrometer and the subsequent separation thereof; *or*

b.1.k.2. Specially designed equipment for achieving a surface roughness of the active surface of a processed wafer with a two-sigma value of 2 micrometer or less, total indicator reading (TIR);

Note: 3B991.b.1.k does not control single-side lapping and polishing equipment for wafer surface finishing.

b.1.l. Interconnection equipment which includes common single or multiple vacuum chambers specially designed to permit the integration of any equipment controlled by 3B991 into a complete system;

b.1.m. "Stored program controlled" equipment using "lasers" for the repair or trimming of "monolithic integrated circuits" with either of the following characteristics:

b.1.m.1. Positioning accuracy less than ± 1 micrometer; *or*

b.1.m.2. Spot size (kerf width) less than 3 micrometer.

b.2. Masks, mask "substrates", mask-making equipment and image transfer equipment for the manufacture of devices and components as specified in the heading of 3B991, as follows:

Note: The term "masks" refers to those used in electron beam lithography, X-ray lithography, and ultraviolet lithography, as well as the usual ultraviolet and visible photo-lithography.

b.2.a. Finished masks, reticles and designs therefor, except:

b.2.a.1. Finished masks or reticles for the production of unembargoed integrated circuits; *or*

b.2.a.2. Masks or reticles, having both of the following characteristics:

b.2.a.2.a. Their design is based on geometries of 2.5 micrometer or more; *and*

b.2.a.2.b. The design does not include special features to alter the intended use by means of production equipment or "software";

b.2.b. Mask "substrates" as follows:

b.2.b.1. Hard surface (*e.g.*, chromium, silicon, molybdenum) coated "substrates" (*e.g.*, glass, quartz, sapphire) for the preparation of masks having dimensions exceeding 125 mm x 125 mm; *or*

b.2.b.2. "Substrates" specially designed for X-ray masks;

b.2.c. Equipment, other than general purpose computers, specially designed for computer aided design (CAD) of semiconductor devices or integrated circuits;

b.2.d. Equipment or machines, as follows, for mask or reticle fabrication:

b.2.d.1. Photo-optical step and repeat cameras capable of producing arrays larger than 100 mm x 100 mm, or capable of producing a single exposure larger than 6 mm x 6 mm in the image (*i.e.*, focal) plane, or capable of producing line widths of less than 2.5 micrometer in the photoresist on the "substrate";

b.2.d.2. Mask or reticle fabrication equipment using ion or "laser" beam lithography capable of producing line widths of less than 2.5 micrometer; *or*

b.2.d.3. Equipment or holders for altering masks or reticles or adding pellicles to remove defects;

Note: 3B991.b.2.d.1 and b.2.d.2 do not control mask fabrication equipment using photo-optical methods which was either commercially available before the 1st January, 1980, or has a performance no better than such equipment.

b.2.e. "Stored program controlled" equipment for the inspection of masks, reticles or pellicles with:

b.2.e.1. A resolution of 0.25 micrometer or finer; *and*

b.2.e.2. A precision of 0.75 micrometer or finer over a distance in one or two coordinates of 63.5 mm or more;

Note: 3B991.b.2.e does not control general purpose scanning electron microscopes except when specially designed and instrumented for automatic pattern inspection.

b.2.f. Align and expose equipment for wafer production using photo-optical or X-ray methods, including both projection image transfer equipment and step and repeat (direct step on wafer) or step and scan (scanner) equipment, capable of performing any of the following functions:

Note: 3B991.b.2.f does not control photo-optical contact and proximity mask align and expose equipment or contact image transfer equipment.

b.2.f.1. Production of a pattern size of less than 2.5 micrometer;

b.2.f.2. Alignment with a precision finer than ± 0.25 micrometer (3 sigma);

b.2.f.3. Machine-to-machine overlay no better than ± 0.3 micrometer; *or*

b.2.f.4. A light source wavelength shorter than 400 nm;

b.2.g. Electron beam, ion beam or X-ray equipment for projection image transfer capable of producing patterns less than 2.5 micrometer;

Note: For focused, deflected-beam systems (direct write systems), see 3B991.b.1.j or b.10.

b.2.h. Equipment using "lasers" for direct write on wafers capable of producing patterns less than 2.5 micrometer.

b.3. Equipment for the assembly of integrated circuits, as follows:

b.3.a. "Stored program controlled" die bonders having all of the following characteristics:

b.3.a.1. Specially designed for "hybrid integrated circuits";

b.3.a.2. X-Y stage positioning travel exceeding 37.5 x 37.5 mm; *and*

b.3.a.3. Placement accuracy in the X-Y plane of finer than ± 10 micrometer;

b.3.b. "Stored program controlled" equipment for producing multiple bonds in a single operation (*e.g.*, beam lead bonders, chip carrier bonders, tape bonders);

b.3.c. Semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a higher temperature than the body of the package, specially designed for ceramic microcircuit packages controlled by 3A001 and that have a throughput equal to or more than one package per minute.

Note: 3B991.b.3 does not control general purpose resistance type spot welders.

b.4. Filters for clean rooms capable of providing an air environment of 10 or less particles of 0.3 micrometer or smaller per 0.02832 m³ and filter materials therefor.

3C004 Hydrides of phosphorus, arsenic or antimony, having a purity better than 99.999%, even diluted in inert gases or hydrogen.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: N/A

Related Definition: * * *

Items:

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

Note: This entry does not control hydrides containing 20% molar or more of inert gases or hydrogen.

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 0.7 micrometer 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.

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 Definition: * * *

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 0.7 micrometer 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.

3E003 Other "technology" for the "development" or "production" of items described in the List of Items Controlled.

* * * * *

License Exceptions

CIV: * * *

TSR: Yes, except .f and .g

List of Items Controlled

Unit: * * *

Related Controls: (1) Technology for the "development" or "production" of "space qualified" electronic vacuum tubes operating at frequencies of 31 GHz or higher, described in 3E003.g, is under the export license authority of the Department of State, Office of Defense Trade Controls (22 CFR part 121); (2) See 3E001 for silicon-on-insulation (SOI) technology for the "development" or "production" related to radiation hardening of integrated circuits.

Related Definitions: * * *

Items:

- a. Vacuum microelectronic devices;
- b. Hetero-structure semiconductor devices such as high electron mobility transistors (HEMT), hetero-bipolar transistors (HBT), quantum well and super lattice devices;
- c. "Superconductive" electronic devices;
- d. Substrates of films of diamond for electronic components;
- e. Substrates of silicon-on-insulator (SOI) for integrated circuits in which the insulator is silicon dioxide;
- f. Substrates of silicon carbide for electronic components;
- g. Electronic vacuum tubes operating at frequencies of 31 GHz or higher.

11. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, the following Export Control Classification Numbers (ECCNs) are amended by:

(a) Revising the License Requirements section, and the *GBS* paragraph in the License Exception section, and the *Items* paragraph in the List of Items Controlled section of ECCN 4A003;

(b) Amending the License Requirements section by removing the *License Requirement Notes* paragraph from the end of this section, and revising the *Items* paragraph in the List of Items Controlled section of ECCN 4D003; and

(c) Revising the *Related Definitions* paragraph and the *Items* paragraph in the List of Items Controlled section of ECCN 4D993.

4A003 "Digital computers", "electronic assemblies", and related equipment therefor, 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 ≤ to 28,000 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 28,000 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 28,000 MTOPS and for "electronic assemblies" described in 4A003.c that are not capable of exceeding a CTP greater than 28,000 MTOPS in aggregation. Computers controlled in this entry for MT reasons are not eligible for NLR.

License Exceptions

LVS: * * *

GBS: Yes, for 4A003.e, and .g and specially designed components therefor, exported separately or as part of a system.

CTP: * * *

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 28,000 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”.

4D003 Specific “software”, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Operating system “software”, “software” development tools and compilers specially designed for “multi-data-stream processing” equipment, in “source code”;

b. [Reserved]

c. “Software” having characteristics or performing functions exceeding the limits in Category 5, Part 2 (“Information Security”).

4D993 “Program” proof and validation “software”, “software” allowing the automatic generation of “source codes”, and operating system “software” specially designed for real time processing equipment.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: “Global interrupt latency time” is the time taken by the computer system to recognize an interrupt due to the event, service the interrupt and perform a context switch to an alternate memory-resident task waiting on the interrupt.

Items:

a. “Program” proof and validation “software” using mathematical and analytical techniques and designed or modified for “programs” having more than 500,000 “source code” instructions;

b. “Software” allowing the automatic generation of “source codes” from data acquired on line from external sensors described in the Commerce Control List;

c. Operating system “software” specially designed for “real time processing” equipment that guarantees a “global interrupt latency time” of less than 20 microseconds.

12. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and “Information Security”, Part I—Telecommunications, Export Control Classification Numbers (ECCNs) are amended by:

(a) Revising the License Exceptions section, and the *Unit* and *Items*

paragraphs in the List of Items Controlled section of ECCN 5A001;

(b) Revising the *Related Definitions* paragraph in the List of Items Controlled section of ECCN 5A991;

(c) Revising the *Items* paragraph in the List of Items Controlled section of ECCN 5B001;

(d) Revising the *TSR* paragraph in the License Exception section and the *Items* paragraph in the List of Items Controlled section of ECCN 5E001; and

(e) Revising the *Related Definitions* paragraph and the *Items* paragraph in the List of Items Controlled section of ECCN 5E991, to read as follows:

5A001 Telecommunications systems, equipment, and components.

* * * * *

License Exceptions

LVS: N/A for 5A001.a and b.5 \$5000 for 5A001b.1, b.2, b.3, b.6, and .d \$3000 for 5A001.c

GBS: Yes, except 5A001.a and b.5

CIV: Yes, except 5A001.a, b.3 and b.5

List of Items Controlled

Unit: Equipment in number; cable and fiber in meters/feet, components and accessories in \$ value

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 1.5 MHz to 30 MHz frequency range or 250 W or more in the 30 MHz to 87.5 MHz frequency range, 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 at rates of less than 2,400 bit/s.

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 2×10^9 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).

5A991 Telecommunication equipment, not controlled by 5A001.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: (1) 'Bandwidth of one voice channel' is data communication equipment designed to operate in one voice channel of 3,100 Hz, as defined in CCITT Recommendation G.151. (2) 'Communications channel controller' is the physical interface that controls the flow of synchronous or asynchronous digital information. It is an assembly that can be integrated into computer or telecommunications equipment to provide communications access. (3) 'Datagram' is a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination data terminal equipment without reliance on earlier exchanges between this source and destination data terminal equipment and the transporting network. (4) 'Fast select' is a facility applicable to virtual calls that allows data terminal equipment to expand the possibility to transmit data in call set-up and clearing 'packets' beyond the basic capabilities of a virtual call. (5) 'Gateway' is the function, realized by any combination of equipment and "software", to carry out the conversion of conventions for representing, processing or communicating information used on one system into the corresponding, but different conventions used in another system. (6) 'Integrated Services Digital Network' (ISDN) is a unified end-to-end digital network, in which data originating from all types of communication (e.g., voice, text, data, still and moving pictures) are transmitted from one port (terminal) in the exchange (switch) over one access line to and from the subscriber. (7) 'Packet' is a group of binary digits including data and call control signals that is switched as a composite whole. The data, call control signals, and possible error control information are arranged in a specified format.

Items: * * *

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 128;

b.5. Equipment employing "common channel signaling" operating in either non-associated mode of operation or quasi-associated mode of operation.

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

* * * * *

License Exceptions

CIV: * * *

TSR: Yes, except for 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" controlled by 5E001.a for the "development" or "production" of the following:

(1) Items controlled by 5A001.b.5; *or*

(2) "Software" controlled by 5D001.a that is specially designed for the "development" or "production" of equipment, functions or features controlled by 5A001.b.5.

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 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 128; or

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

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 either non-associated or quasi-associated mode of operation.

5E991 "Technology" for the "development", "production" or "use" of equipment controlled by 5A991 or 5B991, or "software" controlled by 5D991, and other "technologies" as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: (1) "Synchronous digital hierarchy" (SDH) is a digital hierarchy providing a means to manage, multiplex, and access various forms of digital traffic using a

synchronous transmission format on different types of media. The format is based on the Synchronous Transport Module (STM) that is defined by CCITT Recommendation G.703, G.707, G.708, G.709 and others yet to be published. The first level rate of 'SDH' is 155.52 Mbits/s. (2) 'Synchronous optical network' (SONET) is a network providing a means to manage, multiplex and access various forms of digital traffic using a synchronous transmission format on fiber optics. The format is the North America version of 'SDH' and also uses the Synchronous Transport Module (STM). However, it uses the Synchronous Transport Signal (STS) as the basic transport module with a first level rate of 51.81 Mbits/s. The SONET standards are being integrated into those of 'SDH'.

Items:

a. Specific "technologies" as follows:

a.1. "Technology" for the processing and application of coatings to optical fiber specially designed to make it suitable for underwater use;

a.2. "Technology" for the "development" of equipment employing 'Synchronous Digital Hierarchy' ('SDH') or 'Synchronous Optical Network' ('SONET') techniques.

13. In Supplement No. 1 to part 774 (the Commerce Control List), Category 5—Telecommunications and "Information Security", Part II—"Information Security" is amended by:

(a) Revising the Heading and the *Related Controls* paragraph and the *Items* paragraph in the List of Items Controlled section of ECCN 5A002, to read as set forth below; and

(b) Amending the License Requirements section of ECCNs 5B002 and 5E002 by removing the *License Requirements Notes* paragraph at the end of this section.

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: See also 5A992. This entry does not control:

(a) "Personalized smart cards" where the cryptographic capability is restricted for use in equipment or systems excluded from control paragraphs (b) through (f) of this note. Note that 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) 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;

(d) 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) one-time encryption of copyright protected audio/video data;

(e) Cryptographic equipment specially designed and limited for banking use or money transactions;

(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 basestation) is less than 400 meters according to the manufacturer's specifications. These items are controlled under ECCN 5A992.

Related Definitions: * * *

Items:

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", and other specially designed components therefor:

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.

14. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors is amended by:

(a) Revising the *Items* paragraph in the List of Items Controlled section of ECCN 6A001;

(b) Revising the *Unit* and *Items* paragraphs in the List of items Controlled section of ECCN 6A005;

(c) Revising the Heading of ECCN 6A008;

(d) Revising the Heading and the *Related Definitions* paragraph in the List of Items Controlled section of ECCN 6C992;

(e) Revising the *Related Definitions* paragraph and the *Items* paragraph in the List of Items Controlled section of ECCN 6C994;

(f) Revising the *Items* paragraph in the List of Items Controlled section of ECCN 6D003, to read as follows:

6A001 Acoustics.

* * * * *

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 224 dB (reference $1 \mu\text{Pa}$ 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 $1 \mu\text{Pa}$ 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 $0.01 \text{ mW/mm}^2/\text{Hz}$ for devices operating at frequencies below 10 kHz;

a.1.c.2. A continuously radiated acoustic power density exceeding $0.001 \text{ Mw/mm}^2/\text{Hz}$ 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;

a.2.a.2.b. Piezoelectric polymers; *or*

a.2.a.2.c. 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 $1 \mu\text{Pa}$. For example, a hydrophone of -160 dB (reference $1 \text{ V per } \mu\text{Pa}$) 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 removable 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.

6A005 "Lasers", components and optical equipment, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: Equipment in number; components and accessories in \$ value

Related Controls: * * *

Related Definitions: * * *

Items:

a. Gas "lasers", as follows:

a.1. Excimer "lasers", having any of the following:

a.1.a. An output wavelength not exceeding 150 nm and having any of the following:

a.1.a.1. An output energy exceeding 50 mJ per pulse; or

a.1.a.2. An average output power exceeding 1 W;

a.1.b. An output wavelength exceeding 150 nm but not exceeding 190 nm and having any of the following:

a.1.b.1. An output energy exceeding 1.5 J per pulse; or

a.1.b.2. An average output power exceeding 120 W;

a.1.c. An output wavelength exceeding 190 nm but not exceeding 360 nm and having any of the following:

a.1.c.1. An output energy exceeding 10 J per pulse; or

a.1.c.2. An average output power exceeding 500 W; or

a.1.d. An output wavelength exceeding 360 nm and having any of the following:

a.1.d.1. An output energy exceeding 1.5 J per pulse; or

a.1.d.2. An average output power exceeding 30 W;

N.B. For excimer "lasers" specially designed for lithography equipment, see 3B001.

a.2. Metal vapor "lasers", as follows:

a.2.a. Copper (Cu) "lasers" having an average output power exceeding 20 W;

a.2.b. Gold (Au) "lasers" having an average output power exceeding 5 W;

a.2.c. Sodium (Na) "lasers" having an output power exceeding 5 W;

a.2.d. Barium (Ba) "lasers" having an average output power exceeding 2 W;

a.3. Carbon monoxide (CO) "lasers" having any of the following:

a.3.a. An output energy exceeding 2 J per pulse and a pulsed "peak power" exceeding 5 kW; or

a.3.b. An average or CW output power exceeding 5 kW;

a.4. Carbon dioxide (CO₂) "lasers" having any of the following:

a.4.a. A CW output power exceeding 15 kW;

a.4.b. A pulsed output having a "pulse duration" exceeding 10 μ s and having any of the following:

a.4.b.1. An average output power exceeding 10 kW; or

a.4.b.2. A pulsed "peak power" exceeding 100 kW; or

a.4.c. A pulsed output having a "pulse duration" equal to or less than 10 μ s; and having any of the following:

a.4.c.1. A pulse energy exceeding 5 J per pulse; or

a.4.c.2. An average output power exceeding 2.5 kW;

a.5. "Chemical lasers", as follows:

a.5.a. Hydrogen Fluoride (HF) "lasers";

a.5.b. Deuterium Fluoride (DF) "lasers";

a.5.c. "Transfer lasers", as follows:

a.5.c.1. Oxygen Iodine (O₂-I) "lasers";

a.5.c.2. Deuterium Fluoride-Carbon dioxide (DF-CO₂) "lasers";

a.6. Krypton ion or argon ion "lasers" having any of the following:

a.6.a. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 50 W; or

a.6.b. An average or CW output power exceeding 50 W;

a.7. Other gas "lasers", having any of the following:

Note: 6A005.a.7 does not control nitrogen "lasers".

a.7.a. An output wavelength not exceeding 150 nm and having any of the following:

a.7.a.1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; or

a.7.a.2. An average or CW output power exceeding 1 W;

a.7.b. An output wavelength exceeding 150 nm but not exceeding 800 nm and having any of the following:

a.7.b.1. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 30 W; or

a.7.b.2. An average or CW output power exceeding 30 W;

a.7.c. An output wavelength exceeding 800 nm but not exceeding 1,400 nm and having any of the following:

a.7.c.1. An output energy exceeding 0.25 J per pulse and a pulsed "peak power" exceeding 10 W; or

a.7.c.2. An average or CW output power exceeding 10 W; or

a.7.d. An output wavelength exceeding 1,400 nm and an average or CW output power exceeding 1 W.

b. Semiconductor "lasers", as follows:

b.1. Individual single-transverse mode semiconductor "lasers" having any of the following:

b.1.a. A wavelength equal to or less than 1510 nm, and having an average or CW output power exceeding 1.5 W; or

b.1.b. A wavelength greater than 1510 nm, and having an average or CW output power exceeding 500 mW;

b.2. Individual, multiple-transverse mode semiconductor "lasers" having all of the following:

b.2.a. A wavelength of less than 950 nm or more than 2000 nm; and

b.2.b. An average or CW output power exceeding 10 W.

b.3. Individual arrays of individual semiconductor "lasers", having any of the following:

b.3.a. A wavelength of less than 950 nm and an average or CW output power exceeding 60 W; or

b.3.b. A wavelength equal to or greater than 2000 nm and an average or CW output power exceeding 10 W;

Technical Note: Semiconductor "lasers" are commonly called "laser" diodes.

Note 1: 6A005.b includes semiconductor "lasers" having optical output connectors (e.g. fiber optic pigtails).

Note 2: The control status of semiconductor "lasers" specially designed for other equipment is determined by the control status of the other equipment.

c. Solid state "lasers", as follows:

c.1. "Tunable" "lasers" having any of the following:

Note: 6A005.c.1 includes titanium—sapphire (Ti: Al₂O₃), thulium—YAG (Tm: YAG), thulium—YSGG (Tm: YSGG), alexandrite (Cr: BeAl₂O₄) and color center "lasers".

c.1.a. An output wavelength less than 600 nm and having any of the following:

c.1.a.1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; or

c.1.a.2. An average or CW output power exceeding 1 W;

c.1.b. An output wavelength of 600 nm or more but not exceeding 1,400 nm and having any of the following:

c.1.b.1. An output energy exceeding 1 J per pulse and a pulsed "peak power" exceeding 20 W; or

c.1.b.2. An average or CW output power exceeding 20 W; *or*
 c.1.c. An output wavelength exceeding 1,400 nm and having any of the following:
 c.1.c.1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*
 c.1.c.2. An average or CW output power exceeding 1 W;
 c.2. Non-"tunable" "lasers", as follows:
Note: 6A005.c.2 includes atomic transition solid state "lasers".

c.2.a. Neodymium glass "lasers", as follows:
 c.2.a.1. "Q-switched lasers" having any of the following:
 c.2.a.1.a. An output energy exceeding 20 J but not exceeding 50 J per pulse and an average output power exceeding 10 W; *or*
 c.2.a.1.b. An output energy exceeding 50 J per pulse;
 c.2.a.2. Non-"Q-switched lasers" having any of the following:
 c.2.a.2.a. An output energy exceeding 50 J but not exceeding 100 J per pulse and an average output power exceeding 20 W; *or*
 c.2.a.2.b. An output energy exceeding 100 J per pulse;
 c.2.b. Neodymium-doped (other than glass) "lasers", having an output wavelength exceeding 1,000 nm but not exceeding 1,100 nm, as follows:

N.B.: For neodymium-doped (other than glass) "lasers" having an output wavelength not exceeding 1,000 nm or exceeding 1,100 nm, see 6A005.c.2.

c.2.b.1. Pulse-excited, mode-locked, "Q-switched lasers" having a "pulse duration" of less than 1 ns and having any of the following:
 c.2.b.1.a. A "peak power" exceeding 5 GW;
 c.2.b.1.b. An average output power exceeding 10 W; *or*
 c.2.b.1.c. A pulsed energy exceeding 0.1 J;
 c.2.b.2. Pulse-excited, "Q-switched lasers" having a pulse duration equal to or more than 1 ns, and having any of the following:
 c.2.b.2.a. A single-transverse mode output having:
 c.2.b.2.a.1. A "peak power" exceeding 100 MW;
 c.2.b.2.a.2. An average output power exceeding 20 W; *or*
 c.2.b.2.a.3. A pulsed energy exceeding 2 J; *or*
 c.2.b.2.b. A multiple-transverse mode output having:
 c.2.b.2.b.1. A "peak power" exceeding 400 MW;
 c.2.b.2.b.2. An average output power exceeding 2 kW; *or*
 c.2.b.2.b.3. A pulsed energy exceeding 2 J;
 c.2.b.3. Pulse-excited, non-"Q-switched lasers", having:
 c.2.b.3.a. A single-transverse mode output having:
 c.2.b.3.a.1. A "peak power" exceeding 500 kW; *or*
 c.2.b.3.a.2. An average output power exceeding 150 W; *or*
 c.2.b.3.b. A multiple-transverse mode output having:
 c.2.b.3.b.1. A "peak power" exceeding 1 MW; *or*
 c.2.b.3.b.2. An average power exceeding 2 kW;

c.2.b.4. Continuously excited "lasers" having:
 c.2.b.4.a. A single-transverse mode output having:
 c.2.b.4.a.1. A "peak power" exceeding 500 kW; *or*
 c.2.b.4.a.2. An average or CW output power exceeding 150 W; *or*
 c.2.b.4.b. A multiple-transverse mode output having:
 c.2.b.4.b.1. A "peak power" exceeding 1 MW; *or*
 c.2.b.4.b.2. An average or CW output power exceeding 2 kW;
 c.2.c. Other non-"tunable" "lasers", having any of the following:
 c.2.c.1. A wavelength less than 150 nm and having any of the following:
 c.2.c.1.a. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*
 c.2.c.1.b. An average or CW output power exceeding 1 W;
 c.2.c.2. A wavelength of 150 nm or more but not exceeding 800 nm and having any of the following:
 c.2.c.2.a. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 30 W; *or*
 c.2.c.2.b. An average or CW output power exceeding 30 W;
 c.2.c.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm, as follows:
 c.2.c.3.a. "Q-switched lasers" having:
 c.2.c.3.a.1. An output energy exceeding 0.5 J per pulse and a pulsed "peak power" exceeding 50 W; *or*
 c.2.c.3.a.2. An average output power exceeding:
 c.2.c.3.a.2.a. 10 W for single-mode "lasers";
 c.2.c.3.a.2.b. 30 W for multimode "lasers";
 c.2.c.3.b. Non-"Q-switched lasers" having:
 c.2.c.3.b.1. An output energy exceeding 2 J per pulse and a pulsed "peak power" exceeding 50 W; *or*
 c.2.c.3.b.2. An average or CW output power exceeding 50 W; *or*
 c.2.c.4. A wavelength exceeding 1,400 nm and having any of the following:
 c.2.c.4.a. An output energy exceeding 100 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*
 c.2.c.4.b. An average or CW output power exceeding 1 W;
 d. Dye and other liquid "lasers", having any of the following:
 d.1. A wavelength less than 150 nm and:
 d.1.a. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*
 d.1.b. An average or CW output power exceeding 1 W;
 d.2. A wavelength of 150 nm or more but not exceeding 800 nm and having any of the following:
 d.2.a. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 20 W;
 d.2.b. An average or CW output power exceeding 20 W; *or*
 d.2.c. A pulsed single longitudinal mode oscillator having an average output power exceeding 1 W and a repetition rate exceeding 1 kHz if the "pulse duration" is less than 100 ns;

d.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm and having any of the following:
 d.3.a. An output energy exceeding 0.5 J per pulse and a pulsed "peak power" exceeding 10 W; *or*
 d.3.b. An average or CW output power exceeding 10 W; *or*
 d.4. A wavelength exceeding 1,400 nm and having any of the following:
 d.4.a. An output energy exceeding 100 mJ per pulse and a pulsed "peak power" exceeding 1 W; *or*
 d.4.b. An average or CW output power exceeding 1 W;
 e. Components, as follows:
 e.1. Mirrors cooled either by active cooling or by heat pipe cooling;

Technical Note: Active cooling is a cooling technique for optical components using flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.

e.2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components specially designed for use with controlled "lasers";
 f. Optical equipment, as follows:
N.B. For shared aperture optical elements, capable of operating in "Super-High Power Laser" ("SHPL") applications, see the U.S. Munitions List (22 CFR part 121).
 f.1. Dynamic wavefront (phase) measuring equipment capable of mapping at least 50 positions on a beam wavefront having any of the following:
 f.1.a. Frame rates equal to or more than 100 Hz and phase discrimination of at least 5% of the beam's wavelength; *or*
 f.1.b. Frame rates equal to or more than 1,000 Hz and phase discrimination of at least 20% of the beam's wavelength;
 f.2. "Laser" diagnostic equipment capable of measuring "SHPL" system angular beam steering errors of equal to or less than 10 μ rad;
 f.3. Optical equipment and components specially designed for a phased-array "SHPL" system for coherent beam combination to an accuracy of $\lambda/10$ at the designed wavelength, or 0.1 μ m, whichever is the smaller;
 f.4. Projection telescopes specially designed for use with "SHPL" systems.

6A008 Radar systems, equipment and assemblies having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.

* * * * *

6C992 Optical sensing fibers not controlled by 6A002.d.3 which are modified structurally to have a 'beat length' of less than 500 mm (high birefringence) or optical sensor materials not described in 6C002.b and having a zinc content of equal to or more than 6% by 'mole fraction'.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: (1) 'Mole fraction' is defined as the ratio of moles of ZnTe to the sum of the moles of CdTe and ZnTe present in the crystal. (2) 'Beat length' is the distance over which two orthogonally polarized signals, initially in phase, must pass in order to achieve a 2 Pi radian(s) phase difference.

Items: * * *

6C994 Optical materials.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: (1) 'Fluoride fibers' are fibers manufactured from bulk fluoride compounds. (2) 'Optical fiber preforms' are bars, ingots, or rods of glass, plastic or other materials that have been specially processed for use in fabricating optical fibers. The characteristics of the preform determine the basic parameters of the resultant drawn optical fibers.

Items:

a. Low optical absorption materials, as follows:

a.1. Bulk fluoride compounds containing ingredients with a purity of 99.999% or better; or

Note: 6C994.a.1 controls fluorides of zirconium or aluminum and variants.

a.2. Bulk fluoride glass made from compounds controlled by 6C004.e.1;

b. 'Optical fiber preforms' made from bulk fluoride compounds containing ingredients with a purity of 99.999% or better, specially designed for the manufacture of 'fluoride fibers' controlled by 6A994.b.

6D003 Other "software", as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Acoustics "software", as follows:

a.1. "Software" specially designed for acoustic beam forming for the "real time processing" of acoustic data for passive reception using towed hydrophone arrays;

a.2. "Source code" for the "real time processing" of acoustic data for passive reception using towed hydrophone arrays;

a.3. "Software" specially designed for acoustic beam forming for the "real time processing" of acoustic data for passive reception using bottom or bay cable systems;

a.4. "Source code" for the "real time processing" of acoustic data for passive reception using bottom or bay cable systems;

b. Optical sensors. None.

c. Cameras. None.

d. Optics. None.

e. Lasers. None.

f. Magnetometers.

f.1. "Software" specially designed for magnetic compensation systems for magnetic sensors designed to operate on mobile platforms;

f.2. "Software" specially designed for magnetic anomaly detection on mobile platforms;

g. Gravimeters. "Software" specially designed to correct motional influences of gravity meters or gravity gradiometers;

h. Radar "software", as follows:

h.1. Air Traffic Control "software" application "programs" hosted on general purpose computers located at Air Traffic Control centers and capable of any of the following:

h.1.a. Processing and displaying more than 150 simultaneous "system tracks"; or

h.1.b. Accepting radar target data from more than four primary radars;

h.2. "Software" for the design or

"production" of radomes which:

h.2.a. Are specially designed to protect the "electronically steerable phased array antennae" controlled by 6A008.e.; and

h.2.b. Result in an antenna pattern having an "average side lobe level" more than 40 dB below the peak of the main beam level.

Technical Note: "Average side lobe level" in 6D003.h.2.b is measured over the entire array excluding the angular extent of the main beam and the first two side lobes on either side of the main beam.

15. In Supplement No. 1 to part 774 (the Commerce Control List), Category 7—Navigation and Avionics, the following Export Control Classification Numbers (ECCNs) are amended by:

(a) Revising the Heading and the *Related Controls* paragraph, the *Related Definitions* paragraph, and the *Items* paragraph in the List of Items Controlled section of ECCN 7A003;

(b) Revising the Heading of ECCN 7D002; and

(c) Revising the *Related Definitions* paragraph and the *Items* paragraph in the List of Items Controlled section of ECCN 7D003, to read as follows:

7A003 Inertial Navigation Systems (INS) and specially designed components therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: See also 7A103 and 7A994. Inertial Navigation Systems (INS) and inertial equipment, and specially designed components therefor specifically designed, modified or configured for military use are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)

Related Definitions: "Data-Based Referenced Navigation" ("DBRN") systems are systems which use various sources of previously measured geo-mapping data integrated to provide accurate navigation information under dynamic conditions. Data sources include bathymetric maps, stellar maps, gravity maps, magnetic maps or 3-D digital terrain maps.

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; or

2. A roll and yaw rate of equal to or more than +2.62 radian/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.

7D002 Source code" for the "use" of any inertial navigation equipment including inertial equipment not controlled by 7A003 or 7A004, or Attitude and Heading Reference Systems (AHRS) (except gimballed AHRS).

* * * * *

7D003 Other "software", as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: 'Data-Based Referenced Navigation' ('DBRN') systems are systems which use various sources of previously measured geo-mapping data integrated to provide accurate navigation information under dynamic conditions. Data sources include bathymetric maps, stellar

maps, gravity maps, magnetic maps or 3-D digital terrain maps.

Items:

- a. "Software" specially designed or modified to improve the operational performance or reduce the navigational error of systems to the levels controlled by 7A003 or 7A004;
- b. "Source code" for hybrid integrated systems that improves the operational performance or reduces the navigational error of systems to the level controlled by 7A003 by continuously combining inertial data with any of the following:
 - b.1. Doppler radar velocity data;
 - b.2. Global navigation satellite systems (*i.e.*, GPS or GLONASS) reference data; *or*
 - b.3. Data from "Data-Based Referenced Navigation" ("DBRN") systems;
- c. "Source code" for integrated avionics or mission systems that combine sensor data and employ "expert systems";
- d. "Source code" for the "development" of any of the following:
 - d.1. Digital flight management systems for "total control of flight";
 - d.2. Integrated propulsion and flight control systems;
 - d.3. Fly-by-wire or fly-by-light control systems;
 - d.4. Fault-tolerant or self-reconfiguring "active flight control systems";
 - d.5. Airborne automatic direction finding equipment;
 - d.6. Air data systems based on surface static data; *or*
 - d.7. Raster-type head-up displays or three dimensional displays;
- e. Computer-aided-design (CAD) "software" specially designed for the "development" of "active flight control systems", helicopter multi-axis fly-by-wire or fly-by-light controllers or helicopter "circulation controlled anti-torque or circulation-controlled direction control systems" whose "technology" is controlled by 7E004.b, 7E004.c.1 or 7E004.c.2.

16. In Supplement No. 1 to part 774 (the Commerce Control List), Category 8—Marine, is amended by:

- (a) Revising the *Related Controls* paragraph and the *Items* paragraph in the List of Items Controlled section of ECCNs 8A002 and 8A018; and
- (b) Revising the Heading and the *Related Controls* paragraph of the List of Items Controlled section of ECCN 8A992, to read as follows:

8A002 Systems and equipment, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: See also 8A992 and for underwater communications systems, see Category 5, Part I—Telecommunications). 8A002 does not control closed and semi-closed circuit (rebreathing) apparatus that is controlled under 8A018.a. See also 8A992 for self-contained underwater breathing apparatus that is not controlled by 8A002 or released for control by the 8A002.q Note.

Related Definitions: * * *

Items:

- a. Systems and equipment, specially designed or modified for submersible vehicles, designed to operate at depths exceeding 1,000 m, as follows:
 - a.1. Pressure housings or pressure hulls with a maximum inside chamber diameter exceeding 1.5 m;
 - a.2. Direct current propulsion motors or thrusters;
 - a.3. Umbilical cables, and connectors therefor, using optical fiber and having synthetic strength members;
 - b. Systems specially designed or modified for the automated control of the motion of submersible vehicles controlled by 8A001 using navigation data and having closed loop servo-controls:
 - b.1. Enabling a vehicle to move within 10 m of a predetermined point in the water column;
 - b.2. Maintaining the position of the vehicle within 10 m of a predetermined point in the water column; *or*
 - b.3. Maintaining the position of the vehicle within 10 m while following a cable on or under the seabed;
 - c. Fiber optic hull penetrators or connectors;
 - d. Underwater vision systems, as follows:
 - d.1. Television systems and television cameras, as follows:
 - d.1.a. Television systems (comprising camera, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 800 lines and specially designed or modified for remote operation with a submersible vehicle;
 - d.1.b. Underwater television cameras having a limiting resolution when measured in air of more than 1,100 lines;
 - d.1.c. Low light level television cameras specially designed or modified for underwater use containing all of the following:
 - d.1.c.1. Image intensifier tubes controlled by 6A002.a.2.a; *and*
 - d.1.c.2. More than 150,000 "active pixels" per solid state area array;
- Technical Note:** Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.
- d.2. Systems, specially designed or modified for remote operation with an underwater vehicle, employing techniques to minimize the effects of back scatter, including range-gated illuminators or "laser" systems;
 - e. Photographic still cameras specially designed or modified for underwater use below 150 m having a film format of 35 mm or larger, and having any of the following:
 - e.1. Annotation of the film with data provided by a source external to the camera;
 - e.2. Automatic back focal distance correction; *or*
 - e.3. Automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;
 - f. Electronic imaging systems, specially designed or modified for underwater use,

capable of storing digitally more than 50 exposed images;

- g. Light systems, as follows, specially designed or modified for underwater use:
 - g.1. Stroboscopic light systems capable of a light output energy of more than 300 J per flash and a flash rate of more than 5 flashes per second;
 - g.2. Argon arc light systems specially designed for use below 1,000 m;
- h. "Robots" specially designed for underwater use, controlled by using a dedicated "stored program controlled" computer, having any of the following:
 - h.1. Systems that control the "robot" using information from sensors which measure force or torque applied to an external object, distance to an external object, or tactile sense between the "robot" and an external object; *or*
 - h.2. The ability to exert a force of 250 N or more or a torque of 250 Nm or more and using titanium based alloys or "fibrous or filamentary" "composite" materials in their structural members;
 - i. Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles, having any of the following:
 - i.1. Systems which control the manipulator using the information from sensors which measure the torque or force applied to an external object, or tactile sense between the manipulator and an external object; *or*
 - i.2. Controlled by proportional master-slave techniques or by using a dedicated "stored program controlled" computer, and having 5 degrees of freedom of movement or more;
- Note:** Only functions having proportional control using positional feedback or by using a dedicated "stored program controlled" computer are counted when determining the number of degrees of freedom of movement
- j. Air independent power systems, specially designed for underwater use, as follows:
 - j.1. Brayton or Rankine cycle engine air independent power systems having any of the following:
 - j.1.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;
 - j.1.b. Systems specially designed to use a monoatomic gas;
 - j.1.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; *or*
 - j.1.d. Systems specially designed:
 - j.1.d.1. To pressurize the products of reaction or for fuel reformation;
 - j.1.d.2. To store the products of the reaction; *and*
 - j.1.d.3. To discharge the products of the reaction against a pressure of 100 kPa or more;
 - j.2. Diesel cycle engine air independent systems, having all of the following:
 - j.2.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;
 - j.2.b. Systems specially designed to use a monoatomic gas;

j.2.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; *and*

j.2.d. Specially designed exhaust systems that do not exhaust continuously the products of combustion;

j.3. Fuel cell air independent power systems with an output exceeding 2 kW having any of the following:

j.3.a. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; *or*

j.3.b. Systems specially designed:
j.3.b.1. To pressurize the products of reaction or for fuel reformation;

j.3.b.2. To store the products of the reaction; *and*

j.3.b.3. To discharge the products of the reaction against a pressure of 100 kPa or more;

j.4. Stirling cycle engine air independent power systems, having all of the following:

j.4.a. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; *and*

j.4.b. Specially designed exhaust systems which discharge the products of combustion against a pressure of 100 kPa or more;

k. Skirts, seals and fingers, having any of the following:

k.1. Designed for cushion pressures of 3,830 Pa or more, operating in a significant wave height of 1.25 m (Sea State 3) or more and specially designed for surface effect vehicles (fully skirted variety) controlled by 8A001.f; *or*

k.2. Designed for cushion pressures of 6,224 Pa or more, operating in a significant wave height of 3.25 m (Sea State 5) or more and specially designed for surface effect vehicles (rigid sidewalls) controlled by 8A001.g;

l. Lift fans rated at more than 400 kW specially designed for surface effect vehicles controlled by 8A001.f or 8A001.g;

m. Fully submerged subcavitating or supercavitating hydrofoils specially designed for vessels controlled by 8A001.h;

n. Active systems specially designed or modified to control automatically the sea-induced motion of vehicles or vessels controlled by 8A001.f, 8A001.g, 8A001.h or 8A001.i;

o. Propellers, power transmission systems, power generation systems and noise reduction systems, as follows:

o.1. Water-screw propeller or power transmission systems, as follows, specially designed for surface effect vehicles (fully skirted or rigid sidewall variety), hydrofoils or small waterplane area vessels controlled by 8A001.f, 8A001.g, 8A001.h or 8A001.i:

o.1.a. Supercavitating, super-ventilated, partially-submerged or surface piercing propellers rated at more than 7.5 MW;

o.1.b. Contrarotating propeller systems rated at more than 15 MW;

o.1.c. Systems employing pre-swirl or post-swirl techniques for smoothing the flow into a propeller;

o.1.d. Light-weight, high capacity (K factor exceeding 300) reduction gearing;

o.1.e. Power transmission shaft systems, incorporating "composite" material

components, capable of transmitting more than 1 MW;

o.2. Water-screw propeller, power generation systems or transmission systems designed for use on vessels, as follows:

o.2.a. Controllable-pitch propellers and hub assemblies rated at more than 30 MW;

o.2.b. Internally liquid-cooled electric propulsion engines with a power output exceeding 2.5 MW;

o.2.c. "Superconductive" propulsion engines, or permanent magnet electric propulsion engines, with a power output exceeding 0.1 MW;

o.2.d. Power transmission shaft systems, incorporating "composite" material components, capable of transmitting more than 2 MW;

o.2.e. Ventilated or base-ventilated propeller systems rated at more than 2.5 MW;

o.3. Noise reduction systems designed for use on vessels of 1,000 tons displacement or more, as follows:

o.3.a. Systems that attenuate underwater noise at frequencies below 500 Hz and consist of compound acoustic mounts for the acoustic isolation of diesel engines, diesel generator sets, gas turbines, gas turbine generator sets, propulsion motors or propulsion reduction gears, specially designed for sound or vibration isolation, having an intermediate mass exceeding 30% of the equipment to be mounted;

o.3.b. Active noise reduction or cancellation systems, or magnetic bearings, specially designed for power transmission systems, and incorporating electronic control systems capable of actively reducing equipment vibration by the generation of anti-noise or anti-vibration signals directly to the source;

p. Pumpjet propulsion systems having a power output exceeding 2.5 MW using divergent nozzle and flow conditioning vane techniques to improve propulsive efficiency or reduce propulsion-generated underwater-radiated noise.

q. Self-contained, closed or semi-closed circuit (rebreathing) diving and underwater swimming apparatus.

Note: 8A002.q does not control an individual apparatus for personal use when accompanying its user.

8A018 Items on the International Munitions List.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: See also 8A002 and 8A992.

Related Definitions: * * *

Items:

a. Closed and semi-closed circuit (rebreathing) apparatus specially designed for military use, and specially designed components for use in the conversion of open-circuit apparatus to military use;

b. Naval equipment, as follows:

b.1. Diesel engines of 1,500 hp and over with rotary speed of 700 rpm or over specially designed for submarines;

b.2. Electric motors specially designed for submarines, *i.e.*, over 1,000 hp, quick

reversing type, liquid cooled, and totally enclosed;

b.3. Nonmagnetic diesel engines, 50 hp and over, specially designed for military purposes. (An engine shall be presumed to be specially designed for military purposes if it has nonmagnetic parts other than crankcase, block, head, pistons, covers, end plates, valve facings, gaskets, and fuel, lubrication and other supply lines, or its nonmagnetic content exceeds 75 percent of total weight.);

b.4. Marine boilers designed to have any of the following characteristics:

b.4.a. Heat release rate (at maximum rating) equal to or in excess of 190,000 BTU per hour per cubic foot of furnace volume; *or*

b.4.b. Ratio of steam generated in pounds per hour (at maximum rating) to the dry weight of the boiler in pounds equal to or in excess of 0.83;

b.5. Submarine and torpedo nets; *and*

b.6. Components, parts, accessories, and attachments for the above.

8A992 Underwater systems or equipment, not controlled by 8A002 or 8A018, and specially designed parts therefor.

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List of Items Controlled

Unit: * * *

Related Controls: See also 8A002 and 8A018

Related Definitions: * * *

Items: * * * *

17. In Supplement No. 1 to part 774 (the Commerce Control List), Category 9—Propulsion Systems, Space Vehicles and Related Equipment, is amended by:

(a) Adding Export Control Classification number (ECCN) 9A012 following ECCN 9A011;

(b) Deleting ECCN 9A120;

(c) Revising the Heading and License Requirement section of ECCNs 9D001 and 9D002;

(d) Revising the Heading and the *Related Controls* paragraph of the List of Items Controlled section of ECCN 9D003; *and*

(e) Revising the Heading of ECCN 9D102, to read as follows:

9A012 Non-military unmanned aerial vehicles, having any of the following characteristics (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country Chart
NS applies to entire entry .. MT applies to non-military unmanned air vehicle systems (UAVs) and remotely piloted vehicles (RPVs) that are capable of a maximum range of at least 300 kilometers (km), regardless of payload.	NS Column 1 MT Column 1

Control(s)	Country Chart
AT applies to entire entry ..	AT Column 1

License Exceptions

LVS: N/A
 GBS: N/A
 CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in \$ value
Related Controls: See the U.S. Munitions List Category VIII (22 CFR part 121).
Related Definitions: N/A
Items:
 a. An autonomous flight control and navigation capability (e.g., an autopilot with an Inertial Navigation System); or
 b. Capability of controlled-flight out of the direct vision range involving a human operator (e.g., televisual remote control).
Note: 9A012 does not control model aircraft.

9D001 “Software” specially designed or modified for the “development” of equipment or “technology” controlled by 9A (except 9A018, 9A990 or 9A991), 9B (except 9B990 or 9B991) or 9E003.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country Chart
NS applies to “software” for items controlled by 9A001 to 9A003, 9A012, 9B001 to 9B009, 9E003.	NS Column 1
MT applies to “software” for equipment controlled by 9A001, 9A012, 9A101, 9A106, 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B116 for MT reasons.	MT Column 1
AT applies to entire entry ..	AT Column 1

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

9D002 “Software” specially designed or modified for the “production” of equipment controlled by 9A (except 9A018, 9A990 or 9A991) or 9B (except 9B990 or 9B991).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country Chart
NS applies to “software” for equipment controlled by 9A001 to 9A003, 9A012, 9B001 to 9B009, or 9E003.	NS Column 1
MT applies to “software” for equipment controlled by 9A001, 9A012, 9A101, 9A106, 9B001, 9B002, 9B003, 9B004, 9B005, 9B007 9B116 for MT reasons.	MT Column 1
AT applies to entire entry ..	AT Column 1

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

9D003 “Software” specially designed or modified for the “use” of full authority digital electronic engine controls (FADEC) for propulsion systems controlled by 9A (except 9A018, 9A990 or 9A991) or equipment controlled by 9B (except 9B990 or 9B991), as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: (1) See also 9D103. (2) “Software” “required” for the “use” of equipment or “technology” subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)
Related Definitions: * * *
Items: * * *

9D102 “Software” specially designed for the “use” of items controlled by 9A012 (for MT controlled items only), 9A101, 9A106, and 9A110.

* * * * *

18. Supplement No. 2 to part 774 (General Technology and Software Notes) is revised to read as follows:

1. *General Technology Note.* The export of “technology” that is “required” for the “development”, “production”, or “use” of items on the Commerce Control List is controlled according to the provisions in each Category.

“Technology” “required” for the “development”, “production”, or “use” of a controlled product remains controlled even when applicable to a product controlled at a lower level.

License Exception TSU is available for “technology” that is the minimum necessary for the installation, operation, maintenance (checking), and repair of those products that are eligible for License Exceptions or that are exported under a license.

N.B.: This does not allow release under a License Exception of the repair “technology” controlled by 1E002.e, 1E002.f, 8E002.a, or 8E002.b.

N.B.: The ‘minimum necessary’ excludes “development” or “production” technology and permits “use” technology only to the extent “required” to ensure safe and efficient use of the product. Individual ECCNs may further restrict export of “minimum necessary” information.

2. *General Software Note.* License Exception TSU (“mass market” software) is available to all destinations, except Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria, for release of software that is generally available to the public by being:

- a. Sold from stock at retail selling points, without restriction, by means of:
 1. Over the counter transactions;
 2. Mail order transactions;
 3. Electronic transactions; or
 4. Telephone call transactions; and
- b. Designed for installation by the user without further substantial support by the supplier.

Note: The General Software Note does not apply to “software” controlled by Category 5—part 2 (“Information Security”). For “software” controlled by Category 5, part 2, see Supplement No. 1 to part 774, Category 5, part 2, Note 3—Cryptography Note.

Dated: February 25, 2003.

James J. Jochum,
Assistant Secretary for Export Administration.

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