

**CATEGORY 7 - NAVIGATION AND AVIONICS**

**A. “END ITEMS,” “EQUIPMENT,” “ACCESSORIES,” “ATTACHMENTS,” “PARTS,” “COMPONENTS,” AND “SYSTEMS”**

*N.B.1: For automatic pilots for underwater vehicles, see Category 8. For radar, see Category 6.*

**7A001 Accelerometers as follows (see List of Items Controlled) and “specially designed” “components” therefor.**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to commodities that meet or exceed the parameters of 7A101.	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A

*GBS:* N/A

**List of Items Controlled**

*Related Controls:* (1) See USML Category XII(e) for accelerometers subject to the ITAR. (2) See also ECCNs [7A101](#), [7A611](#), and [7A994](#). (3) For angular or rotational accelerometers, see ECCN [7A001.b](#). (4) MT controls do not apply to

accelerometers that are “specially designed” and developed as Measurement While Drilling (MWD) sensors for use in downhole well service applications.

*Related Definitions:* N/A

*Items:*

a. Linear accelerometers having any of the following:

a.1. Specified to function at linear acceleration levels less than or equal to 15 g and having any of the following:

a.1.a. A “bias” “stability” of less (better) than 130 micro g with respect to a fixed calibration value over a period of one year; *or*

a.1.b. A “scale factor” “stability” of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year;

a.2. Specified to function at linear acceleration levels exceeding 15 g but less than or equal to 100 g and having all of the following:

a.2.a. A “bias” “repeatability” of less (better) than 1,250 micro g over a period of one year; *and*

a.2.b. A “scale factor” “repeatability” of less (better) than 1,250 ppm over a period of one year; *or*

a.3. Designed for use in inertial navigation or guidance systems and specified to function at linear acceleration levels exceeding 100 g;

*Note:* 7A001.a.1 and 7A001.a.2 do not apply to accelerometers limited to measurement of only vibration or shock.

b. Angular or rotational accelerometers, specified to function at linear acceleration levels exceeding 100 g.

**7A002 Gyros or angular rate sensors, having any of the following, and “specially designed” “components” therefor.**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to commodities that meet or exceed the parameters of 7A102.	MT Column 1
AT applies to entire entry	AT Column 1

**License Requirement Note:** For the purpose of MT controls only, the term ‘stability’ is defined as a measure of the ability of a specific mechanism or performance coefficient to remain invariant when continuously exposed to a fixed operating condition. (This definition does not refer to dynamic or servo stability.) (IEEE STD 528-2001 paragraph 2.247)

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: N/A  
 GBS: N/A

**List of Items Controlled**

*Related Controls:* (1) See USML Category XII(e) for gyros or angular rate sensors subject to the ITAR. (2) See also ECCNs [7A102](#), [7A611](#), and [7A994](#). (3) For angular or rotational accelerometers, see ECCN [7A001.b](#).

*Related Definitions:* N/A  
*Items:*

a. Specified to function at linear acceleration levels less than or equal to 100 g and having any

of the following:

a.1. An angular rate range of less than 500 degrees per second and having any of the following:

a.1.a. A “bias” “stability” of less (better) than 0.5 degree per hour, when measured in a 1 g environment over a period of one month, and with respect to a fixed calibration value; *or*

a.1.b. An “angle random walk” of less (better) than or equal to 0.0035 degree per square root hour; *or*

**Note:** 7A002.a.1.b does not control “spinning mass gyros”.

a.2. An angular rate range greater than or equal to 500 degrees per second and having any of the following:

a.2.a. A “bias” “stability” of less (better) than 4 degrees per hour, when measured in a 1 g environment over a period of three minutes, and with respect to a fixed calibration value; *or*

a.2.b. An “angle random walk” of less (better) than or equal to 0.1 degree per square root hour; *or*

**Note:** 7A002.a.2.b does not apply to “spinning mass gyros”.

b. Specified to function at linear acceleration levels exceeding 100 g.

**7A003 ‘Inertial measurement equipment or systems’, having any of the following.**

**License Requirements**

*Reason for Control:* NS, MT, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry	NS Column 1
MT applies to commodities in 7A003.d that meet or exceed the parameters of 7A103	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: N/A  
GBS: N/A

**List of Items Controlled**

*Related Controls:* (1) See also ECCNs [7A103](#), [7A611](#), and [7A994](#). (2) See USML Category XII(d) for guidance or navigation systems subject to the ITAR.

*Related Definitions:* N/A

*Items:*

**Note 1:** ‘Inertial measurement equipment or systems’ incorporate accelerometers or gyroscopes to measure changes in velocity and orientation in order to determine or maintain heading or position without requiring an external reference once aligned. ‘Inertial measurement equipment or systems’ include:

- Attitude and Heading Reference Systems (AHRSSs);
- Gyrocompasses;
- Inertial Measurement Units (IMUs);
- Inertial Navigation Systems (INSs);
- Inertial Reference Systems (IRSs);
- Inertial Reference Units (IRUs).

**Note 2:** 7A003 does not apply to ‘inertial measurement equipment or systems’ which are certified for use on “civil aircraft” by civil aviation authorities of one or more Wassenaar

*Arrangement Participating States, see Supplement No. 1 to part 743 of the EAR.*

**Technical Note:** ‘Positional aiding references’ independently provide position, and include:

a. “Satellite navigation system”;

b. “Data-Based Referenced Navigation” (“DBRN”).

a. Designed for “aircraft”, land vehicles or vessels, providing position without the use of ‘positional aiding references’, and having any of the following “accuracies” subsequent to normal alignment:

a.1. 0.8 nautical miles per hour (nm/hr) “Circular Error Probable” (“CEP”) rate or less (better);

a.2. 0.5% distanced travelled “CEP” or less (better); *or*

a.3. Total drift of 1 nautical mile “CEP” or less (better) in a 24 hr period;

**Technical Note:** The performance parameters in 7A003.a.1, 7A003.a.2 and 7A003.a.3 typically apply to ‘inertia measurement equipment or systems’ designed for “aircraft”, vehicles and vessels, respectively. These parameters result from the utilization of specialized non-positional aiding references (e.g., altimeter, odometer, velocity log). As a consequence, the specified performance values cannot be readily converted between these parameters. Equipment designed for multiple platforms are evaluated against each applicable entry 7A003.a.1, 7A003.a.2, or 7A003.a.3.

b. Designed for “aircraft”, land vehicles or vessels, with an embedded ‘positional aiding reference’ and providing position after loss of all ‘positional aiding references’ for a period of up

to 4 minutes, having an “accuracy” of less (better) than 10 meters “CEP”;

**Technical Note:** 7A003.b refers to systems in which ‘inertial measurement equipment or systems’ and other independent ‘positional aiding references’ are built into a single unit (i.e., embedded) in order to achieve improved performance.

c. Designed for “aircraft”, land vehicles or vessels, providing heading or True North determination and having any of the following:

c.1. A maximum operating angular rate less (lower) than 500 deg/s and a heading “accuracy” without the use of ‘positional aiding references’ equal to or less (better) than 0.07 deg sec (Lat) (equivalent to 6 arc minutes rms at 45 degrees latitude); *or*

c.2. A maximum operating angular rate equal to or greater (higher) than 500 deg/s and a heading “accuracy” without the use of ‘positional aiding references’ equal to or less (better) than 0.2 deg sec (Lat) (equivalent to 17 arc minutes rms at 45 degrees latitude);

d. Providing acceleration measurements or angular rate measurements, in more than one dimension, and having any of the following:

d.1. Performance specified by 7A001 or 7A002 along any axis, without the use of any aiding references; *or*

d.2. Being “space-qualified” and providing angular rate measurements having an “angle random walk” along any axis of less (better) than or equal to 0.1 degree per square root hour.

**Note:** 7A003.d.2 does not apply to ‘inertial measurement equipment or systems’ that contain “spinning mass gyros” as the only type of gyro.

**7A004 ‘Star trackers’ and “components”**

therefor, as follows (see List of Items Controlled).

**License Requirements**

*Reason for Control:* NS, MT, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: N/A  
GBS: N/A

**List of Items Controlled**

*Related Controls:* (1) See USML Category XV for certain ‘star trackers’ that are “subject to the ITAR” (see 22 CFR parts 120 through 130). (2) See also 7A104 and 7A994.

*Related Definitions:* N/A

*Items:*

a. ‘Star trackers’ with a specified azimuth “accuracy” of equal to or less (better) than 20 seconds of arc throughout the specified lifetime of the equipment;

b. “Components” “specially designed” for equipment specified in 7A004.a as follows:

b.1. Optical heads or baffles;

b.2. Data processing units.

**Technical Note:** ‘Star trackers’ are also referred to as stellar attitude sensors or gyro-astro compasses.

**7A005 “Satellite navigation system” receiving equipment having any of the following and “specially designed” “components” therefor.**

- a. Employing a decryption algorithm “specially designed” or modified for government use to access the ranging code for position and time; *or*
- b. Employing ‘adaptive antenna systems’.

**License Requirements**

*Reason for Control:* NS, MT and AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to 7A005.b	NS Column 1
MT applies to commodities in 7A005.b that meet or exceed the parameters of 7A105.	MT Column 1
AT applies to 7A005.b	AT Column 1

*Note:* 7A005.b does not apply to “satellite navigation system” receiving equipment that only uses “components” designed to filter, switch, or combine signals from multiple omnidirectional antennas that do not implement adaptive antenna techniques.

*Technical Note:* For the purposes of 7A005.b ‘adaptive antenna systems’ dynamically generate one or more spatial nulls in an antenna array pattern by signal processing in the time domain or frequency domain.

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: N/A  
GBS: N/A

**7A006 Airborne altimeters operating at frequencies other than 4.2 to 4.4 GHz inclusive and having any of the following (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* NS, MT, AT

**List of Items Controlled**

*Related Controls:* (1) See also ECCNs [7A105](#), [7A611](#) and [7A994](#). Commercially available “satellite navigation system” receivers do not typically employ decryption or adaptive antennae and are classified as [7A994](#). (2) See USML Category XII(d) for “satellite navigation system” receiving equipment subject to the ITAR and USML Category XI(c)(10) for antennae that are subject to the ITAR. (3) Items that otherwise would be covered by ECCN [7A005](#).a are “subject to the ITAR” (see 22 CFR parts 120 through 130).

*Related Definitions:* N/A  
*Items:*

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to commodities in this entry that meet or exceed the parameters of 7A106	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: N/A  
GBS: N/A

**List of Items Controlled**

*Related Controls:* See also [7A106](#), [7A994](#) and Category 6 for controls on radar.  
*Related Definitions:* N/A  
*Items:*

- a. ‘Power management’; or

**Technical Note:** ‘Power management’ is changing the transmitted power of the altimeter signal so that received power at the “aircraft” altitude is always at the minimum necessary to determine the altitude.

- b. Using phase shift key modulation.

**7A008 Underwater sonar navigation systems using Doppler velocity or correlation velocity logs integrated with a heading source and having a positioning “accuracy” of equal to or less (better) than 3% of distance traveled “Circular Error Probable” (“CEP”) and “specially designed” “components” therefor.**

**License Requirements**

*Reason for Control:* NS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* [7A008](#) does not control systems “specially designed” for

installation on surface vessels or systems requiring acoustic beacons or buoys to provide positioning data. See 6A001.a for acoustic systems, and 6A001.b for correlation-velocity and Doppler- velocity sonar log equipment. See 8A002 for other marine systems.

*Related Definitions:* N/A  
*Items:*

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

**7A101 Accelerometers, other than those controlled by 7A001 (see List of Items Controlled), and “specially designed” “parts” and “components” therefor.**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* (1) See USML Category XII(e) for accelerometers subject to the ITAR. (2) See also ECCNs [7A101](#) and [7A611](#). (3) This entry does not control accelerometers that are “specially designed” and developed as MWD (Measurement While Drilling) sensors for use in downhole well service operations.

*Related Definitions:* N/A  
*Items:*

a. Linear accelerometers designed for use in inertial navigation systems or in guidance systems of all types, usable in “missiles” having *all* of the following characteristics, and “specially designed” “parts” and “components” therefor:

a.1. ‘Scale factor’ “repeatability” less (better) than 1250 ppm; and

a.2. ‘Bias’ “repeatability” less (better) than 1250 micro g.

*Note: The measurement of ‘bias’ and ‘scale factor’ refers to one sigma standard deviation with respect to a fixed calibration over a period of one year.*

b. Accelerometers of any type, designed for use in inertial navigation systems or in guidance systems of all types, specified to function at acceleration levels greater than 100 g.

*Note to paragraph (b): This paragraph (b) does not include accelerometers that are designed to measure vibration or shock.*

**7A102 Gyros, other than those controlled by 7A002 (see List of Items Controlled), and “specially designed” “parts” and “components” therefor.**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

**List of Items Controlled**

*Related Controls:* (1) See USML Category XII(e) for gyros or angular rate sensors subject to the ITAR. (2) See also ECCNs [7A002](#), [7A611](#), and [7A994](#).

*Related Definitions:* 1.) Drift rate is defined as the time rate of output deviation from the desired output. It consists of random and systematic components and is expressed as an equivalent angular displacement per unit time with respect to inertial space. 2.) Stability is defined as standard deviation (1 sigma) of the variation of a particular parameter from its calibrated value measured under stable temperature conditions. This can be expressed as a function of time.

*Items:*

a. All types of gyros, usable in rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km, with a rated “drift rate” ‘stability’ of less than 0.5 degrees (1 sigma or rms) per hour in a 1 g environment.

b. Gyros of any type, designed for use in inertial navigation systems or in guidance systems of all types, specified to function at acceleration levels greater than 100 g.

*Technical Note: In this entry, the term ‘stability’ is defined as a measure of the ability of a specific mechanism or performance coefficient to remain invariant when continuously exposed to a fixed operating condition. (This definition does not refer to dynamic or servo stability.) (IEEE STD 528-2001 paragraph 2.247)*

**7A103 Instrumentation, navigation**

equipment and systems, other than those controlled by 7A003, and “specially designed” “parts” and “components” therefor, as follows (see List of Items Controlled).

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* (1) See ECCN 7A003 and 7A994. (2) Inertial navigation systems and inertial equipment, and “specially designed” “parts” and “components” therefor specifically designed, modified or configured for military use are “subject to the ITAR” (see 22 CFR parts 120 through 130).

*Related Definitions:* ‘Inertial measurement equipment or systems’ specified in 7A103.a. incorporate accelerometers or gyros to measure changes in velocity and orientation in order to determine or maintain heading or position without requiring an external reference once aligned.

*Items:*

a. ‘Inertial measurement equipment or systems’ using accelerometers or gyros controlled by 7A001, 7A002, 7A101 or 7A102, and “specially designed” “parts” and “components” therefor;

*Note 1:* 7A103.a does not control equipment containing accelerometers “specially designed” and developed as MWD (Measurement While Drilling) sensors for use in down-hole well services operations.

*Note 2:* 7A103.a does not control inertial or other equipment using accelerometers or gyros controlled by 7A001 or 7A002 that are only NS controlled.

*Note 3:* 7A103.a. includes Attitude and Heading Reference Systems (AHRs), gyrocompasses, Inertial Measurement Units (IMUs), Inertial Navigations Systems (INSs), Inertial Reference Systems (IRSs), and Inertial Reference Units (IRUs).

b. Integrated flight instrument systems, which include gyrostabilizers or automatic pilots, designed or modified for use in rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km, and “specially designed” “parts” and “components” therefor.

c. Integrated Navigation Systems, designed or modified for use in rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km and capable of providing a navigational accuracy of 200m Circular Error Probable (CEP) or less.

**Technical Note:** An ‘integrated navigation system’ typically incorporates the following “parts” and “components”:

1. An inertial measurement device (e.g., an attitude and heading reference system, inertial reference unit, or inertial navigation system);

2. One or more external sensors used to update the position and/or velocity, either periodically or continuously throughout the flight (e.g., satellite navigation receiver, radar altimeter, and/or Doppler radar); and



3. *Integration hardware and software.*

**7A104 Gyro-astro compasses and other devices, other than those controlled by 7A004, which derive position or orientation by means of automatically tracking celestial bodies or satellites and “specially designed” “parts” and “components” therefor.**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* (1) See USML Categories IV and XV for certain ‘star trackers’ that are “subject to the ITAR” (see 22 CFR parts 120 through 130). (2) This entry controls “specially designed” “parts” and “components” for gyro-astro compasses and other devices controlled by 7A004.

*Related Definitions:* N/A

*Items:*

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

**7A105 Receiving equipment for ‘navigation satellite systems’, having any of the following characteristics (see List of Items Controlled),**

**and “specially designed” “parts” and “components” therefor.**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* (1) See also 7A005, 7A611 and 7A994. (2) See USML Category XII(d) for GNSS receiving equipment subject to the ITAR and USML Category XI(c)(10) for antennae that are subject to the ITAR. (3) Items that otherwise would be covered by ECCN 7A105.b.2 are “subject to the ITAR” (see 22 CFR parts 120 through 130). (4) See USML Category XII(d) for GPS receiving equipment in 7A105.a, b.1 and b.3 that are subject to the ITAR.

*Related Definitions:* ‘Navigation satellite systems’ include Global Navigation Satellite Systems (GNSS; e.g. GPS, GLONASS, Galileo or BeiDou) and Regional Navigation Satellite Systems (RNSS; e.g. NavIC, QZSS).

*Items:*

- a. Designed or modified for use in “missiles”; *or*
- b. Designed or modified for airborne applications and having any of the following:

b.1. Capable of providing navigation information at speeds in excess of 600 m/s;

LVS: N/A  
GBS: N/A

b.2. Employing decryption, designed or modified for military or governmental services, to gain access to a ‘navigation satellite system’ secure signal/data; *or*

**List of Items Controlled**

*Related Controls:* N/A  
*Related Definitions:* N/A  
*Items:*

b.3. Being “specially designed” to employ anti-jam features (*e.g.*, null steering antenna or electronically steerable antenna) to function in an environment of active or passive countermeasures.

- a. Internal tilt compensation in pitch (+/-90 degrees) and roll (+/-180 degrees) axes;
- b. Azimuthal accuracy better (less) than 0.5 degrees rms at latitudes of +/-80 degrees, referenced to local magnetic field; *and*
- c. Designed or modified to be integrated with flight control and navigation systems.

*Note: 7A105.b.2 and 7A105.b.3 do not control equipment designed for commercial, civil or Safety of Life (e.g., data integrity, flight safety) 'navigation satellite system' services.*

*Note: Flight control and navigation systems in 7A107 include gyrostabilizers, automatic pilots and inertial navigation systems.*

**7A106 Altimeters, other than those controlled by 7A006, of radar or laser radar type, designed or modified for use in “missiles”. (These items are “subject to the ITAR”. See 22 CFR parts 120 through 130.)**

**7A115 Passive sensors for determining bearing to specific electromagnetic sources (direction finding equipment) or terrain characteristics, designed or modified for use in “missiles”. (These items are “subject to the ITAR”. See 22 CFR parts 120 through 130.)**

**7A107 Three axis magnetic heading sensors having all of the following characteristics (see List of Items Controlled), and “specially designed” “parts” and “components” therefor.**

**7A116 Flight control systems and “parts” and “components”, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* MT, AT

**License Requirements**

*Reason for Control:* MT, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

Control(s)	Country Chart (See Supp. No. 1 to part 738)
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

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for a description of all license exceptions)

LVS: N/A  
 GBS: N/A

**List of Items Controlled**

*Related Controls:* (1) See 9A610.r and 9A610.s for items designed or modified for military UAVs. (2) See USML Category IV for items “specially designed” for use in rockets or missiles that are “subject to the ITAR.”

*Related Definitions:* N/A

*Items:*

a. Pneumatic, hydraulic, mechanical, electro-optical, or electromechanical flight control systems (including fly-by-wire and fly-by-light systems) designed or modified for UAVs capable of delivering at least 500 kilograms of payload to a range of at least 300 km, other than those controlled by either USML paragraph VIII(a) or ECCN 9A610.a;

b. Attitude control equipment designed or modified for UAVs capable of delivering at least 500 kilograms of payload to a range of at least 300 km, other than those controlled by either USML paragraph VIII(a) or ECCN 9A610.a;

c. Flight control servo valves designed or modified for the systems in 7A116.a or 7A116.b, and designed or modified to operate in a vibration environment greater than 10 g rms over the entire range between 20Hz and 2 kHz.

*Note: This entry includes the systems, equipment and valves designed or modified to enable operation of manned aircraft as unmanned aerial vehicles.*

**7A117 “Guidance sets” capable of achieving system accuracy of 3.33% or less of the range (e.g., a “CEP” of 10 km or less at a range of 300 km). (These items are “subject to the**

**ITAR”.** See 22 CFR parts 120 through 130.)

**7A611 Military fire control, laser, imaging, and guidance equipment, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* NS, MT, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 7A611.y	NS Column 1
MT applies to commodities in 7A611.a that meet or exceed the parameters in 7A103.b or .c	MT Column 1
RS applies to entire entry except 7A611.y	RS Column 1
RS applies to 7A611.y	China, Russia, or Venezuela (see § 724.6(a)(7))
AT applies to entire entry	AT Column 1
UN applies to entire entry except 7A611.y	See § 746.1(b) for UN controls

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: \$1500  
 GBS: N/A

**Special Conditions for STA**

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 7A611.

**List of Items Controlled**

*Related Controls:* (1) Military fire control, laser, imaging, and guidance equipment that are

enumerated in USML Category XII, and technical data (including software) directly related thereto, are subject to the ITAR. (2) See Related Controls in ECCNs 0A504, [2A984](#), [6A002](#), [6A003](#), [6A004](#), [6A005](#), [6A007](#), [6A008](#), [6A107](#), [7A001](#), [7A002](#), [7A003](#), [7A005](#), [7A101](#), [7A102](#), and [7A103](#). (3) See ECCN 3A611 and USML Category XI for controls on countermeasure equipment. (4) See ECCN [0A919](#) for foreign-made “military commodities” that incorporate more than a *de minimis* amount of U.S. origin “600 series” controlled content.

*Related Definitions:* N/A

*Items:*

a. Guidance or navigation systems, not elsewhere specified on the USML, that are “specially designed” for a defense article on the USML or for a 600 series item.

b. to w. [Reserved]

x. “Parts,” “components,” “accessories,” and “attachments,” including accelerometers, gyros, angular rate sensors, gravity meters (gravimeters), and inertial measurement units (IMUs), that are “specially designed” for defense articles controlled by USML Category XII or items controlled by 7A611, and that are NOT:

1. Enumerated or controlled in the USML or elsewhere within ECCN 7A611;

2. Described in ECCNs 6A007, 6A107, 7A001, 7A002, 7A003, 7A101, 7A102 or 7A103; or

3. Elsewhere specified in ECCN 7A611.y or 3A611.y.

y. Specific “parts,” “components,” “accessories,” and “attachments” “specially designed” for a commodity subject to control in this ECCN or a defense article in Category XII and not elsewhere specified on the USML or in the CCL, as follows, and “parts,” “components,”

“accessories,” and “attachments” “specially designed” therefor:

y.1 [Reserved]

**7A994 Other navigation direction finding equipment, airborne communication equipment, all aircraft inertial navigation systems not controlled under 7A003 or 7A103, and other avionic equipment, including “parts” and “components,” n.e.s.**

**License Requirements**

*Reason for Control:* AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
AT applies to entire entry	AT Column 1

*License Requirement Notes:* Typically commercially available GPS do not employ decryption or adaptive antenna and are classified as 7A994.

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A

*GBS:* N/A

**List of Items Controlled**

*Related Controls:* See [7A005](#) and [7A105](#).

*Related Definitions:* N/A

*Items:*

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

**B. TEST, INSPECTION AND “PRODUCTION EQUIPMENT”**

**7B001 Test, calibration or alignment equipment, “specially designed” for equipment controlled by 7A (except 7A994).**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* (1) See also [7B101](#), [7B102](#) and [7B994](#). (2) This entry does not control test, calibration or alignment equipment for ‘Maintenance level I’ or ‘Maintenance Level II’.

*Related Definition:* (1) ‘Maintenance Level I’: The failure of an inertial navigation unit is detected on the “aircraft” by indications from the Control and Display Unit (CDU) or by the status message from the corresponding sub-system. By following the manufacturer’s manual, the cause of the failure may be localized at the level of the malfunctioning Line Replaceable Unit (LRU). The operator then removes the LRU and replaces it with a spare. (2) ‘Maintenance Level II’: The defective LRU is sent to the maintenance workshop (the manufacturer’s or that of the operator responsible for level II maintenance). At the maintenance workshop, the malfunctioning LRU is tested by various appropriate means to verify and localize the defective Shop

Replaceable Assembly (SRA) module responsible for the failure. This SRA is removed and replaced by an operative spare. The defective SRA (or possibly the complete LRU) is then shipped to the manufacturer. ‘Maintenance Level II’ does not include the disassembly or repair of controlled accelerometers or gyro sensors.

*Items:*

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

**7B002 Equipment “specially designed” to characterize mirrors for ring “laser” gyros, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* See also [7B102](#) and [7B994](#)

*Related Definitions:* N/A

*Items:*

- a. Scatterometers having a measurement “accuracy” of 10 ppm or less (better);
- b. Profilometers having a measurement “accuracy” of 0.5 nm (5 angstrom) or less

(better).

**7B003 Equipment “specially designed” for the “production” of equipment controlled by 7A (except 7A994).**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A

*GBS:* N/A

**List of Items Controlled**

*Related Controls:* (1) See also [7B103](#), (this entry is “subject to the ITAR” (see 22 CFR parts 120 through 130)) and [7B994](#). (2) This entry includes: Inertial Measurement Unit (IMU module) tester; IMU platform tester; IMU stable element handling fixture; IMU platform balance fixture; gyro tuning test station; gyro dynamic balance station; gyro run-in/motor test station; gyro evacuation and fill station; centrifuge fixtures for gyro bearings; accelerometer axis align stations; accelerometer test station; and fiber optic gyro coil winding machines.

*Related Definitions:* N/A

*Items:*

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

**7B101 “Production equipment”, and other test, calibration, and alignment equipment, other than that described in 2B119 to 2B122, 7B003, and 7B102, designed or modified to be used with equipment controlled by 7A001 to 7A004 or 7A101 to 7A104.**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A

*GBS:* N/A

**List of Items Controlled**

*Related Controls:*1.) See also 2B119 to 2B122, [7B003](#), [7B102](#), and [7B994](#). 2.) This entry includes: inertial measurement unit (IMU module) tester; IMU platform tester; IMU stable element handling fixture; IMU platform balance fixture; gyro tuning test station; gyro dynamic balance stations; gyro run-in/motor test stations; gyro evacuation and filling stations; centrifuge fixtures for gyro bearings; accelerometer axis align stations; and accelerometer test stations.

*Related Definitions:* N/A

*Items:*

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

**7B102 Equipment, other than those**

controlled by 7B002, designed or modified to characterize mirrors, for laser gyro equipment, as follows (see List of Items Controlled).

guidance equipment, as follows (see List of Items Controlled).

**License Requirements**

**License Requirements**

*Reason for Control:* MT, AT

*Reason for Control:* NS, MT, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to 7B611.a commodities “specially designed” for 7A611.a commodities controlled for MT reasons	MT Column 1
RS applies to entire entry	RS Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	See § 746.1(b) for UN controls

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

LVS: N/A  
GBS: N/A

LVS: \$1500  
GBS: N/A

**List of Items Controlled**

**Special Conditions for STA**

*Related Controls:* N/A  
*Related Definitions:* N/A  
*Items:*

*STA:* Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 7B611.

- a. Scatterometers having a threshold accuracy of 10 ppm or less (better).
- b. Reflectometers having a threshold accuracy of 50 ppm or less (better).
- c. Prolifometers having a threshold accuracy of 0.5nm (5 angstrom) or less (better).

**List of Items Controlled**

**7B103 “Specially designed” “production facilities” for equipment controlled by 7A117.** (These items are “subject to the ITAR”. See 22 CFR parts 120 through 130.)

*Related Controls:* N/A  
*Related Definitions:* N/A  
*Items:*

**7B611 Test, inspection, and production commodities “specially designed” for military fire control, laser, imaging, and**

- a. Test, inspection, and production end items and equipment “specially designed” for the “development,” “production,” repair, overhaul, or refurbishing of commodities controlled in ECCN 7A611 (except 7A611.y) or commodities in USML Category XII that are not enumerated in USML Category XII or controlled by another

“600 series” ECCN.

b. Environmental test facilities “specially designed” for the certification, qualification, or testing of commodities controlled in ECCN 7A611 (except 7A611.y) or guidance equipment in USML Category XII that are not enumerated in USML Category XII or controlled by another “600 series” ECCN.

c. Field test equipment “specially designed” to evaluate or calibrate the operation of systems described in USML Category XII(a), (b), or (c).

d. to w. [Reserved]

x. “Parts,” “components,” “accessories,” and “attachments” that are “specially designed” for a commodity listed in this entry and that are not enumerated on the USML or controlled by another “600 series” ECCN.

**7B994 Other equipment for the test, inspection, or “production” of navigation and avionics equipment.**

**License Requirements**

*Reason for Control:* AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*LVS:* N/A  
*GBS:* N/A

**List of Items Controlled**

*Related Controls:* N/A  
*Related Definitions:* N/A  
*Items:*

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

**C. “MATERIALS”  
[Reserved]**

**D. “SOFTWARE”**

**7D001 “Software” “specially designed” or modified for the “development” or “production” of equipment controlled by 7A (except 7A994) or 7B (except 7B994).**

**License Requirements**

*Reason for Control:* NS, MT, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to software” for equipment controlled by 7A001 to 7A004, 7A006, 7A008, 7B001, 7B002 or 7B003	NS Column 1
MT applies to “software” for equipment controlled for MT reasons. MT does not apply to “software” for equipment controlled by 7A008.	MT Column 1
RS applies to “software” for inertial navigation systems and inertial equipment, and “components” therefor, for “9A991.b aircraft”.	RS Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A



**List of Items Controlled**

*Related Controls:* 1.) See also [7D101](#) and [7D994](#). 2.) The “software” related to [7A003.b](#), [7A005](#), [7A103.b](#), [7A105](#), [7A106](#), [7A115](#), [7A116](#), [7A117](#), or [7B103](#) is “subject to the ITAR” (see 22 CFR parts 120 through 130). 3.) “Software” for inertial navigation systems and inertial equipment and “parts” or “components” “specially designed” therefor that are directly related to defense articles and not “specially designed” for use on civil aircraft is “subject to the ITAR” (see 22 CFR parts 120 through 130).

*Related Definitions:* N/A

*Items:*

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

**7D002 “Source code” for the operation or maintenance of any inertial navigation equipment, including inertial equipment not controlled by 7A003 or 7A004, or Attitude and Heading Reference Systems (‘AHRS’).**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**Reporting Requirements**

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**List of Items Controlled**

*Related Controls:* 1.) See also [7D102](#) and [7D994](#). 2.) This entry does not control “source code” for the operation or maintenance of gimbaled ‘AHRS’.

*Related Definition:* ‘AHRS’ generally differ from Inertial Navigation Systems (INS) in that an ‘AHRS’ provides attitude and heading information and normally does not provide the acceleration, velocity and position information associated with an INS.

*Items:*

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

**7D003 Other “software” as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to “software” for equipment controlled for MT reasons. MT does not apply to “software” for equipment controlled by 7A008.	MT Column 1
AT applies to entire entry	AT Column 1

**Reporting Requirements**

See § 743.1 of the EAR for reporting requirements for exports under License

Exceptions, and Validated End-User authorizations.

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

TSR: N/A

**Special Conditions for STA**

STA: License Exception STA may not be used to ship or transmit software in 7D003.a or .b to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

**List of Items Controlled**

*Related Controls:* See also [7D103](#) and [7D994](#).

*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, 7A004 or 7A008;

b. “Source code” for hybrid integrated systems which improves the operational performance or reduces the navigational error of systems to the level controlled by 7A003 or 7A008 by continuously combining heading data with any of the following:

b.1. Doppler radar or sonar velocity data;

b.2. “Satellite navigation system” reference data; *or*

b.3. Data from ‘Data-Based Referenced Navigation’ (‘DBRN’) systems;

c. [Reserved]

d. [Reserved]

*N.B. For flight control “source code,” see 7D004.*

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.1, 7E004.b.3 to b.5, 7E004.b.7 to b.8, 7E004.c.1 or 7E004.c.2.

**7D004 “Source code” incorporating “development” “technology” specified by 7E004.a.2, a.3, a.5, a.6 or 7E004.b, for any of the following: (see List of Items Controlled). License Requirements**

*Reason for Control:* NS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

TSR: N/A

**Special Conditions for STA**

*STA:* License Exception STA may not be used to ship or transmit “software” in 7D004.a to .d and .g to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

*Reason for Control:* NS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

**List of Items Controlled**

*Related Controls:* See [7D103](#) and [7D994](#)

*Related Definitions:* N/A

*Items:*

- a. Digital flight management systems for “total control of flight”;
- b. Integrated propulsion and flight control systems;
- c. “Fly-by-wire systems” or “fly-by-light systems”;
- d. Fault-tolerant or self-reconfiguring “active flight control systems”;
- e. [Reserved];
- f. Air data systems based on surface static data;  
*or*
- g. Three dimensional displays.

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**List of Items Controlled**

*Related Controls:* N/A

*Related Definitions:* N/A

*Items:*

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

*Note:* 7D004 does not apply to “source code” associated with common computer elements and utilities (e.g., input signal acquisition, output signal transmission, computer program and data loading, built-in test, task scheduling mechanisms) not providing a specific flight control system function.

**7D101 “Software” “specially designed” or modified for the “use” of equipment controlled for missile technology (MT) reasons by 7A001 to 7A006, 7A101 to 7A107, 7A115, 7A116, 7A117, 7B001, 7B002, 7B003, 7B101, 7B102, or 7B103.**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**7D005 “Software” “specially designed” to decrypt “Satellite navigation system” ranging signals designed for government use.**

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**License Requirements**

**List of Items Controlled**

*Related Controls:* (1) The “software” related to [7A003.b](#), [7A005](#), [7A103.b](#), [7A105](#), [7A106](#), [7A115](#), [7A116](#), [7A117](#), or [7B103](#) is “subject to the ITAR” (see 22 CFR parts 120 through 130). (2) “Software” for inertial navigation systems and inertial equipment and “parts” and “components” “specially designed” therefor that are directly related to a defense article is “subject to the ITAR” (see 22 CFR parts 120 through 130).

*Related Definitions:* N/A

*Items:*

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

**7D102 Integration “software,” as follows (See List of Items Controlled).**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**List of Items Controlled**

*Related Controls:* The “software” related to [7A003.b](#) or [7A103.b](#) is “subject to the ITAR” (see 22 CFR parts 120 through 130).

*Related Definitions:* N/A

*Items:*

a. Integration “software” for the equipment controlled by 7A103.b.

b. Integration “software” “specially designed” for the equipment controlled by 7A003 or 7A103.a.

**7D103 “Software” “specially designed” for modelling or simulation of the “guidance sets” controlled by 7A117 or for their design integration with “missiles”. (This entry is “subject to the ITAR”. See 22 CFR parts 120 through 130.)**

**7D611 “Software” “specially designed” for commodities controlled by 7A611 or equipment controlled by 7B611, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* NS, MT, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 7D611.y	NS Column 1
MT applies to 7D611.a “software” “specially designed” for 7A611.a commodities controlled for MT reasons	MT Column 1
RS applies to entire entry except 7D611.y	RS Column 1
RS applies to 7D611.y	China, Russia, or Venezuela (see § 724.6(a)(7))
AT applies to entire entry	AT Column 1
UN applies to entire entry except 7D611.y	See § 746.1(b) for UN controls

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**Special Conditions for STA**

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any software in 7D611.

**List of Items Controlled**

*Related Controls:* “Software” directly related to articles enumerated in USML Category XII is subject of USML paragraph XII(f).

*Related Definitions:* N/A

*Items:*

a. “Software” “specially designed” for the “development,” “production,” operation, or maintenance of commodities controlled by ECCNs 7A611 (except 7A611.y) or 7B611.

b. to x. [Reserved]

y. Specific “software” “specially designed” for the “development,” “production,” operation, or maintenance of commodities described in 7A611.y.

**7D994 “Software”, n.e.s., for the “development”, “production”, or “use” of navigation, airborne communication and other avionics.**

**License Requirements**

*Reason for Control:* AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

TSR: N/A

**List of Items Controlled**

*Related Controls:* N/A

*Related Definitions:* N/A

*Items:*

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

**E. “TECHNOLOGY”**

**7E001 “Technology” according to the General Technology Note for the “development” of equipment or “software,” specified by 7A. (except 7A994), 7B. (except 7B994), 7D001, 7D002, 7D003 or 7D005.**

**License Requirements**

*Reason for Control:* NS, MT, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to technology” for items controlled by 7A001 to 7A004, 7A006, 7A008, 7B001 to 7B003, 7D001 to 7D005.	NS Column 1
MT applies to “technology” for equipment controlled for MT reasons. MT <i>does not</i> apply to “technology” for equipment controlled by 7A008. MT <i>does</i> apply to “technology” for equipment specified in 7A001, 7A002 or 7A003.d that meets or exceeds parameters of 7A101, 7A102 or 7A103.	MT Column 1
RS applies to “technology” for inertial navigation systems or inertial	RS Column 1

equipment, and “components” therefor, for 9A991.b aircraft.	
AT applies to entire entry	AT Column 1

**7E002 “Technology” according to the General Technology Note for the “production” of equipment controlled by 7A (except 7A994) or 7B (except 7B994).**

**Reporting Requirements**

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

TSR: N/A

**Special Conditions for STA**

STA: License Exception STA may not be used to ship or transmit any technology in this entry to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

**List of Items Controlled**

*Related Controls:* 1) See also 7E101 and 7E994. 2) The “technology” related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, 7B103, software in 7D101 specified in the Related Controls paragraph of ECCN 7D101, 7D102.a, or 7D103 is “subject to the ITAR” (see 22 CFR parts 120 through 130).

*Related Definitions:* N/A

*Items:*

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

**Note:** 7E001 includes key management “technology” exclusively for equipment specified in 7A005.a.

**License Requirements**

*Reason for Control:* NS, MT, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to “technology” for equipment controlled by 7A001 to 7A004, 7A006, 7A008 or 7B001 to 7B003	NS Column 1
MT applies to “technology” for equipment controlled for MT reasons. MT <i>does not</i> apply to “technology” for equipment controlled by 7A008. MT <i>does</i> apply to “technology” for equipment specified in 7A001, 7A002 or 7A003.d that meets or exceeds parameters of 7A101, 7A102 or 7A103.	MT Column 1
RS applies to “technology” for inertial navigation systems or inertial equipment, and “components” therefor, for 9A991.b aircraft.	RS Column 1
AT applies to entire entry	AT Column 1

**Reporting Requirements**

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

TSR: N/A

TSR: N/A

**Special Conditions for STA**

STA: License Exception STA may not be used to ship or transmit any technology in this entry to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

**List of Items Controlled**

*Related Controls:* (1) See also [7E102](#) and [7E994](#). (2) The “technology” related to [7A003.b](#), [7A005](#), [7A103.b](#), [7A105](#), [7A106](#), [7A115](#), [7A116](#), [7A117](#), or [7B103](#) is “subject to the ITAR” (see 22 CFR parts 120 through 130).

*Related Definitions:* N/A

*Items:*

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

**7E003 “Technology” according to the General Technology Note for the repair, refurbishing or overhaul of equipment controlled by 7A001 to 7A004.**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

**List of Items Controlled**

*Related Controls:* See also 7E994. This entry does not control “technology” for maintenance directly associated with calibration, removal or replacement of damaged or unserviceable LRUs and SRAs of a “civil aircraft” as described in ‘Maintenance Level I’ or ‘Maintenance Level II’.

*Related Definition:* Refer to the Related Definitions for 7B001 for ‘Maintenance Level I’ or ‘Maintenance Level II’.

*Items:*

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

**7E004 Other “technology” as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to “technology” for equipment or systems controlled for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

TSR: N/A

**Special Conditions for STA**

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 7E004, except for 7E004.a.7. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for 7E004, except for 7E004.a.7.

a.3. Three dimensional displays for “aircraft”;

a.4. [Reserved]

a.5. Electric actuators (*i.e.*, electromechanical, electrohydrostatic and integrated actuator package) “specially designed” for ‘primary flight control’;

### List of Items Controlled

*Related Controls:* (1) See also 7E001, 7E002, 7E101, and 7E994. (2) In addition to the Related Controls in 7E001, 7E002, and 7E101 that include MT controls, also see the MT controls in 7E104 for design “technology” for the integration of the flight control, guidance, and propulsion data into a flight management system, designed or modified for rockets or missiles capable of achieving a “range” equal to or greater than 300 km, for optimization of rocket system trajectory; and also see 9E101 for design “technology” for integration of air vehicle fuselage, propulsion system and lifting control surfaces, designed or modified for unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km, to optimize aerodynamic performance throughout the flight regime of an unmanned aerial vehicle.

*Related Definitions:* “Primary flight control” means an “aircraft” stability or maneuvering control using force/moment generators, *i.e.*, aerodynamic control surfaces or propulsive thrust vectoring.

#### Items:

a. “Technology” for the “development” or “production” of any of the following:

a.1. [Reserved]

a.2. Air data systems based on surface static data only, *i.e.*, which dispense with conventional air data probes;

**Technical Note:** ‘Primary flight control’ is “aircraft” stability or maneuvering control using force/moment generators, *i.e.*, aerodynamic control surfaces or propulsive thrust vectoring.

a.6. ‘Flight control optical sensor array’ “specially designed” for implementing “active flight control systems”; *or*

**Technical Note:** A ‘flight control optical sensor array’ is a network of distributed optical sensors, using “laser” beams, to provide real-time flight control data for on-board processing.

a.7. “DBRN” systems designed to navigate underwater, using sonar or gravity databases, that provide a positioning “accuracy” equal to or less (better) than 0.4 nautical miles;

b. “Development” “technology”, as follows, for “active flight control systems” (including “fly-by-wire systems” or “fly-by-light systems”):

b.1. Photonic-based “technology” for sensing “aircraft” or flight control component state, transferring flight control data, or commanding actuator movement, “required” for “fly-by-light systems” “active flight control systems”;

b.2. [Reserved]

b.3. Real-time algorithms to analyze component sensor information to predict and preemptively mitigate impending degradation



and failures of components within an “active flight control system”;

*Note:* 7E004.b.3 does not include algorithms for purpose of off-line maintenance.

b.4. Real-time algorithms to identify component failures and reconfigure force and moment controls to mitigate “active flight control system” degradations and failures;

*Note:* 7E004.b.4 does not include algorithms for the elimination of fault effects through comparison of redundant data sources, or off-line pre-planned responses to anticipated failures.

b.5. Integration of digital flight control, navigation and propulsion control data, into a digital flight management system for “total control of flight”;

*Note:* 7E004.b.5 does not apply to:

1. “Technology” for integration of digital flight control, navigation and propulsion control data, into a digital flight management system for ‘flight path optimization’;

2. “Technology” for “aircraft” flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches.

**Technical Note:** ‘Flight path optimization’ is a procedure that minimizes deviations from a four-dimensional (space and time) desired trajectory based on maximizing performance or effectiveness for mission tasks.

b.6. [Reserved]

b.7. “Technology” “required” for deriving the functional requirements for “fly-by-wire systems” having all of the following:

b.7.a. ‘Inner-loop’ airframe stability controls requiring loop closure rates of 40 Hz or greater; and

**Technical Note:** ‘Inner-loop’ refers to functions of “active flight control systems” that automate airframe stability controls.

b.7.b. Having any of the following:

b.7.b.1. Corrects an aerodynamically unstable airframe, measured at any point in the design flight envelope, that would lose recoverable control if not corrected within 0.5 seconds;

b.7.b.2. Couples controls in two or more axes while compensating for ‘abnormal changes in aircraft state’;

**Technical Note:** ‘Abnormal changes in aircraft state’ include in-flight structural damage, loss of engine thrust, disabled control surface, or destabilizing shifts in cargo load.

b.7.b.3. Performs the functions specified in 7E004.b.5; or

*Note:* 7E004.b.7.b.3 does not apply to autopilots.

b.7.b.4. Enables “aircraft” to have stable controlled flight, other than during take-off or landing, at greater than 18 degrees angle of attack, 15 degrees side slip, 15 degrees/second pitch or yaw rate, or 90 degrees/second roll rate;

b.8. “Technology” “required” for deriving the functional requirements of “fly-by-wire systems” to achieve all of the following:

b.8.a. No loss of control of the “aircraft” in the event of a consecutive sequence of any two individual faults within the “fly-by-wire system”; and

b.8.b. Probability of loss of control of the "aircraft" being less (better) than  $1 \times 10^{-9}$  failures per flight hour;

*Note: 7E004.b does not apply to "technology" associated with common computer elements and utilities (e.g., input signal acquisition, output signal transmission, computer program and data loading, built-in test, task scheduling mechanisms) not providing a specific flight control system function.*

c. "Technology" for the "development" of helicopter systems, as follows:

c.1. Multi-axis fly-by-wire or fly-by-light controllers, which combine the functions of at least two of the following into one controlling element:

- c.1.a. Collective controls;
- c.1.b. Cyclic controls;
- c.1.c. Yaw controls;

c.2. "Circulation-controlled anti-torque or circulation-controlled direction control systems";

c.3. Rotor blades incorporating 'variable geometry airfoils', for use in systems using individual blade control.

*Technical Note: 'Variable geometry airfoils' use trailing edge flaps or tabs, or leading edge slats or pivoted nose droop, the position of which can be controlled in flight.*

**7E101 "Technology", according to the General Technology Note for the "use" of equipment controlled by 7A001 to 7A006, 7A101 to 7A107, 7A115 to 7A117, 7B001, 7B002, 7B003, 7B101, 7B102, 7B103, or 7D101 to 7D103 for MT reasons.**

**License Requirements**

*Reason for Control:* MT, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
RS applies to "technology" required for the use of inertial navigation systems, or inertial equipment, or "specially designed" "parts" and "components" therefor, "specially designed" for 9A991.b aircraft.	RS Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**List of Items Controlled**

*Related Controls:* The "technology" related to [7A003.b](#), [7A005](#), [7A103.b](#), [7A105](#), [7A106](#), [7A115](#), [7A116](#), [7A117](#), [7B103](#), software specified in the Related Controls paragraph of ECCN [7D101](#), [7D102.a](#), or [7D103](#) is "subject to the ITAR" (see 22 CFR parts 120 through 130).

*Related Definitions:* N/A

*Items:*

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

**7E102 "Technology" for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards, from external sources, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**List of Items Controlled**

*Related Controls:* N/A

*Related Definitions:* N/A

*Items:*

- a. Design “technology” for shielding systems;
- b. Design “technology” for the configuration of hardened electrical circuits and subsystems;
- c. Design “technology” for the determination of hardening criteria of .a and .b of this entry.

**7E104 Design “Technology” for the integration of the flight control, guidance, and propulsion data into a flight management system, designed or modified for rockets or missiles capable of achieving a “range” equal to or greater than 300 km, for optimization of rocket system trajectory. (This entry is “subject to the ITAR”. See 22 CFR parts 120 through 130.)**

**7E611 “Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul or refurbishing of commodities controlled by 7A611, commodities controlled by 7B611, or**

**software controlled by 7D611, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control:* NS, MT, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 7E611.y	NS Column 1
MT applies to “technology” in 7E611.a if “required” for items controlled for MT reasons in 7A611.a, 7B611.a, or 7D611.a	MT Column 1
RS applies to 7E611.y	China, Russia, or Venezuela (see § 724.6(a)(7))
RS applies to entire entry except 7E611.y	RS Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry except 7E611.y	See § 746.1(b) for UN controls

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

**Special Conditions for STA**

*STA:* Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any technology in 7E611.

**List of Items Controlled**

*Related Controls:* Technical data directly related to articles enumerated in USML Category XII are subject to the control of USML Category XII(f).

*Related Definitions:* N/A

*Items:*

AT applies to entire entry	AT Column 1
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a. “Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities or “software” controlled by ECCN 7A611 (except 7A611.y), 7B611, or 7D611 (except 7D611.y).

**List Based License Exceptions** (See Part 740 for a description of all license exceptions)

*TSR:* N/A

b. through .x [Reserved]

**List of Items Controlled**

*Related Controls:* N/A  
*Related Definitions:* N/A  
*Items:*

y. Specific “technology” “required” for the “production,” “development,” operation, installation, maintenance, repair, or overhaul of commodities or software controlled by ECCNs 7A611.y or 7D611.y.

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

**7E994 “Technology,” n.e.s., for the “development,” “production” or “use” of navigation, airborne communication, and other avionics equipment.**

**EAR99 Items subject to the EAR that are *not* elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number *EAR99*.**

**License Requirements**

*Reason for Control:* AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
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