

**CATEGORY 7 - NAVIGATION AND AVIONICS**

**A. SYSTEMS, EQUIPMENT AND COMPONENTS**

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

**N.B.2:** For inertial navigation equipment for ships or submersibles see item 9.e on the Wassenaar Munitions List.

**7A001 Accelerometers designed for use in inertial navigation or guidance systems and having any of the following characteristics (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</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

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* See also 7A101 and 7A994.  
 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. A "bias" "stability" of less (better) than 130 micro g with respect to a fixed calibration value over a period of one year;
- b. A "scale factor" "stability" of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year; *or*
- c. Specified to function at linear acceleration levels exceeding 100 g.

**7A002 Gyros having any of the following characteristics (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</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

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* See also 7A102 and 7A994  
*Related Definitions:* N/A  
*Items:*

a. A "drift rate" "stability", when measured in a 1 g environment over a period of three months and with respect to a fixed calibration value, of:

a.1. Less (better) than 0.1° per hour when specified to function at linear acceleration levels below 10 g; *or*

a.2. Less (better) than 0.5° per hour when specified to function at linear acceleration levels from 10 g to 100 g inclusive; *or*

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

**7A003 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 (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</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

**License Exceptions**

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

**●List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* See also 7A103 and 7A994.  
 Inertial navigation systems 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:* N/A

*Items:*

a. Navigation error (free inertial) subsequent to normal alignment of 0.8 nautical mile per hour (50% Circular Error Probable (CEP)) or less (better); *or*

b. Specified to function at linear acceleration levels exceeding 10 g.

**Note:** The parameters of 7A003.a 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 g<sup>2</sup>/Hz over a frequency interval of 15 to 1,000 Hz; *and*

b. The PSD attenuates with frequency from 0.04 g<sup>2</sup>/Hz to 0.01 g<sup>2</sup>/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:** 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.

**7A004 Gyro-astro compasses, and other devices which derive position or orientation by means of automatically tracking celestial bodies or satellites, with an azimuth accuracy of equal to or less (better) than 5 seconds of arc.**

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</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

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* See also 7A104 and 7A994  
*Related Definitions:* N/A  
*Items:*

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

**7A005 Global navigation satellite systems (i.e. GPS or GLONASS) receiving equipment, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR**

**part 121.)**

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

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</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

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* See also 7A106, 7A994 and Category 6 for controls on radar.  
*Related Definitions:* N/A  
*Items:*

- a. "Power management"; *or*
- b. Using phase shift key modulation.

**7A007 Direction finding equipment operating at frequencies above 30 MHz and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)**

**7A101 Accelerometers, other than those controlled by 7A001, with a threshold of 0.05 g or less, or a linearity error within 0.25% of full scale output, or both, which are designed for use in inertial navigation systems or in guidance systems of all types and specially designed components therefor.**

*Reason for Control:* MT, AT

*Control(s)* Country Chart

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

**License Requirements**

*Reason for Control:* MT, AT

*Control(s)* Country Chart

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value

*Related Controls:* This entry does not control accelerometers which are specially designed and developed as MWD (Measurement While Drilling) sensors for use in downhole well service operations.

*Related Definitions:* N/A

*Items:*

The list of items is included in the entry heading.

**7A102 All types of gyros, other than those controlled by 7A002, usable in "missiles", with a rated "drift rate" "stability" of less than 0.5° (1 sigma or rms) per hour in a 1 g environment and specially designed components therefor.**

**License Requirements**

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value

*Related Controls:* N/A

*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:*

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

**7A103 Instrumentation, navigation equipment and systems, other than those controlled by 7A003, and specially designed components therefor.**

**License Requirements**

*Reason for Control:* MT, AT

*Control(s)* Country Chart

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value

*Related Controls:* 1.) Items described in 7A103.b are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121). 2.) Inertial navigation systems 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:* N/A

*Items:*

a. Inertial or other equipment using accelerometers or gyros controlled by 7A001, 7A002, 7A101 or 7A102 and systems incorporating such equipment;

**Note:** 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.

b. Integrated flight instrument systems, which include gyrostabilizers or automatic pilots, designed or modified for use in "missiles".

**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 components therefor.**

**License Requirements**

*Reason for Control:* MT, AT

*Control(s)* Country Chart

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value

*Related Controls:* This entry controls specially designed 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 Global Positioning Systems (GPS) or similar satellite receivers, other than those controlled by 7A005, and designed or modified for use in "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)**

**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 export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

*Control(s)*

*Country Chart*

AT applies to entire entry

AT Column 1

#### License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

**7A115** Passive sensors for determining bearing to specific electromagnetic source (direction finding equipment) or terrain characteristics, designed or modified for use in "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

#### List of Items Controlled

*Unit:* \$ value

*Related Controls:* 1.) Global Positioning Satellite receivers having the following characteristics are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (22 CFR part 121): (a) Designed for encryption or decryption (e.g., Y-code) of GPS precise positioning service (PPS) signal; (b) Designed for producing navigation results above 60,000 feet altitude and at 1,000 knots velocity or greater; (c) Specifically designed or modified for use with a null-steering antenna or including a null-steering antenna designed to reduce or avoid jamming signals; or (d) Designed or modified for use with unmanned air vehicle systems capable of delivering at least a 500 kg payload to a range of at least 300 km. (GPS receivers designed or modified for use with military unmanned air vehicle systems with less capability are considered to be specially designed, modified or configured for military use are controlled by 22 CFR part 121. 2.) This entry controls direction finding equipment that is not subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (22 CFR part 121).

*Related Definitions:* N/A

*Items:*

**7A116** Flight control systems (hydraulic, mechanical, electro-optical, or electro-mechanical flight control systems (including fly-by-wire systems) and attitude control equipment) designed or modified for "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

**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 export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

**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

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</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

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* 1.) See also 7B102 and 7B994. 2.) This entry does not control test, calibration or alignment equipment for Maintenance level I.  
*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 removal of controlled accelerometers or gyro sensors from the SRA.  
*Items:*

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

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

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</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

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value  
*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).

*Items:*

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

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

**7B101 "Production equipment", and other test, calibration, and alignment equipment, other than that described in 7B003, 7B102 and 7B104, designed or modified to be used with equipment controlled by 7A001-7A004 or 7A101-7A104.**

**License Requirements**

*Reason for Control:* NS, MT, AT

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart</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

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**License Exceptions**

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

**License Exceptions**

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

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* 1.) See also 7B103, (this entry is subject to the licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121) 2.) This entry includes: inertial measurement unit tester (IMU module); 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 filling station; centrifuge fixtures for gyro bearings; accelerometer axis align station; and accelerometer test station.  
*Related Definitions:* N/A

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* 1.) See also 7B003, 7B102, 7B104 and 7B994. 2.) This entry includes: inertial measurement unit tester (IMU module); 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 filling station; centrifuge fixtures for gyro bearings; accelerometer axis align station; and accelerometer test station.  
*Related Definitions:* N/A  
*Items:*



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

**Office of Defense Trade Controls. See 22 CFR part 121.)**

**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).**

**7B104 Equipment, designed or modified to be used with equipment controlled by 7A001-7A004, or 7A101 - 7A104, as follows (see List of Items Controlled).**

**License Requirements**

**License Requirements:**

*Reason for Control:* MT, AT

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

**License Exceptions**

**License Exceptions:**

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

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

**List of Items Controlled**

**List of Items Controlled:**

*Unit:* \$ value  
*Related Controls:* N/A  
*Related Definitions:* N/A  
*Items:*

*Unit:* \$ value  
Related Controls: 1) See also 7B101 and 7B994.  
*Related Definitions:* 1.) 7B104.a. does not control balancing machines designed or modified for dental or other medical equipment. 2.) 7B104.c. and 7B104.d. do not control rotary tables designed or modified for machine tools or for medical equipment. 3.) Rate tables not controlled by 7B104.c. and providing the characteristics of a positioning table are to be evaluated according to 7B104.d. 4.) Equipment that has the characteristics specified in 7B104.d. which also meets the characteristics of 7B104.c. will be treated as equipment specified in 7B104.c.  
*Items:*

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

- a. Balancing machines having all the following

**7B103 Specially designed "production facilities" for equipment controlled by 7A117. (These items are subject to the export licensing authority of the U.S. Department of State,**

characteristics:

a.1. Not capable of balancing rotors/assemblies having a mass greater than 3 Kgm;

a.2. Capable of balancing rotors/assemblies at speeds greater than 12,500 rpm;

a.3. Capable of correcting unbalance in two planes or more; and

a.4. Capable of balancing to a residual specific unbalance of 0.2 gram-mm per kg of rotor mass;

b. Indicator heads (sometimes known as balancing instrumentation) designed or modified for use with machines specified in 7B104.a.

c. Motion simulators/rate tables (equipment capable of simulating motion) having all of the following characteristics:

c.1. Two axes or more;

c.2. Slip rings capable of transmitting electrical power and/or signal information; and

c.3. Having any of the following characteristics:

c.3.a. For any single axis:

c.3.a.1. Capable of rates of rotation of 400 degrees/sec or more, or 30 degrees/sec or less, and

c.3.a.2. A rate resolution equal to or less than 6 degrees/sec and an accuracy equal to or less than 0.6 degrees/sec; or

c.3.b. Having a worst case rate stability equal to or better (less) than plus or minus 0.05% averaged over 10 degrees or more; or

c.3.c. A positioning accuracy equal to or better than 5 arc-second.

d. Positioning tables (equipment capable of precise rotary position in any axis) having the following characteristics:

d.1. Two axes or more; and

d.2. A positioning accuracy equal to or better than 5 arc-second;

e. Centrifuges able to impart accelerations above 100 g and having slip rings capable of transmitting electrical power and signal information.

**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</i>
-------------------	----------------------

AT applies to entire entry	AT Column 1
----------------------------	-------------

**License Exceptions**

LVS: N/A

GBS: N/A

CIV: N/A

**List of Items Controlled**

*Unit:* \$ value

*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</i>
NS applies to "software" for equipment controlled by 7A001 to 7A004, 7A006, 7B001, 7B002 or 7B003	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to "software" for inertial navigation systems inertial equipment, and specially designed components therefor, for "civil aircraft"	RS Column 1
AT applies to entire entry	AT Column 1

**License Exceptions**

CIV: N/A  
TSR: N/A

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* 1.) See also 7D101 and 7D994. 2.) The "software" related to 7A003.b, 7A005, 7A007, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are

subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 3.) "Software" for inertial navigation systems and inertial equipment, and specially designed components therefor, not for use on civil aircraft 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:* N/A  
*Items:*

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

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

**License Requirements**

*Reason for Control:* NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</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

**License Exceptions**

CIV: N/A  
TSR: N/A

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* 1.) See also 7D102 and 7D994. 2.) This entry does not control "source code" for the "use" of gimballed

**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</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

**License Exceptions**

CIV: N/A  
 TSR: N/A

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* See also 7D103 and 7D994  
*Related Definitions:* N/A  
*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 navigation data:

- b.1. Doppler radar velocity;
- b.2. Global navigation satellite systems (i.e., GPS or GLONASS) reference data; *or*
- b.3. Terrain data from data bases;

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.

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

**7D102 Integration "software" for the equipment controlled by 7A003 or 7A103.**

**7D101 "Software" specially designed for the "use" of equipment controlled by 7A001 to 7A006, 7A101 to 7A106, 7A115, 7B001, 7B002, 7B003, 7B101, 7B102, 7B103 or 7B104.**

**License Requirements**

*Reason for Control:* MT, AT

**License Requirements**

*Reason for Control:* MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
-------------------	----------------------

MT applies to entire entry	MT Column 1
----------------------------	-------------

<i>Control(s)</i>	<i>Country Chart</i>
-------------------	----------------------

AT applies to entire entry	AT Column 1
----------------------------	-------------

MT applies to entire entry	MT Column 1
----------------------------	-------------

**License Exceptions**

AT applies to entire entry	AT Column 1
----------------------------	-------------

CIV: N/A  
TSR: N/A

**License Exceptions**

CIV: N/A  
TSR: N/A

**List of Items Controlled**

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* 1.) The "software" related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 2.) "Software" for inertial navigation systems and inertial equipment, and specially designed components therefor, not designed for use on civil aircraft by civil aviation authorities of a country listed in Country Group A:1 is 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:* N/A  
*Items:*

*Unit:* \$ value  
*Related Controls:* The "software" related to 7A003.b or 7A103.b 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:* N/A  
*Items:*

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

**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 export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)**

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

*Control(s)*

*Country Chart*

NS applies to "technology" for items controlled by 7A001 to 7A004, 7A006, 7B001 to 7B003, 7D001 to 7D003

**License Requirements**

*Reason for Control:* AT

MT applies to entire entry MT Column 1

*Control(s)*

*Country Chart*

RS applies to "technology" for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft

AT applies to entire entry

AT Column 1

**License Exceptions**

CIV: N/A  
TSR: N/A

AT applies to entire entry AT Column 1

**List of Items Controlled**

*Unit:* \$ value  
*Related Controls:* N/A  
*Related Definitions:* N/A  
*Items:*

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

**License Exceptions**

CIV: N/A  
TSR: N/A

**List of Items Controlled**

*Unit:* N/A  
*Related Controls:* 1.) See also 7E101 and 7E994. 2.) The "technology" related to 7A003.b, 7A005, 7A007, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Control (see 22 CFR part 121).  
*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" controlled by 7A (except 7A994), 7B (except 7B994) or 7D (except 7D994).**

**License Requirements**

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

**7E002 "Technology" according to the General Technology Note for the "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</i>
NS applies to "technology" for equipment controlled by 7A001 to 7A004, 7A006 or 7B001 to 7B003	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to "technology" for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft	RS Column 1
AT applies to entire entry	AT Column 1

**License Exceptions**

CIV: N/A  
 TSR: N/A

**List of Items Controlled**

*Unit:* N/A  
*Related Controls:* 1.) See also 7E102 and 7E994. 2.) The "technology" related to 7A003.b, 7A005, 7A007, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 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:* 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</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

**License Exceptions**

CIV: N/A  
 TSR: N/A

**List of Items Controlled**

*Unit:* N/A  
*Related Controls:* See also 7E994. This entry does not control maintenance "technology" 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.  
*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</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

a.6. "Flight control optical sensor array" specially designed for implementing "active flight control systems";

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

**License Exceptions**

CIV: N/A  
 TSR: N/A

b.1. Configuration design for interconnecting multiple microelectronic processing elements (on-board computers) to achieve "real time processing" for control law implementation;

**List of Items Controlled**

*Unit:* N/A

*Related Controls:* See also 7E104 and 7E994

●*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:*

b.2. Control law compensation for sensor location or dynamic airframe loads, i.e., compensation for sensor vibration environment or for variation of sensor location from the center of gravity;

b.3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration;

a. "Technology" for the "development" or "production" of:

**Note:** 7E004.b.3. does not control "technology" for the design of physical redundancy.

a.1. Airborne automatic direction finding equipment operating at frequencies exceeding 5 MHz;

b.4. Flight controls that permit inflight reconfiguration of force and moment controls for real time autonomous air vehicle control;

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

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

a.3. Raster-type head-up displays or three dimensional displays for "aircraft";

**Note:** 7E004.b.5 does not control:

a.4. Inertial navigation systems or gyro-astro compasses containing accelerometers or gyros controlled by 7A001 or 7A002;

1. "Development" "technology" for integration of digital flight control, navigation and propulsion control data into a digital flight management system for "flight path optimization";

a.5. Electric actuators (i.e., electromechanical, electrohydrostatic and integrated actuator package) specially designed for "primary flight control";

2. "Development" "technology" for "aircraft" flight instrument systems integrated



solely for VOR, DME, ILS or MLS navigation or approaches.

*Control(s)*

*Country Chart*

b.6. Full authority digital flight control or multisensor mission management systems employing "expert systems";

MT applies to entire entry

MT Column 1

**N.B.:** For "technology" for Full Authority Digital Engine Control ("FADEC"), see 9E003.a.9.

RS applies to "use" of inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft.

RS Column 1

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

AT applies to entire entry

AT Column 1

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

**License Exceptions**

CIV: N/A  
TSR: N/A

c.1.a. Collective controls;

c.1.b. Cyclic controls;

c.1.c. Yaw controls;

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

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

**List of Items Controlled**

*Unit:* N/A

*Related Controls:* 1.) The "technology" related to 7A003.b, 7A005, 7A103.b, 7A105, 7A016, 7A115, 7A116, 7A117, 7B103, or 7D103 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 2.) "Technology" for inertial navigation systems and inertial equipment, and specially designed components therefor, not for use on civil aircraft 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:* N/A

*Items:*

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

**7E101 "Technology", other than "technology" controlled by 7E003, according to the General Technology Note for the "use" of equipment controlled by 7A001 to 7A006, 7A101 to 7A106, 7A115 to 7A117, 7B001, 7B002, 7B003, 7B101, 7B102, 7B103, 7B104, 7D101 to 7D103.**

**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**

**License Requirements**

*Reason for Control:* MT, RS, AT

Items Controlled).

authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)

License Requirements

Reason for Control: MT, AT

Control(s) Country Chart

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: N/A

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 "Technology" for the integration of the flight control, guidance, and propulsion data into a flight management system for optimization of rocket system trajectory. (This entry is subject to the export licensing**

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

License Requirements

Reason for Control: AT

Control(s) Country Chart

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items:

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

**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*.**