

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

Items:

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

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

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

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

* * * * *

List of Items Controlled

Unit: * * *

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

Related Definitions: * * *

Items:

- a. Systems and equipment, specially designed or modified for submersible vehicles, designed to operate at depths exceeding 1,000 m, as follows:
 - a.1. Pressure housings or pressure hulls with a maximum inside chamber diameter exceeding 1.5 m;
 - a.2. Direct current propulsion motors or thrusters;
 - a.3. Umbilical cables, and connectors therefor, using optical fiber and having synthetic strength members;
- b. Systems specially designed or modified for the automated control of the motion of submersible vehicles controlled by 8A001 using navigation data and having closed loop servo-controls:
 - b.1. Enabling a vehicle to move within 10 m of a predetermined point in the water column;
 - b.2. Maintaining the position of the vehicle within 10 m of a predetermined point in the water column; or
 - b.3. Maintaining the position of the vehicle within 10 m while following a cable on or under the seabed;
- c. Fiber optic hull penetrators or connectors;
- d. Underwater vision systems, as follows:
 - d.1. Television systems and television cameras, as follows:
 - d.1.a. Television systems (comprising camera, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 800 lines and specially designed or modified for remote operation with a submersible vehicle;
 - d.1.b. Underwater television cameras having a limiting resolution when measured in air of more than 1,100 lines;
 - d.1.c. Low light level television cameras specially designed or modified for underwater use containing all of the following:
 - d.1.c.1. Image intensifier tubes controlled by 6A002.a.2.a; and
 - d.1.c.2. More than 150,000 "active pixels" per solid state area array;

Technical Note: Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.

- d.2. Systems, specially designed or modified for remote operation with an underwater vehicle, employing techniques to minimize the effects of back scatter, including range-gated illuminators or "laser" systems;
- e. Photographic still cameras specially designed or modified for underwater use below 150 m having a film format of 35 mm or larger, and having any of the following:
 - e.1. Annotation of the film with data provided by a source external to the camera;
 - e.2. Automatic back focal distance correction; or
 - e.3. Automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;
- f. Electronic imaging systems, specially designed or modified for underwater use,

capable of storing digitally more than 50 exposed images;

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