THE SCHEDULE OF THE STRATEGIC GOODS (CONTROL) ORDER 2009

PART II

DUAL-USE GOODS THE EXPORT, TRANSHIPMENT OR BRINGING IN TRANSIT OF WHICH, AND TECHNOLOGY THE EXPORT OR TRANSMISSION OF WHICH, REQUIRE A PERMIT

Division 2 – List of Dual-Use Goods

Product Code	*Item Description*
CATEGORY 7 – NAVIGATION AND AVIONICS	
7A	**Systems, Equipment and Components**
	N.B. ***For automatic pilots for underwater vehicles, see Category 8.*** ***For radar, see Category 6.***
DL7A001	Accelerometers, as follows, and specially designed components therefor: ***N.B.*** ***See also Category Code 7A101.*** ***For angular or rotational accelerometers, see Category Code 7A001.b.***
	a. Linear accelerometers having any of the following: 1. Specified to function at linear acceleration levels less than or equal to 15 g, and having any of the following: 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 b. A ‘‘scale factor’’ ‘‘stability’’ of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year; 2. Specified to function at linear acceleration levels exceeding 15 g, and having all of the following: a. A ‘‘bias’’ ‘‘repeatability’’ of less (better) than 5,000 micro g over a period of one year; and b. A ‘‘scale factor’’ ‘‘repeatability’’ of less (better) than 2,500 ppm over a period of one year; or 3. Designed for use in inertial navigation or guidance systems and specified to function at linear acceleration levels exceeding 100 g;
	b. Angular or rotational accelerometers specified to function at linear acceleration levels exceeding 100 g.

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DL7A002	Gyros, and angular rate sensors, having any of the following and specially designed components therefor: ***N.B.*** ***See also Category Code 7A102.*** ***For angular or rotational accelerometers, see Category Code 7A001.b.*** a. A ‘‘bias’’ ‘‘stability’’, when measured in a 1 g environment over a period of one month, and with respect to a fixed calibration value of less (better) than 0.5 degree per hour when specified to function at linear acceleration levels up to and including 100 g; b. An ‘‘angle random walk’’ of less (better) than or equal to 0.0035 degree per square root hour; *Note* *Category Code 7A002.b. does not include ‘spinning mass gyros’.* *Technical Note* *‘Spinning mass gyros’ are gyros which use a continually rotating mass to sense angular motion.* c. A rate range greater than or equal to 500 degrees per second and having any of the following: 1. A ‘‘bias’’ ‘‘stability’’, when measured in a 1 g environment over a period of three minutes and with respect to a fixed calibration value of less (better) than 40 degrees per hour; or 2. An ‘‘angle random walk’’ of less (better) than or equal to 0.2 degree per square root hour; or d. Specified to function at linear acceleration levels exceeding 100 g.
DL7A003	Inertial systems and specially designed components, as follows: ***N.B.*** ***See also Category Code 7A103.***
	a. Inertial Navigation Systems (INS) (gimballed or strapdown) and inertial equipment designed for ‘‘aircraft’’, land vehicle, vessels (surface or underwater) or ‘‘spacecraft’’ for navigation, attitude, guidance or control and having any of the following and specially designed components therefor: 1. Navigation error (free inertial) subsequent to normal alignment of 0.8 nautical mile per hour (nm/hr) ‘Circular Error Probable’ (CEP) or less (better); or 2. Specified to function at linear acceleration levels exceeding 10 g;
	b. Hybrid Inertial Navigation Systems embedded with Global Navigation

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	Satellite Systems(s) (GNSS) or with ‘‘Data-Based Referenced Navigation’’ (‘‘DBRN’’) System(s) for navigation, attitude, guidance or control, subsequent to normal alignment and having an INS navigation position accuracy, after loss of GNSS or ‘‘DBRN’’ for a period of up to four minutes, of less (better) than 10 metres ‘Circular Error Probable’ (CEP);
	c. Inertial Measurement Equipment for heading, or True North determination and having any of the following, and specially designed components therefor: 1. Designed to have an heading, or True North determination accuracy equal to or less (better) than 0.07 deg sec (Lat) equivalent to 6 arc minutes rms at 45 degrees latitude; or 2. Designed to have a non-operating shock level of 900 g or greater at a duration of 1 msec, or greater;
	d. Inertial measurement equipment including Inertial Measurement Units (IMU) and Inertial Reference Systems (IRS), incorporating accelerometers or gyros specified in Category Code 7A001 or 7A002, and specially designed components therefor.
	Note 1 *The parameters of Category Codes 7A003.a. and 7A003.b. are applicable with any of the following environmental conditions:* *a. Input random vibration with an overall magnitude of 7.7 g rms in the first 0.5 hour and a total test duration of 1.5 hour per axis in each of the three perpendicular axes, when the random vibration meets all the following:* *1. A constant Power Spectral Density (PSD) value of 0.04 g^2/Hz over a frequency interval of 15 Hz to 1,000 Hz; and* *2. The PSD attenuates with frequency from 0.04 g^2/Hz to 0.01 g^2/Hz over a frequency interval from 1,000 Hz to 2,000 Hz;* *b. An angular rate capability about one or more axes of equal to or more than + 2.62 rad/s (150 deg/s); or* *c. According to national standards equivalent to a. or b. above.* *Note 2* *Category Code 7A003 does not include inertial navigation systems which are certified for use on ‘‘civil aircraft’’ by civil authorities of a ‘‘participating state’’.* *Note 3* *Category Code 7A003.c.1. does not include theodolite systems incorporating inertial equipment specially designed for civil surveying*

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	purposes. *<u>Technical Notes</u>* *1. Category Code 7A003.b. applies to systems in which an INS and other independent navigation aids are built into a single unit (embedded) in order to achieve improved performance.* *2. 'Circular Error Probable' (CEP) means, in a circular normal distribution, the radius of the circle containing 50 percent of the individual measurements being made, or the radius of the circle within which there is a 50 percent probability of being located.*
DL7A004	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. ***<u>N.B.</u>*** ***See also Category Code 7A104.***
DL7A005	Global navigation satellite systems (i.e., GPS or GLONASS) receiving equipment having any of the following and specially designed components therefor: ***<u>N.B.</u>*** ***See also Category Code 7A105.*** a. Employing decryption; <u>or</u> b. Incorporating a null-steerable antenna.
DL7A006	Airborne altimeters operating at frequencies other than 4.2 Hz to 4.4 GHz inclusive and having any of the following: ***<u>N.B.</u>*** ***See also Category Code 7A106.*** a. ''Power management''; <u>or</u> b. Using phase shift key modulation.
DL7A008	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 travelled ''Circular Error Probable'' (CEP) and specially designed components therefor. *<u>Note</u>* *Category Code 7A008 does not include systems specially designed for installation on surface vessels or systems requiring acoustic beacons or buoys to provide positioning data.*

Product Code	*Item Description*
	N.B. ***See Category Code 6A001.a. for acoustic systems, and Category Code 6A001.b. for correlation-velocity and Doppler-velocity sonar log equipment.*** ***See Category Code 8A002 for other marine systems.***
DL7A101	Accelerometers, other than those specified in Category Code 7A001, as follows, and specially designed components therefor:
	a. Linear accelerometers, designed for use in inertial navigation systems or in guidance systems of all types, usable in 'missiles', having all the following characteristics, and specially designed components therefor: 1. A ''bias'' ''repeatability'' of less (better) than 1,250 micro g; and 2. A ''scale factor'' ''repeatability'' of less (better) than 1,250 ppm; *Note* *Category Code 7A101.a. does not include accelerometers which are specially designed and developed as MWD (Measurement While Drilling) Sensors for use in downhole well service operations.* *Technical Notes* *1. In Category Code 7A101.a. 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km;* *2. In Category Code 7A101.a. the measurement of ''bias'' and ''scale factor'' refers to a one sigma standard deviation with respect to a fixed calibration over a period of one year.*
	b. Continuous output accelerometers specified to function at acceleration levels exceeding 100 g.
DL7A102	All types of gyros, other than those specified in Category Code 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. *Technical Note* *1. In Category Code 7A102 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.* *2. In Category Code 7A102, '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 (IEEE STD 528-2001 paragraph 2.247).*
DL7A103	Instrumentation, navigation equipment and systems, other than those

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	specified in Category Code 7A003, as follows; and specially designed components therefor:
	a. Inertial or other equipment, using accelerometers or gyros as follows, and systems incorporating such equipment:
	1. Accelerometers specified in Category Code 7A001.a.3., 7A001.b. or 7A101 or gyros specified in Category Code 7A002 or 7A102;
	2. Accelerometers specified in Category Code 7A001.a.1. or 7A001.a.2. and having all of the following: a. Designed for use in inertial navigation systems or in guidance systems of all types and usable in 'missiles'; b. A ''bias'' ''repeatability'' of less (better) than 1,250 micro g; and c. A ''scale factor'' ''repeatability'' of less (better) than 1,250 ppm;
	Note *Category Code 7A103.a. does not include equipment containing accelerometers specified in Category Code 7A001 where such accelerometers are specially designed and developed as MWD (Measurement While Drilling) sensors for use in downhole well services operations.*
	b. Integrated flight instrument systems, which include gyrostabilisers or automatic pilots, designed or modified for use in 'missiles';
	c. 'Integrated navigation systems', designed or modified for 'missiles' and capable of providing a navigational accuracy of 200 m ''Circle of Equal Probability'' (CEP) or less; *Technical Notes* *An 'integrated navigation system' typically incorporates the following 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.*
	d. Three axis magnetic heading sensors, designed or modified to be integrated with flight control and navigation systems, having all the

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	following characteristics, and specially designed components therefor: 1. Internal tilt compensation in pitch (±90 degrees) and roll (±180 degrees) axes; and 2. Capable of providing azimuthal accuracy better (less) than 0.5 degrees rms at latitude of ±80 degrees, reference to local magnetic field. *Note* *Flight control and navigation systems in Category Code 7A103.d. include gyrostabilisers, automatic pilots and inertial navigation systems.* *Technical Note* *In Category Code 7A103 'missile' means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.*
DL7A104	Gyro-astro compasses and other devices, other than those specified in Category Code 7A004, which derive position or orientation by means of automatically tracking celestial bodies or satellites and specially designed components therefor.
DL7A105	Receiving equipment for Global Navigation Satellite Systems (GNSS; e.g., GPS, GLONASS, or Galileo), having any of the following characteristics, and specially designed components therefor:
	a. Designed or modified for use in space launch vehicles specified in Category Code 9A004, unmanned aerial vehicles specified in Category Code 9A012 or sounding rockets specified in Category Code 9A104; or
	b. Designed or modified for airborne applications and having any of the following: 1. Capable of providing navigation information at speeds in excess of 600 m/s; 2. Employing decryption, designed or modified for military or governmental services, to gain access to GNSS secured signal/data; or 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. *Note* *Category Codes 7A105.b.2. and 7A105.b.3. do not include equipment designed for commercial, civil or 'Safety of Life' (e.g., data integrity, flight safety) GNSS services.*

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DL7A106	Altimeters, other than those specified in Category Code 7A006, of radar or laser radar type, designed or modified for use in space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104.
DL7A115	Passive sensors for determining bearing to specific electromagnetic source (direction finding equipment) or terrain characteristics, designed or modified for use in space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104. <u>*Note*</u> *Category Code 7A115 includes sensors for the following equipment:* *a. Terrain contour mapping equipment;* *b. Imaging sensor equipment (both active and passive);* *c. Passive interferometer equipment.*
DL7A116	Flight control systems and servo valves, as follows; designed or modified for use in space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104.
	a. Hydraulic, mechanical, electro-optical, or electro-mechanical flight control systems (including fly-by-wire types);
	b. Attitude control equipment;
	c. Flight control servo valves designed or modified for the systems specified in Category Code 7A116.a. or 7A116.b., and designed or modified to operate in a vibration environment of more than 10 g rms between 20 Hz and 2 kHz.
DL7A117	‘‘Guidance sets’’, usable in ‘‘missiles’’ 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).
7B	**Test, Inspection and Production Equipment**
DL7B001	Test, calibration or alignment equipment specially designed for equipment specified in Category 7A. <u>*Note*</u> *Category Code 7B001 does not include test, calibration or alignment equipment for ‘Maintenance Level I’ or ‘Maintenance Level II’.* <u>*Technical Notes*</u> *1. <u>‘Maintenance Level I’</u>* *The failure of an inertial navigation unit is detected on the aircraft by*

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	indications from the Control and Display Unit (CDU) or by the status message from the corresponding subsystem. By following the manufacturer's manual, the cause of the failure may be localised 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 localise 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.* *Note* *'Maintenance Level II' does not include the removal of controlled accelerometers or gyro sensors from the SRA.*
DL7B002	Equipment specially designed to characterise mirrors for ring ''laser'' gyros, as follows: ***N.B.*** ***See also Category Code 7B102.***
	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).
DL7B003	Equipment specially designed for the ''production'' of equipment specified in Category 7A. *Note* *Category Code 7B003 includes:* *— Gyro tuning test stations;* *— Gyro dynamic balance stations;* *— Gyro run-in/motor test stations;* *— Gyro evacuation and fill stations;* *— Centrifuge fixtures for gyro bearings;* *— Accelerometer axis align stations;* *— Fibre optic gyro coil winding machines.*

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DL7B102	Reflectometers specially designed to characterise mirrors, for ‘‘laser’’ gyros, having a measurement accuracy of 50 ppm or less (better).
DL7B103	‘‘Production facilities’’ and ‘‘production equipment’’, as follows:
	a. ‘‘Production facilities’’ specially designed for equipment specified in Category Code 7A117;
	b. ‘‘Production equipment’’, and other test, calibration and alignment equipment, other than that specified in Category Codes 7B001 to 7B003, designed or modified to be used with equipment specified in Category 7A.
7C	**Materials**
	None.
7D	**Software**
DL7D001	‘‘Software’’ specially designed or modified for the ‘‘development’’ or ‘‘production’’ of equipment specified in Category 7A or 7B.
DL7D002	‘‘Source code’’ for the ‘‘use’’ of any inertial navigation equipment, including inertial equipment not specified in Category Code 7A003 or 7A004, or Attitude and Heading Reference Systems (‘AHRS’). <u>*Note*</u> *Category Code 7D002 does not include ‘‘source code’’ for the ‘‘use’’ of gimbaled ‘AHRS’.* <u>*Technical Note*</u> *‘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.*
DL7D003	Other ‘‘software’’, as follows:
	a. ‘‘Software’’ specially designed or modified to improve the operational performance or reduce the navigational error of systems to the levels specified in Category Code 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 specified in Category Code 7A003 or 7A008 by continuously combining heading data with any of the following: 1. Doppler radar or sonar velocity data;

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	2. Global navigation satellite systems (i.e., GPS or GLONASS) reference data; or 3. Data from ‘‘Data-Based Referenced Navigation’’ (‘‘DBRN’’) systems;
	c. ‘‘Source code’’ for integrated avionics or mission systems which combine sensor data and employ ‘‘expert systems’’;
	d. ‘‘Source code’’ for the ‘‘development’’ of any of the following: 1. Digital flight management systems for ‘‘total control of flight’’; 2. Integrated propulsion and flight control systems; 3. Fly-by-wire or fly-by-light control systems; 4. Fault-tolerant or self-reconfiguring ‘‘active flight control systems’’; 5. Airborne automatic direction finding equipment; 6. Air data systems based on surface static data; or 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 specified in Category Code 7E004.b., 7E004.c.1. or E004.c.2.
DL7D101	‘‘Software’’ specially designed or modified for the ‘‘use’’ of equipment specified in Category Code 7A001 to 7A006, 7A101 to 7A106, 7A115, A116.a., 7A116.b., 7B001, 7B002, 7B003, 7B102 or 7B103.
DL7D102	Integration ‘‘software’’, as follows:
	a. Integration ‘‘software’’ for the equipment specified in Category Code 7A103.b.;
	b. Integration ‘‘software’’ specially designed for the equipment specified in Category Code 7A003 or 7A103.a.;
	c. Integration ‘‘software’’ designed or modified for the equipment specified in Category Code 7A103.c.
	Note *A common form of integration ‘‘software’’ employs Kalman filtering.*
DL7D103	‘‘Software’’ specially designed for modelling or simulation of the ‘‘guidance sets’’ specified in Category Code 7A117 or for their design

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	integration with the space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104. <u>*Note*</u> *''Software'' specified in Category Code 7D103 remains within the description in that Category when combined with specially designed hardware specified in Category Code 4A102.*
7E	**Technology**
DL7E001	''Technology'' (according to the General Technology Note) for the ''development'' of equipment or ''software'' specified in Category 7A, 7B or 7D.
DL7E002	''Technology'' (according to the General Technology Note) for the ''production'' of equipment specified in Category 7A or 7B.
DL7E003	''Technology'' (according to the General Technology Note) for the repair, refurbishing or overhaul of equipment specified in Category Codes 7A001 to 7A004. <u>*Note*</u> *Category Code 7E003 does not include 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'.* ***<u>N.B.</u>*** ***See Technical Notes to Category Code 7B001.***
DL7E004	Other ''technology'', as follows:
	a. ''Technology'' for the ''development'' or ''production'' of any of the following: 1. Airborne automatic direction finding equipment operating at frequencies exceeding 5 MHz; 2. Air data systems based on surface static data only, i.e., which dispense with conventional air data probes; 3. Raster-type head-up displays or three dimensional displays for ''aircraft''; 4. Inertial navigation systems or gyro-astro compasses containing accelerometers or gyros specified in Category Code 7A001 or 7A002; 5. Electric actuators (i.e., electromechanical, electrohydrostatic and integrated actuator package) specially designed for ''primary flight

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	control’’; 6. ‘‘Flight control optical sensor array’’ specially designed for implementing ‘‘active flight control systems’’; <u>or</u> 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 or fly-by-light):
	1. Configuration design for interconnecting multiple microelectronic processing elements (on-board computers) to achieve ‘‘real time processing’’ for control law implementation;
	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 centre of gravity;
	3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration; <u>*Note*</u> *Category Code 7E004.b.3. does not include ‘‘technology’’ for the design of physical redundancy.*
	4. Flight controls which permit inflight reconfiguration of force and moment controls for real time autonomous air vehicle control;
	5. Integration of digital flight control, navigation and propulsion control data into a digital flight management system for ‘‘total control of flight’’; <u>*Note*</u> *Category Code 7E004.b.5. does not include:* *a. ‘‘Development’’ ‘‘technology’’ for integration of digital flight control, navigation and propulsion control data into a digital flight management system for ‘‘flight path optimisation’’;* *b. ‘‘Development’’ ‘‘technology’’ for ‘‘aircraft’’ flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches.*
	6. Full authority digital flight control or multisensor mission management systems employing ‘‘expert systems’’; ***<u>N.B.</u>*** ***For ‘‘technology’’ for Full Authority Digital Engine Control***

Product Code	*Item Description*
	(‘‘FADEC’’), see Category Code 9E003.a.9.
	c. ‘‘Technology’’ for the ‘‘development’’ of helicopter systems, as follows:
	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: a. Collective controls; b. Cyclic controls; c. Yaw controls;
	2. ‘‘Circulation-controlled anti-torque or circulation-controlled directional control systems’’;
	3. Rotor blades incorporating ‘‘variable geometry airfoils’’ for use in systems using individual blade control.
DL7E101	‘‘Technology’’ (according to the General Technology Note) for the ‘‘use’’ of equipment specified in Category Code 7A001 to 7A006, 7A101 to 7A106, 7A115 to 7A117, 7B001, 7B002, 7B003, 7B102, 7B103 or 7D101 to 7D103.
DL7E102	‘‘Technology’’ for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards, from external sources, as follows:
	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 Category Codes 7E102.a. and 7E102.b.
DL7E104	‘‘Technology’’ for the integration of the flight control, guidance, and propulsion data into a flight management system for optimisation of rocket system trajectory.