

- b. Vehicles designed or modified for the transport, handling, control, activation and launching of the systems in Item 6001.;
- c. Gravity meters (gravimeters), gravity gradiometers, and specially designed components therefor, designed or modified for airborne or marine use, and having a static or operational accuracy of  $7 \times 10^{-6}$  m/sec<sup>2</sup> (0.7 milligal) or better, with a time to steady-state registration of two minutes or less;
- d. Telemetry and telecontrol equipment usable for unmanned air vehicles or rocket systems;
- e. Precision tracking systems:
  1. Tracking systems which use a translator installed on the rocket system or unmanned air vehicle in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;
  2. Range instrumentation radars including associated optical-infrared trackers and the specially designed software therefor with all of the following capabilities:
    - i. angular resolution better than 3 milli-radians (0.5 mils);
    - ii. range of 30 km or greater with a range resolution better than 10 meters RMS; and
    - iii. velocity resolution better than 3 meters per second;
  3. Software which processes, post-flight, recorded data, enabling determination of vehicle position throughout its flight path.

**Note to Item 6012.:**

Sub-item 6012.d. does not embargo equipment specially designed to be used for remote control of toys such as model planes.

**6013. Analog computers, digital computers, or digital differential analyzers "designed or modified" for use in the systems in Item 6001. having either of the following characteristics:**

- 6013. a. Rated for continuous operation at temperatures from below minus 45°C to above plus 55°C; or
- b. Designed as ruggedized or "radiation hardened".

**Note to Item 6013.:**

Governments may permit the shipment of equipment exported as part of a manned aircraft or satellite or in quantities appropriate for replacement parts for manned aircraft.

**6014. Analog-to-digital converters, usable in the systems in Item 6001. having either of the following characteristics:**

- 6014. a. Designed to meet military specifications for ruggedized equipment; or,
- b. Designed or modified for military use; and being one of the following types:
  1. Analog-to-digital converter "microcircuits", which are "radiation-hardened" or have all of the following characteristics:
    - i. Having a resolution of 8 bits or more;
    - ii. Rated for operation in the temperature range from below minus 54°C to above plus 125°C; and
    - iii. Hermetically sealed.
  2. Electrical input type analog-to-digital converter printed circuit boards or modules, with all of the following characteristics:
    - i. Having a resolution of 8 bits or more;
    - ii. Rated for operation in the temperature range from below minus 45°C to above plus 55°C; and
    - iii. Incorporating "microcircuits" listed in 6014.b.1., above.

**6015. Test facilities and test equipment usable for the systems in Item 6001. and Item 6002., as follows, and specially designed software therefor:**

- 6015. a. Vibration test equipment using digital control techniques, and feedback or closed loop test equipment therefor, capable of vibrating a system at 10 g RMS or more between 20 Hz and 2,000 Hz and imparting forces of 50 kN (11,250 lbs) or greater;
- b. Wind-tunnels for speeds of Mach 0.9 or more;

- c. Test benches/stands which have the capacity to handle solid or liquid propellant rockets or rocket motors of more than 90 kN (20,000 lbs) of thrust, or which are capable of simultaneously measuring the three axial thrust components;
- d. Environmental chambers and anechoic chambers capable of simulating the following flight conditions:
  1. Altitude of 15,000 meters or greater; or
  2. Temperature of at least minus 50°C to plus 125°C; and either
  3. Vibration environments of 10 g RMS or greater between 20 Hz and 2,000 Hz imparting forces of 5 kN or greater for environmental chambers; or
  4. Acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to  $2 \times 10^{-5}$  N per square meter) or with a rated power output of 4 kilowatts or greater, for anechoic chambers;
- e. Radiographic equipment capable of delivering electromagnetic radiation produced by "bremsstrahlung" from accelerated electrons of 2 MeV or greater or by using radioactive sources of 1 MeV or greater, except those specially designed for medical purposes.

**Note to Item 6015. a.:**

The term "digital control" refers to equipment, the functions of which are, partly or entirely, automatically controlled by stored and digitally coded electrical signals.

**6016. "Specially designed" software, or "specially designed" software with related specially designed hybrid (combined analog/digital) computers, for modeling, simulation, or design integration of the systems in Item 6001. and Item 6002.**

**Note to Item 6016.:**

The modeling includes in particular the aerodynamic and thermodynamic analysis of the systems.

**6017. Materials, devices, and "specially designed" software for reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures (i.e. stealth technology), for applications usable for the systems in Item 6001. and Item 6002., for example:**

- 6017. a. Structural materials and coatings specially designed for reduced radar reflectivity;
- b. Coatings, including paints, specially designed for reduced or tailored reflectivity or emissivity in the microwave, infrared or ultraviolet spectra, except when specially used for thermal control of satellites;
- c. Specially designed software or databases for analysis of signature reduction;
- d. Specially designed radar cross section measurement systems.

**6018. Devices for use in protecting rocket systems and unmanned air vehicles against nuclear effects (e.g. Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), and usable for the systems in Item 6001., as follows:**

- 6018. a. "Radiation Hardened" "microcircuits" and detectors;
- b. Radomes designed to withstand a combined thermal shock greater than 100 cal/sq cm accompanied by a peak over pressure of greater than 50 kPa (7 pounds per square inch).

**Note to Item 6018. a.:**

A detector is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a radioactive material.

**6019. Complete rocket systems (including ballistic missile systems, space launch vehicles and sounding rockets) and unmanned air vehicles (including cruise missile systems, target drones and reconnaissance**