disciplined by the internal master frequency, and having any of the following:
1. A maximum synthesised frequency exceeding 31 GHz;
2. A "frequency switching time" from one selected frequency to another of less than 1 ms; *or*
3. A single sideband (SSB) phase noise better than (126 + 20 $\log_{10}F$ - 20 $\log_{10}f$) in dBc/Hz, where F is the off-set from the operating frequency in Hz and f is the operating frequency in MHz;

NOTE:
1031.2.d. does not embargo equipment in which the output frequency is either produced by the addition or subtraction of two or more crystal oscillator frequencies, or by an addition or subtraction followed by a multiplication of the result.

e. Network analysers with a maximum operating frequency exceeding 31 GHz;

NOTE:
1031.2.e. does not embargo "swept frequency network analysers" with a maximum operating frequency not exceeding 40 GHz and which do not contain a data bus for remote control interfacing.

f. Microwave test receivers with both of the following:
1. A maximum operating frequency exceeding 31 GHz; *and*
2. Capable of measuring amplitude and phase simultaneously;

g. Atomic frequency standards having either of the following characteristics:
1. Long term stability (aging) less (better) than 1 x 10^{-11}/month; *or*
2. "Space qualified";

NOTE:
1031.2.g.1. does not embargo non-"space qualified" rubidium standards.

h. Emulators for microcircuits embargoed by 1031.1.a.3. or 1031.1.a.9.;

NOTE:
1031.2.h. does not embargo emulators designed for a "family" which contains at least one device not embargoed by 1031.1.a.3. or 1031.1.a.9.

1032. Test, Inspection and Production Equipment

1032. Equipment for the manufacture or testing of semiconductor devices or materials, as follows, and specially designed components and accessories therefor:

1. "Stored programme controlled" equipment for epitaxial growth, as follows:
   a. Capable of producing a layer thickness uniform to less than ± 2.5% across a distance of 75 mm or more;
   b. Metal organic chemical vapour deposition (MOCVD) reactors specially designed for compound semiconductor crystal growth by the chemical reaction between materials embargoed by 1033.3 or 1033.4;
   c. Molecular beam epitaxial growth equipment using gas sources;
2. "Stored programme controlled" equipment designed for ion implantation, having any of the following:
   a. An accelerating voltage exceeding 200 keV;
   b. Specially designed and optimized to operate at an accelerating voltage of less than 10 keV;
   c. Direct write capability; *or*
   d. Capable of high energy oxygen implant into a heated semiconductor material "substrate";
3. "Stored programme controlled" anisotropic plasma dry etching equipment, as follows:
   a. With cassette-to-cassette operation and load-locks, and having either of the following:
      1. Magnetic confinement; *or*
      2. Electron cyclotron resonance (ECR);
   b. Specially designed for equipment embargoed by 1032.6. and having either of the following:
      1. Magnetic confinement; *or*
      2. Electron cyclotron resonance (ECR);
4. "Stored programme controlled" plasma enhanced CVD equipment, as follows:
   a. With cassette-to-cassette operation and load-locks, and having either of the following:
      1. Magnetic confinement; *or*
      2. Electron cyclotron resonance (ECR);
   b. Specially designed for equipment embargoed by 1032.6. and having either of the following:
      1. Magnetic confinement; *or*
      2. Electron cyclotron resonance (ECR);

1032. 5. "Stored programme controlled" multifunctional focussed ion beam systems specially designed for manufacturing, repairing, physical layout analysis and testing of masks or semiconductor devices, having either of the following:
   a. Target-to-beam position feedback control precision of 0.25 micrometre or finer; *or*
   b. Digital-to-analogue conversion resolution exceeding 12 bit;

1032. 6. "Stored programme controlled" automatic loading multi-chamber central wafer handling systems, having interfaces for wafer input and output, to which more than two pieces of semiconductor processing equipment are to be connected, to form an integrated system in a vacuum environment for sequential multiple wafer processing;

NOTE:
1032.6. does not embargo automatic robotic wafer handling systems not designed to operate in a vacuum environment.

1032. 7. "Stored programme controlled" lithography equipment, as follows:
   a. Align and expose step and repeat equipment for wafer processing using photo-optical or X-ray methods, having any of the following:
      1. A light source wavelength shorter than 400 nm;
      2. A numerical aperture more than 0.40; *or*
      3. An overlay accuracy of ± 0.20 micrometre (3 sigma) or better;

      NOTE:
      1032.7.a. does not embargo align and expose step and repeat equipment having all of the following:
      1. A light source wavelength of 436 nm or more;
      2. A numerical aperture 0.38 or less; *and*
      3. An image size diameter 22 mm or less.
   b. Equipment specially designed for mask making or semiconductor device processing using deflected focussed electron beam, ion beam or "laser" beam, with any of the following:
      1. A spot size smaller than 0.2 micrometre;
      2. Capable of producing a pattern with a feature size of less than 1 micrometre; *or*
      3. An overlay accuracy of better than ± 0.20 micrometre (3 sigma);

1032. 8. Masks or reticles, as follows:
   a. For integrated circuits embargoed by 1031.1.;
   b. Multi-layer masks with a phase shift layer;

1032. 9. "Stored programme controlled" test equipment, specially designed for testing semiconductor devices and unencapsulated dice, as follows:
   a. For testing S-parameters of transistor devices at frequencies exceeding 31 GHz;
   b. For testing integrated circuits, and "assemblies" thereof, and capable of performing functional (truth table) testing at a pattern rate of more than 40 MHz;

      NOTE:
      1032.9.b. does not embargo test equipment specially designed for testing:
      1. "Assemblies" or a class of "assemblies" for home or entertainment applications;
      2. Unembargoed electronic components, "assemblies" or integrated circuits.
   c. For testing microwave integrated circuits at frequencies exceeding 3 GHz;

      NOTE:
      1032.9.c. does not embargo test equipment specially designed for testing microwave integrated circuits for equipment designed or rated to operate in the Standard Civil Telecommunication Bands at frequencies not exceeding 31 GHz.
   d. Electron beam systems designed for operation at or below 3 keV, or "laser" beam systems, for the non-contactive probing of powered-up semiconductor devices, with both of the following: