

## Chapter Seven

### Verification of Space Systems

There are several international agreements presently in force which directly and explicitly relate to the military use of space.<sup>28</sup> The first major agreement was signed in 1963. Usually called the *Partial Test Ban Treaty*, it prohibits the explosion of a nuclear device (*inter alia*) in outer space (Article I). There are currently about 111 parties to this treaty.

The placement of "nuclear weapons or other weapons of mass destruction" in Earth orbit is banned by the *Outer Space Treaty* of 1967. This important agreement also forbids "the establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies." The *Outer Space Treaty* presently has about 92 parties.

The 1977 *Environmental Modification Convention* prohibits the hostile changing of natural processes, including those of outer space, which would result in widespread, long-lasting or severe effects (Articles I and II). About 54 states are presently parties to this agreement.

The above treaties are all multilateral agreements. One bilateral treaty between the US and the USSR also has direct relevance to outer space: the *Anti-ballistic Missile Treaty* of 1972. Under this agreement each party "undertakes not to develop, test or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based" (Article I, emphasis added).

Of course, although various treaties may be legally in effect, determining compliance with them is another matter. For example, the *Outer Space Treaty* is difficult to verify at the present time. It is possible that an unannounced, and hence unknown, nuclear weapon is in orbit at this very moment.

However, the use of GEODSS and other satellite inspection systems is slowly changing that situation. With ground-based optical sys-

tems, one can observe satellites in orbit and resolve details about them. As well, radiometers at GEODSS sites can detect radiative emission and/or leakage from orbiting satellites, checking power generation and their state of operation.<sup>29</sup>

Improved versions of GEODSS systems such as the TEAL AMBER sensor will be not only faster, but also more sensitive to faint objects in space. And new systems are continually being developed each year.

Ground-based observations have extended far beyond advanced astronomical systems. In the Middle East, a DARPA radar system is reportedly capable of actually forming images of low-altitude satellites.<sup>30</sup> The same is said of the MIT "Haystack" radar in Lexington, Massachusetts. At the Maui Optical Tracking and Identification Facility (MOTIF) in Hawaii, a lidar system (using light instead of radio waves) utilizes a "compensated imaging telescope" to maximize information received by analysis of its passive and active sensors.

Space-based reconnaissance systems are also used to observe satellites. Space-based systems first appeared in the 1960's for ground observation missions. When Eisenhower described the proposed "Open Skies" program, which was allegedly intended to provide verification without disarmament, the Soviets "curtly" turned it down. That was in 1955 at the Geneva Summit conference, only a year before U-2 spy planes began flying over Russia. Then, in 1960, with the U-2's out of action, Discoverer 13, the first "spy satellite", returned photographs of Earth.<sup>31</sup>

<sup>28</sup> An excellent overview of arms in space and their relevance in arms control agreements is given by Lindsey, G.R. "The Military Uses of Outer Space and Arms Control", *Canadian Defence Quarterly*, V. 13, no. 1, 1983, pp. 9-14. For a detailed review of outer space law relevant to arms control see the Canadian working paper presented to the Conference on Disarmament entitled "Survey of International Law Relevant to Arms Control and Outer Space", CD/618, 23 July 1985.

<sup>29</sup> McNamara, F.L. and Krag, W.E., *op. cit.*, note 13.

<sup>30</sup> Karas, T. *op. cit.*, note 16.

<sup>31</sup> Steinberg, G.M. *Satellite Reconnaissance*, Praeger Publishers, N.Y., N.Y., 1983.

