NOTES

1. The meaning of intersatellite "harm" is examined in Part II (Chapters 5–9) of this paper, where a graduated scale is developed for measuring satellite harm, ranging from negligible harm to lethality (satellite death). The important circumstance of *intersatellite range* (distance) is discussed in Chapter 10, becoming the basis for *keep-out zones* in Chapter 11.

2. Since most USSR space weapon research is hidden, this paper tends to focus on USA programs, for which more information is available.

3. A satellite's *critical capabilities* will be discussed in Chapter 6.

4. This is significant in light of the possibilities for on-site or on-orbit close-up inspection.

5. The methodology presented in this chapter was first conceived by Peter Stibrany (seconded from Spar Aerospace Ltd. to External Affairs and International Trade Canada) and Kieran Carroll (of Dynacon Enterprises Ltd.).

6. General verification concepts have been examined by F.R. Cleminson and E. Gilman in *A Conceptual Working Paper on Arms Control Verification*, Ottawa: Department of External Affairs, Arms Control Verification Study No. 1 (January 1986).

7. See Loftus, Tilton and Temple, "Decision Time on Orbital Debris," *Aerospace America* (June 1988).

8. The *Anik* satellites are members of an ongoing series of Canadian communications satellites, beginning with *Anik A* in 1972, and continuing with the ninth in the series, *Anik E*, launched on *Ariane* as this is being written. (More than one satellite in the *Anik* series has the same alphabetical label.)

9. When the harm index of the threat satellite attains the critical value, chosen through normalization to be unity, the target satellite is harmed to the extent that it can no longer function. It has, in the vernacular, been "killed."

10. *Radarsat*, scheduled for launch in the mid-1990's, is Canada's latest Earth-resources satellite and features synthetic-aperture-radar technology.

11. Such information has been compiled from the U.S. Department of Defense and the Congressional Office of Technology Assessment in *Anti-Missile and Anti-Satellite Technologies and Programs*, Noyes Publications, Park Ridge, NJ (1986).

12. Detailed analysis of this viewpoint is beyond the scope of this report.

13. Consider a threat satellite in an elliptical orbit with a perigee height of 200 km and an apogee halfway to geostationary altitude. If 20% of its mass is fuel for maneuvering, a forward thrust at perigee will raise the apogee more than 20,000 km toward to geosynchronous radius. This distance is greater than the range of most potential weapons.