opportunities every 24 hours to observe any one small area of special interest, and often only one or none at all. If the sensors cannot operate through cloud, fog, rain or in the dark, the surveillance is prevented. To minimize atmospheric drag, the satellite must keep at least 150 km above the earth's surface, so that the range to objects under surveillance will never be less than this considerable minimum distance.

For most satellites the problem of providing electrical power for the sensors, communications, and "housekeeping" functions such as control of temperature and orientation can be solved by solar arrays, especially when the sensors are of the passive type. However, active sensors such as radar require considerable electrical power, especially if they are expected to detect small objects at ranges of hundreds of kilometres, and if their performance is dependent on elaborate electronic data processing on board the satellite. The first surveillance satellites (the Soviet RORSATs) with active radar had their power supplied by a nuclear reactor,[36] and most of those depending on solar cells have been limited to power levels of no more than a few hundred watts. While research continues in the United States and the Soviet Union with respect to space-borne nuclear reactors, considerable public resistance to increased use of nuclear power sources for earth-orbiting systems is virtually a certainty.[37] If operation is required while a solar powered satellite is in the shadow of the earth, it will be necessary to add storage batteries, which add considerable weight and have a finite lifetime. More information regarding satellite power sources is given in Annex D.

---

[36] Daniel Hirsch, "Soviet Reactors for SDI?", *International Affairs*, January 1990: p. 154. The "Ramashka" reactor was the type on board COSMOS 954 that crashed over northern Canada in 1978.

[37] "Anti-Nuclear Groups Oppose Galileo Launch, Jupiter Probe Powered by Plutonium," *The Washington Post*, 16 September 1989: p. A3.