

Thermal Control and Propulsion

Satellites are subject to large thermal gradients, receiving the sun's radiation on one side while the other side faces into space. In addition, thermal radiation from the earth and the earth's *albedo*, which is the fraction of the radiation falling on earth which is reflected, can be significant for low-altitude earth-orbiting satellites, although it is negligible for geostationary satellites.

Equipment in the satellite also generates heat which has to be removed. The most important consideration is that the satellite's equipment should operate as nearly as possible in a stable temperature environment. Thermal blankets and shields may be used to provide insulation. Radiation mirrors are often used to remove heat from the communications payload.

The mirrored thermal radiator for the Hughes HS 376 satellite can be seen in Figure 2.5. These mirrored drums surround the communications equipment shelves in each case and provide good radiation paths for the generated heat to escape into the surrounding space.

One advantage of spinning satellites compared with body-stabilized is that the spinning body provides an averaging of the temperature extremes experienced from solar flux and the cold back-ground of deep space. In order to maintain constant temperature conditions, heaters may be switched on to make up for the heat reduction which occurs when transponders are switched off. The INTELSAT VI satellite heaters are used to maintain propulsion thrusters and line temperatures.