7.7.2 Generation (Continued)

technology has a characteristic power level capability with solar cells supplying the demand for most applications. Thus, it is not surprising that the Paxsat spacecraft which requires 2.0 kW of EOL power to utilize solar cell technology for its power generation requirements.

The power budget for the Paxsat concept spacecraft is presented in Table 7-13. Of the 2,000 W EOL requirement, 410 W is to be supplied to the payload as determined in section 6.0 of this report. 1,590 W of power is required for the bus and payload support subsystems including the power necessary to charge the batteries for LEO operation. This power budget represents the end of life operations requirement for the spacecraft. The solar array will need to generate more than this requirement to counteract the radiation and the solar aspect angle losses.

The characteristics of a solar cell to be used on a future low earth orbit satellite is given in Table 7-14. This cell is typical of those used on satellites in low earth orbits. Table 7-15 illustrates the radiation factors which will affect the performance of a solar cell after flying a 5 year mission in the radiation environment at an altitude of 1,000 km. The total term implies that a solar cell's output power will diminish to 69% of its initial capability after a 5 year exposure to the radiation at a 1,000 km altitude including other cell losses. In the Paxsat concept, a similar efficiency was assumed to account for the radiation environment. This factor underestimates the radiation degradation for GEO and Molniya orbits and consequently overestimates the performance of the solar array for these orbits. However, in the case of the GEO orbit, the maximum solar aspect angle will be less than that required for LEO operation and thus Paxsat will not experience any degradation in its performance. In the Molniya orbit, however, Paxsat will experience some limitations as it nears end of life. However, time-sharing optical and ESM receiver payload operations should offset this limitation. Increasing the size of the solar array to account for the increased