7.7.3 Storage (Continued)

more energy is generated than required, the spacecraft is overdesigned which may equate to an associated mass penalty. The power subsystem is modelled using efficiencies to define characteristics of the system. Figure 7-8 illustrates the Paxsat power subsystem model.

In the Paxsat concept, an end-of-life power generating capability of 2,000 W provides sufficient power to charge two 22 cell, 50 AHr NiH_2 batteries and provide three 12 minute operations of the payload during eclipse per day and full operations during sunlight. The battery DOD never exceeds a recommended 40% for lifetime considerations. The charge rate for the batteries never exceeds C/1. NiH_2 batteries are now being tested at C/1 and C/2 rates for 90 minute orbits and current thinking does not foresee any difficulties with such rates.

Thus, two 22 cell 50 AHr NiH_2 batteries weighing a total of 33 kg enables the Paxsat spacecraft to monitor a target spacecraft for one complete eclipse period a day and all sunlight periods in a 90 minute low earth orbit. At geosynchronous where eclipses last a maximum of 72 minutes, the Paxsat batteries are able to give full eclipse operation without exceeding an 80% DOD.

7.7.4 Distribution

The distribution and the power electronics on-board the Paxsat spacecraft are based on the power module of the MMS spacecraft. At a weight of 52 kg, this power subsystem offers a maximum power tracking capability over a 28 V nominal unregulated power bus. This system requires power conditioners specific to the needs of each spacecraft subsystem and payload element. This is the usual design feature of a modular spacecraft and since Paxsat is of a modular design, the feature is employed on the Paxsat spacecraft.

The MMS power module can accept a maximum input power of 3,000 W. Since the Paxsat spacecraft can generate