7.7.2   Generation (Continued)

Each wing is divided into ten panels to enable stowage
on the sides of the Paxsat configuration during launch.
With such a solar array configuration, weighing but
167 kg, the Paxsat is able to provide power for all
envisioned missions of the Paxsat spacecraft and allow
compatibility with the Ariane IV and STS launch
vehicles.

7.7.3   Storage

Batteries are typically employed on spacecraft to enable
operation when the earth eclipses the sun. Batteries
enable energy to be stored when the spacecraft is in the
sun, and released for operations during eclipse
periods.

There are two major kinds of batteries employed in the
spacecraft industry today. The first type is Nickel
Cadmium (NiCd) and the second type is Nickel Hydrogen
(NiH$_2$). The NiH$_2$ batteries are relatively new
developments having a much higher energy density by mass
than NiCd batteries. In addition, NiH$_2$ batteries enable
higher depth of discharge and charging rates than NiCd
batteries, but because they are new developments, the
lifetime of these batteries is unknown. Future
applications however are expected to utilize NiH$_2$
batteries exclusively. In the Paxsat concept, the more
robust NiH$_2$ batteries are employed.

The battery concept for the Paxsat spacecraft is driven
by the low earth orbit regime. This domain places the
most demands on a battery system design. In particular,
a 90 minute period orbit was selected as being the worst
orbit in which Paxsat would need to operate. In a
90 minute orbit, 36 minutes are spent in eclipse leaving
only 54 minutes in each orbit to charge the batteries
sufficiently for the next eclispe period. This cycle is
repeated sixteen times a day.

Battery and solar array designs for spacecraft are
highly coupled based on the need to maintain a daily
energy balance. If a balance is not at least maintained
during each day, the mission will soon come to an end as
the batteries continue to be charged to a lower and
lower state, until the spacecraft cannot provide enough
power to maintain itself during eclipse. Conversely, if