7.5.3 Attitude Sensors (Continued)

virtually any arbitrary accuracy. The largest angular error terms will come from errors in orbit determination, timing, and the angular pointing error of Paxsat itself.

In order to minimize this, it was considered that Paxsat should be equipped with a high accuracy inertial measurement unit (IMU), which would measure Paxsat attitude with respect to the stars. Not only would this system give the highest available performance, it is also virtually independent of the satellite orbit.

Such an attitude measurement system is similar to one used by the MMS platform. Whether or not additional sensors are required for back-up control depends on the reliability and the up-time achievable for the computer. At most, some earth sensors might be required for back-up when Paxsat is not investigating a target. For the purpose of the current study, an inertial measurement unit combined with sun sensors would provide adequate, reliable performance, in that a sun facing attitude serves as back-up in case of IMU inoperability during loitering (i.e. during a period in which no investigation is being performed).

7.5.4 Actuators

Attitude is controlled primarily through the use of reaction wheels. When these saturate, external torques are generated by magnetic torquing coils which react against the earth's magnetic field. Magnetometers are used to measure the orientation of that field so that the magnetic torquers can be used to full advantage.

One advantage of this system is that it allows the spacecraft platform to be kept very stable as opposed to the performance of a system which uses thrusters to de-saturate the reaction wheels.

The logic required to drive the magnetic torquers could be either hardwired or implemented through software. For the present concept, a software implementation was used.