of the imaging spectrograph indicates that PSC formations should be detectable. This possibility will be investigated in detail during Phase A.

A nighttime experiment using stars as light sources also offers unique opportunities to make measurements of other species which are undetectable during the daytime. The nitrogen oxides are an important class of such species, which undergo large diurnal variations. The conversion of NO to NO_2 at night is a rapid process, while the photolysis rate of NO_3 is large, such that NO_3 is nearly absent during the day. A secondary objective of the NiteOwl experiment is to determine vertical profiles of these nighttime species. Such measurements may provide valuable information on ozone chemistry and will enhance the interpretation of the ozone results. Both NO_2 and NO_3 have absorption features within the spectral range from 400 to 700 nm. Preliminary calculations for a tangent altitude of 24 km indicate 7% absorption at 431 nm by NO_2. This should be detectable with the target resolution and sensitivity of the NiteOwl instrument. The wide spectral range of the instrument (400-780 nm) also allows more accurate determination of the column concentrations of the absorbing and scattering species, including aerosols. We will also conduct a detailed investigation of the possibility of NO_x measurements during Phase A.

2 The NiteOwl Experiment

The NiteOwl instrument will be launched from SpacePort Canada (Churchill, MB) aboard an Orion rocket. This rocket will take the payload to an altitude of 80km. From apogee the payload will descend using a parachute specially designed to provide a low spin rate. Measurements of stellar spectra attenuated by atmospheric absorption will be taken using an imaging spectrograph (ISG) viewing horizontally. As the payload rotates the ISG will scan the full horizon. The position of the payload will be monitored using an onboard Global Positioning System (GPS) receiver, which will also facilitate post-flight recovery. An attitude video camera (AVC) in the payload will image the star field to determine the look direction of the ISG. Data transmitted to the ground will include measurements made by the ISG and the GPS receiver, an attitude video camera (AVC), a temperature sensor, and possibly a chemiluminescent ozonesonde to measure ozone *in situ*. A block diagram of the payload is shown in Figure 1-3.

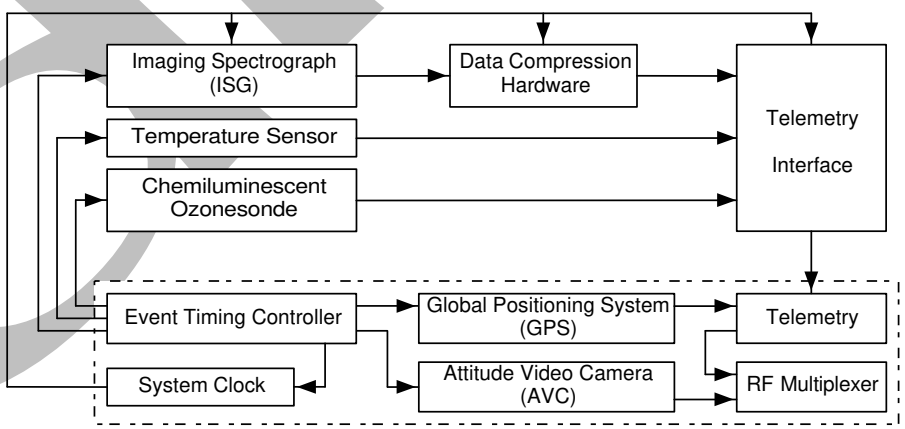

Fig. 1-3. Block diagram of the NiteOwl payload showing the flow of control and data.