Team PLEASE

April Status Report

HASP

Activities of the Team:

We have been attempting to prove that the 1 reading per second we initially were aiming for was indeed sufficient for arcminute accuracy. This entailed first observing how much the yaw, pitch, and roll of a similar payload changes every second. For pitch and roll during the float period of a typical flight changed only slightly each second, less than 3 arcminutes. For yaw, however, it often changed more than 30 arcminutes in a single second. This means that the position in between two readings would be unaccounted for. We then had to show that we could interpolate for these points with the desired accuracy. By fitting polynomials to small sections of the position plots, we could achieve a correlation coefficient of over .99. This means that the ponts in between the recorded datapoints can be interpolated to within 99% relative accuracy.

We constructed a Styrofoam box with a "Baader Film" window for initial camera testing as a proof of concept. The wide window allows the camera to photograph the sun without saturating the chip. We planned on using several of the cameras we had around the lab to see what sort of exposure time we would need, and also if the image processing technique using IDL would accurately locate the centroid of the sun disc. We executed initial tests using a Sony "Bloggie" camera with a 360 degree fisheye lens.

We completed our preliminary PSIP. This entailed deciding on what commands we would want to use with the serial uplink provided by HASP. We also had to create a record of data that would be sent from HASP every minute as a packetized bundle.

The system design was updated, particularly the "Data Acquisition Subsystem" page. The design was expounded upon; we will use the interrupt functions that are allowed by the Arduino Mega. The pulse of the GPS will be tied to an Interrupt Service Routine (IRS) so that when it pulses every second it interrupts the Arduino's default functions via a Interrupt Request line (IRQ). The IRS will prompt the Arduino to record all data, trigger the camera, start conversions, etc. Once this routine is completed it will return to the default mode, which means it will wait for commands, downlink the record, and check the pulse count.

Problems Encountered:

The Sony "Bloggie" did not take sufficient pictures of the sun. It uses its own algorithm to clean up the photographs, which may have distorted or even erased the sun disc. It also allows very

little control over the photographing; you cannot change exposure time, focal length, focus, etc. We will try again with several other models of camera.

Milestones Achieved:

Proved the 1Hz readings will be sufficient for arcminute accuracy

Constructed camera box that will be used for testing

Completed preliminary PSIP

Current Team Members and Demographics:

Members: Josh Frick and Joel Taylor

Faculty Advisor: Michael Cherry

With Guidance From: Michael Stewart, Gregory Guzik