All the info here is only for the boards we would need to test comms and some minimal ADCS stuff. We’ll need to choose a payload experiment before I can say what else we may need to order.

**Timeline for Parts ordering:**

Most of our parts will need to be ordered by the electrical team. These would be a backplane, the comms board, the avionics board, and the EPS board. Jayson would know the definite answer, but if I remember right the boards themselves come within a couple weeks (and I’m pretty sure we have plenty of duplicates already in the electrical room that we can use anyway). The more challenging part is the chips that you put on the boards which can have widely varying lead times. We will definitely need the BNO055 IMU chips, at least one STM microcontroller chip, and the GPS chip. The GPS chip will be hardest because we’ve been having lots of issues with multiple months long lead times on it already for CougSat-1. There may also be some other chips that I’m forgetting. The good news is we might have some of the chips already in inventory, Jayson or Chase would know for sure.

**Cost of Parts:**

Jayson would know since he’s had to order the parts for these boards already. If I had to take a wild guess I would say around $200 each, but that may be way off.

**Functionality of Design:**

The comms board has a microcontroller/uController chip which is just a tiny CPU and is where the code is actually executed. This chip communicates with the other “dumb” chips on the board by sending them commands through its pins. The communications system basically operates by generating a 435MHz carrier signal and then “modulating” it to encode information. This modulated signal is then sent through a UF.L connector to the +X panel which has the antenna on it and that antenna generates radio waves. Those waves are then picked up by the big purple antenna connected to the hackrf. Right now this doesn’t work but me, Derek, Jayson, and Chase have been working with Bradley to get it up and running and I’m confident we’ll at least have a beep by April 1st.

The avionics board was actually designed to have 3 systems on it: the ADCS(or avionics), IFJR, and IHU, each with their own dedicated uController. Since IFJR and IHU have been abandoned, only the ADCS chip actually needs to be there. The ADCS chip reads in data from the 3 redundant IMUs, 6 photodiodes, and a GPS to determine the satellites attitude. It also outputs to three motor controller chips to power the magnetorquers. For Spaceport America, the only systems we would really be able to test are the GPS and the attitude determination system using the IMUs alone (no photodiodes). We could transmit this data or just store it on built in SD cards. One problem with transmitting the data is it would require inter-chip communication between the ADCS uController and the comms uController, which I haven’t looked into yet. This is why I’ve been saying we probably want a back-up solution for GPS like a Telemetrum.

A couple things we’ll need to keep in mind when designing the payload: The EPS board may be too flimsy for the high 11g we’ll experience in a sounding rocket. The batteries are attached directly to the board with no additional support and held on with zip ties. This is fine for a regular rocket launch, but I think would probably snap the board in this case. Also, the antenna deployment will need to be looked into, we’re supposed to burn through some fishing line with a couple resistors to deploy the antenna on CougSat-1 and the Spaceport payload but I don’t think that’s been looked into at all.

**Individual Responsibilities:**

Attitude Control will be responsible for getting comms working and the ADCS board.