

## **Overview**

The Perlan II aircraft has a payload bay capable of holding four standard CubeSat frames. This bay has access to the outside environment via an air inflow, air outflow and small sapphire glass windows. The info can be segmented to individual experiments as needed. The outflow can be used for aerosol disbursement testing. The windows are best suited for spectrographic readings, delivered to the experiment via fiber optic cable. The windows are not suitable for photographic cameras.

The aircraft will carry a number of weather sensors and photographic cameras on board. This data can be made available to the experimenter after the flight as needed.

## **Structure**

The basic units will follow the CubeSat specifications as laid out in Revision 13, CubeSat Design Specification, Updated April 6, 2015 located at:

[http://www.cubesat.org/images/developers/cds\\_rev13\\_final2.pdf](http://www.cubesat.org/images/developers/cds_rev13_final2.pdf).

There are two specific types of hardware structures: one for flight operation and the other for classroom work. CubeSats will be constructed out of one of the following materials:

### **Flight Hardware**

Aluminum frame - 6061-T6 or equivalent metal structure in the CubeSat specification sheet. (Pumpkin hardware - \$995)

PETG frame - created using common 3D printer technology based on the ArduSat framework (<https://www.ardusat.com/lessons/157>). All frame assembly screws need to be secured using Loctite or similar compound.

### **Classroom Demo Hardware**

Same as PETG frame but made with ABS or PLA plastic

## **Power**

Each of the Perlan CubeSats will be required to provide their own power systems. Power systems will be activated just before flight. Estimated flight duration is 7-9 hours. Each CubeSat experiment must be able to provide its own power for the full duration of the flight. Battery compartments should be isolated from the experiment hardware due to temperature fluctuations.

### **Non-Rechargeable Systems**

Primary power is lithium single use cells (Ex. Energizer L91)  
Max voltage 6 VDC

### **Rechargeable Systems**

Lithium-Ion only (no NiMH, NiCad, etc.)  
Voltage Max 12 VDC

## **Flight Experiment Hardware**

As a base set of equipment, Teachers in Space intends to fly the following hardware on each mission:

- Arduino/Edision/System on Chip (SOC) microcontroller
- 3 axis accelerometer
- 3 axis gyroscope
- 3 axis magnetometer
- 1 pressure sensor
- 1 humidity sensor
- 1 temp sensor

## **Potential Experiments**

The following is a list of potential experiments. This section may be removed if it is redundant or deemed of low value.

- Atmospheric sampling
- Dosimeter for radiation
- Sat transmission of data testing

## **Radio Interference**

None of the experiment hardware (including radio communication, if required) contained within the CubeSat may interfere in the operations of the Perlan vehicle. All experiments will be tested prior to flight. Any experiment found to cause interference will not fly until the issues are resolved. In the event that an experiment cannot be modified in the field, it will be returned.

All experiments need to have an on/off trigger using a “remove before flight” pin system.