

HADES 2013 Status Report  
Month: June

1. Activities of the Team Members:

A. Mechanical: S. Burke

- Completed Payload Design
- Made all Mechanical Drawings
- Fabricated all parts
- Assembled vast majority of the mechanical structure
- Bench tested motor and shaft coupling
- Decided on a location and orientation on the HASP Interface Plate

B. Electrical: David Branch

- Designed printed circuit board shield for h-bridge actuator control and temperature sensors.
- Designed HADES to HASP power and communication interface board.
- Tested new GPS/Logging shield from B. Ellison.

C. Software: David Branch

- Developed telemetry and serial downlink commands for HADES flight.
- Developed a timeline of the LAMB III flight from the logged information on the SD card.

D. Biology:

- Addressed comments from the preliminary PSIP
- Continue to isolate organisms from prototype payload that sampled from 75,000-95,000 ft.
- Extract and amplify DNA from the first 13 isolates
- Sequence the 16S region of the DNA to identify the closest neighbor to isolated organisms
- Begin desiccation and low pressure survival trials for the first set of isolates

2. Issues Encountered:

A. Mechanical:

- Not accounting for extra thickness of the slip ring mounting bracket stock material
- Incorrect measurement of an essential vertical bracket hole placement by 5 thousandths of an inch resulting in wasted time remaking the part and 2 ½” wasted length of scrap right angle stock
- Sheared 10-24 wing head screw in half, and had to remove threaded stub from hole
- Completed design extends outside of the HASP foot print

B. Electrical:

None. Only design during this month.

### C. Software:

The GPS/Logger shield required reconfiguration of the software. I/O lines that were configured for the previous shield were originally for the Arduino UNO and were used to communicate with the GPS module, SD card, RX, and TX lines. These lines had to be changed because the new shield is designed for the Arduino MEGA.

### D. Biology:

- Failed to properly purify the amplified DNA and the sequencing reaction fail
- Ran out of amplified DNA and had to re-amplify before attempting second (and successful) sequencing reaction
- Additional organisms have appeared on sample plates requiring additional time to isolate
- The bell jar used for the low pressure tolerance tests becomes warm after 9 hours of operation requiring further investigation into the duty cycle of the pump

## 3. Milestones Achieved:

### A. Mechanical:

- Finished Payload Design
- Created Parts List
- Ordered Parts
- Created All Mechanical Drawings Needed
- Fabricated Components
- Completed vast majority of assembly
- Bench tested motor
- Determined HADES location on the HASP Interface plate
- Will submit a waiver for exceeding the HASP foot print

### B. Electrical:

The new actuator control board will have jumpers that will allow for all of the actuators to be controlled at once.

### C. Software:

None. Other than changing I/O line definitions, no new software was created.

### D. Biology:

- PSIP submitted for HASP review
- First 13 isolates from the stratosphere have been identified to the species level
- Desiccation tolerance for the isolates is being tested to predict possible stratosphere survival times
- Another round of isolates are being identified
- Continue to monitor the controls for possible contamination
- Due to the success in isolating organisms from the stratosphere, a new plan for HADES culturing is being drafted to maximize the number of organisms recovered from the HASP 2013 flight

4. Current Team Members and Advisors:

Name	Year	Demo	Role
Noelle Bryan	Graduate Student	Caucasian	Team Lead, Biology
Scott Burke	Jr.	Caucasian	Mechanical
David Branch	Jr.	Caucasian	Software
B. Christner	n/a		PI