

# Milestone Review Flysheet 2017-2018

**Institution** University of Alabama in Huntsville

**Milestone** Preliminary Design Review

## Vehicle Properties

Total Length (in)	96
Diameter (in)	4" body + 6" fairing
Gross Lift Off Weight (lb.)	39.5
Airframe Material(s)	Fiberglass
Fin Material and Thickness (in)	Fiberglass/0.1875
Coupler Length/Shoulder Length(s) (in)	12/5.5

## Stability Analysis

Center of Pressure (in from nose)	63
Center of Gravity (in from nose)	51
Static Stability Margin (on pad)	2.0
Static Stability Margin (at rail exit)	2.0
Thrust-to-Weight Ratio	8.7
Rail Size/Type and Length (in)	1515/T-Slot/72
Rail Exit Velocity (ft/s)	55.7

## Recovery System Properties

### Drogue Parachute

Manufacturer/Model	Fruity Chutes/CFC
Diameter (in)	18
Altitude at Deployment (ft)	5282
Velocity at Deployment (ft/s)	0
Terminal Velocity (ft/s)	62.2
Recovery Harness Material	Nylon
Recovery Harness Size/Thickness (in)	1
Recovery Harness Length (ft)	50

**Harness/Airframe Interfaces**  
The shock cord that is used for the drogue chute has two connection points, one to the bulkhead on the avionics bay and one to the forward motor retention bulkhead.

Kinetic Energy of Each Section (Ft-lbs)	Aft Section	Fairing & Coupler	Section 3	Section 4
	1950.88	5030.08		

## Recovery Electronics

Altimeter(s)/Timer(s) (Make/Model)	PerfectFlite StratoLoggerCF
Redundancy Plan and Backup Deployment Settings	Dual, independent system
Pad Stay Time (Launch Configuration)	Indefinite with pull pin installed, unknown with pin removed (hours)

## Motor Properties

Motor Brand/Designation	Aerotech/L1520T - P
Max/Average Thrust (lb.)	397/342
Total Impulse (lbf-s)	835
Mass Before/After Burn (lb.)	39.5/35.6
Liftoff Thrust (lb.)	353
Motor Retention Method	Forward Retention

## Ascent Analysis

Maximum Velocity (ft/s)	623
Maximum Mach Number	0.56
Maximum Acceleration (ft/s^2)	289
Predicted Apogee (From Sim.) (ft)	5282

## Recovery System Properties

### Main Parachute

Manufacturer/Model	Fruity Chutes/Iris Ultra
Diameter (in)	96
Altitude at Deployment (ft)	600
Velocity at Deployment (ft/s)	62.2
Terminal Velocity (ft/s)	15.7
Recovery Harness Material	Nylon
Recovery Harness Size/Thickness (in)	1
Recovery Harness Length (ft)	50

**Harness/Airframe Interfaces**  
The shock cord that is used for the main chute has two connection points, one to the bulkhead on the avionics bay and the other to the bulkhead at the aft end of the payload

Kinetic Energy of Each Section (Ft-lbs)	Aft Section	Coupler and Upper Airframe	Fairing	Section 4
	46.76	52.72	67.85	

## Recovery Electronics

Rocket Locators (Make/Model)	Xbee Pro transmitter with Antenova GPS chip		
Transmitting Frequencies (all vehicle and payload)	900 MHz		
Ejection System Energetics		Black Powder	
Energetics Mass - Drogue Chute (grams)	Primary	4.0	
	Backup	6.0	
Energetics Mass - Main Chute (grams)	Primary	4.0	
	Backup	6.0	
Energetics Masses - Other (grams) - If Applicable	Primary		
	Backup		

Payload	
Payload 1 (official payload)	Overview
	The payload selected is the deployable rover. In its compressed state, the payload wheels have a diameter of 5.7 in, a length of 13 in, and the weighs 7lbf. The payload resides in the 6" fairing of the launch vehicle. It is ejected through the top of the fairing through the use of a piston. Upon clearing the fairing, springs will pull the wheels to their expanded diameter, 14 in and the tail unfurls. The rover will then begin moving, taking temperature, pressure, location data, and images. Upon reaching the required distance, the lid of the chassis will slide open, via a DC motor and linear gear, in order to reveal the solar panels.
Payload 2 (non-scored payload)	Overview
	No secondary payload.

Test Plans, Status, and Results	
Ejection Charge Tests	Standard operating procedures have been developed for ejection testing. The location is a dedicated test area at the UAH Propulsion Research Center. This area is shielded for testing to be done safely. The subscale ejection test is scheduled for November 10th and the full-scale ejection test is scheduled for January 12th. Eight team members have completed first aid and CPR training and are eligible to conduct testing.
Sub-scale Test Flights	The first subscale flight is scheduled for November 18th in Childersburg, AL. A backup/secondary date is December 16th. Both launches are hosted by Phoenix Missile Works, TRA section 81. The vehicle will be assembled (without energetics) and inspected the night before the launch. Preparation and launch day activities will be conducted according to Standard Operating Procedures.
Full-scale Test Flights	The first full-scale flight is scheduled for January 20th in Childersburg, AL. A backup/secondary date is February 17th. Both launches are hosted by Phoenix Missile Works, TRA section 81. The vehicle will be assembled (without energetics) and inspected the night before the launch. Preparation and launch day activities will be conducted according to Standard Operating Procedures.

Institution

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Milestone

Preliminary Design Review

Additional Comments

The team is flying a motor that typically uses a 75/3840 case, but the team is using a 75/5120 case with a spacer in case a larger motor is later required in the design. This case is also already in stock from previous competitions.