

Milestone Review Flysheet 2017-2018

Institution University of Alabama in Huntsville

Milestone Critical Design Re

Vehicle Properties	
Total Length (in)	103
Diameter (in)	6" fairing + 4" body
Gross Lift Off Weigh (lb.)	43.8
Airframe Material(s)	Fiberglass
Fin Material and Thickness (in)	Fiberglass/0.1875
Coupler Length/Shoulder Length(s) (in)	12/5.5

Motor Properties	
Motor Brand/Designation	Aerotech/L1420R-F
Max/Average Thrust (lb.)	373.76/326.18
Total Impulse (lbf-s)	1035
Mass Before/After Burn (lb.)	10.0/5.6
Liftoff Thrust (lb.)	309.51
Motor Retention Method	Aft Retention

Stability Analysis	
Center of Pressure (in from nose)	68.935
Center of Gravity (in from nose)	55.606
Static Stability Margin (on pad)	2.22
Static Stability Margin (at rail exit)	2.26
Thrust-to-Weight Ratio	7.45
Rail Size/Type and Length (in)	1515/T-slot/144
Rail Exit Velocity (ft/s)	63.93

Ascent Analysis	
Maximum Velocity (ft/s)	66
Maximum Mach Number	0.5
Maximum Acceleration (ft/s ²)	25
Predicted Apogee (From Sim.) (ft)	542

Recovery System Properties				
Drogue Parachute				
Manufacturer/Model	Fruity Chutes/CFC-18			
Size/Diameter (in or ft)	18 in			
Altitude at Deployment (ft)	5429 ft			
Velocity at Deployment (ft/s)	0 ft/s			
Terminal Velocity (ft/s)	112.7			
Recovery Harness Material	Nylon			
Recovery Harness Size/Thickness (in)	1 in			
Recovery Harness Length (ft)	50 ft			
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 and Coupler	Section 3	Section 4
	1950.88	5030.08		

Recovery System Properties			
Main Parachute			
Manufacturer/Model	Fruity Chute/!		
Size/Diameter (in or ft)	96		
Altitude at Deployment (ft)	600 ft		
Velocity at Deployment (ft/s)	112.7		
Terminal Velocity (ft/s)	17.45		
Recovery Harness Material	Nyl		
Recovery Harness Size/Thickness (in)	1 i		
Recovery Harness Length (ft)	50		
Harness/Airframe Interfaces	The shock cord that is used for t has two connection points, one t on the avionics bay and the c bulkhead at the aft end of tt		
Kinetic Energy of Each Section (Ft-lbs)	Aft Section	Coupler and Upper Airframe	Fairing
	46.76	52.72	67.85

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	PerfectFlight Stratologger CF
Redundancy Plan and Backup Deployment Settings	Dual, independent system

Recovery Electronics		
Rocket Locators (Make/Model)	Xbee Pro transmitt Antenova GPS c	
Transmitting Frequencies (all - vehicle and payload)	900 MHz	
Ejection System Energetics (ex. Black Powder)	Black P	
Energetics Mass - Drogue Chute (grams)	Primary	4
	Backup	6
Energetics Mass - Main Chute (grams)	Primary	4
	Backup	6

Pad Stay Time (Launch Configuration)	Indefinite with pull pin installed, unknown with pin removed (hours)	Energetics Masses - Other (grams) - If Applicable	Primary	12 (C
			Backup	N,

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Payload	
Payload 1 (official payload)	<p style="text-align: center; margin: 0;">Overview</p> <hr/> <p>The payload selected is the deployable rover. In its compressed state, the payload wheels have a diameter of 5.7 in, a length of 15.04 in, and weighs 7 lb. resides in the 6 in 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 pop to their expanded diameter, 16.06 in and the tail unfolds. The rover will then begin moving, taking temperature, pressure, location data, and images. Upon required distance, the lid of the chassis will slide open, via a DC motor and linear gear, in order to reveal the solar panels.</p>
Payload 2 (non-scored payload)	<p style="text-align: center; margin: 0;">Overview</p> <hr/>

Test Plans, Status, and Results	
Ejection Charge Tests	<p>Standard operating procedures were developed for ejection testing and followed for testing which occurred on November 18, 2017 before the sub-scale location is a dedicated test area at the UAH Propulsion Research Center and is shielded for testing to be done safely. Eight team members have completed CPR training and are eligible to conduct testing.</p>
Sub-scale Test Flights	<p>The first subscale flight occurred on November 19th in Childersburg, AL. The conditions were very windy which led to a lower apogee than expected but systems deployed successfully at their desired altitudes and the rocket was recovered within close range of the launch rail. The second and third flights occurred on December 16th in Childersburg, AL. The second flight appeared to have a canted nozzle in the COTS motor which was not noticed before assembly, which caused the rocket to experience oscillations during flight and did not reach the intended altitude. The third flight, however experienced no anomalies and reached the intended apogee. All subscale flights had successful recoveries and were suitable to reflly.</p>
Full-scale Test Flights	

The first full-scale flight is scheduled for February 17th in Childersburg, AL. This launch field is hosted by Phoenix Missile Works, TRA section 81. The vehicle was assembled (without energetics) and inspected the night before the launch. Preparation and launch day activities will be conducted according to Standard Procedures.

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Additional Comments





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