

Milestone Review Flysheet 2017-2018

Institution York College of Pennsylvania

Milestone FRR

Vehicle Properties

Total Length (in)	138 in.
Diameter (in)	6.007 in.
Gross Lift Off Weigh (lb.)	28.49 lb
Airframe Material(s)	Carbon Fiber Composite
Fin Material and Thickness (in)	Ultem Plastic (Varies)
Coupler Length/Shoulder Length(s) (in)	6 in. +

Motor Properties

Motor Brand/Designation	Aerotech L1150R-PS
Max/Average Thrust (lb.)	302.95 lb / 258.53 lb
Total Impulse (lbf*s)	790.65 lbf*s
Mass Before/After Burn (lb.)	8.099 lb / 3.907 lb
Liftoff Thrust (lb.)	276.7 lb
Motor Retention Method	AP 75 Flanged Motor Retainer

Stability Analysis

Center of Pressure (in from nose)	102.36 in.
Center of Gravity (in from nose)	85.43 in.
Static Stability Margin (on pad)	2.77
Static Stability Margin (at rail exit)	3.11
Thrust-to-Weight Ratio	9.07 : 1
Rail Size/Type and Length (in)	1515 / 144 in.
Rail Exit Velocity (ft/s)	83.99 ft/s

Ascent Analysis

Maximum Velocity (ft/s)	751.3 ft/s
Maximum Mach Number	0.67
Maximum Acceleration (ft/s^2)	306.76 ft/s^2
Predicted Apogee (From Sim.) (ft)	5,400 ft

Recovery System Properties

Drogue Parachute

Manufacturer/Model	ParaMedichutes
Size/Diameter (in or ft)	15 in.
Altitude at Deployment (ft)	5,280 ft
Velocity at Deployment (ft/s)	0 ft/s
Terminal Velocity (ft/s)	147 ft/s
Recovery Harness Material	Kevlar
Recovery Harness Size/Thickness (in)	3/8 in.
Recovery Harness Length (ft)	30 ft

Harness/Airframe Interfaces	1/4" thick u-bolt attached to wood bulkeads will provide mounting surface for 1/4" quicklinks to the ariframe. Quicklinks will attach the recovery harness to the u-bolt.
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Recovery System Properties

Main Parachute

Manufacturer/Model	ParaMedichutes
Size/Diameter (in or ft)	120 in.
Altitude at Deployment (ft)	550 ft
Velocity at Deployment (ft/s)	147 ft/s
Terminal Velocity (ft/s)	12.7 ft/s
Recovery Harness Material	Kevlar
Recovery Harness Size/Thickness (in)	3/8 in.
Recovery Harness Length (ft)	30 ft

Harness/Airframe Interfaces	1/4" thick u-bolt attached to wood bulkeads will provide mounting surface for 1/4" quicklinks to the ariframe. Quicklinks will attach the recovery harness to the u-bolt.			
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Kinetic Energy of Each Section (Ft-lbs)	Nose (Payload)	Middle	Bottom	Section 4
	21.74	16.39	36.83	*

Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	*	*	*	*

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	PerfectFlite Strattlogger CF
Redundancy Plan and Backup Deployment Settings	2 altimeters will be contained in the electronics bay. 1 will be designated as the main altimeter and one will be designated as the redundant
Pad Stay Time (Launch Configuration)	3 hours (9V battery)

Recovery Electronics		
Rocket Locators (Make/Model)	AMW / High Power Transmitter	
Transmitting Frequencies (all - vehicle and payload)	Rocket Locator Transmitter - 223.170 MHz Wireless Serial Port Module - 441.0 MHz X-Bee Radio (Nose-Cone) - 2.4 GHz	
Ejection System Energetics (ex. Black Powder)		
Energetics Mass - Drogue Chute (grams)	Primary	5.0 grams
	Backup	6.0 grams
Energetics Mass - Main Chute (grams)	Primary	5.0 grams
	Backup	6.0 grams
Energetics Masses - Other (grams) - If Applicable	Primary	8.0 grams (CO2 ejection)
	Backup	Above charge is for nose-cone

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Payload	
Payload 1 (official payload)	Overview
	Deployable Rover - See the report for a more detailed overview of the payload and its detailed drawings
Payload 2 (non-scored payload)	Overview
	N/A

Test Plans, Status, and Results

Ejection Charge Tests	<p>We completed a sub-scale rocket ejection charge test. This test confirmed that the calculations we had completed were fairly accurate and produced about the right amount of thrust to separate two sections of tubing.</p> <p>We also held a full-scale ejection test before our launch on February 18th, 2018. We went out to a local field and laid the rocket onto a stand and filled both the drogue and main ejection wells with an initial 4.0 grams of black powder. We wired the e-match directly to a power wire that had a length of 50 feet. This allowed for a safe distance to be made for testing. On the initial 4.0 gram test, both body-tubes had successful separation, but they seemed to lack the speed and distance necessary for successful parachute ejection. We then reloaded and tested both wells with 5.0 grams of black powder which increased our tube pressure. This increase provided successful results and made for a successful test. This is a change that we have noted in our report and flysheet.</p>
Sub-scale Test Flights	<p>First Flight - 3,450 feet with straight flight profile / Second Flight - 3,650 feet with straight flight profile</p>
Full-scale Test Flights	<p>Full - Scale Flight Testing took place on February 17th, 2018 and March 17th, 2018 at the MDRA Launch Field in Henderson, Maryland.</p> <p>Flight Data - 3,480 feet with a straight flight profile (angle of attack around 6 degrees) Wind Speed: 14 mph Temperature: 47 degrees</p>
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Additional Comments



N/A