Milestone Review Flysheet 2017-2018

Institution	University of North Dakota	Milestone	FRR

Vehicle Properties

Total Length (in)	118
Diameter (in)	6
Gross Lift Off Weigh (lb.)	33.13
Airframe Material(s)	Carbon Fibre
Fin Material and Thickness (in)	Fiberglass - 1/8
Coupler Length/Shoulder Length(s) (in)	11.75 / 4

Motor Properties

Motor Brand/Designation	AeroTech L1150
Max/Average Thrust (lb.)	294 / 258
Total Impulse (lbf-s)	784.36
Mass Before/After Burn (lb.)	8.125 / 3.54
Liftoff Thrust (lb.)	83.9
Motor Retention Method	Nozzle Thrust Ring

Stability Analysis

Center of Pressure (in from nose)	86.65
Center of Gravity (in from nose)	72.3
Static Stability Margin (on pad)	2.39
Static Stability Margin (at rail exit)	2.3
Thrust-to-Weight Ratio	7.82
Rail Size/Type and Length (in)	12
Rail Exit Velocity (ft/s)	78.6

Ascent Analysis

Maximum Velocity (ft/s)	665
Maximum Mach Number	0.6
Maximum Acceleration (ft/s^2)	262
Predicted Apogee (From Sim.) (ft)	5375

Recovery System Properties

Drogue Parachute

Manufacturer/Model	Public Missiles Limited
Size/Diameter (in or ft)	24 in
Altitude at Deployment (ft)	Apogee
Velocity at Deployment (ft/s)	0
Terminal Velocity (ft/s)	68.1
Recovery Harness Material	Tubular Nylon
Recovery Harness Size/Thickness (in)	1
Recovery Harness Length (ft)	12
Harness/Airframe Interfaces	Stainless steel u-bolt connected to bulkhead

Kinetic Energy of Each Section (Ft-lbs)	Nosecone	Altimeter	Fin Can	N/A
	1018	14.56	1013	

Recovery System Properties

Main Parachute

Manufacturer/Model	Public Missiles Limited
Size/Diameter (in or ft)	120 in
Altitude at Deployment (ft)	700
Velocity at Deployment (ft/s)	68
Terminal Velocity (ft/s)	17.2
Recovery Harness Material	Tubular Nylon
Recovery Harness Size/Thickness (in)	1
Recovery Harness Length (ft)	12
Harness/Airframe Interfaces	Stainless steel u-bolt connected to bulkhead

Kinetic Energy of Each Section (Ft-lbs)	Nosecone	Altimeter	Fin Can	N/A
	65.34	0.93	65.01	

Recovery Electronics

Altimeter(s)/Timer(s) (Make/Model)	PerfectFlite SL100
Redundancy Plan and Backup Deployment Settings	Secondary altimeter in altimeter bay, deploys back up black powder charge regardless if primary altimeter was successful
Pad Stay Time (Launch Configuration)	1 to 2 hours

Recovery Electronics

Rocket Locators (Make/Model)	Com-Spec at-2b Transmitter/PR-100A	
Transmitting Frequencies (all vehicle and payload)	915 MHz	
Ejection System Energetics (ex. Black Powder)		Blackpowder
Energetics Mass - Drogue Chute (grams)	Primary	3
	Backup	3.5
Energetics Mass - Main Chute (grams)	Primary	6
	Backup	6.5
Energetics Masses - Other (grams) - If Applicable	Primary	N/A
	Backup	N/A

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Payload	
	Overview
Payload 1 (official payload)	Rover payload will be secured underneath the nose cone by a lockable bearing. Upon landing, and the deployment process is initiated, the rover will be orientated right side up. Actuators will begin to push the nose cone forward. As the actuators extend the plate the rover resides on will extrude out with the actuators. Once the actuators have deployed fully the rover will rotate on the plate and proceed to drive 5 feet, stop and deploy a set of solar panels
	Overview
Payload 2 (non-scored payload)	

Test Plans, Status, and Results	
Ejection Charge Tests	Second charge test for the scale rocket was successful. Charge test for the full-scale was successful on first attempt.
Sub-scale Test Flights	Sub-Scale launch results: Successful. Launch vehicle reached an apogee of 1250 feet according to altimeter data
Full-scale Test Flights	Full-scale flight has been attempted. Both parachutes deployed, except the drogue parachute was not attached to the altimeter bay resulting in the aft section of the rocket to fall only with the drogue and the fore section to only fall with the main. The flight was deemed a failure due to this. The launch vehicle reached an apogee of 4,271 feet according to altimeter date. Motor that was used was not the launch day motor, it was the L850W instead of the L1150

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Additional Comments