Milestone Review Flysheet 2017-2018

Institution	North Carolina State University

Milestone	CDR

Vehicle Properties	
Total Length (in)	128
Diameter (in)	7.5
Gross Lift Off Weigh (lb.)	47.1
Airframe Material(s)	Blue Tube body, plastic nosecone
Fin Material and Thickness (in)	Aircraft Grade Birch Plywood 1/4 in.
Coupler Length/Shoulder Length(s) (in)	6 in. / 6 in.

Motor Properties	
Motor Brand/Designation	AeroTech L2200G-PS
Max/Average Thrust (lb.)	697.29 / 504.25
Total Impulse (lbf-s)	1147.42
Mass Before/After Burn (lb.)	10.54 / 4.99
Liftoff Thrust (lb.)	504.25
Motor Retention Method	Retainer, Engine Mount, Centering ring

Stability Analysis	
Center of Pressure (in from nose)	94.9
Center of Gravity (in from nose)	79.5
Static Stability Margin (on pad)	2.05
Static Stability Margin (at rail exit)	2.075
Thrust-to-Weight Ratio	14.97
Rail Size/Type and Length (in)	1.5 x 1.5 x 96 aluminum rail
Rail Exit Velocity (ft/s)	77.3

Ascent Analysis	
Maximum Velocity (ft/s)	702
Maximum Mach Number	0.63
Maximum Acceleration (ft/s^2)	457
Predicted Apogee (From Sim.) (ft)	5371

Recovery System Properties Drogue Parachute				
Manufacturer/Model			Fruity Chute / Classic Elliptical	
Size/Diameter (in or ft)			24	
Altitude at Deployment (ft)			Apogee (5280 ft AGL)	
Velocity at Deployment (ft/s)			0	
Terminal Velocity (ft/s)			93.47	
Recovery Harness Material			Kevlar	
Recovery Harness Size/Thickness (in)			0.5	
Recovery Harness Length (ft)			40	
Harness/Airframe Interfaces		U-bolt with quick link		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	407.87	798.74	900.71	

Recovery System Properties Main Parachute				
Manufacturer/Model			Fruity Chute / Iris Ultra Standard	
Size/Diameter (in or ft)			120 in.	
Altitude at Deployment (ft)			700	
Velocity at Deployment (ft/s)			93.47	
Terminal Velocity (ft/s)			13.85	
Recovery Harness Material			Kevlar	
Recovery Harness Size/Thickness (in)			0.5	
Recovery Harness Length (ft)			40	
Harness/Airframe Interfaces		Black powder charge and u-bolt with quick link		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	21.1	46.04	46.99	

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	StratoLoggerCF PerfectFlite
Redundancy Plan and Backup Deployment Settings	Entacore AIM USB 3.0
Pad Stay Time (Launch Configuration)	1 hr

Recovery Electronics		
Rocket Locators (Make/Model)		BigRedBee/ BRB 900 MHz GPS
Transmitting Frequencies (all - vehicle and payload)		900 MHz - Required for CDR
Ejection System Energetics (ex. Black Powder)		Goex 4F Black Powder
Energetics Mass - Drogue Chute (grams)	Primary	6.2
	Backup	6.7
Energetics Mass - Main Chute (grams)	Primary	6.6
	Backup	7.1
Energetics Masses - Other (grams) - If Applicable	Primary	N/A
	Backup	N/A

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Payload

	Overview
Payload 1 (official payload)	The payload is a custom designed rover which is to deploy from the internal structure of the launch vehicle upon remote triggering. During flight, it is housed in the payload tube which is rotating about a Lazy Susan bearing system. Upon landing, the payload tube self-rights, and the electric latch keeping the rover in the tube is unlocked. At the same time, the rover exits the payload tube is to autonomously drive 5 ft in any direction and deploy foldable solar cell panels upon reaching the final resting point. The solar panels will be deployed using a rotating arm with folded panels attached. As the arm rotates, the panels unfurl.

	Overview
Payload 2 (non-scored payload)	N/A

Test Plans, Status, and Results

Ejection Charge Tests	In order to ensure that the altimeters used for ejection charges onboard the rocket execute correctly, altimeters will be placed in a vacuum chamber and will be hooked up to an LED. If the LED illuminates at the correct pressure, then it will be deemed worthy for flight. Black powder ejection charge testing will take place to confirm calculations performed in the PDR. These calculations rely on a constant to find the ideal pressure for a certain separation force. Testing will start with the calculated amount of black powder loaded into a mock-up of each section that is weighted and connected appropriately. Further tests will be performed until the sections separate by the appropriate amount.
Full-scale Test Flights	The full-scale test flight will take place in February 24, 2018 . This test will validate all launch vehicle and payload systems and provide complete confidence in mission success prior to FRR. Payload will implement deployable rover and rover mission will be tested and completed. . Launch vehicle recovery system timing and sizing will be confirmed. Target apogee and altimeter accuracy will be tested and necessary weight adjustments will be made in the weeks preceeding FRR.

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Additional Comments