

Milestone Review Flysheet 2017-2018

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Milestone CDR

Vehicle Properties	
Total Length (in)	94
Diameter (in)	5
Gross Lift Off Weigh (lb.)	24.9
Airframe Material(s)	Fiberglass
Fin Material and Thickness (in)	Fiberglass, 0.187
Coupler Length/Shoulder Length(s) (in)	4

Motor Properties	
Motor Brand/Designation	AeroTech / K1000T-P
Max/Average Thrust (lb.)	256.28 / 227.51
Total Impulse (lbf-s)	561.34
Mass Before/After Burn (lb.)	5.675 / 3.069
Liftoff Thrust (lb.)	256.28
Motor Retention Method	Aeropack Retainer

Stability Analysis	
Center of Pressure (in from nose)	73.59
Center of Gravity (in from nose)	59.9
Static Stability Margin (on pad)	2.73
Static Stability Margin (at rail exit)	2.92
Thrust-to-Weight Ratio	9:01
Rail Size/Type and Length (in)	1515 / 96
Rail Exit Velocity (ft/s)	68.5

Ascent Analysis	
Maximum Velocity (ft/s)	649
Maximum Mach Number	0.58
Maximum Acceleration (ft/s^2)	307
Predicted Apogee (From Sim.) (ft)	5194

Recovery System Properties				
Drogue Parachute				
Manufacturer/Model	SkyAngle			
Size/Diameter (in or ft)	28 in			
Altitude at Deployment (ft)	5192			
Velocity at Deployment (ft/s)	1.98			
Terminal Velocity (ft/s)	70.19			
Recovery Harness Material	Tubular Nylon			
Recovery Harness Size/Thickness (in)	0.5			
Recovery Harness Length (ft)	25			
Harness/Airframe Interfaces	1/4-20 Forged Eye bolts and Quick Links			
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	679.89	413.81	N/A	N/A

Recovery System Properties				
Main Parachute				
Manufacturer/Model	SkyAngle			
Size/Diameter (in or ft)	60 in.			
Altitude at Deployment (ft)	700			
Velocity at Deployment (ft/s)	55.94			
Terminal Velocity (ft/s)	21.4			
Recovery Harness Material	Tubular Nylon			
Recovery Harness Size/Thickness (in)	0.5			
Recovery Harness Length (ft)	25			
Harness/Airframe Interfaces	1/4-20 Forged Eyebolts and Quick Links			
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	70.18	11.59	49.77	N/A

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	Stratologger CF
Redundancy Plan and Backup Deployment Settings	Second, Independent Stratologger CF. Backup drogue ejection charge with 1 sec delay, backup main ejection charge with 100 ft delay.
Pad Stay Time (Launch Configuration)	1+ Hours

Recovery Electronics		
Rocket Locators (Make/Model)	AltusMetrum TeleGPS	
Transmitting Frequencies (all - vehicle and payload)	433MHz	
Ejection System Energetics (ex. Black Powder)	Black Powder	
Energetics Mass - Drogue Chute (grams)	Primary	2g
	Backup	3g
Energetics Mass - Main Chute (grams)	Primary	2g
	Backup	3g
Energetics Masses - Other (grams) - If Applicable	Primary	
	Backup	

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Payload	
Payload 1 (official payload)	Overview
	The payload chosen is the Deployable Rover. The rover will be integrated into the rocket in the Payload Bay where it will be hosed during flight. The rover itself will be comprised of a body, gear wheels, servos, and on-board electronics which will control the rover. The rover will be deployed via two systems. The first system is a CO2 ejection system which will eject the Payload Bay from the rest of the body. The second system is a set of gear wheels which will run along a track to move the vehicle out. Once out of the rocket, the vehicle will travel 5-feet and then deploy a solar panel. Once the rover is activated, data about the rover's position and solar panel output will be remotely sent to the team. Mission success will constitute fully traveling the required 5-feet and receiving solar panel output data.
Payload 2 (non-scored payload)	Overview
	N/A

Test Plans, Status, and Results	
Ejection Charge Tests	<p><u>Test Plan:</u> Ground testing will occur with the three systems integrated into the vehicle: Drogue Chute Ejection, Main Chute Ejection, and Payload Bay Ejection. These three tests will be conducted on the ground in order to verify the appropriate black powder charge has been calculated and that the CO2 canister system will be able to eject from the Payload Bay. The test setup will involve setting up the required interfaces in the same manner as in the vehicle. The items will be placed on a test stand in order to ensure that the ground will not interfere (Excluding the payload bay ejection test) and video will be taken in order to ensure that proper documentation is taken.</p> <p><u>Status:</u> Complete</p> <p><u>Results:</u> Both the main and backup charges for the main parachute and drogue were able to properly</p>
Sub-scale Test Flights	<p><u>Test Plan:</u> A Sub-Scale Model of the rocket will be constructed in order to simulate the full scale design. This sub-scale design will keep key components such as fin size, body diameter, body length, and motor performance in scale while other components, such as the parachute sizes, out of scale. The sub-scale rocket will be designed to be flown on a NAR Level 1 Motor in order to simulate High Powered Rocketry. The rocket will fly on an H195 Motor and will have a single deployment recovery system. Flight Data such as altitude, velocity, and acceleration will be recorded in order to compare to with full-scale simulation data.</p> <p><u>Status:</u> Complete; The sub-scale launch has been successfully completed.</p> <p><u>Results:</u> A successful flight have been recorded and documented, showing the Altitude reached, Max Velocity achieved, and Max Acceleration achieved. No damage was incurred upon recovery deployment or landing. The flight, visually, proved to be a straight, textbook-like flight that will allow the team to compare results with the full scale simulations and draw conclusions about the predicted flight.</p>
Full-scale Test Flights	<p><u>Test Plans:</u> A Full Scale test vehicle will be constructed that will match what is intended to fly during the competition. This vehicle will fly with all sub systems setup in the same manner as to what will be flown in the competition. This will allow for the team to have an accurate representation of the flight that will be performed and any sub system flaws can be worked out. All on board electronics will be engaged and recording data such as altitude, velocity and acceleration. The GPS system will be engaged and transmitting information as well. The team will also carry out a preliminary test of the payload deployment and operating procedure to ensure that all systems are working as expected. This vehicle will be flown before the FRR on a tentative launch date of February 17, 2018.</p> <p><u>Status:</u> Completed; Full scale was successful and recovered.</p> <p><u>Results:</u> A huge success, data was received and with little to no signs of damage to the structure.; Testing Incomplete</p>

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Additional Comments

No Additional Comments