Milestone Review Flysheet 2017-2018

Institution	Cornell University

Milestone	PDR

Vehicle Properties	
Total Length (in)	104
Diameter (in)	5.15
Gross Lift Off Weigh (lb.)	34.7
Airframe Material(s)	G12 Fiberglass
Fin Material and Thickness (in)	G10 Fiberglass
Coupler Length/Shoulder Length(s) (in)	10.75, 11, 3

Motor Properties	
Motor Brand/Designation	AeroTech L1300R-P
Max/Average Thrust (lb.)	349/298
Total Impulse (lbf-s)	1024
Mass Before/After Burn (lb.)	10.8/5.24
Liftoff Thrust (lb.)	297
Motor Retention Method	Machined tailcone retainer

Stability Analysis	
Center of Pressure (in from nose)	77.58
Center of Gravity (in from nose)	61.3
Static Stability Margin (on pad)	3.16
Static Stability Margin (at rail exit)	2.9
Thrust-to-Weight Ratio	7.71
Rail Size/Type and Length (in)	1515/144
Rail Exit Velocity (ft/s)	74.7

Ascent Analysis	
Maximum Velocity (ft/s)	627
Maximum Mach Number	0.56
Maximum Acceleration (ft/s^2)	244.2
Predicted Apogee (From Sim.) (ft)	5249

Recovery System Properties				
Drogue Parachute				
Manufacturer/Model	The Rocketman Parachutes/Standard 15"			
Size/Diameter (in or ft)	15" diameter			
Altitude at Deployment (ft)	5280			
Velocity at Deployment (ft/s)	-15			
Terminal Velocity (ft/s)	-85			
Recovery Harness Material	Kevlar			
Recovery Harness Size/Thickness (in)	5/16			
Recovery Harness Length (ft)	10			
Harness/Airframe Interfaces	1 in. forged steel eyebolts			
Kinetic Energy of Each Section (Ft-lbs)	Forward Section	Booster Section	Section 3	Section 4
	1638.167	1382.168		

Recovery System Properties				
Main Parachute				
Manufacturer/Model	The Rocketman Parachutes/Standard 70"			
Size/Diameter (in or ft)	70" diameter			
Altitude at Deployment (ft)	500			
Velocity at Deployment (ft/s)	-85			
Terminal Velocity (ft/s)	-14.92			
Recovery Harness Material	Kevlar			
Recovery Harness Size/Thickness (in)	5/16			
Recovery Harness Length (ft)	10			
Harness/Airframe Interfaces	1in. Forged steel eyebolts			
Kinetic Energy of Each Section (Ft-lbs)	Forward Section	Booster Section	Section 3	Section 4
	50.892	49.337		

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	RRC3 from Missile Works
Redundancy Plan and Backup Deployment Settings	RRC3 from Missile Works
Pad Stay Time (Launch Configuration)	1 hour minimum

Recovery Electronics		
Rocket Locators (Make/Model)	BigRedBee 100mW BeeLine/ 70cm BeeLine GPS	
Transmitting Frequencies (all vehicle and payload)	420 MHz, 424 MHz, 428 MHz, 432 MHz, 436 MHz, 444 MHz	
Ejection System Energetics (ex. Black Powder)		
Energetics Mass - Drogue Chute (grams)	Primary	2.5
	Backup	2.5
Energetics Mass - Main Chute (grams)	Primary	3
	Backup	3
Energetics Masses - Other (grams) - If Applicable	Primary	
	Backup	

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Payload	
Payload 1 (official payload)	Overview
	The Deployable Rover System (DRS) will remain stationary during flight. After the LV has landed, the rover will deploy after receiving a signal from CRT's ground station. Then the rover will drrive 5 ft away from the LV and deply solar panels.
Payload 2 (non-scored payload)	Overview

Test Plans, Status, and Results	
Ejection Charge Tests	CRT will test black powder charge amounts, wiring electronics, section ejections, and parachute deployment by conducting ground testing. CRT will place the determined black powder charge amounts within the launch vehicle, and manually ignite ejection charges. In order for ground testing to be successful, all section must separate fully, parachutes must be pulled out of the launch vehicle, and the separable wiring must separate without any damage to the launch vehicle.
Sub-scale Test Flights	CRT will launch sub-scale launch vehicle. The sub-scale results will show that the planned recovery system of the launch vehicle successfully recovers both sections of the launch vehicle. The separable wiring will be tested to make sure signal can be passed along the outside of the LV.
Full-scale Test Flights	CRT will conduct full-scale test flights using the fully constructed launch vehicle in order to verify that the DRS works properly, and adjust the ballast mass and drag coefficients in order to more accurately reach the target apogee of 5280 ft.

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Additional Comments

In addition to the two parachutes listed above, CRT is using two other parachutes in order to recover the booster section of the LV. The booster section is attached to a 14" diameter drogue parachute and a 60" diamater main parachute. These parachutes will be secured on a single 5/16" thick kevlar shock cord of 10 ft length.