Milestone Review Flysheet 2017-2018

Institution	Texas Tech University

Milestone	PDR

Vehicle Properties	
Total Length (in)	107
Diameter (in)	6
Gross Lift Off Weigh (lb.)	46.12
Airframe Material(s)	Blue Tube, G10
Fin Material and Thickness (in)	G10 1/8
Coupler Length/Shoulder Length(s) (in)	(12,10)/(6,5)

Motor Properties	
Motor Brand/Designation	Cesaroni L1410-SK
Max/Average Thrust (lb.)	Avg: 319; Max:366
Total Impulse (lbf-s)	1085
Mass Before/After Burn (lb.)	Before: 11.7; After: 4.94
Liftoff Thrust (lb.)	366
Motor Retention Method	Thrust Plate/Casing

Stability Analysis	
Center of Pressure (in from nose)	84.25
Center of Gravity (in from nose)	66.14
Static Stability Margin (on pad)	2.98
Static Stability Margin (at rail exit)	3.08
Thrust-to-Weight Ratio	6.87
Rail Size/Type and Length (in)	1515: 144
Rail Exit Velocity (ft/s)	56.43

Ascent Analysis	
Maximum Velocity (ft/s)	656.17
Maximum Mach Number	0.58
Maximum Acceleration (ft/s^2)	231.57
Predicted Apogee (From Sim.) (ft)	5488.85

Recovery System Properties				
Drogue Parachute				
Manufacturer/Model		Rocket Man Standard 1.1		
Size/Diameter (in or ft)		2 ft		
Altitude at Deployment (ft)		Apogee		
Velocity at Deployment (ft/s)		31.781		
Terminal Velocity (ft/s)		123.967		
Recovery Harness Material		Tubular Nylon with Kevlar		
Recovery Harness Size/Thickness (in)		1		
Recovery Harness Length (ft)		30		
Harness/Airframe Interfaces		2 Point connection to bulkhead with 3/8 inch U-bolts backed by 1 inch washers and Quick links		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	2713.111	6924.145		

Recovery System Properties				
Main Parachute				
Manufacturer/Model		Rocket Man Standard 1.1		
Size/Diameter (in or ft)		16		
Altitude at Deployment (ft)		750		
Velocity at Deployment (ft/s)		123.967		
Terminal Velocity (ft/s)		14.573		
Recovery Harness Material		Tubular Nylon with Kevlar		
Recovery Harness Size/Thickness (in)		1		
Recovery Harness Length (ft)		30		
Harness/Airframe Interfaces		4 Point connection to bulkhead with 3/8 inch eye-bolts backed by 1 inch washers, and Quick links		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	36.99	15.448	70.993	

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	Perfect Flight StratologgerCF
Redundancy Plan and Backup Deployment Settings	We will have 2 altimiters which are connected to 2 charges for each seperation
Pad Stay Time (Launch Configuration)	2 Hours

Recovery Electronics		
Rocket Locators (Make/Model)	Missile Works T3 GPS Tracking System	
Transmitting Frequencies (all - vehicle and payload)	***Required by CDR***	
Ejection System Energetics (ex. Black Powder)		4F Black Powder
Energetics Mass - Drogue Chute (grams)	Primary	1.1
	Backup	1.1
Energetics Mass - Main Chute (grams)	Primary	4.1
	Backup	4.1
Energetics Masses - Other (grams) - If Applicable	Primary	0.74
	Backup	0.74

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Payload	
Payload 1 (official payload)	Overview: After landing, the nosecone of the rocket will separate with black powder charges, allowing the rover to exit from its location near the nosecone. The rover will be located on a rotating housing, which utilizes two roller element bearings and an offset center of mass to rotate the rover to an upright position. After attaining an upright position, the rover will be released from its payload housing and will be ejected from the rocket via a compressed spring. The rover will demonstrate the ability to stow, decreasing its effective volume in order to fit a larger rover into the size constraints of the rocket. The rover will rotate its wheels downward, lifting the chassis of the rover. It will also extend its wheel base by pushing the wheels outward after exiting the rocket.
Payload 2 (non-scored payload)	Overview: Incorporating a dynamic apogee control system (DACS) into the launch vehicle is a very probable option for a second payload.

Test Plans, Status, and Results	
Ejection Charge Tests	For sub scale testing we will build a scale model where we scale down our ejection charges. For ground testing we will fabricate the bulkheads and body tube then test both the 6 and 8 shear pin options to see which fulfills the safety standards we previously set in place
Sub-scale Test Flights	Sub-Scale launch will be scheduled for the month of December. We plan on ordering parts as soon as possible and beginning construction immediately.
Full-scale Test Flights	Full scale testing will be held in between the months of February - March, and ideally the DACS will be integrated in the test while the rover is not.

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Additional Comments

Straight 6" design was used for flysheet because it was chosen as the more favorable of the two.