

Milestone Review Flysheet 2018-2019

Institution Boy Scout Troop 17

Milestone Full Scale CDR

Vehicle Properties	
Total Length (in)	83.5
Diameter (in)	4
Gross Lift Off Weigh (lb)	16.6
Airframe Material(s)	G10 Fiberglass
Fin Material and Thickness (in)	G10 Fiberglass 0.125
Coupler Length(s)/Shoulder Length(s) (in)	8"/4"

Motor Properties	
Motor Brand/Designation	Aerotech K805
Max/Average Thrust (lb)	213/180
Total Impulse (lbf-s)	396
Mass Before/After Burn (lb)	3.4/1.9
Liftoff Thrust (lb)	179
Motor Retention Method	Aeropack

Stability Analysis	
Center of Pressure (in. from nose)	64.6
Center of Gravity (in. from nose)	53.9
Static Stability Margin (on pad)	2.6
Static Stability Margin (at rail exit)	2.65
Thrust-to-Weight Ratio	10.5
Rail Size/Type and Length (in)	1010 /120
Rail Exit Velocity (ft/s)	75.9

Ascent Analysis	
Maximum Velocity (ft/s)	695
Maximum Mach Number	0.618
Maximum Acceleration (ft/s ²)	393
Target Apogee (ft)	5200
Predicted Apogee (From Sim.) (ft)	5295

Recovery System Properties - Overall	
Total Descent Time (s)	76.2
Total Drift in 20 mph winds (ft)	2435

Recovery System Properties - Energetics		
Ejection System Energetics (ex. Black Powder)		
Energetics Mass - Drogue Chute (grams)	Primary	2
	Backup	3
Energetics Mass - Main Chute (grams)	Primary	2
	Backup	3
Energetics Mass - Other (grams) - If Applicable	Primary	N/A
	Backup	N/A

Recovery System Properties - Recovery Electronics	
Primary Altimeter Make/Model	Missile Works RRC3
Secondary Altimeter Make/Model	Missile Works RRC3
Other Altimeters (if applicable)	
Rocket Locator (Make/Model)	Missile Works RTX
Additional Locators (if applicable)	
Transmitting Frequencies (all - vehicle and payload)	***Required by CDR*** (Complete on pages 3 and 4)
Describe Redundancy Plan (batteries, switches, etc.)	Each altimeter will have it's own screw switch, battery and deployment charge(s)
Pad Stay Time (Launch Configuration)	2 hours

Recovery System Properties - Drogue Parachute				
Manufacturer/Model		Sky Angle Classic		
Size or Diameter (in or ft)		20"		
Main Altimeter Deployment Setting		Apogee		
Backup Altimeter Deployment Setting		Apogee plus 1 sec		
Velocity at Deployment (ft/s)		5		
Terminal Velocity (ft/s)		95.7		
Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap)		1/4" Tublar Kevlar		
Recovery Harness Length (ft)		25		
Harness/Airframe Interfaces		1/4-20 1" u-bolt /0.188 fiber glass lid / 1/4" oval quick link / 3 2-56 plastic bolt shear pins		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	457.9	701.2	1216.4	N/A

Recovery System Properties - Main Parachute				
Manufacturer/Model		Sky Angle Classic		
Size or Diameter (in or ft)		60 in		
Main Altimeter Deployment Setting (ft)		600		
Backup Altimeter Deployment Setting (ft)		500		
Velocity at Deployment (ft/s)		94.3		
Terminal Velocity (ft/s)		17.9		
Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap)		1/4" tublar Kevlar		
Recovery Harness Length (ft)		25		
Harness/Airframe Interfaces		1/4-20 1" stainless stell u-bolt /0.188 fiber glass lid / 1/4" oval quick link / 3x 2-56 nylon shear pins		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	16	24.5	42.6	N/A

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Payload	
Payload 1 (official payload)	Overview
	3-axis dynamic vibration characterization of the rocket during all phases of the flight. A Pi Pico, 6 DOF accelerometer and gyroscope, and a separate payload GPS all produce data logged by the Pi Pico and recorded in an on-board MicroSD card for post-flight retrieval and analysis.
Payload 2 (non-scored payload)	Overview
	N/A

Test Plans, Status, and Results	
Ejection Charge Tests	A publicly available charge size spreadsheet will estimate the initial mass of the BP charges. We will use this as an initial charge size for ground tests and will adjust upwards until reliable separation is achieved. The backup charges will be sized 50% larger to provide extra safety margin. Final charge sizes will be documented in the checklist and written by the charge wells for future reference.
Sub-scale Test Flights	Successful 75% scale dual deployment HPR subscale test conducted on 12/13/21 at the Tripoli Central Virginia launch at Battle Park near Culpeper, VA
Vehicle Demonstration Flights	Full-scale vehicle demonstration flight is planned for the February 12-13 launch weekend by Tripoli Central Virginia at Battle Park. In the event that our full scale is not ready or that the launch that weekend is cancelled, we can access the field, obtain an FAA waiver, and obtain assistance from the Tripoli prefecture to arrange a private launch on another mutually suitable day prior to the FRR deadline.
Payload Demonstration Flights	Payload demonstration flight is planned for the February 12-13 launch weekend by Tripoli Central Virginia at Battle Park. In the event that our full scale is not ready or that the launch that weekend is cancelled, we can access the field, obtain an FAA waiver, and obtain assistance from the Tripoli prefecture to arrange a private launch on another mutually suitable day prior to the FRR deadline.

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Transmitter #1			
Location of transmitter:	Nose cone		
Purpose of transmitter:	GPS tracker		
Brand	Missile Works	250mW	
Model	RTX	902-908 MHz	
Handshake or frequency hopping? (explain)	900 MHz ISM radio band (902-928 MHz). Frequency hopping spread spectrum, Radio Network Addressing is XBee Pro 900HP Preamble ID: 5. XBee Pro 900HP Network ID's: 0 thru FFFF which are assigned and maintained by the manufacture.		
Distance to closest e-match or altimeter (in)	40" from the Altimeters and e-matches and 80" from the motor/ignitor		
Description of shielding plan:	None is required. Missile Works guarantees RTx will not interfere with altimeters.		

Transmitter #2			
Location of transmitter:			
Purpose of transmitter:			
Brand		RF Output Power (mW)	
Model		Specific Frequency used by team (MHz)	
Handshake or frequency hopping? (explain)			
Distance to closest e-match or altimeter (in)			
Description of shielding plan:			

Transmitter #3			
Location of transmitter:			
Purpose of transmitter:			
Brand		RF Output Power (mW)	
Model		Specific Frequency used by team (MHz)	
Handshake or frequency hopping? (explain)			
Distance to closest e-match or altimeter (in)			
Description of shielding plan:			

Transmitter #4			
Location of transmitter:			
Purpose of transmitter:			
Brand		RF Output Power (mW)	
Model		Specific Frequency used by team (MHz)	
Handshake or frequency hopping? (explain)			
Distance to closest e-match or altimeter (in)			
Description of shielding plan:			

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Transmitter #5

Location of transmitter:			
Purpose of transmitter:			
Brand		RF Output Power (mW)	
Model		Specific Frequency used by team (MHz)	
Handshake or frequency hopping? (explain)			
Distance to closest e-match or altimeter (in)			
Description of shielding plan:			

Transmitter #6

Location of transmitter:			
Purpose of transmitter:			
Brand		RF Output Power (mW)	
Model		Specific Frequency used by team (MHz)	
Handshake or frequency hopping? (explain)			
Distance to closest e-match or altimeter (in)			
Description of shielding plan:			

Additional Comments

