

# Milestone Review Flysheet

**Institution** Spring Grove Area High School

**Milestone** FRR

Vehicle Properties	
Total Length (in)	85.25
Diameter (in)	4
Gross Lift Off Weigh (lb)	17.8
Airframe Material	Fiberglass
Fin Material	Ultem 3D Filment
Drag	1.1

Motor Properties	
Motor Manufacturer	Cesaroni
Motor Designation	K740 C-Star
Max/Average Thrust (lb)	198.7/166.4
Total Impulse (lbf-s)	421.3
Mass Before/After Burn	3.234 lb. / 1.254 lb.
Liftoff Thrust (lb)	182.54

Stability Analysis	
Center of Pressure (in from nose)	55.48
Center of Gravity (in from nose)	47.86
Static Stability Margin	2.8
Static Stability Margin (off launch rail)	3.5
Thrust-to-Weight Ratio	10.1
Rail Size and Length (in)	1.5/96
Rail Exit Velocity	72.6

Ascent Analysis	
Maximum Velocity (ft/s)	736.86
Maximum Mach Number	0.654
Maximum Acceleration (ft/s^2)	645.49
Target Apogee (From Simulations)	5725 less 20% for payload
Stable Velocity (ft/s)	42
Distance to Stable Velocity (ft)	3.4

Recovery System Properties				
Dogue Parachute				
Manufacturer/Model		FRUITYCHUTES/IFC		
Size		24 in		
Altitude at Deployment (ft)		5481		
Velocity at Deployment (ft/s)		6.41		
Terminal Velocity (ft/s)		53.48		
Recovery Harness Material		Tubular Nylon		
Harness Size/Thickness (in)		1		
Recovery Harness Length (ft)		15		
Harness/Airframe Interfaces		The harness is attached to key structural components via quick links which safely secures it to the rocket.		
Kinetic Enerfy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	130.44	173.92	376.84	N/A

Recovery System Properties				
Main Parachute				
Manufacturer/Model		FRUITYCHUTES/IA		
Size		72 in		
Altitude at Deployment (ft)		600		
Velocity at Deployment (ft/s)		53.48		
Terminal Velocity (ft/s)		14.04		
Recovery Harness Material		Tubular Nylon		
Harness Size/Thickness (in)		1		
Recovery Harness Length (ft)		25		
Harness/Airframe Interfaces		The harness is attached to key structural components via quick links which safely secures it to the rocket.		
Kinetic Enerfy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	8.87	11.83	25.63	N/A

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	Perfectflite CF Altimeters
Redundancy Plan	The e-bay will have 2 altimeters. Each of the altimeters will have 2 charges located on either side of the e-bay, one for the drogue and the other for the main parachute. Two altimeters gives a redundant system.
Pad Stay Time (Launch	Each altimeter will have a battery

Recovery Electronics	
Rocket Locators (Make/Model)	Communications Specialists, Inc. R-300 R/C ELT Receiver
Transmitting Frequencies	222.470 Hz
Black Powder Mass Drogue Chute (grams)	1.8
Black Powder Mass Main	2.8

Configuration)

life of 4 hours.

Chute (grams)

2.0

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### Autonomous Ground Support Equipment (MAV Teams Only)

Capture Mechanism	Overview
	N/A
Container Mechanism	Overview
	N/A
Launch Rail Mechanism	Overview
	N/A
Igniter Installation Mechanism	Overview
	N/A

### Payload

Payload 1	Overview
	The payload of our rocket is designed to test the rate of air intake through a turbine and it's ability to generate current on ascent.
Payload 2	Overview
	N/A

### Test Plans, Status, and Results

Ejection Charge Tests	Our ejection charge from the drogue contains 1.8g of black powder and the main has 2.8g of black powder. These charges are designed to eject both our main and drogue parachutes through the separation of the launch vehicle. These ejections are triggered by the altimeters.
Sub-scale Test Flights	Successful sub-scale test flight was completed November 21st. This subscale rocket was built at a 60% scale of what the full scale will be. Each flight had a successful deployment of the main parachute at 600 feet.
Full-scale Test Flights	A successful full-scale flight was recently completed the weekend of March 12th and 13th. Rocket #1 reached a height of 5471 feet and had a stable flight with a drogue ejection at apogee and a main deployment at 600 feet. Rocket #2 reached a height of 5675 feet also had a stable flight but the main parachute deployed at apogee and the rocket drifted about five miles due to missing shear pins. We are aware of being over the mile-mark and are taking further steps to correct this error for future launches.

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### Additional Comments

Section 1 refers to nosecone and payload.  
Section 2 refers to front body tube and e-bay.  
Section 3 refers to back body tube, fins, and motor casing.

