

Milestone Review Flysheet

PDR, CDR, FRR

Institution Name Spring Grove Area High School

Milestone FRR

Vehicle Properties

Diameter (in)	ID: 3.90 in / OD: 4.094 in
Length (in)	81.45 in
Gross Liftoff Weight (lb)	10.71 lb
Launch Lug/button Size	1.0 in for a 1010 rail
Motor Retention	54mm Aerospac Retainer - P

Motor Properties

Motor Manufacturer	Cesaroni
Motor Designation	Pro 54 K2035 Vmax
Max/Average Thrust (N/lb)	2184 N / 1996 N
Total Impulse (N-sec/lb-sec)	1417 N-sec
Mass pre/post Burn (lb)	2.34 lb / 1.26 lb

Stability Analysis

Center of Pressure (in from nose)	58.056 in
Center of Gravity (in from nose)	68.519 in
Static Stability Margin	2.56
Thrust-to-Weight Ratio	42.53
Rail Size (in) / Length (in)	1.0 in / 96 in

Ascent Analysis

Rail Exit Velocity (ft/s)	147 ft/s
Max Velocity (ft/s)	953 ft/s
Max Mach Number	0.85
Max Acceleration (ft/s ²)	1483 ft/s ²
Peak Altitude (ft)	6264 ft

Recovery System Properties

Drogue Parachute

Manufacturer/Model	Fruity Chutes / CFC-15
Size	15 in
Altitude at Deployment (ft)	5264 ft
Velocity at Deployment (ft/s)	0 ft/s
Terminal Velocity (ft/s)	92.1 ft/s
Recovery Harness Material	Tubular Nylon
Harness Size/Thickness (in)	1 in
Recovery Harness Length (ft)	20 ft

Harness/Airframe Interfaces

The drogue chute is connected to a swivel on a quicklink on a 1545 section of shock cord attached to the payload. A 5 ft shock cord on the other side attaches to the

Kinetic Energy Upon Landing (ft-lb)	Section 1	Section 2	Section 3	Section 4
	436 ft-lb	100 ft-lb	607 ft-lb	N/A

Recovery System Properties

Main Parachute

Manufacturer/Model	Fruity Chutes / IFC-72
Size	72 in
Altitude at Deployment (ft)	600 ft
Velocity at Deployment (ft/s)	92.1 ft/s
Landing Velocity (ft/s)	19.1 ft/s
Recovery Harness Material	Tubular Nylon
Harness Size/Thickness (in)	1 in
Recovery Harness Length (ft)	25 ft

Harness/Airframe Interfaces

The parachute is connected to the shock cord with a swivel. The shock cord connects to ~ 1/4" Quicklink on a 5/16" shank through a 1/2" bulkhead

Kinetic Energy Upon Landing (ft-lb)	Section 1	Section 2	Section 3	Section 4
	15.8 ft-lb	5.5 ft-lb	25.8 ft-lb	6.2 ft-lb

Recovery System Properties

Electronics/Ejection

Altimeter(s) Make/Model	Perfectflite / Stratologger
Redundancy Plan	Two altimeters hooked to 2 different power sources and key switches w/ 2 ejection charges for each chute. one altimeter is set up for a slight delay
Pad Stay Time (Launch Configuration)	Around 4 hours

Recovery System Properties

Electronics/Ejection

Rocket Locators (Make, Model)	Communication Specialists Inc. / AT-28 Transmitter
Transmitting Frequencies	***Required by CDR*** 222.470 MHz
Black Power Mass Drogue Parachute (gram)	1.5 grams
Black Power Mass Main Parachute (gram)	1.5 grams

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Payload/Science

Succinct Overview of Payload/Science Experiment	While the payload descends it will record the current and voltage produced at different altitudes. We will analyze the relationship between power and altitude. This will be possible due to the pressure sensor that is incorporated into the payload's circuitry.
Identify Major Components	Arduino data logger, flexible solar panel, BT-200, Lucite cylinder for solar panel protection, analog ammeter, digital pressure sensor, SD card, resistors, volt batteries, epoxy, diode, eye-bolts, wind nuts, threaded rod, wooden specialized sled
Mass of Payload/Science	1.7 lbs

Test Plan Schedule/Status

Ejection Charge Test(s)	The ejection charges have been tested with 5 hair pins, and it has been determined that 1.5 grams of black powder should be ideal.
Sub-scale Test Flights	The subscale flight tests were conducted January 6 th and yield great data on the stability of the rocket.
Full-scale Test Flights	The full scale flights were conducted March 2 nd and March 17 th and yielded good flight results.

Additional Comments

A ring was added to the Electronics Bay to make room in the back half of the rocket for the payload. The Payload is now in line with the shock chord that connects the back half of the rocket to the Electronics Bay. The drogue parachute, is then above the payload, not attached to the payload's top eye bolt. All of these changes were already approved.