Milestone Review Flysheet

Institution	University of Cincinnati

Milestone	CDR

Vehicle Properties

Total Length (in)	87.1
Diameter (in)	5.54
Gross Lift Off Weigh (lb)	23.97
Airframe Material	Kraft Paper w/ Glassine Wrap
Fin Material	G-10 plastic
Drag	0.3 (Cd)

Motor Properties

Motor Manufacturer	Cesaroni
Motor Designation	K750-RL
Max/Average Thrust (lb)	212.74 / 168.56
Total Impulse (lbf-s)	528.86
Mass Before/After Burn	72.55 oz / 25.96 oz
Liftoff Thrust (lb)	212.74

Stability Analysis

Center of Pressure (in from nose)	61.92
Center of Gravity (in from nose)	51.72 (before burnout) / 48.60 (after)
Static Stability Margin	1.85 / 2.40
Static Stability Margin (off launch rail)	1.85
Thrust-to-Weight Ratio	7.03
Rail Size and Length (in)	1.5" x 1.5" / 96 in
Rail Exit Velocity	62.07 ft/s

Ascent Analysis

Maximum Veloxity (ft/s)	621.1	
Maximum Mach Number	0.56	
Maximum Acceleration (ft/s^2)	262.89	
Target Apogee (From Simulations)	5280	
Stable Velocity (ft/s)	44	
Distance to Stable Velocity (ft)	4' 2"	

Recovery System Properties

Drogue Parachute

Manufacturer/Model	SkyAngle
Size	4.4 & 8.6 ft^2
Altitude at Deployment (ft)	5280
Velocity at Deployment (ft/s)	0.0249
Terminal Velocity (ft/s)	103 & 63.2
Recovery Harness Material	Tubular Kevlar
Harness Size/Thickness (in)	1/2"
Recovery Harness Length (ft)	24'
Harness/Airframe Interfaces	Swivel eye hook / U-bolt

Kinetic Enerfy of Each Section (Ft-lbs)	Upper	Lower		
	1193 & 564	1259 & 595		

Recovery System Properties

Main Parachute

Manufacturer/Model	SkyAngle
Size	29.5 ft^2 & 14.2 ft^2
Altitude at Deployment (ft)	1000-1500
Velocity at Deployment (ft/s)	103 & 63.2
Terminal Velocity (ft/s)	22.9
Recovery Harness Material	Tubular Kevlar
Harness Size/Thickness (in)	1/2"
Recovery Harness Length (ft)	24'
Harness/Airframe Interfaces	Swivel eye hook / U-bolt

Kinetic Enerfy of Each Section (Ft-lbs)	Upper	Lower	PIL	Fairing
	21	71	34	12

Recovery Electonics

Altimeter(s)/Timer(s) (Make/Model)	PerfectFlite StratoLogger SL 100
Redundancy Plan	Multiple altimeter, backup ejection charges
Pad Stay Time (Launch Configuration)	250 Hours

Recovery Electonics

Rocket Locators (Make/Model)	Sparkfun Venus GPS
Transmitting Frequencies	902-928 MHz
Black Powder Mass Drogue Chute (grams)	1.5 g (2g backup)
Black Powder Mass Main Chute (grams)	1.5 g (2g backup)

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Payload	
Payload 1	Overview
	The main task of the Payload is to record atmospheric measurements of earth's atmosphere from an altitude of 1,500 feet. The PIL is designed to record data including, but not limited to, Pressure, Temperature, Relative Humidity, UV Radiation and Solar irradiance. The PIL will also capture at least 2 images in the air, as well as 3 images on the ground. In order to accomplish all of these tasks, multiple sub-systems have been integrated into the PIL. Among these systems, includes a landing module for the PIL to remain upright for photos.
Payload 2	Overview
	The fairing shall also successfully deploy in-order for complete mission success. The fairing is designed to split in half with a powder charge ignited at 1,500 feet, with the 2 fairing sections attached to the PIL itself with shock cord.

Test Plans, Status, and Results	
Ejection Charge Tests	The team will conduct multiple ground ejection "pop" tests to see gauge the amount of black powder to use in our charges. We will be testing the fairing separation charge, the drogue charge and main charge individually. The first test was completed on January 14th, 2016 and was successful. 0.75 grams of Black Powder was used on the subscale fairing design.
Sub-scale Test Flights	Our scale rocket was constructed from the Iris rocket kit from LOC Precision. The outer diameter of the rocket was 3.10" and used a 38mm J335 motor tube. This model was a 0.56 scale of our full scale launch vehicle. This rocket model was chosen as our scale rocket because it was the kit that most closely resembled our full scale vehicle and would minimize any customization needed. Our first scheduled subscale test took place on November 21st of 2015. The subscale was loaded with ballast as needed in order to most closely match mass placement and stability margin of the full scale. Due to the loss of our rocket in trees the first sub-scale test was not completely successful and we are going to complete another subscale launch on Jan 30th. We will also be using this subscale model in the wind tunnel in our university's Aerospace laboratory. The rocket will be loaded on a sting mount and connected to a force balance. The values obtained from our wind tunnel tests will help to give us a more accurate estimation for the coefficient of drag for our full scale vehicle.
Full-scale Test Flights	Once the team has proven with the subscale model that our design works, we will do full scale testing of the launch vehicle using a simulated mass as our payload. Our full scale tests will also test our fairing separation system.

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