Milestone Review Flysheet 2017-2018

Institution	Cedar Falls High School

Milestone	CDR

Vehicle Properties	
Total Length (in)	96"
Diameter (in)	4.5"
Gross Lift Off Weight (lb.)	18.3
Airframe Material(s)	Fiberglass
Fin Material and Thickness (in)	Fiberglass, 0.125"
Coupler Length/Shoulder Length(s) (in)	12"

Motor Properties	
Motor Brand/Designation	Cesaroni K660
Max/Average Thrust (lb.)	148.1
Total Impulse (lbf-s)	547.9
Mass Before/After Burn (lb.)	4.29/1.7
Liftoff Thrust (lb.)	240
Motor Retention Method	AeroPack Retainer - 54mm

Stability Analysis	
Center of Pressure (in from nose)	69.6
Center of Gravity (in from nose)	60.1
Static Stability Margin (on pad)	2.19
Static Stability Margin (at rail exit)	2.19
Thrust-to-Weight Ratio	13:1
Rail Size/Type and Length (in)	1010 rail, 12ft tall
Rail Exit Velocity (ft/s)	77.3

Ascent Analysis	
Maximum Velocity (ft/s)	734
Maximum Mach Number	0.65
Maximum Acceleration (ft/s^2)	395
Predicted Apogee (From Sim.) (ft)	5,224

Recovery System Properties Drogue Parachute	
Manufacturer/Model	Topflight Recovery Parachute
Size/Diameter (in or ft)	24 " diameter
Altitude at Deployment (ft)	5,224
Velocity at Deployment (ft/s)	30.85
Terminal Velocity (ft/s)	87
Recovery Harness Material	Kevlar
Recovery Harness Size/Thickness (in)	0.25 tubular
Recovery Harness Length (ft)	40'
Harness/Airframe Interfaces	Eye hooks attached to electronics bay/motor mount tube/ nosecone

Recovery System Properties Main Parachute				
Manufacturer/Model			Topflight Recovery Parachute	
Size/Diameter (in or ft)			78" diameter	
Altitude at Deployment (ft)			500	
Velocity at Deployment (ft/s)			87	
Terminal Velocity (ft/s)			17 f/s	
Recovery Harness Material			Kevlar	
Recovery Harness Size/Thickness (in)			0.25 tubular	
Recovery Harness Length (ft)			40'	
Harness/Airframe Interfaces		Eye hooks attached to electronics bay/motor mount tube/ nosecone		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	69.6 ft-lbf			

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	69.6 ft-lb			

Recovery Electronics	
Altimeter(s)/Timer(s) (Make/Model)	Perfectflite Stratologger
Redundancy Plan and Backup Deployment Settings	A second Stratologger with separate batter will be in place to fire back-up ejection charges
Pad Stay Time (Launch Configuration)	3 hrs

Recovery Electronics		
Rocket Locators (Make/Model)	Wildman Tracking System	
Transmitting Frequencies (all - vehicle and payload)	219 MHz	
ection System Energetics (ex. Black Powder		Black Powder
Energetics Mass - Drogue Chute (grams)	Primary	3g
	Backup	4g
Energetics Mass - Main Chute (grams)	Primary	3g
	Backup	4g
Energetics Masses - Other (grams) - If Applicable	Primary	
	Backup	

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Payload	
Payload 1 (official payload)	Overview
	The payload will consist of electronics on the inside and outside of the rocket. Solar panels will be attched to the outside and wired into the rocket. The solar panels wil be connected to the Arduino board and the information will be stored in the Arduino. The Perfect Flite Stratologger altimeter will read the altitude and coordinate with the voltage read by the Arduino. The Adafruit gyroscope will be in snyc with the control on the ground. This control will be what we compare the voltage read out by the solar panels in the air. The HAM Radio will let us know where the rocket is at all times. This radio connects with the Arduino and works along side that board.
Payload 2 (non-scored payload)	Overview
	N/A

Test Plans, Status, and Results	
Ejection Charge Tests	The booster ejection charge will be ground tested in Platteville, WI under the direction of our mentor, Tyler Sorensen. We will begin by testing the booster/drogue section using 3g of 4F black powder. If this is not powerful enough, we will do additional ground tests using increases in black powder of 0.5g increments. If the initial 3g amount seems to large, using our mentor's discretion we will do additional ground tests using 0.5g smaller increments each time. The payload/main parachute section will be tested using the same incremental testing procedures.
Sub-scale Test Flights	The sub-scale rocket was built prior to January 6, 2018, and then launched on Saturday, January 6th in Platteville, WI. The temperatures were below 0 deg. F, but the team's launch was successful. The flight profile was mostly straight with little drift/arc. The predicted altitude, velocity, etc. were very closely matched with the actual flight results. The recovery system deployed exactly as planned and descent velocities were desireable.
Full-scale Test Flights	N/A

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Additional Comments