Institution	AIAA OC Section

Milestone	FRR

Vehicle Properties	
Total Length (in)	149.325
Diameter (in)	4"
Gross Lift Off Weigh (lb)	31
Airframe Material(s)	G12 Fiberglass
Fin Material and Thickness (in)	Fiberglass (0.375 in)
Coupler Length(s)/Shoulder Length(s) (in)	Minimum 4"

Motor Properties	
Motor Brand/Designation	Cesaroni K1085WT
Max/Average Thrust (lb)	2.654/2.454
Total Impulse (lbf-s)	5.32
Mass Before/After Burn (lb)	5.357/2.714
Liftoff Thrust (lb)	450.5
Motor Retention Method	Aeropack 75mm Retainer

Stability Analysis	
Center of Pressure (in. from nose)	80.8445
Center of Gravity (in. from nose)	68.1625
Static Stability Margin (on pad)	7.41
Static Stability Margin (at rail exit)	9.875
Thrust-to-Weight Ratio	8.16:1
Rail Size/Type and Length (in)	12ft 1515
Rail Exit Velocity (ft/s)	73.732

Ascent Analysis	
Maximum Velocity (ft/s)	491.62
Maximum Mach Number	0.444
Maximum Acceleration (ft/s^2)	694.82
Target Apogee (ft)	4700
Predicted Apogee (From Sim.) (ft)	3488.62

Recovery System Properties - Overall	
Total Descent Time (s)	54.48
Total Drift in 20 mph winds (ft)	2006.210316

Recovery System Properties - Energetics		
Ejection System Energetics (ex. Black Powder)		F4 Black Powder
Energetics Mass - Drogue Chute (grams)	Primary	2.2907
	Backup	3.2071
Energetics Mass - Main Chute (grams)	Primary	4.2099
	Backup	5.8939
Energetics Mass - Other (grams) - If Applicable	Primary	
	Backup	

Recovery System Properties - Recovery Electronics	
Primary Altimeter Make/Model	Stratologger CF Flight Computer
Secondary Altimeter Make/Model	RRC3 Flight Computer
Other Altimeters (if applicable)	
Rocket Locator (Make/Model)	Big Red Bee
Additional Locators (if applicable)	APRSDroid
Transmitting Frequencies (all - vehicle and payload)	***Required by CDR*** (Complete on pages 3 and 4)
Describe Redundancy Plan (batteries, switches, etc.)	The rocket has a dual redundancy system where the two altimeters are on two completely different circuits and are not connected in any way. They are also two different flight computers so if one has a bug, the other will be able to execute the commands still.
Pad Stay Time (Launch Configuration)	The rocket will be able to sit on the launch pad for at least 2 hour minimum

Recovery System Properties - Drogue Parachute				
Manufacturer/Model			Fruity Chutes	
Size or Diameter (in or ft)			18"	
Main Altimeter Deployment Setting			Apogee	
Backup Altimeter Deployment Setting			1 seconds after Apogee	
Velocity at Deployment (ft/s)			9.7281	
Terminal Velocity (ft/s)				
Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap)			1" Tubular Nylon	
Recovery Harness Length (ft)			25 ft	
Harness/Airframe Interfaces		Machine-closed stainless steel eye bolts, tubular nylon shock cord		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	1535.746413	1127.913412	1776.196338	

Recovery System Properties - Main Parachute				
Manufacturer/Model			Fruity Chutes	
Size or Diameter (in or ft)			72"	
Main Altimeter Deployment Setting (ft)			600	
Backup Altimeter Deployment Setting (ft)			500	
Velocity at Deployment (ft/s)			100.3979	
Terminal Velocity (ft/s)				
Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap)			1" Tubular Nylon	
Recovery Harness Length (ft)			25 ft	
Harness/Airframe Interfaces		Machine-closed stainless steel eye bolts, tubular nylon shock cord		
Kinetic Energy of Each Section (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	64.83942252	47.62065772	74.99125105	

Milestone Review Flysheet 2018-2019

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Payload	
	Overview
Payload 1 (official payload)	The payload is a rover that has a camera attached to the top. The rover is cylindrical in shape with two wheels and a tail to stabilize the rover while it is moving. The task of the rover after being released is to find a colored band on the rocket and move towards the rocket. Once it has located and moved to the band, the rover will then take a picture with the camera and store it on an SD card inside the rover. The program will then stop and the rover will have completed its task.
	Overview
Payload 2 (non-scored payload)	

Test Plans, Status, and Results	
Ejection Charge Tests	Build up the rocket as though it were flight ready. Then, the charge was ignited via wires out to a 9V battery at a safe distance (25 ft). A successful test is defined by the rocket separating at the designed point and the parachutes fully being ejected from the body tube. There should be no damage to the rocket body, parachute, or surrounding area. Both drogue and main chute ejections will be tested for both subscale and full scale vehicles. These tests will be performed as soon as the vehicle is ready.
Sub-scale Test Flights	The subscale was flown at an organized launch on a CTI J295. It was launched twice, the first time without the air brakes live to test the altitude without the air brakes. The air brake electonics were still inside the rocket for this flight, but it wasn't be powered. This flight was flown on 1/5/2019. The second test flight tested the air brakes and how close it can get the vehicle to our desired altitude. The air brakes were ground tested before flying on the rocket. This flight was flown on 2/16/2019. Both flights had ballasts for all the masses unable to fit inside the 3" rocket that will be used for the 4" rocket.
Vehicle Demonstration Flights	The full scale will be flown a total of two times before the Huntsville launch. The first launch was without the air brakes active to test the altitude of the rocket. After ground testing the rover release system, it was flown on the first flight to test it in flight conditions. This flight was done on 2/16/2019. The rover was used as a ballast, but the electronics and movement of the rover was not tested. A second flight willbe conducted to test the rover itself as well as live air brakes to test how close the air brakes can get the vehicle to the desired altitude. The second full scale launch is set for 3/16/2019. An addendum document will be submitted as necessary.
Payload Demonstration Flights	The payload will be ground tested as soon as it has been completed. In addition to the rover being ground tested, we will test the entire release system from start to finish while grounded. The release system and retention system with the rover ballast has been tested in flight and proven to work. The rover payload's task will be tested on 3/16/2019 on our second full scale launch at FAR.

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Institution	AIAA OC Section	Milestone	FRR

Transmitter #1			
Location of transmitter:	Nose Cone		
Purpose of transmitter:	GPS on the Vehicle		
Brand	Beeline GPS	RF Output Power (mW)	100mW
Model	Big Red Bee	Specific Frequency used by team (MHz)	438.92 MHz
Handshake or frequency hopping? (explain)	Fixed Frequency		
Distance to closest e-match or altimeter (in)	69.9375		
Description of shielding plan:	Will add Super Shield from MG Chemicals around sensitive electonics (eg Avionics Bay)		

Transmitter #2			
Location of transmitter:	Piston Bay		
Purpose of transmitter:	Release System for Rocket		
Brand	Enhanced Radio Services	RF Output Power (mW)	200mW
Model	Hamshield Mini	Specific Frequency used by team (MHz)	446 MHz
Handshake or frequency hopping? (explain)	Fixed Frequency		
Distance to closest e-match or altimeter (in)	26.3125		
Description of shielding plan:	Will add Super Shield from MG Chemicals around sensitive electonics (eg Avionics Bay)		

Transmitter #3			
Location of transmitter:	Ground Station (RDO)		
Purpose of transmitter:	Radio for Rover Release		
Brand	Baofeng	RF Output Power (mW)	1 W
Model	UV-5R	Specific Frequency used by team (MHz)	446 MHz
Handshake or frequency hopping? (explain)	Fixed Frequency		
Distance to closest e-match or altimeter (in)	N/A		
Description of shielding plan:	Will add Super Shield from MG Chemicals around sensitive electonics (eg Avionics Bay)		

Transmitter #4			
Location of transmitter:	Ground Station		
Purpose of transmitter:	Walkie Talkie for Communcation of Video Feed of Rover Deployment		
Brand	Motorola	RF Output Power (mW)	.5W
Model	T5530	Specific Frequency used by team (MHz)	462-467 MHz
Handshake or frequency hopping? (explain)	Fixed Frequency		
Distance to closest e-match or altimeter (in)	N/A		
Description of shielding plan:	Will add Super Shield from MG Chemicals around sensitive electonics (eg Avionics Bay)		

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Institution	AIAA OC Section	Milestone	FRR

Transmitter #5

Location of transmitter:	Ground Station		
Purpose of transmitter:	Video Feed of Rover Deployment		
Brand	Woolfwhoop	RF Output Power (mW)	200mW
Model	Q3-X	Specific Frequency used by team (MHz)	5725MHz
Handshake or frequency hopping? (explain)	Fixed Frequency (Band A, Chanel 8)		
Distance to closest e-match or altimeter (in)	N/A		
Description of shielding plan:	Will add Super Shield from MG Chemicals around sensitive electonics (eg Avionics Bay)		

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