

Milestone Review Flysheet

PDR, CDR, FRR

Institution Name	Massachusetts Institute of Technology
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Milestone	FRR
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Vehicle Properties	
Diameter (in)	6.28
Length (in)	126.5
Gross Liftoff Weight (lb)	49.27
Launch Lug/button Size	3/16"
Motor Retention	Stainless Steel Rod

Motor Properties	
Motor Manufacturer	Cesaroni
Motor Designation	L1115
Max/Average Thrust (N/lb)	1713N, 1119N
Total Impulse (N-sec/lb-sec)	5015 Ns
Mass pre/post Burn (lb)	4.4kg, 2.01kg

Stability Analysis	
Center of Pressure (in from nose)	89.95
Center of Gravity (in from nose)	77.09
Static Stability Margin	2.11
Thrust-to-Weight Ratio	8.3
Rail Size (in) / Length (in)	1.5" x 1.5", 8ft

Ascent Analysis	
Rail Exit Velocity (ft/s)	54
Max Velocity (ft/s)	594.6
Max Mach Number	0.53
Max Acceleration (ft/s^2)	503.3
Peak Altitude (ft)	5,463

Recovery System Properties				
Drogue Parachute				
Manufacturer/Model		Surplus Military Pilot		
Size		60"		
Altitude at Deployment (ft)		5,280		
Velocity at Deployment (ft/s)		~20 ft/s depending on wind		
Terminal Velocity (ft/s)		54.5		
Recovery Harness Material		Tubuluar Nylon		
Harness Size/Thickness (in)		1"		
Recovery Harness Length (ft)		16'		
Harness/Airframe Interfaces		Attached to a 3/8" forged eye bolt in top of payload sabot unit. Eye bolt also attached to webbing that goes to tender descender		
Kinetic Energy During Descent (ft-lb)	Section 1	Section 2	Section 3	Section 4
	1615			

Recovery System Properties				
Main Parachute				
Manufacturer/Model		RocketMan		
Size		16'		
Altitude at Deployment (ft)		800'		
Velocity at Deployment (ft/s)		54.5		
Landing Velocity (ft/s)		10.98		
Recovery Harness Material		Tubular Nylon		
Harness Size/Thickness (in)		1"		
Recovery Harness Length (ft)		3.25'		
Harness/Airframe Interfaces		3/8" Forged eye-nut into top of avionics bay, connected to threaded rod into top of motor		
Kinetic Energy Upon Landing (ft-lb)	Section 1	Section 2	Section 3	Section 4
	42.65 (body)	.95 (Nose/Sab)	3.3 (Quadrotor)	

Recovery System Properties				
Electronics/Ejection				
Altimeter(s) Make/Model		Featherweight Raven2		
Redundancy Plan		Perfectflite Stratologger, redundant drogue ejection charges. Redundant igniters in Tender Descender on main		
Pad Stay Time (Launch Configuration)		Upwards of 8 hours		

Recovery System Properties		
Electronics/Ejection		
Rocket Locators (Make, Model)	Big Red Bee 70cm Transmitter/2m GPS.	
Transmitting Frequencies	[RC Transmitter]2.4 Ghz (hopping 9 Ch); [3DR]433 Mhz; [Xbee]900 Mhz; [Video Stream]1280 Mhz	
Black Power Mass Drogue Parachute (gram)	3.5	
Black Power Mass Main Parachute (gram)	0.2 (Tender Descender release device)	

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Payload/Science

Succinct Overview of Payload/Science Experiment

A Custom built composite quadrotor carrying a system of payloads to exhibit object tracking and recognition in dynamic environments and to quantitatively measure high-altitude atmospheric lightning events

Identify Major Components

The primary payload of the rocket will be the quadrotor which will be equipped with GPS, radio telecommand devices, an IMU, pressure sensors, an onboard computer, CMOS cameras, IR emitters/detectors, and an autonomous flight stabilizer.

Mass of Payload/Science

The mass of the quadrotor is being estimated to be about 10 pounds.

Test Plan Schedule/Status

Ejection Charge Test(s)

12/14/ 2012 (Successful)

Sub-scale Test Flights

12/15/2012 (Successful)

Full-scale Test Flights

3/17/2103 (Unsuccessful) Follow up being planned for either 4/6/2013 or 4/13/2013

Additional Comments