

Milestone Review Flysheet

PDR, CDR, FRR

Institution Name	The Pennsylvania State University
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Milestone	PDR
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Vehicle Properties	
Diameter (in)	3.25
Length (in)	93.5
Gross Liftoff Weight (lb)	22.6
Launch Lug/button Size	1.5"
Motor Retention	Aero Pack 54mm

Motor Properties	
Motor Manufacturer	AeroTech
Motor Designation	K828FJ
Max/Average Thrust (N/lb)	Max: 1304/885 Average: 293/199
Total Impulse (N-sec/lb-sec)	2157/485
Mass pre/post Burn (lb)	4.9/1.87

Stability Analysis	
Center of Pressure (in from nose)	67
Center of Gravity (in from nose)	60
Static Stability Margin	2.10
Thrust-to-Weight Ratio	8.8
Rail Size (in) / Length (in)	1.5 / 40

Ascent Analysis	
Rail Exit Velocity (ft/s)	48.7
Max Velocity (ft/s)	638
Max Mach Number	0.57
Max Acceleration (ft/s ²)	378
Peak Altitude (ft)	5,333

Recovery System Properties				
Drogue Parachute				
Manufacturer/Model		Giant Leap TAC-9		
Size		24"		
Altitude at Deployment (ft)		Apogee		
Velocity at Deployment (ft/s)		~0		
Terminal Velocity (ft/s)		82		
Recovery Harness Material		Kevlar		
Harness Size/Thickness (in)		0.5		
Recovery Harness Length (ft)		50		
Harness/Airframe Interfaces		Metal quick-links to steel U-bolts to double fiberglass bulkplates		
Kinetic Energy During Descent (ft-lb)	Section 1	Section 2	Section 3	Section 4
	995	840		

Recovery System Properties				
Main Parachute				
Manufacturer/Model		Giant Leap TAC-1		
Size		72"		
Altitude at Deployment (ft)		750		
Velocity at Deployment (ft/s)		82		
Landing Velocity (ft/s)		24		
Recovery Harness Material		Kevlar		
Harness Size/Thickness (in)		0.5		
Recovery Harness Length (ft)		25		
Harness/Airframe Interfaces		Metal quick-links to steel U-bolts to double fiberglass bulkplates		
Kinetic Energy Upon Landing (ft-lb)	Section 1	Section 2	Section 3	Section 4
	27.7	57.7	71.7	

Recovery System Properties				
Electronics/Ejection				
Altimeter(s) Make/Model		2x PerfectFlite Stratologger SL100		
Redundancy Plan		Dual Altimeters, Dual black power charges for each ejection event, Dual e-matches for each black powder charge		
Pad Stay Time (Launch Configuration)		>2 hr		

Recovery System Properties				
Electronics/Ejection				
Rocket Locators (Make, Model)		Garmin Astro DC20		
Transmitting Frequencies		~2.4 GHz		
Black Power Mass Drogue Parachute (gram)		2		
Black Power Mass Main Parachute (gram)		3		

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Payload/Science

Succinct Overview of Payload/Science Experiment	1) Gravity Gradiometer - Determination of space-time Riemann Curvature Tensor components using rotational arms in torsional resonance. 2) Stand-Alone Science Mission Directorate - Single board automated device that collects atmospheric boundary layer data and vehicle tracking information.
Identify Major Components	1) Gravity Gradiometer - Gradiometer 1, 2 and 3. Spherical housing, electronics (to be determined), and gimbal system. 2) Stand-Alone Science Mission Directorate - Main circuit board, Camera, GPS/Antenna, and
Mass of Payload/Science	1) Gravity Gradiometer - Mass of gradiometers, electronics, spherical housing (acrylic) and gimbal (ABS plastic) estimation: 0.625 lbs. 2) Stand-Alone Science Mission Directorate - 0.231 lbs.

Test Plan Schedule/Status

Ejection Charge Test(s)	Planned early December/January
Sub-scale Test Flights	1 st Planned Date: November 10 th , 2012 at Penn State; 2 nd Planned Flight: November 17 th , 2012 at Red Glare XIII
Full-scale Test Flights	Planned early February into March

Additional Comments

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