

# Milestone Review Flysheet

PDR, CDR, FRR

<b>Institution Name</b>	The Pennsylvania State University
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<b>Milestone</b>	CDR
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Vehicle Properties	
Diameter (in)	4.25 / 3.25
Length (in)	102
Gross Liftoff Weight (lb)	23.8
Launch Lug/button Size	1.5"
Motor Retention	Aero Pack 54mm

Motor Properties	
Motor Manufacturer	AeroTech
Motor Designation	K700W
Max/Average Thrust (N/lb)	Max: 1029/231 Average: 689/155
Total Impulse (N-sec/lb-sec)	2281/513
Mass pre/post Burn (lb)	4.49/1.64

Stability Analysis	
Center of Pressure (in from nose)	73.5
Center of Gravity (in from nose)	65
Static Stability Margin	2.04
Thrust-to-Weight Ratio	9.7 (max), 6.5 (ave)
Rail Size (in) / Length (in)	1.5 / 72

Ascent Analysis	
Rail Exit Velocity (ft/s)	58.7
Max Velocity (ft/s)	593
Max Mach Number	0.53
Max Acceleration (ft/s <sup>2</sup> )	288
Peak Altitude (ft)	5,235

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)		66		
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
	705	627		

Recovery System Properties				
Main Parachute				
Manufacturer/Model		Giant Leap TAC-1		
Size		84"		
Altitude at Deployment (ft)		700		
Velocity at Deployment (ft/s)		66		
Landing Velocity (ft/s)		17.5		
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
	44.1	29.1	20.5	

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)		3		
Black Power Mass Main Parachute (gram)		3		

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<b>Payload/Science</b>	
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 Battery
Mass of Payload/Science	1) Gravity Gradiometer - Mass of gradiometers, electronics, housing (acrylic) and gimbal (ABS plastic) estimation: 0.7 lbs. 2) Stand-Alone Science Mission Directorate – 0.25 lbs.

<b>Test Plan Schedule/Status</b>	
Ejection Charge Test(s)	Planned early February
Sub-scale Test Flights	Completed November 24 <sup>th</sup> , 2012
Full-scale Test Flights	Planned early to mid February

<b>Additional Comments</b>	