Institution	Oregon State University

Milestone	PDR

Vehicle Properties

Total Length (in)	118
Diameter (in)	6.25
Gross Lift Off Weigh (lb)	60
Airframe Material(s)	Carbon Fiber/fiberglass
Fin Material and Thickness (in)	Carbon Fiber 0.25
Coupler Length(s)/Shoulder Length(s) (in)	15/6.5

Motor Properties

Motor Brand/Designation	AeroTech L2200
Max/Average Thrust (lb)	700/495
Total Impulse (lbf-s)	1147
Mass Before/After Burn (lb)	10.46/4.92
Liftoff Thrust (lb)	590
Motor Retention Method	Bolted Retaining Ring

Stability Analysis

Center of Pressure (in. from nose)	87.8
Center of Gravity (in. from nose)	66
Static Stability Margin (on pad)	3.01
Static Stability Margin (at rail exit)	3.07
Thrust-to-Weight Ratio	8.25:1
Rail Size/Type and Length (in)	1515 /180
Rail Exit Velocity (ft/s)	92.2

Ascent Analysis

Maximum Velocity (ft/s)	553
Maximum Mach Number	0.52
Maximum Acceleration (ft/s^2)	353
Target Apogee (ft)	4000
Predicted Apogee (From Sim.) (ft)	4431

Recovery System Properties - Overall

Total Descent Time (s)	88.8
Total Drift in 20 mph winds (ft)	1750

Recovery System Properties - Energetics

Ejection System Energetics (ex. Black Powder		Carbon Dioxide and Black Powder
Energetics Mass - Drogue Chute (grams)	Primary	12g of CO2
	Backup	3.5g of Black Powder
Energetics Mass - Main Chute (grams)	Primary	23g of CO2
	Backup	6.5g of Black Powder
Energetics Mass - Other (grams) - If Applicable	Primary	N/A
	Backup	N/A

Payload Deployment

Location: Air or Ground (if applicable)	Ground
Altitude of Deployment (if applicable)	0 ft AGL

Recovery System Properties - Recovery Electronics

Primary Altimeter Make/Model	PerfectFlite Stratologger CF
Secondary Altimeter Make/Model	TE MS5038 - Avionics
Other Altimeters (if applicable)	TE MS5038 - BEAVS
Rocket Locator (Make/Model)	ublox SAM-M8Q -
Additional Locators (if applicable)	ublox SAM-M8Q -
Transmitting Frequencies (all - vehicle and payload)	***Required by CDR*** (Complete on pages 3 and 4)
Pad Stay Time (Launch Configuration)	10 hr
Describe Redundancy Plan (batteries, switches, etc.)	The avionics bay will have additional batteries for twice the required time with backups in BEAVS.

Recovery System Properties - Drogue Parachute

Manufacturer/Model			Fruity chutes elliptical	
Size or Diameter (in or ft)			4ft	
Main Altimeter Deployment Setting			4000ft	
Backup Altimeter Deployment Setting			3950ft	
Velocity at Deployment (ft/s)			2.23ft/s	
Terminal Velocity (ft/s)			64.6ft/s	
Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap)			1in nylon flat shock cord	
Recovery Harness Length (ft)			45ft	
Harness/Airframe Interfaces		Eye bolts		
Kinetic Energy (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	1343	1336	N/A	N/A

Recovery System Properties - Main Parachute

Manufacturer/Model			Iris ultra toroidal parachute fruity chutes	
Size or Diameter (in or ft)			12 ft	
Main Altimeter Deployment Setting (ft)			525	
Backup Altimeter Deployment Setting (ft)			500	
Velocity at Deployment (ft/s)			63.6	
Terminal Velocity (ft/s)			14	
Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap)			1in nylon shock cord flat	
Recovery Harness Length (ft)			18	
Harness/Airframe Interfaces		Eyebolts and butterfly knot		
Kinetic Energy (Ft-lbs)	Section 1	Section 2	Section 3	Section 4
	63.1	62.7	N/A	N/A

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Payload	
	Overview
Payload 1 (official payload)	The payload will be retained within the fore section of the airframe. Upon landing the payload & nose cone will eject from the airframe using a lead screw mechanism. Once ejected the payload wheels and tail will deploy and the rover electronics will be turned on. The payload will consist of a coaxial drivetrain, powered by two seperate motors. A ductile tail will be used to stabilize the rover. The rover system will be controlled remotly using a RF controller with a handshake frequency. The rover will then navigate to a collection site. Where a augar collection system will be deployed to collect a simulated lunar ice sample. Once the sample is collected it will be stored and transported 10 ft from the collection site.
	Overview
Payload 2 (non-scored payload)	

Test Plans, Status, and Results	
Ejection Charge Tests	
Sub-scale Test Flights	
Vehicle Demon-stration Flights	
Payload Demon-stration Flights	

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Transmitter #1			
Location of transmitter:	Nose Cone		
Purpose of transmitter:	To track rocket altitude during flight		
Brand	HOPERF electronic	RF Output Power (mW)	100mW
Model	RFM95	Specific Frequency used by team (MHz)	915
Handshake or frequency hopping? (explain)	Will use a handshake protocol with acknowledgments		
Distance to closest e-match or altimeter (in)	61.33		
Description of shielding plan:	be surrounded by the ground plane, and will be isolated from the altimeter with several bulkheads which are slightly cond		

Transmitter #2			
Location of transmitter:	Payload Bay		
Purpose of transmitter:	Ejection of Payload		
Brand	HOPERF electronic	RF Output Power (mW)	100mW
Model	RFM95	Specific Frequency used by team (MHz)	915
Handshake or frequency hopping? (explain)	Yes, to ensure that payload is not ejected prematurely. It will involve handshakes and acknowledgement.		
Distance to closest e-match or altimeter (in)	38.95		
Description of shielding plan:	It will be separated by a bulk head and will be surrounded by a ground plane.		

Transmitter #3			
Location of transmitter:	Rover		
Purpose of transmitter:	Rover Control		
Brand	HOPERF electronic	RF Output Power (mW)	100mW
Model	RFM95	Specific Frequency used by team (MHz)	915
Handshake or frequency hopping? (explain)	Yes, it will use handshake to validate that the controls are correct.		
Distance to closest e-match or altimeter (in)	38.95		
Description of shielding plan:	e payload is ejected. Upon payload ejection it will be turned on and will not interfere wit		

Transmitter #4			
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:			

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Transmitter #5	
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:			

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