

Milestone Review Flysheet 2018-2019

Institution Oregon State University

Milestone PDR

Vehicle Properties

| | |
|---|--------------------------|
| Total Length (in) | 100 |
| Diameter (in) | 6.25 |
| Gross Lift Off Weigh (lb) | 54.9 |
| Airframe Material(s) | Carbon Fiber, Fiberglass |
| Fin Material and Thickness (in) | Carbon Fiber |
| Coupler Length(s)/Shoulder Length(s) (in) | 12.5 / 6.25 |

Motor Properties

| | |
|-----------------------------|-------------------|
| Motor Brand/Designation | Cesaroni L2375-WT |
| Max/Average Thrust (lb) | 586.3 / 533.7 |
| Total Impulse (lbf-s) | 1102.67 |
| Mass Before/After Burn (lb) | 9.71 / 4.06 |
| Liftoff Thrust (lb) | 553.5 |
| Motor Retention Method | Threaded Retainer |

Stability Analysis

| | |
|--|------------|
| Center of Pressure (in. from nose) | 72.051 |
| Center of Gravity (in. from nose) | 58.548 |
| Static Stability Margin (on pad) | 2.1 |
| Static Stability Margin (at rail exit) | 2.1 |
| Thrust-to-Weight Ratio | 9.77 |
| Rail Size/Type and Length (in) | 1515 / 144 |
| Rail Exit Velocity (ft/s) | 84.6 |

Ascent Analysis

| | |
|-----------------------------------|------|
| Maximum Velocity (ft/s) | 596 |
| Maximum Mach Number | 0.54 |
| Maximum Acceleration (ft/s^2) | 322 |
| Target Apogee (ft) | 4500 |
| Predicted Apogee (From Sim.) (ft) | 4797 |

Recovery System Properties - Overall

| | |
|----------------------------------|-------------------------|
| Total Descent Time (s) | 71 (fore), 72 (aft) |
| Total Drift in 20 mph winds (ft) | 2092 (fore), 2113 (aft) |

Recovery System Properties - Energetics

| Ejection System Energetics (ex. Black Powder) | | Black Powder |
|---|---------|--------------|
| Energetics Mass - Drogue Chute (grams) | Primary | 2.12 |
| | Backup | 3 |
| Energetics Mass - Main Chute (grams) | Primary | 0.33 |
| | Backup | 0.33 |
| Energetics Mass - Other | Primary | 5.5 |

Recovery System Properties - Recovery Electronics

| | |
|--|--|
| Primary Altimeter Make/Model | PerfectFlite, StratoLoggerCF |
| Secondary Altimeter Make/Model | Missleworks, RRC3 |
| Other Altimeters (if applicable) | Jolly Logic, AltimeterThree |
| Rocket Locator (Make/Model) | X-Bee Pro 900HP; Sparkfun Venus GPS |
| Additional Locators (if applicable) | |
| Transmitting Frequencies (all - vehicle and payload) | ***Required by CDR*** (Complete on pages 3 and 4) |
| Describe Redundancy Plan (batteries, switches, etc.) | Ejection charges, Tender decenders |
| Pad Stay Time (Launch Configuration) | 4 hrs |

Recovery System Properties - Drogue Parachute

| | | | | |
|--|-----------------|--|--------------------|-----------|
| Manufacturer/Model | | Top Flight Recovery / XTEAR-18 | | |
| Size or Diameter (in or ft) | | 18 in. (fore) / 18 in. (aft) | | |
| Main Altimeter Deployment Setting | | Apogee | | |
| Backup Altimeter Deployment Setting | | Apogee +1 s | | |
| Velocity at Deployment (ft/s) | | 1.7 | | |
| Terminal Velocity (ft/s) | | 146 (fore) /127 (aft) | | |
| Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap) | | 1 in. Nylon Web | | |
| Recovery Harness Length (ft) | | 30 (fore) / 30 (aft) | | |
| Harness/Airframe Interfaces | | 3/8 in. forged steel eyebolts connected to altimeter bulkheads | | |
| Kinetic Energy of Each Section (Ft-lbs) | Section 1 | Section 2 | Section 3 | Section 4 |
| | 5137.452 (fore) | 3444.499 (aft) | 419.329 (nosecone) | |

Recovery System Properties - Main Parachute

| | | | | |
|--|-----------|--|-----------|-----------|
| Manufacturer/Model | | Fruity Chutes Toroidal | | |
| Size or Diameter (in or ft) | | 10 ft (fore) / 8 ft (aft) | | |
| Main Altimeter Deployment Setting (ft) | | 525 | | |
| Backup Altimeter Deployment Setting (ft) | | 500 | | |
| Velocity at Deployment (ft/s) | | 146 (fore) / 127 (aft) | | |
| Terminal Velocity (ft/s) | | 12.015 (fore) / 12.952 (aft) | | |
| Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap) | | 1 in. Nylon Web | | |
| Recovery Harness Length (ft) | | 15 | | |
| Harness/Airframe Interfaces | | 3/8 in. forged steel eyebolts connected to altimeter bulkheads | | |
| Kinetic | Section 1 | Section 2 | Section 3 | Section 4 |

| | | | | | | | |
|-------------------------|--------|------|---------------------------------|---------------|--------------|------------------|--|
| (grams) - If Applicable | Backup | 8.25 | Energy of Each Section (Ft-lbs) | 60.195 (fore) | 52.407 (aft) | 4.913 (nosecone) | |
|-------------------------|--------|------|---------------------------------|---------------|--------------|------------------|--|

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| Payload | |
|-----------------------------------|---|
| Payload 1 (official payload) | Overview |
| | <p>The rover will be contained within the fore section of the airframe. Upon landing, the rover will be ejected from the airframe using black powder charges. The rover will have two coaxial, independently driven wheels with a chassis suspended between them. A spring-loaded stabilizer arm will act as a third point of contact with the ground. An Arduino Teensy 3.6 development board will autonomously control the motors to move the rover, receiving input from a sensor array including active sonar, passive sonar, and a nine-degree-of-freedom IMU. An auger will be mounted in the center of the chassis. When the rover is deployed the auger will periodically gather soil samples and store them in an internal containment unit. After collection, the rover will autonomously drive to a Scientific Base Station where it will perform an additional scientific experiment.</p> |
| Payload 2 (non-scored payload) | Overview |
| | |

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

| | |
|--------------------|--|
| station Flights | |
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| Transmitter #1 | | | |
|---|--|---------------------------------------|--|
| 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 #2 | | | |
|---|--|---------------------------------------|--|
| 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 #3 | | | |
|---|--|---------------------------------------|--|
| 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 #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 |
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