

Milestone Review Flysheet 2020-2021

Institution Piedmont Virginia Community College

Milestone FRR

Vehicle Properties

| | |
|---|---------------------------|
| Total Length (in) | 120 |
| Diameter (in) | 6.17 |
| Gross Lift Off Weigh (lb) | 51 |
| Airframe Material(s) | Fiberwound G12 Fiberglass |
| Fin Material and Thickness (in) | Plywood, 1/2 in. |
| Coupler Length(s)/Shoulder Length(s) (in) | 12\6 |

Motor Properties

| | |
|-----------------------------|-------------------|
| Motor Brand/Designation | AeroTech/L1150 |
| Max/Average Thrust (lb) | 302.49/258.53 |
| Total Impulse (lbf-s) | 790.65 |
| Mass Before/After Burn (oz) | 129.47 / 62.45 |
| Liftoff Thrust (N) | 227 |
| Motor Retention Method | Aeropack retainer |

Stability Analysis

| | |
|--|----------|
| Center of Pressure (in. from nose) | 95.9 |
| Center of Gravity (in. from nose) | 72.6 |
| Static Stability Margin (on pad) | 3.77 |
| Static Stability Margin (at rail exit) | 4.1 |
| Thrust-to-Weight Ratio | 5.1:1 |
| Rail Size/Type and Length (in) | 1515/144 |
| Rail Exit Velocity (ft/s) | 52 |

Ascent Analysis

| | |
|---|---------|
| Maximum Velocity (ft/s) | 405 |
| Maximum Mach Number | 0.36 |
| Maximum Acceleration (ft/s ²) | 160 |
| Target Apogee (ft) | 4200 |
| Predicted Apogee (From Sim.) (ft) | 2691.52 |

Recovery System Properties - Overall

| | |
|----------------------------------|-------|
| Total Descent Time (s) | 58 |
| Total Drift in 20 mph winds (ft) | 1,900 |

Recovery System Properties - Energetics

| | | |
|---|--------------|-----|
| Ejection System Energetics (ex. Black Powder) | Black Powder | |
| Energetics Mass - Drogue Chute (grams) | Primary | 5.5 |
| | Backup | 6 |
| Energetics Mass - Main Chute (grams) | Primary | 7.5 |
| | Backup | 8.3 |
| Energetics Mass - Other (grams) - If Applicable | Primary | |
| | Backup | |

Recovery System Properties - Recovery Electronics

| | |
|--|--|
| Primary Altimeter Make/Model | MissleWorks/RRC3 |
| Secondary Altimeter Make/Model | MissleWorks/RRC3 |
| Other Altimeters (if applicable) | N/A |
| Rocket Locator (Make/Model) | Adafruit Ultimate |
| Additional Locators (if applicable) | Eggfinder |
| Transmitting Frequencies (all - vehicle and payload) | 900 MHz, 5800 MHz |
| Describe Redundancy Plan (batteries, switches, etc.) | Two separate circuits, each with an RRC3 altimeter, 9V battery, and terminals to the black powder charges activated by their own key switches. |
| Pad Stay Time (Launch Configuration) | 15+ hours |

Recovery System Properties - Drogue Parachute

| | | | | |
|---|---------------------|-----------|---------|--------|
| Manufacturer/Model | FruityChutes | | | |
| Size or Diameter (in) | 12 | | | |
| Main Altimeter Deployment Setting | Apogee | | | |
| Backup Altimeter Deployment Setting | Apogee+2s | | | |
| Velocity at Deployment (ft/s) | 0 | | | |
| Terminal Velocity (ft/s) | 230 | | | |
| Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap) | 3/4" tubular kevlar | | | |
| Recovery Harness Length (ft) | 35 | | | |
| Harness/Airframe Interfaces | Dual U-bolts | | | |
| Kinetic Energy of Each Section (Ft-lbs) | Payload | Parachute | Booster | Lander |
| | 9575 | 9055 | 16066 | 4142 |

Recovery System Properties - Main Parachute

| | | | | |
|---|---------------------|-----------|---------|--------|
| Manufacturer/Model | FruityChutes | | | |
| Size or Diameter (in) | 192 | | | |
| Main Altimeter Deployment Setting (ft) | 700 | | | |
| Backup Altimeter Deployment Setting (ft) | 600 | | | |
| Velocity at Deployment (ft/s) | 230 | | | |
| Terminal Velocity (ft/s) | 14 | | | |
| Recovery Harness Material, Size, and Type (examples - 1/2 in. tubular Nylon or 1 in. flat Kevlar strap) | 3/4" tubular kevlar | | | |
| Recovery Harness Length (ft) | 35 | | | |
| Harness/Airframe Interfaces | Dual U-bolts | | | |
| Kinetic Energy of Each Section (Ft-lbs) | Payload | Parachute | Booster | Lander |
| | 37 | 35 | 63 | 32 |

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Payload

| Payload | |
|-----------------------------------|------------------------|
| Payload 1 (official payload) | Overview |
| | A 5 lb mass simulator. |
| Payload 2 (non-scored payload) | Overview |
| | |

Test Plans, Status, and Results

| | |
|-------------------------------|---|
| Ejection Charge Tests | Ejection charge tests were performed on the ground. Slightly more black powder was added in the main backup charge. |
| Sub-scale Test Flights | A subscale flight took place on January 3rd. |
| Vehicle Demonstration Flights | A VDF took place on March 6. It flew up to 2464 ft. |
| Payload Demonstration Flights | A payload demonstration flight may happen later this month. |

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Transmitter #1

| | | | |
|---|--|---------------------------------------|-----|
| Location of transmitter: | Avionics Bay | | |
| Purpose of transmitter: | GPS tracking of the booster section | | |
| Brand | Eggfinder | RF Output Power (mW) | 100 |
| Model | | Specific Frequency used by team (MHz) | 900 |
| Handshake or frequency hopping? (explain) | No | | |
| Distance to closest e-match or altimeter (in) | 3.75 in. to altimeter | | |
| Description of shielding plan: | Aluminum foil tape covering inside of avionics bay bulkhead. | | |

Transmitter #2

| | | | |
|---|--|---------------------------------------|------|
| Location of transmitter: | Nosecone | | |
| Purpose of transmitter: | GPS tracking of the nosecone | | |
| Brand | Lumenier | RF Output Power (mW) | 200 |
| Model | TX5G2R | Specific Frequency used by team (MHz) | 5800 |
| Handshake or frequency hopping? (explain) | No | | |
| Distance to closest e-match or altimeter (in) | 55 in. | | |
| Description of shielding plan: | Aluminum foil tape covering inside of avionics bay bulkhead. | | |

Transmitter #3

| | | | |
|---|--|---------------------------------------|-----|
| Location of transmitter: | Lander | | |
| Purpose of transmitter: | GPS tracking of lander | | |
| Brand | Eggfinder | RF Output Power (mW) | 100 |
| Model | Mini | Specific Frequency used by team (MHz) | 900 |
| Handshake or frequency hopping? (explain) | No | | |
| Distance to closest e-match or altimeter (in) | 42 in. from altimeter | | |
| Description of shielding plan: | Aluminum foil tape covering inside of avionics bay bulkhead. | | |

Transmitter #4

| | | | |
|---|------------------------|---------------------------------------|------|
| Location of transmitter: | 4 on lander | | |
| Purpose of transmitter: | Transmit video to team | | |
| Brand | | RF Output Power (mW) | 25 |
| Model | EWRF 7081U AIO Cameras | Specific Frequency used by team (MHz) | 5800 |
| Handshake or frequency hopping? (explain) | No | | |
| Distance to closest e-match or altimeter (in) | 42 in. from altimeter | | |
| 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