

Milestone Review Flysheet

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|---|--|--|--|---|---|--|--|
| Institution | Rensselaer Polytechnic Institute | | | Milestone | FRR | | |
| Vehicle Properties | | | | Motor Properties | | | |
| Total Length (in) | 96 | | | Motor Manufacturer | Aerotech | | |
| Diameter (in) | 4.02 | | | Motor Designation | K1103X | | |
| Gross Lift Off Weight (lb) | 15.81 | | | Max/Average Thrust (lb) | 364.19/247.07 | | |
| Airframe Material | Phenolic Resin | | | Total Impulse (lbf-s) | 396.34 | | |
| Fin Material | G-10 Fiberglass | | | Mass Before/After Burn (oz) | 51.5/22.2 | | |
| Drag | Polished Surfaces | | | Liftoff Thrust (lb) | 233.69 | | |
| Stability Analysis | | | | Ascent Analysis | | | |
| Center of Pressure (in from nose) | 67.4 | | | Maximum Velocity (ft/s) | 781 | | |
| Center of Gravity (in from nose) | 46.8 | | | Maximum Mach Number | 0.701 | | |
| Static Stability Margin | 5.15 | | | Maximum Acceleration (ft/s ²) | 702 | | |
| Static Stability Margin (off launch rail) | 6.1 | | | Target Apogee (From Simulations) | 5659 | | |
| Thrust-to-Weight Ratio | 15.63 | | | Stable Velocity (ft/s) | 774 | | |
| Rail Size and Length (in) | 15-15, 96 | | | Distance to Stable Velocity (ft) | 788 | | |
| Rail Exit Velocity | 100 ft/s | | | | | | |
| Recovery System Properties | | | | Recovery System Properties | | | |
| Dogue Parachute | | | | Main Parachute | | | |
| Manufacturer/Model | Rocketman Ballistic Mach II 2ft Drogue | | | Manufacturer/Model | SkyAngle Classic-II 52 | | |
| Size | 4 sq. ft | | | Size | 29.5 sq. ft | | |
| Altitude at Deployment (ft) | 5434 | | | Altitude at Deployment (ft) | 800 | | |
| Velocity at Deployment (ft/s) | 0 | | | Velocity at Deployment (ft/s) | 50 | | |
| Terminal Velocity (ft/s) | 50 | | | Terminal Velocity (ft/s) | 14.5 | | |
| Recovery Harness Material | Tubular Nylon | | | Recovery Harness Material | Tubular Nylon | | |
| Harness Size/Thickness (in) | 1/2/2016 | | | Harness Size/Thickness (in) | 1/2/2016 | | |
| Recovery Harness Length (ft) | 25 | | | Recovery Harness Length (ft) | 25 | | |
| Harness/Airframe Interfaces | Swivel Joint, 1500 lbf max; 1 in eyebolt fixed to forward motor centering ring and rear payload section bulkhead | | | Harness/Airframe Interfaces | Swivel Joint, 1500 lbf max; 1 in eyebolt fixed to forwardmost bulkhead in main airframe | | |

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| Kinetic Energy of Each Section (Ft-lbs) | Section 1 | Section 2 | Section 3 | Section 4 | Kinetic Energy of Each Section (Ft-lbs) | Section 1 | Section 2 | Section 3 | Section 4 |
| | 44.94 | 495.83 | 304.16 | N/A | | 3.78 | 52.2 | 29.4 | N/A |

| Recovery Electronics | | | | Recovery Electronics | | | | |
|--------------------------------------|---------------------------------|--|--|--|--------------------------|--|--|--|
| Altimeter(s)/Timer(s) (Make/Model) | Perfectflite Stratologger SL100 | | | Rocket Locators (Make/Model) | Adafruit GPS, model PA6H | | | |
| Redundancy Plan | Featherweight Raven3 | | | Transmitting Frequencies | Channel 45 | | | |
| | | | | Black Powder Mass Drogue Chute (grams) | 1.1 | | | |
| Pad Stay Time (Launch Configuration) | 1 hour | | | Black Powder Mass Main Chute (grams) | 0.6 | | | |

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Autonomous Ground Support Equipment (MAV Teams Only)

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| Capture Mechanism | Overview |
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| Container Mechanism | Overview |
| | |
| Launch Rail Mechanism | Overview |
| | ***Include Description of rail locking mechanism*** |
| Igniter Installation Mechanism | Overview |
| | |

| Payload | |
|-----------|--|
| Payload 1 | Overview |
| | Analysis of structural protuberances by altering the deployment angle of 3D printed drag flaps and examine the differences in pressure created. After motor burn out, the rocket's altitude and velocity are plotted against an idealized curve. Drag flap angle is adjusted in order to match the curve and reach the target altitude. Pressure readings are taken inside the drag-flap area are out side of it in order to observe pressure variation. |
| Payload 2 | Overview |
| | Atmospheric measurements with a sensors array and a camera to capture images of the horizon. Sensors and camera gather data via a clear Lexan Polycarbonate section of Body Tube. The camera follows the horizon with a rotating collar around the central axis based on a gravity-controlled system. |

| Test Plans, Status, and Results | |
|---------------------------------|--|
| Ejection Charge Tests | |
| Sub-scale Test Flights | Sub-scale test flight run with 3.0" diameter paper rocket with plywood fins that is 64" in length. Fin structure was extremely similar to full-scale rocket fin structure. Test flight completed successfully. Actual apogee of 1237' was higher than projected apogee of 1000'. First recovery deployment event occurred at apogee as expected with a small streamer deployed as the drogue. Second recovery deployment event occurred at 700' as expected with a 20" Nylon parachute deployed as the main parachute. Both events were triggered with an electronic deployment system run by a Perfectflite Stratologger SL100 altimeter similar to the one that will be used in the full-scale launch vehicle. The launch vehicle was successfully recovered with no damage to the launch vehicle. |
| Full-scale Test Flights | First test flight conducted to find altitude ceiling of launch vehicle. Full-power motor used on full-scale rocket. All payload components were deactivated for this launch. Test flight ended in mission failure near the end of motor burnout. Launch Vehicle shredded mid-flight. Fin canister, motor casing, parachutes, shock cord, payload bay, and nosecone sections are all intact. Body sections from just below top rail button to bottom of payload section needs to be reconstructed, and airframe section between top of payload bay and the nosecone needs to be replaced. Eye bolts on lower airframe connections failed in shear. Launch failure is described further in FRR report and presentation. A successful Full-Scale Test Flight must be completed before competition. |

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| Additional Comments |
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