Exhibit D

Orbital Debris Assessment Report

Frazier Spacecraft Technology Demonstration
Orbital Debris Assessment Report (ODAR)

DAS Software v3.2.6

This report is presented as compliance with NASA-STD-8719.14, APPENDIX A.

APPROVAL:

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Revision History

Revision	Date	Author(s)	Description
0.0	01/15/2024	DT	Draft
1.0	05/01/2024	DT	Initial release
2.0	06/17/2024	DT	Updated drop off altitude, bounding dimensions of spacecraft, typo on mass, surface to mass ratio, probability of accidental collision, demise orbit lifetime and plots, output in appendix and Solar Flux files. Added spinnaker payload description.
3.0	07/22/2024	DT	Updated DAS output results to match 525km worst case drop-off

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Self-Assessment per NASA-STD-8719.14

A self-assessment in accordance with the format provided in Appendix A.2 of NASA-STD-8719.14 is shown below in **Error! Reference source not found.**.

Section	Status	Comment
4.3-1, Mission-Related Debris Passing Through LEO	Compliant	
4.3-2, Mission-Related Debris Passing Near GEO	Compliant	Not passing through GEO
4.4-1, Limiting the risk to other space systems from accidental explosions during deployment andmission operations while in orbit about Earth or the Moon	Compliant	
4.4-2, Design for passivation after completion of mission operations while in orbit about Earth or the Moon	Compliant	
4.4-3, Limiting the long-term risk to other space systems from planned breakups for Earth and lunar missions	Compliant	No planned breakup
4.4-4, Limiting the short-term risk to other space systems from planned breakups for Earth orbital missions	Compliant	No planned breakup
4.5.1, Limiting debris generated by collisions with large objects when in Earth orbit	Compliant	
4.5-2, Limiting debris generated by collisions with small objects when operating in Earth orbit	Compliant	
4.6-1, Natural reentry, direct reentry, or direct retrieval	Compliant	
4.6-2, Storage and Earth escape	Compliant	Not passing through GEO
4.6-3, Long-term reentry for space structures in Medium Earth Orbit (MEO), Tundra orbits, highly inclined GEO	Compliant	No special orbit required
4.6-4, Reliability of post mission disposal maneuver operations in Earth orbit	Compliant	No post mission maneuver is planned
4.7-1, Limit the risk of human casualty	Compliant	
4.8-1, Special classes of space missions	Compliant	No special cases

Table 1: Assessment Report Format

Assessment Report Format

Astro Digital US, Inc is a US company. This ODAR follows the format in NASA-STD-8719.14, Appendix A.1 and includes the content indicated as a minimum, in each of sections 2 through 8 below. Sections 9 through 14 apply to the launch vehicle ODAR and are not covered here.

1 Program Management and Mission Overview

Astro Digital

Systems Engineer: David Thorne

Program Manager: Jeff Mok

Foreign government or space agency participation: None

Summary of NASA's responsibility under the governing agreement(s): N/A

1.1 Schedule of upcoming mission milestones:

- Notional shipment of spacecraft: Q4 CY2024
- Notional launch: Q1 CY2025

1.2 Mission Overview:

The Frazier spacecraft is a technology demonstration mission consisting of a single satellite that will provide flight qualification of the Spinnaker dragsail payload on orbit. The primary mission is to validate functionality of the payload avionics, sail deployment and expected deorbit performance with a deployed dragsail based upon two-line element datasets. The satellite is manufactured by Astro Digital and is based on the Corvus-Micro satellite platform. The Spinnaker payload is Customer Furnished Equipment (CFE) provided by Vestigo Aerospace.

1.3 Launch Vehicles and Launch Sites:

SpaceX Falcon 9 rideshare mission, launch site TBD

1.4 Proposed Initial Launch Date:

February 6th, 2025

1.5 Mission Duration:

The time to complete the mission is expected to be less than 6 months, if the dragsail successfully deploys. In an abundance of caution, Astro Digital seeks authority to operate for 12 months to allow for unanticipated delays. In the worst-case scenario, in which the spacecraft is deployed into a 525 km orbit and the dragsail fails to deploy, the estimated time for reentry is calculated to be 3.206 years.

1.6 Launch and deployment profile, including all parking, transfer, and operational orbits with apogee, perigee, and inclination:

The selected launch vehicle will deliver the Frazier spacecraft directly to a target operational circular polar orbit with an altitude of 510 km. The spacecraft is expected to operate for less than 6 months at the following orbital parameters:

- Orbital Altitude Deployment Window: 510 +/- 15 km
- Target Deployment Altitude: 510 km
- Eccentricity: 0.000 to 0.004
- Inclination: 97.6 +/- 1
- Mean Local Time of Ascending Node: 1030

2 Spacecraft Description

2.1 Physical description of the spacecraft

The Frazier spacecraft is based on the standardized Corvus-Micro bus platform and has a current best estimate (CBE) mass of 32 kg with bounding dimensions of 0.48m x 0.84m x 0.38m. The satellite structure is comprised of six aluminum iso-grid plates, in which all components are mounted on the inner and outer faces. All structural panels are referenced against the body frame of the spacecraft as seen on Figure 1.

A total of three Main Solar Panels (MSPs) are used as the primary source of power generation. These MSPs are body mounted and have dimensions of 0.45m x 0.32m x 0.0016m. An additional smaller keep alive panel with dimensions of 0.22m x 0.17m x 0.0016m is used for safeguard. A total of three Coarse Attitude Sensors (CAS) are mounted externally to spacecraft structure with dimensions of 0.12m x 0.013m x 0.0016m and contain embedded electronics such as a sun sensor and magnetometer.

The satellite avionics is enclosed inside the Data Power Module (DPM) which is comprised of a flight computer with integrated IMU, GPS module, TT&C transceiver, two battery packs, charging module, power distribution module and a high voltage power board. An additional Direct Energy Pack (DEP) is also used to further supply power to the payload and regulate the high-power loads. A camera is mounted on one of the external panels and is tilted upward toward the dragsail payload. All the avionics components have flight heritage and flown in different Astro Digital missions.

The satellite is equipped with two TT&C transceivers, S-band for uplink and UHF for downlink. Two UHF antennas are placed on the bottom corners of the spacecraft. Four S-band patch antennas are placed opposite each other, externally on the structural side panels. The standalone GPS antenna is also mounted external to the structural panels. The Attitude Determination and Control System (ADCS) consists of flight proven externally sourced hardware with one star-tracker, one gyroscope, three reaction wheels and three torque rods.

The Spinnaker dragsail payload is mounted on the top of the spacecraft, external to the structural panel. All the Spinnaker mechanical and electrical hardware is mounted internal to the structural panels of the payload. An 11-inch Planetary Systems Motorized Lightband on the bottom structural panel of the satellite is used to deploy the spacecraft from the launch vehicle. The Spinnaker product line of dragsails provides a low size, weight, power, and cost (SWaP-C), reliable approach to accelerating the deorbit of low Earth orbit (LEO) satellites. A dragsail is a thin-film membrane, deployed by a set of lightweight booms, Once deployed, the dragsail provides a large surface area, and accelerates the deorbit of the host vehicle through aerodynamic drag.

2.2 Detailed illustration of the spacecraft

An illustration of the spacecraft is shown in Figure 1:

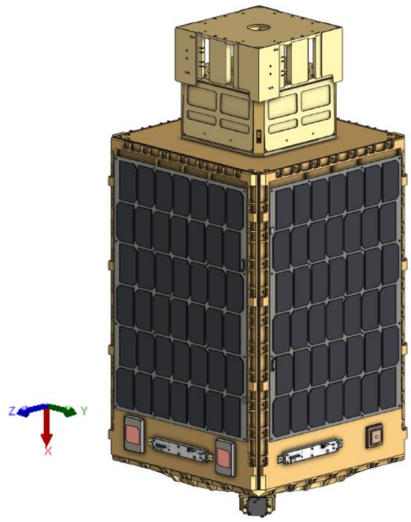

Figure 1: Frazier Spacecraft

2.3 Total Satellite Mass

Current best estimate (CBE) of 32 kg.

2.4 Dry Mass of the Satellite

Current best estimate (CBE) of 32 kg. There is no propulsion system or propellant.

2.5 Identification of All Fluids On-board

No propulsion system on board the spacecraft.

2.6 Description of Propulsion System

No propulsion system on board the spacecraft.

2.7 Description of Attitude Control System

Post separation will consist of autonomous de-tumble followed by a safe-mode, sun-tracking mode. Note that the spacecraft will be launched into a sun-synchronous orbit for which the amount of sunlight it will see throughout an orbit will vary depending on the LTDN. All the following attitude modes use a combination of the following sensors and actuators to perform maneuvers. A magnetometer, sun sensors, gyroscope, reaction wheels, torque rods and star trackers are used to orientate the spacecraft correctly.

ADCS Mode	Description
Nominal	The spacecraft will be tracking the sun vector on its body mounted solar panels to generate sufficient power to charge the batteries.
TT&C	During TT&C mode the spacecraft will perform a slew to track the ground station but may not be required based on the antenna placement and attitude of the spacecraft
IDLE	During dragsail deployment, the spacecraft will disable its 3-axis control which will put the spacecraft into a tumble. This will keep all attitude sensors active while disabling the actuators.

Table 2: Spacecraft ADCS Modes

2.8 Fluids in Pressurized Batteries

None, the Frazier spacecraft uses unpressurized standard lithium-ion battery cells. The spacecraft will have two battery packs, one inside the DPM avionics and an external pack, DEP, to accommodate the high-power load that the payload requires. The DPM battery pack contains a set of eight lithium-Ion battery cells in parallel with a total capacity of 160 W-hrs. The DEP contains a set of seven lithium-Ion battery cells in series, with a capacity of 140 W-hrs.

2.9 Description of Pyrotechnic Devices

No pyrotechnic devices on board the spacecraft.

2.10 Description of Electrical and Power System

Power is generated by the three Main Solar Panels (MSP) mounted on the spacecraft structural panels. A keep alive panel is additionally mounted on the structural panel to serve as backup power generators in case of an uncontrolled tumble or clocking maneuvers.

As mentioned, the satellite will have a total of two battery packs, one internal to the DPM and one DEP. The DPM battery pack is enclosed inside its housing module and then mounted inside the DPM. The DEP packs are enclosed inside their own housing and function as a standalone module. The battery packs are all equipped with power regulation ICs which regulate the discharge state of the individual battery cells. All the power regulation required for operating the bus is done though DPM. The DEP batteries function as the primary source of energy storage while DPM batteries are used as backup. All battery packs are charged through the solar panels.

The charge/discharge cycle is managed by a power management system overseen by the Flight Computer and Electrical Power Subsystem.

2.11 Identification of Other Stored Energy

No additional stored energy devices on board the spacecraft.

2.12 Identification of Any Radioactive Materials

No radioactive materials on board the spacecraft.

3 Assessment of Spacecraft Debris Released during Normal Operations

3.1 Identification of Objects Expected to be Released at Any Time

No items are planned to be released during normal operations.

3.2 Rationale for Release of Objects

No objects will be released from the spacecraft.

3.3 Time of Release of Objects

No objects will be released from the spacecraft.

3.4 Release Velocity

No objects will be released from the spacecraft.

3.5 Expected Orbital Parameters After Object Release

No objects will be released from the spacecraft.

3.6 Calculated Orbital Lifetime of Release Objects

No objects will be released from the spacecraft.

3.7 Assessment of Compliance with Requirement 4.3-1 and 4.3-2

3.7.1 Requirements 4.3-1

"All debris released during the deployment, operation, and disposal phases shall be limited to a maximum orbital lifetime of 25 years from date of release. The total object-time product shall be no larger than 100 object-years per mission. For the purpose of this standard, satellites smaller than a 1U standard CubeSat are treated as mission-related debris and thus are bound by this definition to collectively follow the same 100 object-years per mission deployment limit."

Compliance Statement: Compliant, no planned released debris.

3.7.2 Requirements 4.3-2

"For missions leaving debris in orbits with the potential of traversing GEO (GEO altitude +/- 200 km and +/- 15 degrees inclination), released debris with diameters of 5 mm or greater shall be left in orbits which will ensure that within 25 years after release the apogee will no longer exceed GEO - 200 km or the perigee will not be lower than GEO + 200 km , and also ensures that the debris is incapable of being perturbed to lie within that GEO +/- 200 km and +/- 15□ zone for at least 100 years thereafter."

Compliance Statement: Compliant, no planned debris passing near GEO.

4 Assessment of Spacecraft Intentional Breakups and Potential for Explosions

4.1 Identification of all potential causes of spacecraft breakup during deployment and mission operation

No breakups are baselined during deployment and mission operations.

4.2 Summary of failure modes and effects analyses of all credible failure modes which may lead to an accidental explosion

The in-orbit failure of a battery cell protection circuit could lead to a short circuit resulting in overheating and a very remote possibility of battery cell explosion. The battery safety systems discussed in the FMEA (see requirement 4.4-1 below) describe the combined faults that must occur for any of seven (7) independent, mutually exclusive failure modes to lead to such an explosion.

4.3 Detailed plan for any designed spacecraft breakup, including explosions and intentional collisions

No planned breakups, explosions or intentional collisions are planned for this mission.

4.4 List of components which shall be passivated at End of Mission (EOM) including method of passivation and amount which cannot be passivated

After the satellite has reached its End of Lifetime (EOL), its fifteen lithium-Ion Battery Cells will be discharged completely. The solar array charging circuit will be disabled, which will fully discharge all cells within a few days.

4.5 Rationale for all items which are required to be passivated, but cannot be due to their design

All items were designed to be passivated once the mission is over.

4.6 Assessment of spacecraft compliance with Requirements 4.4-1 through 4.4-4

4.6.1 Requirement 4.4-1

"For each spacecraft and launch vehicle orbital stage employed for a mission, the program or project shall demonstrate, via failure mode and effects analyses or equivalent analyses, that the integrated probability of explosion for all credible failure modes of each spacecraft and launch vehicle is less than 0.001 (excluding small particle impacts) (Requirement 56449)."

Compliance Statement:

- Required Probability: 0.001
- Expected Probability:0.000

Supporting Rationale and FMEA Details

- Battery Explosion
    - Effect: All failure modes below might result in battery explosion with the possibility of orbital debris generation. However, in the unlikely event that a battery cell does explosively rupture, the small size, mass, and potential energy, of these small batteries is such that while the spacecraft could be expected to vent gases, most debris from the battery rupture should be contained within the spacecraft due to the lack of penetration energy to the multiple enclosures surrounding the batteries.
    - Probability: Extremely Low. It is believed to be less than 0.01% given that multiple independent faults must occur for each failure to cause an explosion. Each battery cell is UL, UN and IEC certified with individual over-voltage and over-current protection. Identical batteries have been flown on all Astro Digital spacecraft.

- Failure Mode 1: Internal short circuit
    - Mitigation: Protoflight level sine burst, sine and random vibration in three axes, thermal vacuum cycling and extensive functional testing followed by maximum system rate-limited charge and discharge cycles are performed to prove that no internal short circuit sensitivity exists. Additional environmental and functional testing of the batteries at the power subsystem vendor facilities is also conducted on the batteries in accordance with UL1642 standard.
    - Combined faults required for realized failure: Environmental testing AND functional charge/discharge tests must both be ineffective to enable this failure mode.

- Failure Mode 2: Internal thermal rise due to high load discharge rate
    - Mitigation: Battery cells are tested in lab for high load discharge rates in a variety of flight-like configurations to determine if the feasibility of an out-of-control thermal rise in the cell.

Cells are also tested in a hot, thermal environment in order to test the upper limit of the cells capability. No failures are observed or identified via satellite telemetry or via external monitoring circuitry. Both overcurrent and temperature protection is implemented in the battery management system.
  - Combined faults required for realized failure: Spacecraft thermal design must be incorrect AND external overcurrent detection AND thermal protection AND disconnect function must fail to enable this failure mode.

- Failure Mode 3: Excessive discharge rate or short-circuit due to external device failure or terminal contact with conductors not at battery voltage levels (due to abrasion or inadequate proximity separation).
  - Mitigation: Qualification tested short circuit protection on each external circuit, design of battery packs and insulators such that no contact with nearby board traces is possible without being caused by some other mechanical failure, observation of such other mechanical failures by protoflight level environmental tests (sine burst, random vibration, thermal cycling, and thermal).
  - Combined faults required for realized failure: An external load must fail/short-circuit AND external over-current detection AND disconnect function must all occur to enable this failure mode.

- Failure Mode 4: Inoperable vents
  - Mitigation: Battery venting is not inhibited by the battery holder design or the spacecraft design. The battery pack is not hermetically sealed and is capable of venting gases to the external environment.
  - Combined faults required for realized failure: The spacecraft design fails to provide proper venting orifices.

- Failure Mode 5: Crushing
  - Mitigation: There are no moving parts in the proximity of the batteries and are mounted internally to each subsystem using bracket fixtures which prevent batteries from moving.
  - Combined faults required for realized failure: A catastrophic failure must occur in an external system AND the failure must cause a collision sufficient to crush the batteries AND the satellite must be in a naturally sustained orbit at the time the crushing occurs.

- Failure Mode 6: Low level current leakage or short-circuit through battery pack case or due to moisture-based degradation of insulators.
  - Mitigation: Battery holder/case design made of non-conductive plastic, tested, and operated in vacuum such that no moisture can affect insulators.
  - Combined faults required for realized failure: Abrasion or piercing of circuit board coating or wire insulators AND dislocation of battery packs AND failure of battery terminal insulators AND failure to detect such failures during environmental test must occur to result in this failure mode.

- Failure Mode 7: Excess temperatures due to orbital environment and high discharge combined.
  - Mitigation: Thermal rise has been analyzed in combination with space environment

temperatures showing that batteries do not exceed normal allowable operating temperatures under a variety of modeled cases, including worst case orbital scenarios. Analysis shows these temperatures to be well below temperatures of concern for explosions.

- Combined faults required for realized failure: Thermal analysis AND thermal design AND thermal chamber testing AND over-current monitoring and control must all fail for this failure mode to occur.

4.6.2 Requirement 4.4-2

"Design of all spacecraft and launch vehicle orbital stages shall include the ability to deplete all onboard sources of stored energy and disconnect all energy generation sources when they are no longer required for mission operations or post-mission disposal or control to a level which cannot cause an explosion or deflagration large enough to release orbital debris or break up the spacecraft (Requirement 56450)."

Compliance Statement: The spacecraft includes the ability to fully disconnect the Lithium Ion cells from the charging current of the solar arrays. Once the satellite reaches its End of Life (EOL), this feature will be used to completely passivate the batteries by removing all energy from them. In the unlikely event that a battery cell does explosively rupture, the small size, mass, and potential energy, of these small batteries is such that while the spacecraft could be expected to vent gases, the debris from the battery rupture should be contained within the spacecraft due to the lack of penetration energy to the multiple enclosures surrounding the batteries.

4.6.3 Requirement 4.4-3

"Limiting the long-term risk to other space systems from planned breakups for Earth and lunar missions. Planned explosions or intentional collisions shall: Be conducted at an altitude such that for orbital debris fragments larger than 10 cm the object-time product is less than 100 object-years. For example, if the debris fragments greater than 10 cm decay in the maximum allowed 1 year, a maximum of 100 such fragments can be generated by the breakup. Not generate debris larger than 1 mm that remains in Earth orbit longer than one year."

Compliance Statement: No planned breakups, explosions or intentional collisions are planned for this mission.

4.6.4 Requirement 4.4-4

"Limiting the short-term risk to other space systems from planned breakups for Earth orbital missions: Immediately before a planned explosion or intentional collision, the probability of debris, orbital or ballistic, larger than 1 mm colliding with any operating spacecraft within 24 hours of the breakup shall be less than 10-6."

Compliance Statement: No planned breakups, explosions or intentional collisions are planned for this mission.

5 Assessment of Spacecraft Potential for On-Orbit Collisions

5.1 Assessment of Compliance with Requirement 4.5-1 and 4.5-2

The evaluation of collisions with both small and large objects involves the consideration of the worst-case scenario area-to-mass ratio. This occurs when the spacecraft deploys its dragsail.

- Dragsail deployed: 0.2978 m2/kg

5.1.1 Requirement 4.5-1

"For each spacecraft and launch vehicle orbital stage in or passing through LEO, the program or project shall demonstrate that, during the orbital lifetime of each spacecraft and orbital stage, the probability of accidental collision with space objects larger than 10 cm in diameter does not exceed 0.001. For spacecraft and orbital stages passing through the protected region ±200 km and ±15 degrees of geostationary orbit, the probability of accidental collision with space objects larger than 10 cm in diameter shall not exceed 0.001 when integrated over 100 years from time of launch."

Compliance Statement:

- Status: Compliant
- Probability: 2.3955E-05

5.1.2 Requirement 4.5-2

"For each spacecraft, the program or project shall demonstrate that, during the mission of the spacecraft, the probability of accidental collision with orbital debris and meteoroids sufficient to prevent compliance with the applicable post mission disposal maneuver requirements does not exceed 0.01"

Compliance Statement:

- Status: Compliant

The Frazier mission seeks to demonstrate the use of a dragsail. However, even in the worst-case scenario, where the dragsail fails to deploy and the spacecraft is launched into a 525 km altitude, Frazier will reenter the Earth's atmosphere in 3.206 years. Accordingly, no post-mission disposal maneuver is required to meet the FCC's five-year reentry threshold.

6 Assessment of Spacecraft Postmission Disposal Plans and Procedures

6.1 Description of Spacecraft Disposal Option Selected

The satellite will de-orbit naturally by atmospheric re-entry within 0.074 years at EOL after the dragsail has been deployed. Disposal will be accelerated using the Spinnaker dragsail payload, although such accelerated re-entry is not necessary for compliance with FCC deorbit rules.

6.2 Plan for any spacecraft maneuvers required to accomplish post-mission disposal

No spacecraft maneuvers are baselined during normal operations or post-mission disposal.

6.3 Calculation of area-to-mass ratio after post-mission disposal if the controlled reentry option is not selected

- Spacecraft Mass: 32 Kg (CBE)
  - Current best estimate plus margin is used to assess reentry criteria giving a lower area to mass ratio which in turn increases the orbit dwell time.

- Cross-sectional Area: 9.5304 m2 (Tumbling + Dragsail)
  - The average cross-sectional area for the analysis was calculated using the NASA-STD-871814C guidelines. The scenario was assessed in a random tumble where the spacecraft attitude is variable.

- Area to mass ratio: 0.2978 m2/kg

6.4 Assessment of Compliance with Requirement 4.6-1 Through 4.6-4

6.4.1 Requirement 4.6-1

"A spacecraft or orbital stage with a perigee altitude below 2,000 km shall be disposed of by one of the following three methods:"

- Atmospheric reentry option: Leave the space structure in an orbit in which natural forces will lead to atmospheric reentry within 25 years after the completion of mission; or maneuver the space structure into a controlled de-orbit trajectory as soon as practical after completion of mission

- Storage orbit option: Maneuver the space structure into an orbit with perigee altitude above 2000km and ensure its apogee altitude will be below 19,700 km, both for a minimum of 100 years

- Direct retrieval: Retrieve the space structure and remove it from orbit within 10 years after completion of mission

Compliance Statement The orbit lifetime was assessed using NASA's DAS Orbit Evolution Analysis Tool. The estimate time of reentry, given the spacecraft parameters identified in Section 6.3, is 0.074 years after the dragsail has been deployed. Figure 2 depicts the Apogee and Perigee of the orbit over time. Dragsail is intended to be actuated at a maximum of 6 months after the spacecraft has been deployed from the launch vehicle.

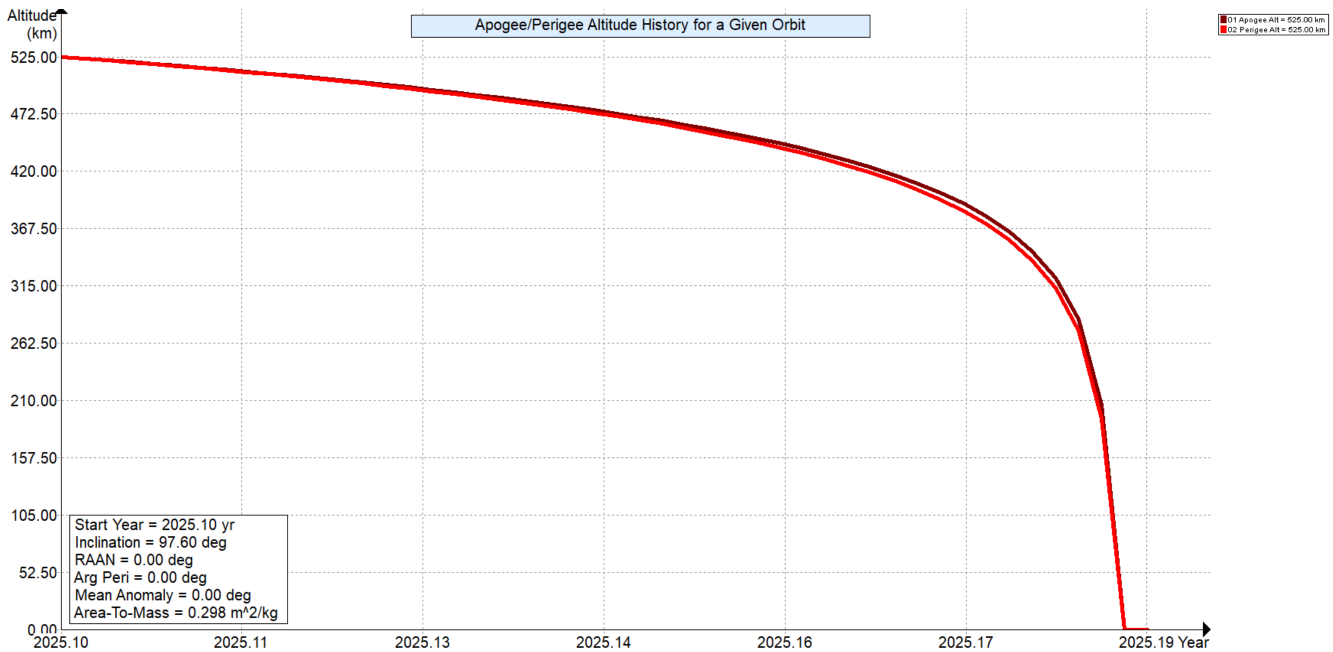

Figure 2: Apogee/Perigee Altitude History for 0.2978 m2/kg

Reliability of passive deorbit has been validated through different missions in which the accuracy of the orbit's dwell time has a small variation of a couple of months. It's worth nothing that DAS utilizes a constant solar flux condition of F10.7 which functions as a conservative estimate derived from the Solar Flux sigma level.

Additionally, a scenario in which the dragsail fails to deploy was assessed to validate reentry within the required six-year timeline imposed by the corresponding license application. The spacecraft cross sectional area and area to mass ratio will differ with the following:

- Cross-sectional Area: 0.3581 m2 (tumbling)
- Area to mass ratio: 0.0112 m2/kg

The estimated time of reentry, given the spacecraft parameters depicted above, is 3.206 years if the dragsail were to not deploy. Figure 3 depicts the Apogee and Perigee of the orbit over time.

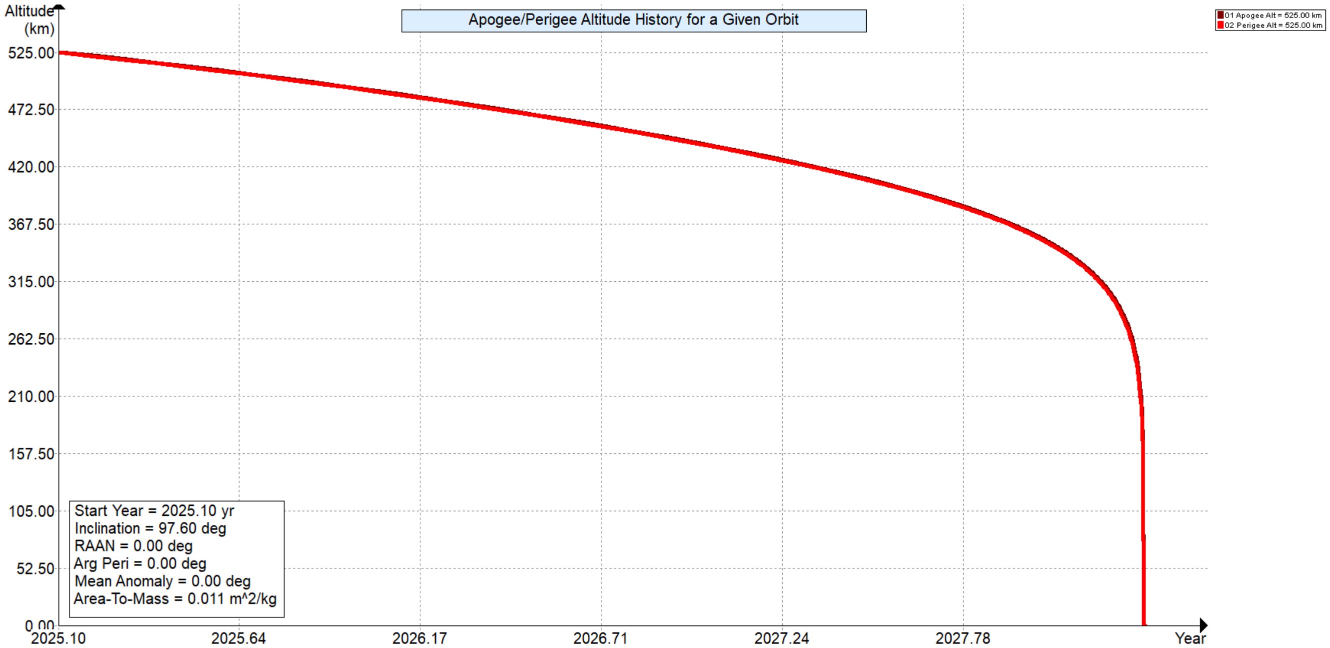

Figure 3: Apogee/Perigee Altitude History for 0.0112 m2/kg

6.4.2 Requirement 4.6-2

"Storage and Earth escape shall comply with the following:"

- Storage between LEO and GEO:
  - Maneuver to a highly eccentric disposal orbit (e.g., GEO transfer orbit) where (i) perigee altitude remains above 2000 km for at least 100 years, (ii) apogee altitude remains below 35,586 km for at least 100 years, and (iii) the time spent by the space structure between 20,182 +/- 300 km is limited to 25 years or less over 200 years; or,
  - Maneuver to a near-circular disposal orbit to (i) avoid crossing 20,182 +/- 300 km, the GEO zone, and the LEO zone for at least 100 years, and (ii) limit the risk to other operational constellations, for example, by avoiding crossing the altitudes occupied by known missions of 10 or more spacecraft using near-circular orbits, for 100 years.
- Storage above GEO: Maneuver to a disposal orbit above GEO with a predicted minimum perigee altitude of 35,986 km for a period of at least 100 years after disposal.
- Earth escape: Maneuver to a heliocentric, Earth-escape trajectory

Compliance Statement: The spacecraft is planned for natural reentry and no storage is being baselined.

6.4.3 Requirement 4.6-3

"Long-term reentry for space structures in Medium Earth Orbit (MEO), Tundra orbits, highly inclined GEO, and other orbits shall:"

- Maneuver to a disposal orbit where orbital resonances will increase the eccentricity for long-term reentry of the space structure,
- Limit the post mission orbital lifetime to as short as practicable but no more than 200 years,
- Limit the time spent by the space structure in the LEO zone, the GEO zone, and between 20,182 +/- 300 km to 25 years or less per zone, and
- Limit the probability of collisions with debris 10 cm and larger to less than 0.001 (1 in 1,000) during orbital lifetime.

Compliance Statement: Spacecraft will not operate in any other region that is not LEO.

6.4.4 Requirement 4.6-4

"Reliability of post mission disposal maneuver operations in Earth orbit: NASA space programs and projects shall ensure that all post mission disposal operations to meet Requirements 4.6-1, 4.6-2, and 4.6-3 are designed for a probability of success as follows:"

- Be no less than 0.90 at EOM, and
- For controlled reentry, the probability of success at the time of reentry burn must be sufficiently high so as not to cause a violation of Requirement 4.7-1 pertaining to limiting the risk of human casualty.

Compliance Statement: The spacecraft is planned for natural reentry and no post mission maneuver is being baselined.

7 Assessment of Spacecraft Reentry Hazards

Astro Digital's bus is designed for demise in that all material selections are prioritized to have a low melting point and density, such as aluminum. Materials known to survive re-entry, such as tungsten or titanium, are avoided. The Frazier spacecraft is based on Astro Digital heritage designs as submitted and approved in prior ODAR filings.

7.1 Assessment of Compliance with Requirement 4.7-1

7.1.1 Requirement 4.7-1

- For uncontrolled reentry, the risk of human casualty from surviving debris shall not exceed 0.0001(1:10,000)
- For controlled reentry, the selected trajectory shall ensure that no surviving debris impact with a kinetic energy greater than 15 joules is closer than 370 km from foreign landmasses, or is within 50 km from the continental U.S., territories of the U.S., and the permanent ice pack of Antarctica
- For controlled reentries, the product of the probability of failure to execute the reentry burn and the risk of human casualty assuming uncontrolled reentry shall not exceed 0.0001 (1:10,000)

Compliance Statement DAS calculates the risk of human casualty to be 0, complying with the limit of the risk of human casualty requirement. All components are listed in detail in the full DAS results, as shown in appendix A.

8 Assessment for Special Classes of Space Missions

"Special classes of space missions: Special classes of space missions, including large constellations; rendezvous, proximity operations, and satellite servicing; safety of active debris removal operations; tethers; and small satellites, shall comply with the requirements in Sections 4.3 through 4.7."

Compliance Statement: Mission does not fall into any of the special classes described in the requirements.

Appendix A: DAS Output Log

Processing Requirement 4.3-1: Return Status : Not Run

=====================
No Project Data Available
=====================

=============== End of Requirement 4.3-1 ===============
Processing Requirement 4.3-2: Return Status : Passed

=====================
No Project Data Available
=====================

=============== End of Requirement 4.3-2 ===============
Processing Requirement 4.5-1: Return Status : Passed

==============
Run Data
==============

INPUT

Space Structure Name = Frazier
Space Structure Type = Payload
Perigee Altitude = 525.000 (km)
Apogee Altitude = 525.000 (km)
Inclination = 97.600 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass Ratio = 0.2978 (m^2/kg)
Start Year = 2025.100 (yr)
Initial Mass = 32.000 (kg)
Final Mass = 32.000 (kg)
Duration = 5.000 (yr)
Station-Kept = False
Abandoned = True
Long-Term Reentry = False

OUTPUT

Collision Probability = 2.3955E-05
Returned Message: Normal Processing
Date Range Message: Normal Date Range
Status = Pass

==============

============== End of Requirement 4.5-1 ===============
Requirement 4.5-2: Compliant

============== End of Requirement 4.5-2 ===============
Processing Requirement 4.6   Return Status : Passed

==============
Project Data
==============

INPUT

Space Structure Name = Frazier
Space Structure Type = Payload

Perigee Altitude = 525.000000 (km)
Apogee Altitude = 525.000000 (km)
Inclination = 97.600000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Area-To-Mass Ratio = 0.297800 (m^2/kg)
Start Year = 2025.100000 (yr)
Initial Mass = 32.000000 (kg)
Final Mass = 32.000000 (kg)
Duration = 5.000000 (yr)
Station Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)

PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)
Long-Term Reentry = False

OUTPUT

Suggested Perigee Altitude = 525.000000 (km)
Suggested Apogee Altitude = 525.000000 (km)
Returned Error Message = Reentry during mission (no PMD req.).

Released Year = 2025 (yr)
Requirement = 61
Compliance Status = Pass

==============

=============== End of Requirement 4.6 ===============
Processing Requirement 4.7-1
Return Status : Passed

INPUT
Item Number = 1

name = Frazier
quantity = 1
parent = 0
materialID = 8
type = Box
Aero Mass = 32.000000
Thermal Mass = 32.000000
Diameter/Width = 0.476000
Length = 0.837000
Height = 0.385000

name = Corner Rails
quantity = 4
parent = 1
materialID = 8
type = Box
Aero Mass = 0.210000

Thermal Mass = 0.210000
Diameter/Width = 0.032000
Length = 0.470000
Height = 0.032000

name = Structural Panel +X
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 11.890000
Thermal Mass = 2.600000
Diameter/Width = 0.250000
Length = 0.250000

name = Star Tracker pX
quantity = 1
parent = 3
materialID = 8
type = Cylinder
Aero Mass = 0.190000
Thermal Mass = 0.190000
Diameter/Width = 0.150000
Length = 0.330000

name = UHF pX
quantity = 2
parent = 3
materialID = 8
type = Box
Aero Mass = 0.040000
Thermal Mass = 0.040000
Diameter/Width = 0.030000
Length = 0.050000
Height = 0.010000

name = Torque Control Board
quantity = 1
parent = 3
materialID = 23
type = Flat Plate

Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.100000
Length = 0.100000

name = Reaction Wheel Control Board
quantity = 1
parent = 3
materialID = 23
type = Flat Plate
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.100000
Length = 0.100000

name = DPM
quantity = 1
parent = 3
materialID = 8
type = Box
Aero Mass = 5.150000
Thermal Mass = 2.580000
Diameter/Width = 0.152000
Length = 0.240000
Height = 0.090000

name = DPM Structure
quantity = 1
parent = 8
materialID = 8
type = Box
Aero Mass = 0.660000
Thermal Mass = 0.660000
Diameter/Width = 0.152000
Length = 0.240000
Height = 0.090000

name = DPM Backplane
quantity = 1
parent = 8
materialID = 23

type = Flat Plate
Aero Mass = 0.220000
Thermal Mass = 0.220000
Diameter/Width = 0.150000
Length = 0.220000

name = Battery Module
quantity = 2
parent = 8
materialID = 8
type = Box
Aero Mass = 0.430000
Thermal Mass = 0.430000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = Flight Computer
quantity = 1
parent = 8
materialID = 8
type = Box
Aero Mass = 0.130000
Thermal Mass = 0.130000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = Power Board
quantity = 1
parent = 8
materialID = 8
type = Box
Aero Mass = 0.120000
Thermal Mass = 0.120000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = Charging Board
quantity = 1

parent = 8
materialID = 8
type = Box
Aero Mass = 0.130000
Thermal Mass = 0.130000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = TURVA Module
quantity = 2
parent = 8
materialID = 8
type = Box
Aero Mass = 0.110000
Thermal Mass = 0.110000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = GPS Module
quantity = 1
parent = 8
materialID = 8
type = Box
Aero Mass = 0.120000
Thermal Mass = 0.120000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = HVPB Module
quantity = 1
parent = 8
materialID = 8
type = Box
Aero Mass = 0.110000
Thermal Mass = 0.110000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = XPU
quantity = 1
parent = 3
materialID = 8
type = Box
Aero Mass = 1.380000
Thermal Mass = 0.690000
Diameter/Width = 0.100000
Length = 0.120000
Height = 0.090000

name = XPU Structure
quantity = 1
parent = 18
materialID = 8
type = Box
Aero Mass = 0.360000
Thermal Mass = 0.360000
Diameter/Width = 0.100000
Length = 0.120000
Height = 0.090000

name = XPU Backplane
quantity = 1
parent = 18
materialID = 23
type = Flat Plate
Aero Mass = 0.070000
Thermal Mass = 0.070000
Diameter/Width = 0.100000
Length = 0.120000

name = XPU PCB_1
quantity = 1
parent = 18
materialID = 8
type = Box
Aero Mass = 0.100000
Thermal Mass = 0.100000
Diameter/Width = 0.700000

Length = 0.800000
Height = 0.010000

name = XPU PCB_2
quantity = 1
parent = 18
materialID = 8
type = Box
Aero Mass = 0.160000
Thermal Mass = 0.160000
Diameter/Width = 0.700000
Length = 0.800000
Height = 0.010000

name = Reaction wheel bracket
quantity = 1
parent = 3
materialID = 8
type = Box
Aero Mass = 0.630000
Thermal Mass = 0.630000
Diameter/Width = 0.127000
Length = 0.128000
Height = 0.106000

name = Reaction wheel
quantity = 3
parent = 3
materialID = 8
type = Cylinder
Aero Mass = 0.230000
Thermal Mass = 0.230000
Diameter/Width = 0.070000
Length = 0.080000

name = Gyroscope
quantity = 1
parent = 3
materialID = 8
type = Box
Aero Mass = 0.050000

Thermal Mass = 0.050000
Diameter/Width = 0.040000
Length = 0.050000
Height = 0.020000

name = Motorized Lightband
quantity = 1
parent = 3
materialID = 8
type = Flat Plate
Aero Mass = 0.520000
Thermal Mass = 0.520000
Diameter/Width = 0.100000
Length = 0.340000

name = Structural Panel -X
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 13.590000
Thermal Mass = 1.510000
Diameter/Width = 0.350000
Length = 0.350000

name = Spinnaker Payload
quantity = 1
parent = 27
materialID = 8
type = Box
Aero Mass = 12.080000
Thermal Mass = 6.040000
Diameter/Width = 0.200000
Length = 0.200000
Height = 0.200000

name = Bottom Plate
quantity = 1
parent = 28
materialID = 8
type = Box

Aero Mass = 0.630000
Thermal Mass = 0.630000
Diameter/Width = 0.200000
Length = 0.200000
Height = 0.006000

name = Bottom Post
quantity = 3
parent = 28
materialID = 8
type = Box
Aero Mass = 0.180000
Thermal Mass = 0.180000
Diameter/Width = 0.036000
Length = 0.109000
Height = 0.018000

name = Top Plate
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 0.540000
Thermal Mass = 0.540000
Diameter/Width = 0.200000
Length = 0.200000
Height = 0.006350

name = Center Plate
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 0.510000
Thermal Mass = 0.510000
Diameter/Width = 0.200000
Length = 0.200000
Height = 0.006000

name = Post
quantity = 4

parent = 28
materialID = 8
type = Box
Aero Mass = 0.100000
Thermal Mass = 0.100000
Diameter/Width = 0.040000
Length = 0.076500
Height = 0.012700

name = Boom Mount
quantity = 4
parent = 28
materialID = 40
type = Box
Aero Mass = 0.090000
Thermal Mass = 0.090000
Diameter/Width = 0.051400
Length = 0.052000
Height = 0.043600

name = Sail Door
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.090000
Thermal Mass = 0.090000
Diameter/Width = 0.100000
Length = 0.170000
Height = 0.002800

name = Battery
quantity = 4
parent = 28
materialID = 8
type = Cylinder
Aero Mass = 0.080000
Thermal Mass = 0.080000
Diameter/Width = 0.030000
Length = 0.080000

name = Sail Caddy
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.105000
Length = 0.175000
Height = 0.043000

name = Bottom Post (w/connector)
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 0.170000
Thermal Mass = 0.170000
Diameter/Width = 0.036000
Length = 0.109000
Height = 0.018000

name = Boom Cover
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.040000
Thermal Mass = 0.040000
Diameter/Width = 0.050600
Length = 0.069300
Height = 0.050600

name = Top Flange
quantity = 1
parent = 28
materialID = 8
type = Cylinder
Aero Mass = 0.140000
Thermal Mass = 0.140000
Diameter/Width = 0.050000

Length = 0.100000

name = Boom Motor
quantity = 1
parent = 28
materialID = 54
type = Cylinder
Aero Mass = 0.140000
Thermal Mass = 0.140000
Diameter/Width = 0.020000
Length = 0.100000

name = Bottom Flange
quantity = 1
parent = 28
materialID = 8
type = Cylinder
Aero Mass = 0.140000
Thermal Mass = 0.140000
Diameter/Width = 0.050000
Length = 0.100000

name = Chunk
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 0.090000
Thermal Mass = 0.090000
Diameter/Width = 0.031200
Length = 0.051900
Height = 0.031200

name = Motor Mount Bracket
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 0.090000
Thermal Mass = 0.090000
Diameter/Width = 0.050800

Length = 0.101600
Height = 0.040000

name = Rod
quantity = 12
parent = 28
materialID = 8
type = Cylinder
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.010000
Length = 0.080000

name = Spring Block
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.020000
Thermal Mass = 0.020000
Diameter/Width = 0.016000
Length = 0.076500
Height = 0.006000

name = Spring Block plain
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.020000
Thermal Mass = 0.020000
Diameter/Width = 0.016000
Length = 0.076500
Height = 0.006000

name = Battery Insulator
quantity = 8
parent = 28
materialID = 50
type = Box
Aero Mass = 0.010000

Thermal Mass = 0.010000
Diameter/Width = 0.034800
Length = 0.034800
Height = 0.006000

name = Sail Quadrant
quantity = 4
parent = 28
materialID = 50
type = Box
Aero Mass = 0.020000
Thermal Mass = 0.020000
Diameter/Width = 3.000000
Length = 3.000000
Height = 0.000010

name = Bottom Rotor
quantity = 1
parent = 28
materialID = 8
type = Cylinder
Aero Mass = 0.060000
Thermal Mass = 0.060000
Diameter/Width = 0.050000
Length = 0.050000

name = Main bearing
quantity = 2
parent = 28
materialID = 54
type = Cylinder
Aero Mass = 0.030000
Thermal Mass = 0.030000
Diameter/Width = 0.015000
Length = 0.030000

name = Battery Back
quantity = 4
parent = 28
materialID = 8
type = Box

Aero Mass = 0.020000
Thermal Mass = 0.020000
Diameter/Width = 0.025400
Length = 0.072000
Height = 0.025400

name = Battery Plate (top)
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.020000
Thermal Mass = 0.020000
Diameter/Width = 0.050000
Length = 0.050000
Height = 0.010000

name = Battery Plate
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.020000
Thermal Mass = 0.020000
Diameter/Width = 0.050000
Length = 0.050000
Height = 0.010000

name = Door Hinge
quantity = 4
parent = 28
materialID = 54
type = Box
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.036400
Length = 0.088900
Height = 0.001000

name = Top Rotor
quantity = 1

parent = 28
materialID = 8
type = Cylinder
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.050000
Length = 0.050000

name = Standoff
quantity = 4
parent = 28
materialID = 54
type = Cylinder
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.010000
Length = 0.100000

name = Controller Card board
quantity = 1
parent = 28
materialID = 23
type = Flat Plate
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.040000
Length = 0.090000

name = Boom Mount Clamp
quantity = 4
parent = 28
materialID = 8
type = Box
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.012750
Length = 0.045050
Height = 0.010000

name = Boom End Clamp
quantity = 8

parent = 28
materialID = 8
type = Box
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.010000
Length = 0.050000
Height = 0.010000

name = Boom End Clamp2
quantity = 8
parent = 28
materialID = 8
type = Box
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.010000
Length = 0.050000
Height = 0.010000

name = Roller bearing
quantity = 4
parent = 28
materialID = 50
type = Cylinder
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.020000
Length = 0.050000

name = pin puller bracket
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 0.030000
Thermal Mass = 0.030000
Diameter/Width = 0.038000
Length = 0.060000
Height = 0.015000

name = Structural Panel +Y
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 7.280000
Thermal Mass = 1.600000
Diameter/Width = 0.350000
Length = 0.520000

name = MSP pY
quantity = 1
parent = 64
materialID = 23
type = Flat Plate
Aero Mass = 0.720000
Thermal Mass = 0.720000
Diameter/Width = 0.320000
Length = 0.420000

name = CAS pY
quantity = 1
parent = 64
materialID = 23
type = Box
Aero Mass = 0.040000
Thermal Mass = 0.040000
Diameter/Width = 0.020000
Length = 0.150000
Height = 0.010000

name = GPS pY
quantity = 1
parent = 64
materialID = 8
type = Box
Aero Mass = 0.030000
Thermal Mass = 0.030000
Diameter/Width = 0.030000
Length = 0.030000
Height = 0.020000

name = Structural Panel -Y
quantity = 1
parent = 64
materialID = 8
type = Flat Plate
Aero Mass = 1.470000
Thermal Mass = 1.470000
Diameter/Width = 0.350000
Length = 0.490000

name = Camera
quantity = 1
parent = 64
materialID = 5
type = Box
Aero Mass = 0.360000
Thermal Mass = 0.360000
Diameter/Width = 0.050000
Length = 0.072000
Height = 0.037000

name = Torque rod mY
quantity = 1
parent = 64
materialID = 19
type = Box
Aero Mass = 0.480000
Thermal Mass = 0.480000
Diameter/Width = 0.050000
Length = 0.300000
Height = 0.020000

name = XMSP
quantity = 1
parent = 64
materialID = 23
type = Flat Plate
Aero Mass = 0.200000
Thermal Mass = 0.200000
Diameter/Width = 0.170000

Length = 0.220000

name = DEP
quantity = 1
parent = 64
materialID = 8
type = Box
Aero Mass = 2.380000
Thermal Mass = 1.180000
Diameter/Width = 0.100000
Length = 0.190000
Height = 0.040000

name = DEP Structure
quantity = 1
parent = 72
materialID = 8
type = Box
Aero Mass = 0.460000
Thermal Mass = 0.460000
Diameter/Width = 0.100000
Length = 0.190000
Height = 0.040000

name = Battery Bracket
quantity = 1
parent = 72
materialID = 8
type = Box
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.100000
Length = 0.190000
Height = 0.030000

name = DEP PCB_1
quantity = 1
parent = 72
materialID = 23
type = Flat Plate
Aero Mass = 0.080000

Thermal Mass = 0.080000
Diameter/Width = 0.100000
Length = 0.150000

name = DEP PCB_2
quantity = 1
parent = 72
materialID = 23
type = Flat Plate
Aero Mass = 0.120000
Thermal Mass = 0.120000
Diameter/Width = 0.100000
Length = 0.170000

name = DEP Battery
quantity = 7
parent = 72
materialID = 8
type = Cylinder
Aero Mass = 0.070000
Thermal Mass = 0.070000
Diameter/Width = 0.020000
Length = 0.100000

name = Structural Panel +Z
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 4.420000
Thermal Mass = 1.500000
Diameter/Width = 0.350000
Length = 0.490000

name = XBOX
quantity = 1
parent = 78
materialID = 8
type = Box
Aero Mass = 1.600000
Thermal Mass = 1.600000

Diameter/Width = 0.152000
Length = 0.240000
Height = 0.090000

name = Torque rod pZ
quantity = 1
parent = 78
materialID = 19
type = Box
Aero Mass = 0.480000
Thermal Mass = 0.480000
Diameter/Width = 0.050000
Length = 0.300000
Height = 0.020000

name = MSP pZ
quantity = 1
parent = 78
materialID = 23
type = Flat Plate
Aero Mass = 0.720000
Thermal Mass = 0.720000
Diameter/Width = 0.320000
Length = 0.420000

name = SRX pZ
quantity = 2
parent = 78
materialID = 8
type = Box
Aero Mass = 0.040000
Thermal Mass = 0.040000
Diameter/Width = 0.040000
Length = 0.060000
Height = 0.010000

name = CAS pZ
quantity = 1
parent = 78
materialID = 23
type = Box

Aero Mass = 0.040000
Thermal Mass = 0.040000
Diameter/Width = 0.020000
Length = 0.150000
Height = 0.010000

name = Structural Panel -Z
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 2.810000
Thermal Mass = 1.490000
Diameter/Width = 0.350000
Length = 0.490000

name = Torque rod mZ
quantity = 1
parent = 84
materialID = 19
type = Box
Aero Mass = 0.480000
Thermal Mass = 0.480000
Diameter/Width = 0.050000
Length = 0.300000
Height = 0.020000

name = MSP mZ
quantity = 1
parent = 84
materialID = 23
type = Flat Plate
Aero Mass = 0.720000
Thermal Mass = 0.720000
Diameter/Width = 0.320000
Length = 0.420000

name = SRX mZ
quantity = 2
parent = 84
materialID = 8

type = Box
Aero Mass = 0.040000
Thermal Mass = 0.040000
Diameter/Width = 0.040000
Length = 0.060000
Height = 0.010000

name = CAS mZ
quantity = 1
parent = 84
materialID = 23
type = Box
Aero Mass = 0.040000
Thermal Mass = 0.040000
Diameter/Width = 0.020000
Length = 0.150000
Height = 0.010000

**************OUTPUT****
Item Number = 1

name = Frazier
Demise Altitude = 77.998316
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Corner Rails
Demise Altitude = 77.642466
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structural Panel +X
Demise Altitude = 74.375978
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Star Tracker pX
Demise Altitude = 74.176278

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = UHF pX
Demise Altitude = 73.747053
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Torque Control Board
Demise Altitude = 70.343352
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Reaction Wheel Control Board
Demise Altitude = 70.343352
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DPM
Demise Altitude = 71.853731
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DPM Structure
Demise Altitude = 71.213164
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DPM Backplane
Demise Altitude = 70.718034
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery Module

Demise Altitude = 71.758557
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Flight Computer
Demise Altitude = 71.825200
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Power Board
Demise Altitude = 71.825721
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Charging Board
Demise Altitude = 71.825200
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = TURVA Module
Demise Altitude = 71.834861
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = GPS Module
Demise Altitude = 71.825721
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = HVPB Module
Demise Altitude = 71.834861
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = XPU
Demise Altitude = 73.010050
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = XPU Structure
Demise Altitude = 72.295626
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = XPU Backplane
Demise Altitude = 72.202948
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = XPU PCB_1
Demise Altitude = 72.992205
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = XPU PCB_2
Demise Altitude = 72.975319
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Reaction wheel bracket
Demise Altitude = 73.307312
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Reaction wheel
Demise Altitude = 73.076592
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Gyroscope
Demise Altitude = 73.822159
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Motorized Lightband
Demise Altitude = 73.405709
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structural Panel -X
Demise Altitude = 76.672919
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Spinnaker Payload
Demise Altitude = 72.015889
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Bottom Plate
Demise Altitude = 70.911235
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Bottom Post
Demise Altitude = 70.977441
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Top Plate
Demise Altitude = 71.065317
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Center Plate
Demise Altitude = 71.116399
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Post
Demise Altitude = 71.205909
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Boom Mount
Demise Altitude = 70.359074
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Sail Door
Demise Altitude = 71.747827
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery
Demise Altitude = 71.165899
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Sail Caddy
Demise Altitude = 71.963147
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Bottom Post (w/connector)
Demise Altitude = 71.029453
Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****
name = Boom Cover
Demise Altitude = 71.835914
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Top Flange
Demise Altitude = 71.187716
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Boom Motor
Demise Altitude = 67.066167
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Bottom Flange
Demise Altitude = 71.187716
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Chunk
Demise Altitude = 71.255538
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Motor Mount Bracket
Demise Altitude = 71.674752
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Rod
Demise Altitude = 71.785888

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Spring Block
Demise Altitude = 71.664695
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Spring Block plain
Demise Altitude = 71.664695
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery Insulator
Demise Altitude = 71.717116
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Sail Quadrant
Demise Altitude = 72.015889
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Bottom Rotor
Demise Altitude = 71.422924
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Main bearing
Demise Altitude = 68.276946
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery Back

Demise Altitude = 71.865588
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery Plate (top)
Demise Altitude = 71.786321
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery Plate
Demise Altitude = 71.786321
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Door Hinge
Demise Altitude = 71.747708
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Top Rotor
Demise Altitude = 71.524470
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Standoff
Demise Altitude = 71.415879
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Controller Card board
Demise Altitude = 70.765419
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Boom Mount Clamp
Demise Altitude = 71.785040
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Boom End Clamp
Demise Altitude = 71.764823
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Boom End Clamp2
Demise Altitude = 71.764823
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Roller bearing
Demise Altitude = 71.717108
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = pin puller bracket
Demise Altitude = 71.725359
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structural Panel +Y
Demise Altitude = 77.040995
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = MSP pY
Demise Altitude = 75.377718
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = CAS pY
Demise Altitude = 76.101059
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = GPS pY
Demise Altitude = 76.336937
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structural Panel -Y
Demise Altitude = 76.060772
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Camera
Demise Altitude = 71.465482
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Torque rod mY
Demise Altitude = 74.350719
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = XMSP
Demise Altitude = 75.926806
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DEP
Demise Altitude = 74.538343
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DEP Structure
Demise Altitude = 73.581983
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery Bracket
Demise Altitude = 74.442197
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DEP PCB_1
Demise Altitude = 73.736802
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DEP PCB_2
Demise Altitude = 73.467503
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = DEP Battery
Demise Altitude = 73.608715
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structural Panel +Z
Demise Altitude = 77.043117
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = XBOX
Demise Altitude = 75.161503
Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****
name = Torque rod pZ
Demise Altitude = 74.287090
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = MSP pZ
Demise Altitude = 75.339842
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = SRX pZ
Demise Altitude = 76.483921
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = CAS pZ
Demise Altitude = 76.088576
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structural Panel -Z
Demise Altitude = 77.038383
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Torque rod mZ
Demise Altitude = 74.176473
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = MSP mZ
Demise Altitude = 75.261803

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = SRX mZ
Demise Altitude = 76.465045
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = CAS mZ
Demise Altitude = 76.053515
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

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=============== End of Requirement 4.7-1 ===============