Exhibit A – Orbital Debris Assessment Report ("ODAR")

Swarm Orbital Debris Assessment Report

SWARM TECHNOLOGIES MISSION PROFILE
PREPARED BY: SWARM TECHNOLOGIES INC
REVISION 1: February 28, 2020

ODAR Signature Approval

Program/ Project Manager	Sara Spangelo
Signature	
Date	February 28, 2020

ODAR Section 1: Program Management and Mission Overview

Program/Project Manager	Sara Spangelo
Mission Description	The purpose of the Swarm satellite constellation is to provide low-cost, global two-way communication services within the UHF band. Swarm proposes to provide these services by deploying a constellation consisting of 450 ¼U satellites.
Foreign Government Involvement	None
Project Milestones Proposed Launch Date: Proposed Launch Vehicles: Proposed Launch Sites: Launch Vehicle Operator:	The Swarm satellites will typically be launched 12 to 48 at a time, dependent on launch availability and the orbital characteristics required to optimize system coverage. Swarm will deploy its constellation by launching its satellites as secondary payloads. Swarm proposes July 1, 2020 as the nominal deployment start date for this analysis. Launches will be booked as they become available and are subject to schedule and orbital parameter changes. As a result, Swarm's finalized list of launch dates and orbital parameters is not yet available. Swarm therefore requests authorization to deploy and subsequently replenish its constellation on launches with parameters within the following bounds: ● Inclination: equatorial (0 degrees) to polar sun-synchronous (98 degrees)

<table>
<tr><td></td><td>

Apogee: 325-585 km
Perigee: 325-585 km

The table below includes a list of the desired altitudes and orbital planes for Swarm's 450-satellite constellation and is representative of available launch opportunities in the desired timeframe.
<table>
<tr><th># Satellites</th><th>Altitude [km]</th><th>Inclination [°]</th></tr>
<tr><td>60</td><td>585</td><td>45</td></tr>
<tr><td>60</td><td>585</td><td>10</td></tr>
<tr><td>330</td><td>585</td><td>97-98 (SSO)</td></tr>
<tr><td>Lower and upper bound</td><td>325-585</td><td>0-98</td></tr>
</table>
This ODAR analyzes a range of representative orbits. For the purposes of debris assessment, an analysis was conducted with the "worst-case" altitude (585 km) in all cases to assess the maximum collision probability over the lifetime of the satellites. Rather than relying on analytic estimates, the effective area-to-mass ratios of the satellites were derived empirically from radar measurements of the orbital altitude history over time for the first four Swarm satellites in LEO, which are also ¼U and have a similar, passively-stabilized flight configuration. This process is detailed in Section 6. These area-to-mass ratios accurately represent both operational and non-operational satellites, as passive stability is the primary flight mode in both cases. Active maneuvering capabilities are reserved for collision avoidance, accelerated deorbit, and phase adjustments.
The aggregate collision probability for all Swarm satellites launched over the 15-year period of the requested grant is also calculated.
</td></tr>
<tr><td>Mission Duration:</td><td>The operational lifetime of the hardware for each satellite is designed to be up to 20 years following deployment from the launch vehicle. The orbital lifetime for the satellites is expected to range from 2.6 to 4.3 years, depending on the vehicle's mass, initial altitude, and the solar influence of the Earth's atmosphere, as described in Section 6. The hardware design allows for a margin of 4.7x to 7.7x the orbital lifetime.</td></tr>
<tr><td>Launch /
Deployment Profile:</td><td>
Launch
The Swarm satellites will be injected directly into the target orbits outlined above.

Checkout
For up to 1 month following deployment into orbit, the Swarm satellites will remain in checkout phase. During this phase, ground operators will verify correct operation of the satellites and their payloads, and prepare them for the operational phase.

Operations
The operational phase of the satellite begins following the successful
</td></tr>
</table>

	deployment of the Swarm satellites from the launch vehicle and successful checkout. **Post-mission Disposal** Following the end of the operational phase, the satellites will remain on orbit in a non-transmitting mode while the orbit of the satellites passively decays until the satellites reenter the atmosphere and disintegrate. The satellites are nominally expected to reenter the atmosphere 2.6 to 4.3 years following deployment from the launch vehicle.
Selection of Orbit:	The selection of the chosen orbits was made based on available launch opportunities, orbital lifetime considerations, and system requirements.
Potential Physical Interference with Other Orbiting Object:	The satellite orbits will naturally decay following deployment from the launch vehicle. As detailed in Section 5, the probability of physical interference between the satellites and other space objects is sufficiently unlikely that the satellites comply with Requirement 4.5.

ODAR Section 2: Spacecraft Description

Physical Description:

Property	**Value**
Total Mass at Launch	0.30 kg to 0.60 kg
Dry Mass at Launch	0.30 kg to 0.55 kg
Form Factor	¼U satellite
COG	0.30 kg satellite: <X1,Y1,Z1> = <0, 16.5, -1.5> [mm] relative to center 0.60 kg satellite: <X1,Y1,Z1> = <0, 16.5, -1.5> [mm] relative to center
Envelope (stowed)	118mm x 118mm x 28mm
Envelope (deployed)	118mm x 118mm x 28mm Deployed antennas are 500 mm tip to tip
Propulsion Systems	None
Fluid Systems	None
ADCS	GPS, 9 DOF IMU, magnetometer, magnetorquer system for attitude control
Range Safety/ Pyrotechnic Devices	None
Electrical Generation	Solar cells

Electrical Storage	Rechargeable lithium-ion battery. Qty 1: 18650 cell.
Radioactive Materials	None

ODAR Section 3: Assessment of Debris Released During Normal Operations

Objects larger than 1mm expected to be released during orbit:	**None**
Rationale for release of each object:	N/A
Time of release of each object:	N/A
Release velocity of each object:	N/A
Expected orbital parameters of each object:	N/A
Calculated orbital lifetime of each object:	N/A

Assessment of spacecraft compliance with Requirements 4.3-1 and 4.3-2:	
4.3-1, Mission-Related Debris Passing Through LEO:	COMPLIANT
4.3-2, Mission-Related Debris Passing Near GEO:	COMPLIANT

A DAS 3.0 log demonstrating the compliance to the above requirements is available in Appendix A – “DAS 3.0 Log”.

ODAR Section 4: Assessment of Spacecraft Intentional Breakups and Potential for Explosions

Potential causes for spacecraft breakup (there is only one plausible causes for breakup of the satellites):

- Energy released from onboard Lithium-ion battery from the unlikely event of overcharging or shorts

Summary of failure modes and effects analysis of all credible failure modes which may lead to an accidental explosion:
The battery aboard the satellite is a 11 Whr Lithium-Ion battery, which represents the only credible failure mode during which stored energy is released. The main failure modes associated with Lithium Ion batteries result from overcharging, over-discharging, internal shorts, and external shorts.

The battery onboard Swarm satellites complies with all controls / process requirements identified in JSC-20793 Section 5.4.3 to mitigate the chance of any accidental venting / explosion caused by the above failure modes.

Detailed Plan for any designed spacecraft breakup, including explosions and intentional collisions:
There is no planned breakup of the satellites on-orbit.

List of components passivated at EOM:
At the end of the mission, all radio transmissions and beacons will be disabled. Spacecraft transmissions are only initiated by ground command and self terminate. All RF transmissions from the satellite can be disabled via command from the ground.

Rationale for all items required to be passivated that cannot be due to design:
N/A

Assessment of spacecraft compliance with Requirements 4.4-1 through 4.4-4:	
4.4-1, Limiting the risk to other space systems from accidental explosions during deployment and mission 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: There are no planned breakups of any of the satellites.	**COMPLIANT**
4.4-4, Limiting the short-term risk to other space systems from planned breakups There are no planned breakups of any of the satellites.	**COMPLIANT**

ODAR Section 5: Assessment of Spacecraft Potential for On-Orbit Collisions

Probability for Collision with Objects >10cm:

The probability of a collision of any of the Swarm satellites with an orbiting object larger than 10 cm in diameter was calculated using DAS 3.0 software. Table 1 below shows the risk of collision for minimum and maximum mass satellites deployed into a range of orbits, at the upper bound of 585 km in altitude to determine the maximum collision risk.

In every scenario evaluated, including the worst-case (maximum satellite mass, longest-lifetime) scenario, the lifetime collision risk for any individual satellite was less than 2e-7. Notably, this analysis uses a newer version of DAS that has an improved capability for reporting small probabilities. Swarm's previous VHF application used DAS 2.1.1, which truncated probabilities less than 5e-7 to 0.000000.

Table 1 - Collision Risk for Swarm Satellite in Each Planned Orbit in the Nominal Mission Scenario

Altitude [km]	Inclination [°]	Satellite Mass [kg]	Area to mass ratio [m²/kg]	Lifetime [yrs]	Collision risk per DAS analysis
585	45	0.30	0.0375	2.7	6.67e-8
585	45	0.60	0.0187	4.3	9.26e-8
585	10	0.30	0.0375	2.6	5.94e-8
585	10	0.60	0.0187	4.2	8.18e-8
585	97-98 (SSO)	0.30	0.0375	2.6	1.14e-7
585	97-98 (SSO)	0.60	0.0187	4.1	1.62e-7

The aggregate probability of collision for the constellation was also evaluated. Swarm anticipates deploying approximately 1630 satellites over the 15-year license term to maintain a constellation of 450 operational satellites (see Table 2). Multiplying the total satellite numbers with their respective maximum individual collision risk values from Table 1 yields a lifetime worst-case probability of collision of 0.00023. This result is significantly lower than the maximum value of 0.001 set forth in NASA Requirement 4.5-1.

Table 2 - Anticipated Satellite Deployments Over 15-Year License Term

# Satellites in Operational Constellation	Altitude [km]	Inclination [°]	Lifetime [yrs]	Number of satellites deployed in given orbit over 15-year term
60	585	45	4.3	209
60	585	10	4.2	214
330	585	97-98 (SSO)	4.1	1207
			Total	**1630**

Probability of Damage from Small Objects

Compliance with Requirement 4.5-2 requires an assessment of the probability that post-mission disposal will be impeded by damage from space objects, including small orbital debris and meteoroids, of sufficient size to prevent post-mission disposal. Because post-mission disposal is accomplished via natural

atmospheric drag, none of the satellite subsystems are vital to completing post-mission disposal. The satellites therefore comply with Requirement 4.5-2.

Assessment of spacecraft compliance with Requirement 4.5-1 and 4.5-2:	
4.5-1, Probability of Collision with Large Objects:	**COMPLIANT**
4.5-2, Probability of Damage from Small Objects:	**COMPLIANT**

A DAS 3.0 log demonstrating the compliance to the above requirements is available in Appendix A – "DAS 3.0 Log".

ODAR Section 6: Assessment of Spacecraft Post-mission Disposal Plans and Procedures

Description of Disposal Option Selected:

The satellites will be deployed from the P-POD with a spring and will separate from one another with separation springs in the feet. Following their deployment, the satellites' orbits will naturally decay until they reenter the atmosphere. Table 3 describes the mission scenarios for which lifetime analysis of Swarm satellites was considered, and the effective area-to-mass ratio of the satellite in each scenario. To determine the effective area-to-mass ratio in the nominal configuration, two years of orbital altitude history for SPACEBEE-1, 2, 3, and 4 (¼U, VHF-band Swarm satellites in LEO) were collected from Space Surveillance Network radar observations. The DAS apogee/perigee history tool was used to fit an area-to-mass ratio to those observations, using accurate solar activity data for this time period. The area-to-mass ratios were adjusted to account for the mass and configuration of the UHF satellites relative to the configuration of SPACEBEE-1, 2, 3, and 4. For the intentional, accelerated deorbit scenario, which requires active ADCS, the area-to-mass ratio was determined using the measured frontal area of the satellites while in a high-drag configuration.

Table 3 - Area-to-Mass Ratio of Swarm Satellites in Various Mission Scenarios

Scenario	**Description**	**Effective Area-to-Mass (m^2/kg)**
Nominal	● Determined empirically from observational history of previous Swarm ¼U satellites	0.0375 (for minimum satellite mass of 0.30 kg) 0.0187 (for maximum satellite mass of 0.60 kg)
Intentional De-orbit	● Satellite actively maintains a high-drag configuration	0.0464 (for minimum satellite mass of 0.30 kg) 0.0232 (for maximum satellite mass of 0.60 kg)

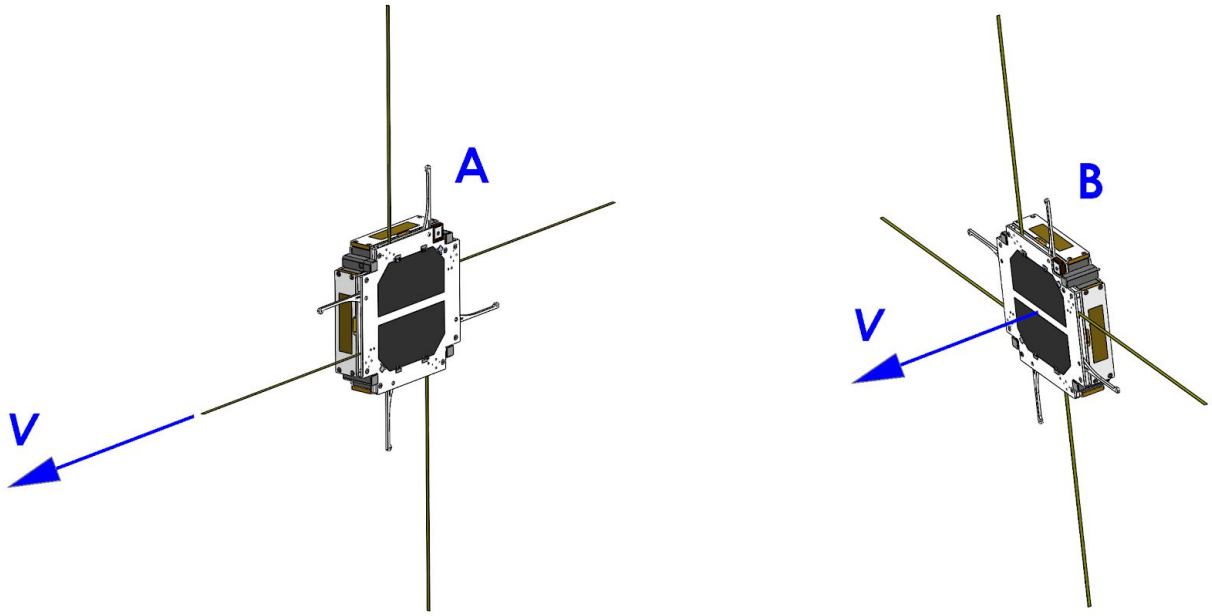

Figure 1. (A) A Swarm satellite in an edge-on flight configuration, which can be actively maintained over short intervals for space debris avoidance via differential drag. **(B)** A Swarm satellite in high-drag mode for intentional, accelerated de-orbiting.

Tables 4 and 5 show the simulated orbital dwell time for a Swarm satellite in a range of possible orbits in each of the identified mission scenarios. In all mission scenarios and orbits, the dwell time of the satellite was simulated using DAS 3.0 software to be 4.3 years or less.

Table 4 – Orbit Dwell Time for Swarm Satellite in Each Planned Orbit in the Nominal Mission Scenario

Altitude [km]	Inclination [°]	Satellite Mass [kg]	Scenario	Area to mass ratio [m²/kg]	Lifetime [yrs]
585	45	0.30	Nominal	0.0375	2.7
585	45	0.60	Nominal	0.0187	4.3
585	10	0.30	Nominal	0.0375	2.6
585	10	0.60	Nominal	0.0187	4.2
585	97-98 (SSO)	0.30	Nominal	0.0375	2.6
585	97-98 (SSO)	0.60	Nominal	0.0187	4.1

Table 5 – Orbit Dwell Time for Swarm Satellite in Each Planned Orbit in the Intentional Accelerated De-Orbit Mission Scenario

Altitude [km]	Inclination [°]	Satellite Mass [kg]	Scenario	Area to mass ratio [m²/kg]	Lifetime [yrs]

585	45	0.30	Intentional De-Orbit	0.0464	2.4
585	45	0.60	Intentional De-Orbit	0.0232	3.6
585	10	0.30	Intentional De-Orbit	0.0464	2.4
585	10	0.60	Intentional De-Orbit	0.0232	3.5
585	97-98 (SSO)	0.30	Intentional De-Orbit	0.0464	2.3
585	97-98 (SSO)	0.60	Intentional De-Orbit	0.0232	3.5

Identification of Systems Required for Post-mission Disposal: None

Plan for Spacecraft Maneuvers required for Post-mission Disposal: N/A

Calculation of final Area-to-Mass Ratio if Atmospheric Reentry Not Selected: N/A

Assessment of Spacecraft Compliance with Requirements 4.6-1 through 4.6-4:	
4.6-1, Disposal for space structures passing through LEO All of the satellites will reenter the atmosphere within 25 years of mission completion and 30 years of launch.	**COMPLIANT**
4.6-2, Disposal for space structures passing through GEO:	**N/A**
4.6-3, Disposal for space structures between LEO and GEO:	**N/A**
4.6-4, Reliability of post-mission disposal operations:	**COMPLIANT**

ODAR Section 7: Assessment of Spacecraft Reentry Hazards

Detailed description of spacecraft components by size, mass, material, shape, and original location on the space vehicle:
A system-level mass breakdown and primary materials list included in the generic satellite bus is available in the table below:

Table 6 - Subsystem Components Evaluated as Reentry Hazards

Subsystem	Materials	Quantity	Mass (grams)	Shape	Size (mm)
Solar Panels	Copper, Glass	2	1	Box	79 x 50 x 0.3
Main Board PCB	FR4	2	28	Box	98 x 98 x 1.6
Primary Structure	Al 6061	1	193 (for 300 g satellite)	Box	118 x 118 x 28

			493 (for 600 g satellite)		
Battery	Li-Ion	1	49	Cylinder	18 (r) x 67 (l)

Summary of objects expected to survive an uncontrolled reentry (using DAS 3.0 software): None
Calculation of probability of human casualty for expected reentry year and inclination: 0%

Assessment of spacecraft compliance with Requirement 4.7-1:	
4.7-1, Casualty Risk from Reentry Debris:	**COMPLIANT**

A DAS 3.0 log demonstrating the compliance to Requirement 4.7-1 is available in Appendix A – "DAS 3.0 Log".

ODAR Section 7A: Assessment of Spacecraft Hazardous Materials

Summary of Hazardous Materials Contained on Spacecraft: None

ODAR Section 8: Assessment for Tether Missions

Type of tether: N/A
Description of tether system: N/A
Determination of minimum size of object that will cause the tether to be severed: N/A
Tether mission plan, including duration and post-mission disposal: N/A
Probability of tether colliding with large space objects: N/A
Probability of tether being severed during mission or after post-mission disposal: N/A
Maximum orbital lifetime of a severed tether fragment: N/A

Assessment of compliance with Requirement 4.8-1:	
4.8-1, Collision Hazards of Space Tethers:	**N/A**

Appendix A: DAS 3.0 Log

```
02 21 2020; 03:15:13AM  Activity Log Started
02 21 2020; 03:21:02AM  Science and Engineering - Orbit Lifetime/Dwell Time
```

```
**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 45.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.037500 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 2.683094 (yr)
      Time Spent in LEO during Lifetime  = 2.683094 (yr)
      Last year of Propagation = 2023 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:21:12AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 45.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.018700 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 4.281999 (yr)
      Time Spent in LEO during Lifetime  = 4.281999 (yr)
      Last year of Propagation = 2024 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:21:24AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 10.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.037500 (m^2/kg)

**OUTPUT**
```

```
      Orbital Lifetime from Startyr = 2.639288 (yr)
      Time Spent in LEO during Lifetime  = 2.639288 (yr)
      Last year of Propagation = 2023 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:21:33AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 10.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.018700 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 4.177960 (yr)
      Time Spent in LEO during Lifetime  = 4.177960 (yr)
      Last year of Propagation = 2024 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:21:45AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 97.500000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.037500 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 2.611910 (yr)
      Time Spent in LEO during Lifetime  = 2.611910 (yr)
      Last year of Propagation = 2023 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:21:51AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 97.500000 (deg)
```

```
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.018700 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 4.106776 (yr)
      Time Spent in LEO during Lifetime  = 4.106776 (yr)
      Last year of Propagation = 2024 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:22:05AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 45.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.046400 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 2.398357 (yr)
      Time Spent in LEO during Lifetime  = 2.398357 (yr)
      Last year of Propagation = 2022 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:22:10AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 45.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.023200 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 3.608487 (yr)
      Time Spent in LEO during Lifetime  = 3.608487 (yr)
      Last year of Propagation = 2024 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:22:18AM  Science and Engineering - Orbit Lifetime/Dwell Time
```

```
**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 10.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.046400 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 2.365503 (yr)
      Time Spent in LEO during Lifetime  = 2.365503 (yr)
      Last year of Propagation = 2022 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:22:23AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 10.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.023200 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 3.542779 (yr)
      Time Spent in LEO during Lifetime  = 3.542779 (yr)
      Last year of Propagation = 2024 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:22:37AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 97.500000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.046400 (m^2/kg)

**OUTPUT**
```

```
      Orbital Lifetime from Startyr = 2.343600 (yr)
      Time Spent in LEO during Lifetime  = 2.343600 (yr)
      Last year of Propagation = 2022 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:22:46AM  Science and Engineering - Orbit Lifetime/Dwell Time

**INPUT**

      Start Year = 2020.500000 (yr)
      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 97.500000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Area-To-Mass Ratio = 0.023200 (m^2/kg)

**OUTPUT**

      Orbital Lifetime from Startyr = 3.488022 (yr)
      Time Spent in LEO during Lifetime  = 3.488022 (yr)
      Last year of Propagation = 2023 (yr)
      Returned Error Message: Object reentered
02 21 2020; 03:22:52AM  Project Data Saved To File
02 21 2020; 03:23:00AM  Processing Requirement 4.3-1: Return Status :  Not Run

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

=============== End of Requirement 4.3-1 ===============
02 21 2020; 03:23:05AM  Processing Requirement 4.3-2: Return Status : Passed

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

=============== End of Requirement 4.3-2 ===============
02 21 2020; 04:15:33AM  Processing Requirement 4.5-1: Return Status :  Passed

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

**INPUT**

      Space Structure Name = Nominal, 45 deg, 0.3 kg
      Space Structure Type = Payload
      Perigee Altitude = 585.000 (km)
```

```
      Apogee Altitude = 585.000 (km)
      Inclination = 45.000 (deg)
      RAAN = 0.000 (deg)
      Argument of Perigee = 0.000 (deg)
      Mean Anomaly = 0.000 (deg)
      Final Area-To-Mass Ratio = 0.0375 (m^2/kg)
      Start Year = 2020.500 (yr)
      Initial Mass = 0.300 (kg)
      Final Mass = 0.300 (kg)
      Duration = 2.700 (yr)
      Station-Kept = False
      Abandoned = True

**OUTPUT**

      Collision Probability = 6.6727E-08
      Returned Message: Normal Processing
      Date Range Message: Normal Date Range
      Status = Pass

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

**INPUT**

      Space Structure Name = Nominal, 45 deg, 0.6 kg
      Space Structure Type = Payload
      Perigee Altitude = 585.000 (km)
      Apogee Altitude = 585.000 (km)
      Inclination = 45.000 (deg)
      RAAN = 0.000 (deg)
      Argument of Perigee = 0.000 (deg)
      Mean Anomaly = 0.000 (deg)
      Final Area-To-Mass Ratio = 0.0187 (m^2/kg)
      Start Year = 2020.500 (yr)
      Initial Mass = 0.600 (kg)
      Final Mass = 0.600 (kg)
      Duration = 4.300 (yr)
      Station-Kept = False
      Abandoned = True

**OUTPUT**

      Collision Probability = 9.2598E-08
      Returned Message: Normal Processing
      Date Range Message: Normal Date Range
      Status = Pass

==============
```

INPUT

Space Structure Name = Nominal, 10 deg, 0.3 kg
Space Structure Type = Payload
Perigee Altitude = 585.000 (km)
Apogee Altitude = 585.000 (km)
Inclination = 10.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass Ratio = 0.0375 (m^2/kg)
Start Year = 2020.500 (yr)
Initial Mass = 0.300 (kg)
Final Mass = 0.300 (kg)
Duration = 2.600 (yr)
Station-Kept = False
Abandoned = True

OUTPUT

Collision Probability = 5.9385E-08
Returned Message: Normal Processing
Date Range Message: Normal Date Range
Status = Pass

==========

INPUT

Space Structure Name = Nominal, 10 deg, 0.6 kg
Space Structure Type = Payload
Perigee Altitude = 585.000 (km)
Apogee Altitude = 585.000 (km)
Inclination = 10.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass Ratio = 0.0187 (m^2/kg)
Start Year = 2020.500 (yr)
Initial Mass = 0.600 (kg)
Final Mass = 0.600 (kg)
Duration = 4.200 (yr)
Station-Kept = False
Abandoned = True

OUTPUT

Collision Probability = 8.1825E-08
Returned Message: Normal Processing
Date Range Message: Normal Date Range
Status = Pass

==========

INPUT

Space Structure Name = Nominal, SSO, 0.3 kg
Space Structure Type = Payload
Perigee Altitude = 585.000 (km)
Apogee Altitude = 585.000 (km)
Inclination = 97.500 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass Ratio = 0.0375 (m^2/kg)
Start Year = 2020.500 (yr)
Initial Mass = 0.300 (kg)
Final Mass = 0.300 (kg)
Duration = 2.600 (yr)
Station-Kept = False
Abandoned = True

OUTPUT

Collision Probability = 1.1382E-07
Returned Message: Normal Processing
Date Range Message: Normal Date Range
Status = Pass

==========

INPUT

Space Structure Name = Nominal, SSO, 0.6 kg
Space Structure Type = Payload
Perigee Altitude = 585.000 (km)
Apogee Altitude = 585.000 (km)
Inclination = 97.500 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass Ratio = 0.0187 (m^2/kg)
Start Year = 2020.500 (yr)
Initial Mass = 0.600 (kg)
Final Mass = 0.600 (kg)

```
      Duration = 4.100 (yr)
      Station-Kept = False
      Abandoned = True

**OUTPUT**

      Collision Probability = 1.6152E-07
      Returned Message: Normal Processing
      Date Range Message: Normal Date Range
      Status = Pass

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

=============== End of Requirement 4.5-1 ===============

02 21 2020; 04:34:41AM  Processing Requirement 4.6    Return Status :  Passed

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

**INPUT**

      Space Structure Name = Nominal, 45 deg, 0.3 kg
      Space Structure Type = Payload

      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 45.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Mean Anomaly = 0.000000 (deg)
      Area-To-Mass Ratio = 0.037500 (m^2/kg)
      Start Year = 2020.500000 (yr)
      Initial Mass = 0.300000 (kg)
      Final Mass = 0.300000 (kg)
      Duration = 2.700000 (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)

**OUTPUT**
```

```
      Suggested Perigee Altitude = 585.000000 (km)
      Suggested Apogee Altitude = 585.000000 (km)
      Returned Error Message = Reentry during mission (no PMD req.).

      Released Year = 2023 (yr)
      Requirement = 61
      Compliance Status = Pass

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

**INPUT**

      Space Structure Name = Nominal, 45 deg, 0.6 kg
      Space Structure Type = Payload

      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 45.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Mean Anomaly = 0.000000 (deg)
      Area-To-Mass Ratio = 0.018700 (m^2/kg)
      Start Year = 2020.500000 (yr)
      Initial Mass = 0.600000 (kg)
      Final Mass = 0.600000 (kg)
      Duration = 4.300000 (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)

**OUTPUT**

      Suggested Perigee Altitude = 585.000000 (km)
      Suggested Apogee Altitude = 585.000000 (km)
      Returned Error Message = Reentry during mission (no PMD req.).

      Released Year = 2024 (yr)
      Requirement = 61
      Compliance Status = Pass

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

**INPUT**
```

```
      Space Structure Name = Nominal, 10 deg, 0.3 kg
      Space Structure Type = Payload

      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 10.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Mean Anomaly = 0.000000 (deg)
      Area-To-Mass Ratio = 0.037500 (m^2/kg)
      Start Year = 2020.500000 (yr)
      Initial Mass = 0.300000 (kg)
      Final Mass = 0.300000 (kg)
      Duration = 2.600000 (yr)
      Station Kept = False
      Abandoned = True
      PMD Perigee Altitude = 354.612554 (km)
      PMD Apogee Altitude = 357.541528 (km)
      PMD Inclination = 9.992422 (deg)
      PMD RAAN = 166.611141 (deg)
      PMD Argument of Perigee = 76.816140 (deg)
      PMD Mean Anomaly = 0.000000 (deg)

**OUTPUT**

      Suggested Perigee Altitude = 354.612554 (km)
      Suggested Apogee Altitude = 357.541528 (km)
      Returned Error Message = Passes LEO reentry orbit criteria.

      Released Year = 2023 (yr)
      Requirement = 61
      Compliance Status = Pass

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

**INPUT**

      Space Structure Name = Nominal, 10 deg, 0.6 kg
      Space Structure Type = Payload

      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 10.000000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Mean Anomaly = 0.000000 (deg)
      Area-To-Mass Ratio = 0.018700 (m^2/kg)
```

```
      Start Year = 2020.500000 (yr)
      Initial Mass = 0.600000 (kg)
      Final Mass = 0.600000 (kg)
      Duration = 4.200000 (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)

**OUTPUT**

      Suggested Perigee Altitude = 585.000000 (km)
      Suggested Apogee Altitude = 585.000000 (km)
      Returned Error Message = Reentry during mission (no PMD req.).

      Released Year = 2024 (yr)
      Requirement = 61
      Compliance Status = Pass

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

**INPUT**

      Space Structure Name = Nominal, SSO, 0.3 kg
      Space Structure Type = Payload

      Perigee Altitude = 585.000000 (km)
      Apogee Altitude = 585.000000 (km)
      Inclination = 97.500000 (deg)
      RAAN = 0.000000 (deg)
      Argument of Perigee = 0.000000 (deg)
      Mean Anomaly = 0.000000 (deg)
      Area-To-Mass Ratio = 0.037500 (m^2/kg)
      Start Year = 2020.500000 (yr)
      Initial Mass = 0.300000 (kg)
      Final Mass = 0.300000 (kg)
      Duration = 2.600000 (yr)
      Station Kept = False
      Abandoned = True
      PMD Perigee Altitude = 290.168941 (km)
      PMD Apogee Altitude = 298.325417 (km)
      PMD Inclination = 97.522359 (deg)
      PMD RAAN = 206.056998 (deg)
      PMD Argument of Perigee = 108.587022 (deg)
```

PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Suggested Perigee Altitude = 290.168941 (km)
Suggested Apogee Altitude = 298.325417 (km)
Returned Error Message = Passes LEO reentry orbit criteria.

Released Year = 2023 (yr)
Requirement = 61
Compliance Status = Pass

==========

INPUT

Space Structure Name = Nominal, SSO, 0.6 kg
Space Structure Type = Payload

Perigee Altitude = 585.000000 (km)
Apogee Altitude = 585.000000 (km)
Inclination = 97.500000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Area-To-Mass Ratio = 0.018700 (m^2/kg)
Start Year = 2020.500000 (yr)
Initial Mass = 0.600000 (kg)
Final Mass = 0.600000 (kg)
Duration = 4.100000 (yr)
Station Kept = False
Abandoned = True
PMD Perigee Altitude = 232.096807 (km)
PMD Apogee Altitude = 239.898100 (km)
PMD Inclination = 97.572993 (deg)
PMD RAAN = 34.687172 (deg)
PMD Argument of Perigee = 104.492078 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Suggested Perigee Altitude = 232.096807 (km)
Suggested Apogee Altitude = 239.898100 (km)
Returned Error Message = Passes LEO reentry orbit criteria.

Released Year = 2024 (yr)
Requirement = 61
Compliance Status = Pass

```
==============

=============== End of Requirement 4.6 ===============
02 21 2020; 15:51:21PM  *********Processing Requirement 4.7-1
      Return Status :  Passed

***********INPUT****
 Item Number = 1

name = Nominal 45 deg 0.3 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = Solar Panels
quantity = 2
parent = 1
materialID = 24
type = Box
Aero Mass = 0.001000
Thermal Mass = 0.001000
Diameter/Width = 0.050000
Length = 0.079000
Height = 0.000300

name = Main Board PCB
quantity = 2
parent = 1
materialID = 23
type = Box
Aero Mass = 0.028000
Thermal Mass = 0.028000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.001600

name = Battery
quantity = 1
parent = 1
materialID = 5
type = Cylinder
```

```
Aero Mass = 0.049000
Thermal Mass = 0.049000
Diameter/Width = 0.039000
Length = 0.067000

name = Primary Structure
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.193000
Thermal Mass = 0.193000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

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

name = Nominal 45 deg 0.3 kg
Demise Altitude = 77.998642
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = Solar Panels
Demise Altitude = 77.975159
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = Main Board PCB
Demise Altitude = 77.019333
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = Battery
Demise Altitude = 73.442200
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = Primary Structure
Demise Altitude = 70.615593
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
```

```
************************************

***********INPUT****
 Item Number = 2

name = Nominal 45 deg 0.6 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = N
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 2

name = Nominal 45 deg 0.6 kg
Demise Altitude = 77.998398
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = N
Demise Altitude = 64.741219
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 3

name = Nominal 10 deg 0.3 kg
quantity = 1
```

```
parent = 0
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = N
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 3

name = Nominal 10 deg 0.3 kg
Demise Altitude = 77.992775
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = N
Demise Altitude = 66.474533
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 4

name = Nominal 10 deg 0.6 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
```

```
Height = 0.028000

name = N
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 4

name = Nominal 10 deg 0.6 kg
Demise Altitude = 77.993393
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = N
Demise Altitude = 63.973984
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 5

name = Nominal SSO 0.3 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = N
quantity = 1
parent = 1
materialID = 5
type = Box
```

```
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 5

name = Nominal SSO 0.3 kg
Demise Altitude = 77.991989
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = N
Demise Altitude = 68.855171
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 6

name = Nominal SSO 0.6 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = N
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
```

```
Item Number = 6

name = Nominal SSO 0.6 kg
Demise Altitude = 77.990906
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = N
Demise Altitude = 66.757225
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 7

name = De-Orbit 45 deg 0.3 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = D
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

*************OUTPUT****
Item Number = 7

name = De-Orbit 45 deg 0.3 kg
Demise Altitude = 77.998642
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
```

```
************************************
name = D
Demise Altitude = 67.138390
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 8

name = De-Orbit 45 deg 0.6 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = D
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 8

name = De-Orbit 45 deg 0.6 kg
Demise Altitude = 77.998398
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = D
Demise Altitude = 64.741219
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
```

```
***********INPUT****
 Item Number = 9

name = De-Orbit 10 deg 0.3 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = D
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 9

name = De-Orbit 10 deg 0.3 kg
Demise Altitude = 77.992775
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = D
Demise Altitude = 66.474533
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 10

name = De-Orbit 10 deg 0.6 kg
quantity = 1
parent = 0
```

```
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = D
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 10

name = De-Orbit 10 deg 0.6 kg
Demise Altitude = 77.993393
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = D
Demise Altitude = 63.973984
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 11

name = De-Orbit SSO 0.3 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000
```

```
name = D
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.300000
Thermal Mass = 0.300000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 11

name = De-Orbit SSO 0.3 kg
Demise Altitude = 77.991989
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = D
Demise Altitude = 68.855171
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

***********INPUT****
 Item Number = 12

name = De-Orbit SSO 0.6 kg
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

name = D
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.600000
```

```
Thermal Mass = 0.600000
Diameter/Width = 0.118000
Length = 0.118000
Height = 0.028000

**************OUTPUT****
Item Number = 12

name = De-Orbit SSO 0.6 kg
Demise Altitude = 77.990906
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************
name = D
Demise Altitude = 66.757225
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

************************************

=============== End of Requirement 4.7-1 ===============
02 21 2020; 15:51:21PM  Project Data Saved To File
```