Narrative Exhibit

Dove 1 is a technology demonstration mission. The satellite will be launched No Earlier Than (NET) December 2012 to Low Earth Orbit on the Antares (formerly Taurus II) launch vehicle. Dove 1 will be ejected from an ISIPOD 3U cubesat deployer into a planned circular orbit of 280 km at 55 degrees inclination. Due to the extremely low altitude of the orbit, the satellite is expected to decay and completely burn up in the Earth's atmosphere approximately 2 weeks after launch. See the Orbital Debris Assessment for further details.

Dove 1 frequency characteristics:
Primary Uplink: 2.4 GHz
Secondary Uplink: 402.4 MHz
Primary Downlink: 2.4 GHz
Secondary Downlink: 401.3 MHz

Dove 1 radio characteristics:
S-band (ISM) transceiver: MHX2420 (Microhard)
UHF transceiver: D3-400-RT (Cosmogia)

Dove 1 antenna characteristics:
S-band: 5 dBi peak-gain patch antenna, 90 degree Half Power Beamwidth, Nadir facing
UHF: 2 dBi non-directional monopole

Earth Station Description
Stanford Research Institute (SRI) Observation Site: Palo Alto, CA
Latitude/Longitude: 37.403084, -122.174096
Primary Antenna Combination: 18 meter parabolic dish with UHF and S-band feed
Secondary Antenna: boom-mounted UHF yagi (10 element, cross polarized)

Further Reentry Analysis

The Dove 1, 2, 3 and 4 Orbital Debris Assessment Reports include an analysis using NASA's DAS 2.0 software of the risk of casualties on the ground due to atmospheric reentry. While the risk of casualties was always found to be compliant with NASA-STD-8719.14, DAS did suggest a small probability that our optical tube assembly (OTA) would reach the ground. We therefore chose to perform higher fidelity analysis to better quantify this risk. Very few analysis tools exist to model the physics of reentry, so we chose to work with the NASA Debris Program Office who maintains The Object Reentry Survival Analysis Tool (ORSAT). From the ORSAT website:

"The ORSAT code uses integrated trajectory, atmospheric, aerodynamic, aerothermodynamic, and thermal/ablation models to perform a complete satellite or launch vehicle upper stage component analysis in determining the impact risk" More details on ORSAT's methodology and capabilities can be found online (http://www.orbitaldebris.jsc.nasa.gov/reentry/orsat.html).

Typically this tool is only used after DAS has deemed re-entry risks as non-compliant, however we requested that ORSAT be used for our Invar OTA. The dimensions and a drawing of the tube assembly were provided to Nicholas Johnson of the debris office and he confirmed, via email:

From: Johnson, Nicholas L. (JSC-KX111) <nicholas.l.johnson@nasa.gov> Date: Tue, Jul 10, 2012 at 8:32 AM
Subject: RE: ORSAT/SCARAB
To: James Mason <james@cosmogia.com>

Mr. Mason,

We have assessed the survivability of both the Invar tube and its end plate. We determine with high confidence that both elements will in fact demise, i.e., not reach the surface of the Earth following reentry.

Let me know if we can be of any further assistance. Best regards,

Nicholas L. Johnson NASA

Upon asking for further details of the analysis results, Mr. Johnson instructed us to refer any questions to him and the NASA Debris Program Office.

Nicholas L. Johnson
Chief Scientist, Orbital Debris
Email: nicholas.l.johnson@nasa.gov , Fax: 281-483-5276