QB50 US03 Discovery Mission Overview

Rev. B, 11 March 2016
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Document History

Rev.	Date	Pages	Author	Description
A	27 February 2016	All	Stephen West	Document Created
B	11 March 2016	All	Nicolas Lee	Formatting, footer

QB50 Overview

The QB50 project is an European Comission FP7 support program seeking to study the thermosphere with a network of small satellites built by teams from across the world. The 40 satellites each carry one of three common payloads (Ion-Neutral Mass Spectrometer, multi-Needle Langmuir Probe, or Flux-ϕ-Probe Experiment). The data returned from the network will provide multi-point, in-situ measurements of the lower thermosphere. Knowledge gained from this project will complement ground-based measurements and in-situ measurements from sounding rockets to improve the quality of atmospheric models. The von Karman Institute (Sint-Genesisus-Rode, Belgium) leads the project and Stanford University (Palo Alto, California, USA) is contributing one of the four US-built satellites.

Discovery Overview

Discovery is a 2U CubeSat, designed, developed, and operated by the Space and Systems Development Laboratory at Stanford University. Discovery carries the Ion-Neutral Mass Spectrometer (INMS), developed by Mullard Space Science Laboratory at University College London, as its primary payload. An experimental sun sensor, developed by Stanford's Extreme Environment Microsystems Laboratory, is carried as a secondary payload and technology demonstration. Deployed by NanoRacks from the International Space Station (ISS), Discovery will orbit in LEO until atmospheric reentry. The nominal mission duration is six months, but actual mission duration is dependent upon rate of orbit decay. Discovery's nominal initial orbit upon release from ISS will have an apogee of 407 km, perigee of 401 km, and inclination of 51.6 degrees.

Discovery Communications

Discovery relies on a UHF radio link to transmit science data and spacecraft telemetry to the ground and to receive telecommands from the ground station. A single transceiver operates aboard the spacecraft and a ground station is operated on the Stanford University campus. Data rate for command uplink and telemetry/science data downlink is 9600 baud in the ~70 cm band. Maximum transmit power from the spacecraft is 4 Watts (may be limited by available power on the spacecraft).