TROOP-F2 Technical Description

The goal of the TROOP-F2 mission is testing radios and sensors.

TROOP-F2 will be deployed from SpaceX Transporter 11, NET July 1, 2024, into a circular sun synch orbit at 510 km altitude, 97.4 degrees inclination. Transmission from the TROOP-F2 will begin 30 minutes after it is deployed. TROOP-F2 will remain active for 2 years. Atmospheric friction will de orbit the TROOP-F2, within 11 years after launch.

TROOP-F2 is a 4.8 kg 6U cubesat, see Figures 1 and 2.

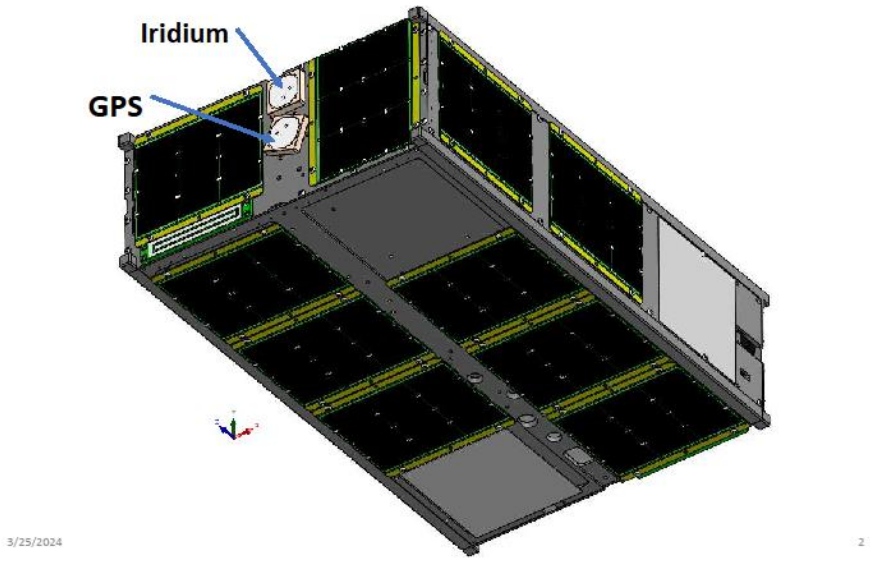

Figure 1 TROOP-F2 Overview Showing Antenna Locations

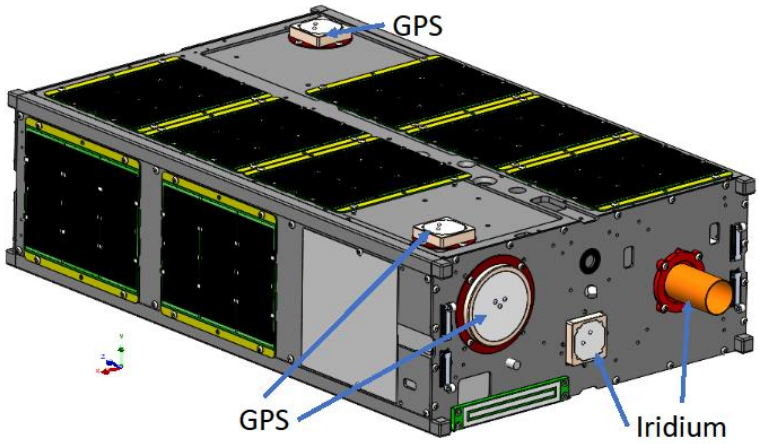

Figure 2 TROOP-F2 Overview Showing Antenna Locations

TROOP-F2 contains the following systems:

Navigation and Attitude Subsystem: Attitude determination is made using a GridEye infrared horizon sensor. A GPS receiver is also included. From the GPS inputs, the CDH determines position and velocity, and orbit parameters are derived. Transmitted to Earth, these will provide accurate orbital TLEs, which will support accurate ground station antenna pointing, as well as updating of the SpaceTrack database to allow CSPOC to catalog and maintain the location of the spacecraft.

Command and Data Handling (CDH) Subsystem: The CDH function shares hardware with the EPS function. The hardware includes dual processors with onboard diagnostics supporting both the EPS and CDH functions. Commands from NSL mission operations, transmitted by the NSL ground station, are received through the receiver module.

Communications System: Two EyeStar S4 transceiver modules manufactured by NSL, each using a patch antenna, and communicating with the Iridium constellation on the established Iridium channels. Two are provided, only one is used at any given time. A GridEye Horizon Sensor on the patch antenna, allows transmitting only when the antenna is pointing away from the earth.

In conformance with § 5.107 Transmitter control requirements, all transmission from the satellite can be terminated by a command transmitted via the Iridium constellation from mission operations to the satellite.

Electrical Power Subsystem (EPS): The EPS is a direct energy transfer system using 2 1U NSL solar arrays, producing approximately 1.6 W of orbit average power to charge the 5.6A-hr battery system. The total energy storage capacity is 41.44 W-hrs. The solar arrays utilize standard Alta Devices flexible photovoltaic cells; the batteries are COTS Tenergy 925050 Li-Polymer cells. The

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Advanced EPS board controls the charging through four MPPT modules and load switching of the system.

Thermal Monitoring Subsystem (TMS): The TMS consists of (4) thermocouples located throughout the electronics boards and on each solar array. There are no active heating mechanisms. The thermocouples are wired to the Advanced EPS board, which hosts algorithms to monitor and record the temperatures, and the EPS can shut down modules based on temperature.

Structure Subsystem: The structure is fabricated of 6061 Aluminum alloy. Solar panels extend upon deployment of the cubesat.

Payload Subsystem: 5 aluminum cylinders, approximately 2 cm diameter x 20 cm length, containing cremains, which will remain on the spacecraft and demise upon reentry with the rest of the spacecraft.

Propulsion Subsystem: No propulsion subsystem is included.