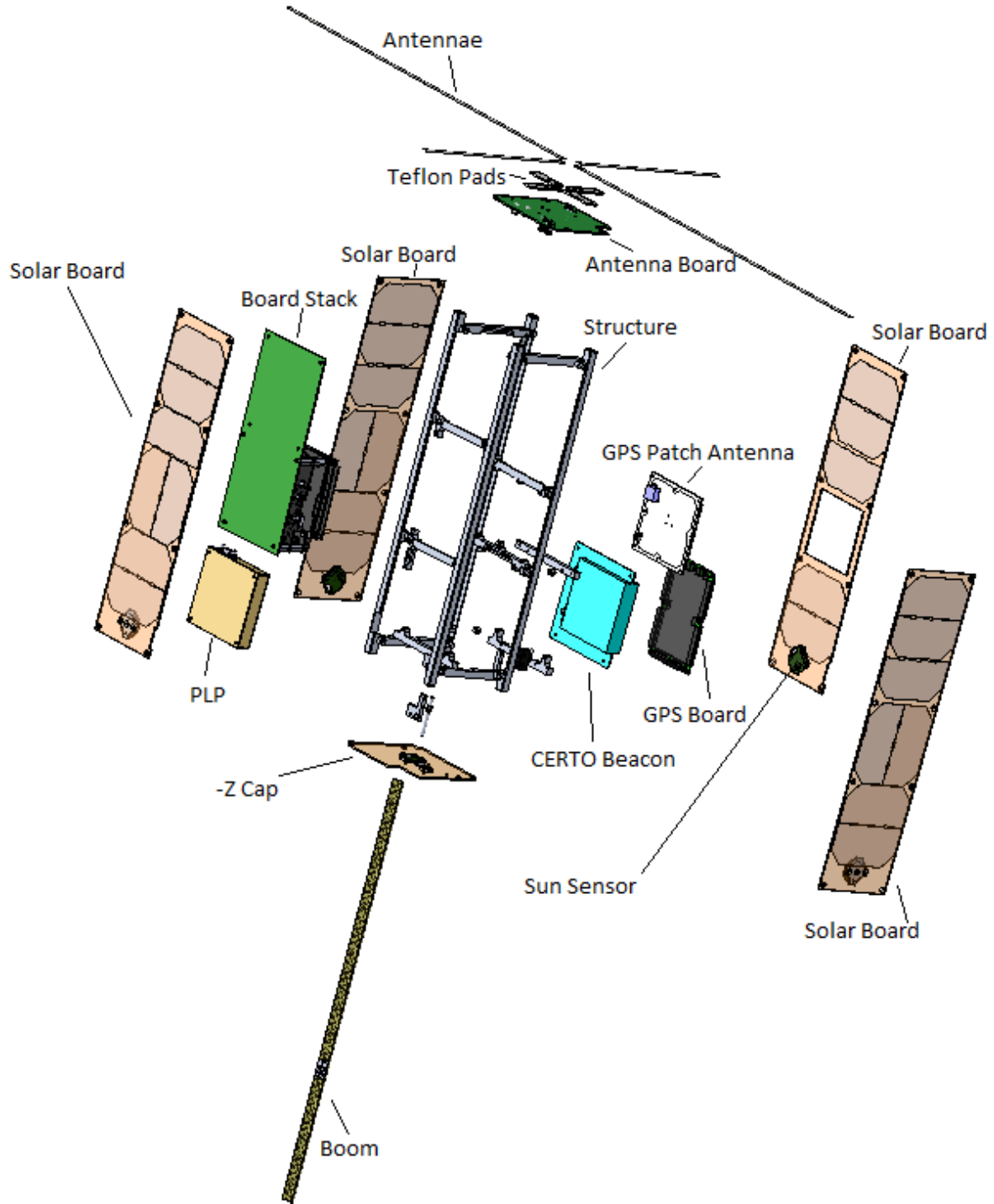


ELaNa-22 ODAR

OSIRIS-3U – The Pennsylvania State University Student Space Programs Laboratory – 3U



OSIRIS-3U will provide *in situ* and remote sensing measurements of the spatial characteristics of the stimulated ionosphere. These measurements will be correlated with ground-based measurements to better understand variable space weather. Measurements will be taken using two scientific instruments. Scientific instruments include a Pulsed Langmuir Probe (PLP) and the Compact Total Electron Content Sensor (CTECS). The Pennsylvania State Student Space Programs Laboratory will be coordinating with Arecibo Observatory in Puerto Rico. At predefined times the Arecibo Observatory will activate their atmospheric heaters. The OSIRIS-3U satellite will pass through the heated region and take measurements using devices described above.

Upon deployment from the P-POD, OSIRIS-3U will begin charging its batteries and a timer will begin. After 45 minutes, the antennas and boom will be deployed and the GPS receiver will be activated. The satellite will begin beaconing once 3 GPS points have been collected and the battery has sufficient charge. After contact with ground has been made the satellite will continue to beacon less frequently, and will enter an idle state. At predetermined times the satellite will pass through a synthetically heated region of the ionosphere and take measurements with the suite of instruments described above. Scientific data will be collected and periodically downlinked to the State College, Pennsylvania earth station. The mission will last approximately one year.

The satellite frame will be 3D printed in AlSi10Mg or constructed from 6061 aluminum. The power and communications subsystem are built upon COTS modules. The communications subsystem makes use of the Astronautical Development Lithium-1 radio, and the power subsystem uses the Clyde Space Third Generation EPS and the 10Whr Lithium Polymer battery. The boom required for the PLP is built from LoadPath P/N 1106-03TS-0050-180-041-005 polymer. Solar cells will be secured to the cover glass using Dow Corning 93-500 epoxy. The solar cells to be used are SolAero Technologies' ZTJ space solar cell. In order to have large enough conducting body for the PLP's measurements the cover glass for the solar panels will be coated with a thin layer of indium tin oxide (ITO). All bolts will use Loctite 242 or 247 to ensure thread all threads remain locked. Both the communications and science antennas will be constructed from steel measuring tape. Teflon will be used on the antenna mount to provide isolation from the body of the craft. All electrical components are standard and commercially available.

There are no pressure vessels or hazardous materials on the satellite. The solar panel cover glass will be coated with ITO. A boom constructed from LoadPath P/N 1106-03TS-0050-180-041-005 polymer will be used. The communications and science antennas will be constructed from steel measuring tape.

The electrical power storage system consists of the Clyde Space Third Generation 10Whr Lithium Polymer battery. The battery has over-charge, over-current, over-voltage, and under-voltage protection circuitry. The battery is qualified to NASA standards EP-Wi-032