

DoD SPACE TEST PROGRAM (STP)

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STP Mission

The Space Test Program was chartered by the Office of the Secretary of Defense in 1965 to provide access to space for the DoD-wide space R&D community. The Air Force was directed to serve as the Executive Agent for the program to reduce duplication and achieve efficiencies of scale. To carry out this mission, STP matches a ranked list of sanctioned experiments with available budgets and searches for the most cost effective mechanisms to get the experiments to space. STP has successfully flown over 350 experiments in its long history, using dedicated freeflyer spacecraft, secondary space on the Space Shuttle, and various host satellites. Typical missions (other than those on the Shuttle) provide one year of on-orbit experiment data to the sponsor.

Organization

The Space Test Program belongs to Space and Missile Systems Center's (SMC) Space and Missile Test and Evaluation Directorate (SMC/TE). Early in 1995, SMC/TE was relocated to Kirtland AFB, in Albuquerque NM, from Los Angeles AFB, CA. Consolidation of some of SMC/TE's elements is continuing at Kirtland AFB as of this writing. The Space Test Program Office (SMC/TEL) is managed by Col Peter Young, who oversees the efforts of the following divisions: Mission Design and Management (TELO), Shuttle Payloads (TELH, co-located with NASA at the Johnson Space Center, Houston), the Tri-Service Spacecraft Division (TELS), and the Spacecraft Development Division (TELM, the remainder of the former SMC/CU contingent in Los Angeles). Launch Services, Program Control and Contracting activities are provided through matrixed support.

Space Experiments Review Board (SERB) Process

Each year, the experiment submission process begins with individual research agencies (typically service laboratories or research institutions) ranking their space experiments for submission to the respective services. The services then submit their rankings to the DoD SERB for consolidation, which usually occurs in May of each year. The DoD SERB ranks the experiments based on their assessment of the experiments' military relevance, along with other factors, such as experiment quality, maturity, and internal service priority. STP is then tasked to fly the optimum number of highly ranked experiments the budget will allow.

Spaceflight Opportunities

Once an experiment makes the priority list there are three general ways which it can gain spaceflight. Mission design and planning effort is initiated to study the most cost effective means for spaceflight, attempting to match up flight opportunities with specific experiments. For experiments with unique orbital requirements that can best be met by free-flying spacecraft, STP contracts for spacecraft development, experiment integration, and launch service. STP also flies experiments as secondary payloads (piggybacks) on spacecraft of various agencies, including NASA and DoD, and various countries, including Russian and French. The third way in which STP gains spaceflight for SERB ranked experiments is through a collaboration with NASA to fly experiments on the Space Shuttle. Some experiments can be located in the payload bay and either retained within the bay or ejected for orbital flight. Other experiments are flown in the mid-deck area of the Space Shuttle crew cabin.

Since the beginning of the program in 1965, 30 piggyback missions have been flown, 27 free-flyer satellites have been launched, and 53 Shuttle flights have carried STP experiments. The total number of individual experiments flown to date is 373. Launch vehicles used so far have included the Space Shuttle, Scout, Ariane,

Delta, Pegasus, Proton, and Taurus. Host vehicles carrying STP experiments have included DSCS, SPOT, the STEP series, and RESURS. Eleven missions have suffered launch failures.

Some examples of how STP spacecraft have played a significant role in the development of military space systems are:

- Spacecraft Charging at High Altitudes (SCATHA) - Measured the charge on spacecraft surfaces and the conditions of the plasma surrounding the spacecraft.
- Combined Release and Radiation Effects Satellite (CRRES) - Collected data on charged particles, electric and magnetic fields, and waves in the near-earth environment.
- STACKSAT - Collected data on communications transceiver and solid-state recorder devices.

Often, technology proven through STP experiments evolves into a new realm of capabilities. The knowledge gained from STP experiments on radiation belts, satellite charging, and rubidium atomic clocks contributed to the creation of the Global Positioning System (GPS), which provides precise navigation information to a variety of military and civilian users.

Operational Missions

Operating Freeflyers

- APEX - Provides spaceflight for three experiments: Photovoltaic Array Space Power Plus Diagnostics (PASP-Plus); Cosmic Ray Upset Experiment (CRUX); Thin Film Ferroelectric Experiment (FERRO).
- RADCAL - Provides a radar calibration target for approximately 70 C-band sites around the world
- STEP Mission 0 - Provides spaceflight for the Technology for Autonomous Operational Survivability (TAOS) experiment.
- STEP Mission 2 - Provides spaceflight for the Signal Identification Experiment (SIDEX) which evaluates multi-integrated small signal detection methods.

Operating Piggybacks

- POAM II - The Polar Ozone and Aerosol Monitor is returning data on the ozone hole in unprecedented detail.
- MAHRSI - Middle Atmosphere High Resolution Spectrograph Investigation measures the concentration of the hydroxyl radical and the nitric oxide in the middle atmosphere and lower thermosphere.
- SWIM - Solar Wind Interplanetary Measurements will be used to develop ways to predict space weather conditions.
- CCGEO - Satellite Charge Control Experiment at Geosynchronous Orbit demonstrates the ability to detect the build-up of charges on spacecraft and then discharge the satellite.

Recent Shuttle Experiments

- RME-III - Radiation Monitoring Equipment III gathered data on the ionizing radiation environment in the Space Shuttle as a function of geographic location, altitude, spacecraft shielding, and spacecraft orientation. Will result in improved risk assessment models for crew and equipment radiation exposures in low earth orbit.
- CREAM - Cosmic Radiation Effects and Activation Monitor measured radiation effects in the crew compartment as a function of time, orbital location and shielding. Data will improve space environment and radiation shielding models used to predict single event upset rates in electronics and background rates in sensors.
- HERCULES/MSI - Provided test and evaluation of a multispectral imager/geolocator system. The geolocator will determine surface location of each image taken by the multispectral imager within 2.5 nautical miles.

- STL - Space Tissue Loss experiment studied the micro-gravity induced tissue loss phenomena of exposed tissue cultures. Results will improve pharmacological agents to extend human activity in the space environment.
- MIS - Microcapsules Production in Space produced space-made microcapsules for performance comparison with similar earth-made microcapsules for improved drug efficacy and decreased drug toxicity.

Planned Missions

Planned Freeflyers

- FORTE - The Fast On-Orbit Recording of Transient Events satellite will address a gap in the space-borne nuclear detonation detection system.
- REX II - The Radiation Experiment II will do further research to overcome and understand the physics of the electron density irregularities that cause disruptive scintillation effects on radio signals.
- ARGOS - The Advanced Research & Global Observation Satellite will house eight high priority space experiments (including 31 sub-experiments) and will flight-qualify key components for operational programs.
- STEP Mission 4 - The Space Test and Experimentation Platform #4 will provide spaceflight for three experiments: Orbiting Ozone and Aerosol Measurement (OOAM); Electro-Magnetic Propagation Experiment (EMPE); and Digital Ion Driftmeter (DIDM).
- TSX-5 - The Tri-Service eXperiments satellite #5 will provide spaceflight for two experiments: The Compact Environmental Anomaly Sensor (CEASE) and the US/UK Space Test Research Vehicle-2 (STRV-2).

Planned Piggybacks

- BINRAD - The Beryllium-7 Induced Radiation Experiment will provide basic knowledge of the low Earth orbit environment explaining unexpected high levels of Beryllium-7.
- POGS II - The Polar Orbiting Geomagnetic Survey II will collect data to update the geomagnetic maps of the Earth.
- POAM III - The third Polar Ozone and Aerosol Monitor will collect upper atmosphere ozone concentration data at lower latitudes as well as at polar regions.

For more information about the Space Test Program, please contact Col Peter Young or Lt Col Joseph Marino at (505) 846-8812, FAX (505) 846-8814. Or write to: SMC/TEL

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