

Acronym: DRAGONSat

Payload Title: Dual RF Astrodynamic GPS Orbital Navigator Satellite

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Sponsoring Agency: National Aeronautics and Space Administration (NASA)

Increment(s) Assigned: 18

Mission: STS-127/2J/A

Brief Research Summary (PAO): Dual RF Astrodynamic GPS Orbital Navigator Satellite (DRAGONSat) will demonstrate autonomous rendezvous and docking (ARD) in low Earth orbit (LEO) and gather flight data with a global positioning system (GPS) receiver strictly designed for space applications. ARD is the capability of two independent spacecraft to rendezvous in orbit and dock without crew intervention. DRAGONSat consists of two picosatellites (one built by the University of Texas and one built by Texas A and M University) and the Space Shuttle Payload Launcher (SSPL); this project will ultimately demonstrate ARD in LEO.

Research Summary:

- Dual RF Astrodynamic GPS Orbital Navigator Satellite (DRAGONSat) is a low cost, low risk project designed to prove that autonomous rendezvous and docking (ARD) can be performed successfully in space.
- It will also provide invaluable flight data for the global positioning system (GPS) receiver designed strictly for space applications to demonstrate precision relative navigation and precision real-time navigation as well as provide orbit determination.

Detailed Research Description: To successfully travel beyond low Earth orbit (LEO), to the moon, Mars and beyond the ability for two spacecraft to autonomously rendezvous and dock

(ARD) in space must be demonstrated. Dual RF Astrodynamic GPS Orbital Navigator Satellite (DRAGONSat) is a collaboration project with two universities (University of Texas at Austin and Texas A and M University) to each build a satellite that will ultimately rendezvous and dock with each other in space without the benefit of human intervention.

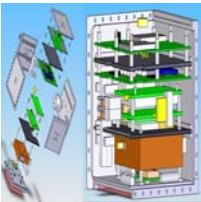
DRAGONSat is an anticipated eight-year program with a launch of the satellites approximately every two years. The first three missions will test individual components and subsystems while the final mission will culminate with the successful docking of two satellites. Each mission builds upon the previous mission culminating in a fully autonomous rendezvous and docking mission. In addition, the universities are required to use a global positioning system (GPS) receiver designed by National Aeronautics and Space Administration (NASA) in order to gather flight data in the space environment to determine its functionality. The objective is to demonstrate precision real-time navigation capability as well as precision relative navigation between the two satellites.

Project Type: Payload

Images and Captions:



Computer-generated depiction of the University of Texas Satellite: PARADIGM Structural Layout. Image provided courtesy of NASA.



Computer-generated depiction of the Texas A&M University Satellite: AggieSat2 Structural Layout. Image provided courtesy of NASA.

Operations Location: Sortie

Brief Research Operations: The two DRAGONSat satellites are located in the SSPL on the side wall of the orbiter payload bay. They will be ejected from the SSPL by a crewmember through a switch activation. Once a safe distance from the Space Shuttle, the two picosatellites will separate.

Operational Requirements: DRAGONSat is comprised of two 5 inches x 5 inches x 5 inches satellites which are launched from the orbiter payload bay. A picosatellite is defined as being 5 inches x 5 inches x 10 inches, so each of these satellites is actually one half of a picosatellite. Both satellites are composed of aluminum with a mass of approximately 7.5 kg. The surface of each picosatellite is covered with photo voltaic cells which will enable a longer active life in orbit. Each satellite also has a dipole antenna and two antennas for the GPS receiver. The satellites are ejected from the SSPL which is located on the payload bay sidewall.

Operational Protocols: The two satellites comprising DRAGONSat are launched together in the Space Shuttle Payload Launcher (SSPL) which is attached to the side wall of the orbiter payload bay. They are adjacent in the SSPL but when ejected, and once they are at a safe distance from the Space Shuttle, they will separate and begin the experiment. The data subsequently collected will be downlinked to ground stations for as long as the satellites are able to transmit.

Review Cycle Status: DoD reviewed

Category: Technology Development for Exploration

Sub-Category: Picosatellites and Control Technologies

Space Applications: This project will demonstrate ARD in space and provide NASA with actual flight data that is directly linked to the Exploration Systems Architecture Study Technology Focus Area under Avionics and Software. ARD will be utilized in the Constellation Program for unmanned cargo vehicles and in space assembly. Data from DRAGONSat will have a direct impact on the development of that capability.

Earth Applications: Student education is enhanced by engaging in a real world scenario including requirements, geographical distance, system engineering, project management, and dealing with diverse cultures. This project will also develop critical skills that will be invaluable to NASA in the future as the aerospace workforce continues to mature and retire. This project also gives NASA insight into the best and brightest students.

Supporting Organization: Department of Defense (DOD)

Previous ISS Missions: None

Web Sites:

Related Payloads: STP-H2-MEPSI, STP-H2-RAFT, PSSC