NRL launches nano-satellite experimental platforms

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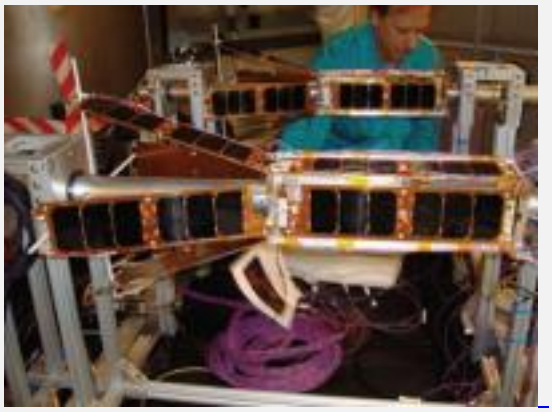
Launched from Cape Canaveral Air Force Station, December 8, 2010, as secondary payloads on a Space Exploration (SpaceX) Technologies, Inc., Falcon 9 launch vehicle, two NRL Naval Center for Space Technology designed and built nano-satellites have been deployed to evaluate nano-satellites as a platform for experimentation and technology development.

Known as the CubeSat Experiment (QbX), the two 3U (30x10x10 cm) CubeSat buses were built by Pumpkin, Inc., San Francisco, Calif., and provided to the NRL by the National Reconnaissance Office's (NRO's) Colony Program Office.

This is the first flight of the Pumpkin-built Colony I spacecraft bus and is being used to evaluate the performance of the vehicle as a platform for experimentation.

Engineers from the NRL Spacecraft Engineering Department are in the checkout phase of the 3U CubeSats, the NRL developed tracking, telemetry and command (TTC) radio is fully functional, providing reliable two-way data transfers and the flight software, ported from previous and ongoing NRL programs to the Pumpkin Colony I processor, is providing an onboard scheduler for routine vehicle control and operation.

"Currently, the spacecraft are healthy and experimentation and checkout are continuing," said Dr. Stephen Arnold, electronics engineer, NRL Spacecraft Engineering Department. "Deployments, including arrays and antennas, were successful and verified shortly after launch."



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Spacecraft attitude is controlled by, and operates in, a novel "Space Dart" mode. Due to the low orbit (300km) atmospheric drag provides a stabilization torque that, used with reaction wheels and torque coils, provides stable pointing to within five degrees of Nadir throughout the orbit. The system has been verified on both vehicles and is providing a stable platform for continued experimentation.

"It is expected that the QbX vehicles will remain in orbit for approximately 30 days," said Arnold. "After which, they will succumb to the effects of atmospheric drag and be destroyed during re-entry to Earth's atmosphere."

The primary payload launched aboard the SpaceX Falcon 9 was the Dragon Module. Developed by SpaceX and sponsored by NASA's Commercial Orbital Transportation Services (COTS) program, the Dragon Module is an initiative to develop private spacecraft to ferry cargo to and from the International Space Station.

Flight software, antennas, and the TTC radio were built and integrated by the NRL, as was the developmental communications payload. Environmental testing of the completed package was also performed at NRL. Ground stations on the east and west coasts provide coverage for command loads and data collection.

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