

SpinSat FCC Experimental License Application Attachment 1 -

SpinSat Educational, Experimental Amateur Operations

License Application Number: # 0011-EX-ST-2014

Educational Objective: The Naval Research Laboratory has a long history of outreach to local educational institutions. We have shared our satellite programs in the past with area schools and the amateur radio community. The outreach started with the ANDE satellites in 2006. Amateur radio operators tracked the satellites in support of the atmospheric drag study. The second set of satellites, Castor and Pollux involved high school students in the development of the satellites, Pollux in particular. For the Pollux satellite, students from three high schools developed small payloads to be flown in the satellite. The payloads tested MEMS sensors in space. In addition, four high school girls developed the flight software for the satellite. The satellites operated successfully in 2009. To continue the educational outreach effort, the SpinSat satellite will be used to teach students about ground station operations. Students will develop the ground station software, acquire amateur radio licenses and operate the satellite.

Ivan Galysh designed the electronics for the satellite and holds an amateur radio license, KD4HBO. He is a volunteer with the educational non-profit organization Federation of Galaxy Explorers, www.foge.org. He is the Director of Aerospace Programs at the Federation of Galaxy Explorers. Ivan runs an after school aerospace club at Chantilly High School working with the engineering teacher, Martin Rothwell. Together they develop educational programs and projects. When a satellite opportunity becomes available, they develop a project and select students to work on the satellite project.

The Naval Center for Space Technologies at the Naval Research Laboratory installed a satellite ground station at Chantilly High School to allow students to get hands-on learning of satellite operations and communications.

With the Federation of Galaxy Explorers, an effort has started in developing lesson materials to teach students from grades 5 through 12 radio communications with an emphasis on satellite communications.

Schools:

Chantilly High School
4201 Stringfellow Road
Chantilly, VA 20151
Teacher: Martin Rothwell
Martin.rothwell@fcps.edu

US Naval Academy
121 Blake Road
Annapolis, MD 21402
Robert Bruninga
Wb4apr@amsat.org

Chantilly High School Class: grades 10 through 12

2014 Students: To be determined

2013 Students:

Austin Carey, KK4NDC

Harry McClellan, KK4NDD

Operational Details:

Summary: SpinSat will launch on a SpaceX-4 vehicle as part of the NASA payload allocation. The launch date has slipped from 2013 to June 8, 2014. After it has arrived at the International Space Station (ISS), it will be transferred through the Japanese airlock and deployed by the NASA designed and build Cyclops release mechanism. When it has met the ISS requirements for a safe separation margin from the ISS, the high school will be notified to initiate operations. In addition to the high school students commanding the satellite, the UHF amateur frequency and orbital coordinates will be available to the worldwide amateur community for amateurs to receive the satellites transmitted signals.

Activation: Once released from the ISS, and clear of the possibility of recontact with the ISS, the students will send the activation command to SpinSat. They will receive acknowledgment and telemetry.

Operations: The satellite operates off of primary batteries. It is estimated with the needed operations, the satellite will be active for up to 6 months. The satellite has a new technology thruster payload that will be tested. Under supervision, the students will command the satellite to fire the thrusters and collect sensor data to determine the performance of the thrusters. Students will analyze the sensor data and calculate thruster performance.

For the worldwide amateur radio community, the satellite will send a short burst telemetry once a minute. The amateur community will collect the telemetry and forward the data and also track the orbit and predict the time of reentry. This was done before with Castor and Pollux.

Disposal: As the satellite lowers its orbit, the students, teacher and advisers will work together to estimate the date of entry and will track the possible reentry time. This can be enhanced in accuracy by coordinating the worldwide amateur community.

SpinSat:

Dimensions: Sphere 22 inches in diameter

Weight: 55 Kg

Transmission Frequency: 437.23 MHz

Technology Committee:

Ivan Galysh, Director of Aerospace Programs. KD4HBO

Martin Rothwell, Engineering Systems Instructor, KJ4WKF

Linda McNeil, Executive Director, Federation of Galaxy Explorers

License Fee: \$60