SAREX Working Group (Amateur Radio on the International Space Station)

Document 24

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Report: ARISS Activity for July 2003 to December 2003

Highlights for This Past 6 Months

- In December ARISS saw both the Phase 1 and Phase 2 hardware go operational after the team did end-to-end testing in Russia of the systems.

- A first for ARISS is to finally use antennas on the outside of a spacecraft! On December 20, NASA approved the use of the Kenwood radio with our antennas on the outside of the *ISS Service Module*. A short time later, Mike Foale was on the air on voice.

On the Air -- PR, Education, and Enthusiasm for Amateur Radio

A new crew came aboard the International Space Station (ISS) in October as part of ISS Expedition 8 -- ISS Commander Michael Foale, KB5UAC, and ISS Flight Engineer Alexander Kaleri, U8MIR. They are experienced hams, so the ARISS team had high hopes for busy ARISS activity. This crew -- and the previous crew for July through October -- have made us happy by doing more general voice QSOs plus school QSOs. Also, APRS has been used, and packet is back on.

School QSO schedules are averaging one per week. NASA Hq requires evaluation forms from our schools. NASA was very pleased that tallies of evaluations for 2003 showed that 13,586 students participated in ARISS-related science activities with 890 teachers. Another 650 students listened to QSOs from other schools. Frank Bauer and Rosalie prepare weekly reports at NASA Hq's request as part of the defense of NASA funds for our program. NASA Hq likes our program, calling it "a plum" for education.

Every ARISS QSO generates media hits and goodwill for ham radio and ARRL. In November, Rosalie wrote a *QST* article commemorating the 20th anniversary of Amateur Radio in space and the 15th anniversary of ham radio on *Mir*. The ARISS Team is grateful to Rick Lindquist for his many stories posted to the ARRL Web and his news items in *QST*'s "Happenings."

This fall we were very saddened to hear of the passing of Roy Neal, K6DUE. Roy dedicated years of his life to Amateur Radio in space, managing to get it back on the space shuttles after the 1986 *Challenger* accident. He was an inspiration to ARISS team members for years, in many critical moments when we were about to give up. He was a great moderator when tension was high among the international teams. At Thanksgiving, the ARISS team began the Roy Neal

Commemorative Event. Hams who communicated with the ISS through the end of 2003, qualified to receive a special certificate designed and printed by NASA. ARISS volunteers will handle shipping, using hams' self-addressed stamped envelopes. Hams in Australia, Europe and the US reported QSOs. F&ES has a tall stack of envelopes waiting for certificates to be printed.

New Hardware -- Phase 1 and Phase 2 Hardware Operational

With space shuttles not flying, plus the switch to smaller crews, ARISS was concerned about progress with hardware during 2003. We shouldn't have worried. Both the Phase 1 and Phase 2 hardware are now operational! (Phase 1 is the Ericsson 2-m and 70-cm radios. Phase 2 is the Kenwood D700 system and ARISS antennas, and the SSTV systems.) The packet system was activated -- but on simplex. We requested the crew change frequencies to 145.80 down and 145.99 up; this was done on January 10.

Just before Thanksgiving, the USA team went to Russia to support meetings and tests at Energia (Russia's spacecraft manufacturer). The team included Frank Bauer, KA3HDO; Mark Steiner, K3MS; Carolynn Conley, KD5JSO (all 3 traveled at NASA expense); Lou McFadin, W5DID (at ARRL expense); Dave Taylor, W8AAS (at AMSAT expense); and Miles Mann, WF1F, (paid his own way). We heartily thanked NASA for covering the majority of the hotel costs for our team.

A series of end-to-end tests of the Phase 1 and Phase 2 hardware were done in the Energia high-bay building that houses all their flight equipment including a "flight-equivalent" mock-up of a full-size ISS *Service Module*. Our "flight equivalent" antennas were actually installed on the outside of the flight-equivalent *Service Module*. Then the antennas were tested with our radios and feedlines inside the *Service Module*. Successful completion of the tests was a Russian requirement to clear the radio systems for use in space. The team signed agreements with Energia that documented good test results. ARISS rep Sergej Samburov, RV3DR, led the testing, and extended his congratulations to our diverse team living around the world who developed and provided the systems -- quite a challenge to make happen.

In early December the ISS crew set up the Phase 2 radios within the ISS. On December 20, NASA approved the use of the Kenwood radio with our outside antennas, and a short time later, Mike Foale was on the air doing voice QSOs! We will soon perform air-to-ground tests before doing school QSOs. Those tests have to be done by Russia, and the ISS is above Moscow when the crew is asleep and can't get instructions. The US ARISS team was tasked with developing a plan and methods for this.

We hope to launch the Yaesu radio into space in 2004. In November, the ARISS team was required to take part in an ISS Safety Review Panel on non-ionizing radiation in regard to transmitter power. NASA was concerned that once the Yaesu was in space, it could put out 100 watts, making space walks dangerous. NASA "yellow-tagged" all of our radios until the ARISS team proved there was no reason for concern. Our ops rules do not allow radios to be operational during space walks.

Summary

ARISS has affected a great many achievements in the three years since ham radio has been on the ISS. What is accomplished by ARISS is done in an international setting -- it is a difficult task to pull it all together. We depend on hundreds of volunteers worldwide. Some of those team members are from the space agencies from around the globe; these people give us vital support, enabling ARISS to thrive. One tiny example of this is that one of the team has begun to help yet another astronaut (for Expedition 11) to get licensed. Volunteers prepare schools and the telebridge ground stations. Volunteers relay information to the space agencies. One of our volunteers made us proud -- when ARISS Canadian rep Daniel Lamoureux, was recently elected president of RAC.

The ARISS team has been told by the many space agencies involved in the ISS that ARISS is a tremendous educational outreach program. We heartily thank all of our volunteers for their support over the years.