



Doc #19

Amateur Radio on the International Space Station

Committee Report

to the

ARRL Board of Directors

July 19-20, 2019

by

The ARRL ARISS Committee

Executive Summary

Amateur Radio on the International Space Station (ARISS) project is a well-known international partnership that promotes education, STEM and amateur radio around the world. The ARRL part of the project has been successful to include leadership, advice to ARISS leaders on items related to FCC regulations, and Public Relations support for the project and many school contact events. The ARRL ARISS Committee has been tasked with improving the ARRL part of the project.

Since 1983, international amateur radio organizations have worked with the space agencies to fly amateur radio and to support Educational Outreach on Space Shuttle (SAREX), Mir (Mirex/SAREX) and ISS (ARISS). Each year, Astronauts make hundreds of school contacts from the ISS. The educational activity alone puts amateur radio in the picture for students, educators, media, school leadership, communities, local political leaders. Astronauts have also made thousands of amateur radio contacts using FM voice, SSTV and packet.

During the January 2019 Board meeting the Board passed a motion to establish a new Amateur Radio on the International Space Station (ARISS) Committee. The Board motion / committee charter is as follows.

Be it therefore resolved: A permanent ARISS committee is created by the Board to develop an interactive relationship with ARISS. Said committee should consist of three members of the Board, with assistance of the ARRL Lifelong Learning Manager and the ARRL Communications Manager as consultants, all to be appointed by the ARRL President. The committee will recommend the framework under which the ARRL will support ARISS to include recommendation of the ARRL representative to ARISS, standardized mission support, operational needs, ongoing mentoring and assistance to local Amateur Radio clubs in support of ARISS contacts, and a standardized set of Public Relations messages to ensure consistency of the ARRL message to ARISS, local Amateur Radio groups and the public at large.

ARISS committee activities from February to July 2019:

The ARRL President established the following ARISS Committee Membership.

Director Sarratt (Chairman)

Director Jairam

Vice Director Tharp

Mr. Kris Bickell (Consultant - Lifelong Learning Manager)

Mr. David Isgur (Consultant - Media & Communications Manager)

Ms. Rosalie White K1STO (Consultant - ARRL representative to ARISS)

The committee met three times, March 28th, April 11th and April 25th via Zoom video teleconference service and exchanged multiple emails. May and June meetings were not held due to multiple committee member obligations with various other projects.

An ARRL email reflector was generated by the ARRL IT staff for the ARISS committee use. All of the committees email communications are on the reflector except for a few emails before the reflector was setup.

The chairman sent an email survey to the committee so everyone could introduce themselves and learn about the committee members ARISS and satellite experience. Email request were also sent to determine good meeting times.

Rosalie White was asked to put together summary presentation on the US and international structure of the ARISS working group, provide ARISS's history, some of the complexities of ARISS sponsors, and things the ARISS team is currently doing.

On March 28th the committee Kickoff meeting was conducted via Zoom video teleconference.

The committee reviewed the Board motion / charter and Rosalie presented the ARISS project summary information covering structure, history, sponsorship, ARRL representative duties, education process and scheduling, mentoring, path forward and gaps.

Rosalie has extensive knowledge concerning ARISS history and activities, and ARRL participation in space projects because of being involved with the projects from the beginning by first working at the ARRL, then as a consultant and now as a volunteer. Rosalie participates in multiple ARISS teleconferences each week.

We learned that ISS was originally slated to last for 15 years, from 2000 to 2015. In 2011 Brad Cothran, Boeing's director of sustaining engineering for the ISS said the space station stands a good chance of surviving to 2028 but solar panels producing less power has to be addressed. "Right now we don't see any show stoppers." Amateur Radio was the first operational payload on ISS and its main objectives are education and backup communications.

Follow on projects are in planning for ARISS-like components to be on Lunar Gateway and Exploration beyond.

We discussed how education is a worldwide theme for ISS and reviewed the process of a school contact from start to finish. Media exposure for amateur radio from the school events are extraordinary. School contacts have been made in 48 of 50 States. Wyoming and South Dakota are needed.

The planned 2019 U.S. School contacts are:

January - June 2019

Faith Christian Academy	Orlando, Florida
Hidden Oaks Middle School	Prior Lake, Minnesota
Huntington High School	Huntington, Texas
Moriah Central School	Port Henry, New York
National Institutes of Health	Bethesda, Maryland
Park County Public Library & B&G Club	Fairplay, Colorado
Pembroke Junior Senior High School	Corfu, New York

July – December 2019

24th World Scout Jamboree	Bechtel, West Virginia
Council Rock High School South	Holland, Pennsylvania
Galileo STEM Academy	Eagle, Idaho
Golden Oak Montessori	Castro Valley, California
Lakeside Elementary School	West Point, Utah
Loudoun County Space Dreamers	Ashburn, Virginia
National Air & Space Museum, Udvar-Hazy	Chantilly, Virginia
Pearsall High School Air Force Jr. ROTC	Pearsall, Texas
Santa Barbara Public Library & schools	Santa Barbara, California
Sonoma County Library	Rohnert Park, California
Traverse Area District Library	Traverse City, Michigan
U of Colorado Amateur Radio Club & schools	Boulder, Colorado
Woodridge Middle School	High Ridge, Missouri
Young Scientists Program at Univ. So. Calif	Los Angeles, California

Greg asked the committee to study the summary presentation to see how ARRL might best support ARISS before the next meeting.

At the April 11th committee meeting, the committee began discussing the committee's objectives, the charter contents and broke down the Board motion into elements for better understand. The committee discussed the summary presentation to see how ARRL might best support ARISS and how to improve the ARRL part of the project.

The main task of the committee is to develop an interactive relationship with ARISS.

The motion task recommendation breakout is as follows.

The committee will recommend the framework under which the ARRL will support ARISS to include:

- 1: recommendation of the ARRL representative to ARISS,
- 2: standardized mission support,
- 3: operational needs,
- 4: ongoing mentoring and
- 5: assistance to local Amateur Radio clubs in support of ARISS contacts, and
- 6a: a standardized set of Public Relations messages to ensure consistency of the ARRL message to ARISS,
- 6b: local Amateur Radio groups and
- 6c: the public at large.

Most of the meeting was spent brainstorming on the committee objectives and discussing items 2-6. We discussed ARRL PR involvement in ARISS activities, new PR templates, newsletters, mentoring, Lifelong Learning ideas, Section Manager awareness, education activities and opportunities, and trade shows.

Dave Isgur reported the ARRL PR committee is interested and eager to help. Dave will look into better information for PIC's/POIs. Rosalie already informs the PR committee, Director and SM about an upcoming school contact. The committee thinks it is a good idea to involve the PR committee more. We discussed providing a periodic status of the ARISS committee to the membership, we feel one voice is best for coordinated reports, and will start when we have newsworthy information.

We discussed the possibility of a future Lifelong Learning unit about on-the-air activities ARISS offers to general hams, such as the very popular ARISS SSTV downlinks and well-used ARISS APRS packet.

At the April 25th video telecon meeting the committee continued discussing the objectives and items 2-6 on the break out charter list, and how the ARRL might best support ARISS.

The committee held good discussion on ways the ARRL ARISS web pages could be improved. Kris Bickell took the lead to better arrange and update the webpages with needed easy items and committee members will review and recommend updates. Kris will spend minimal time to fix simple items to make the web site more appealing. The idea is to keep the information generic, point the viewer to the ARISS webpages for detailed content and to AMSAT webpages for donation functions.

The committee held good discussion on ways the ARRL PR committee and ARRL PICs/PIOs can help different press releases, for example, teacher level, media / general public level, and

amateur radio community level press releases. The ARISS committee and ARRL PR committee will work together on the press releases. We are fortunate to have Dave Isgur on both committees.

As a result of our Committee discussions, Rosalie connected David with the ARISS PR volunteer to make sure that David received press releases about upcoming ARISS school contacts. This gives David the opportunity to reach out directly to the PIOs in those sections to help ensure that those PIOs can get involved in promoting the ARISS contact with the media.

Lifelong learning units covering ARISS activities and education was discussed. These units could be a combination of video and study for the different communities connected to ARISS. Discussed creating and shoot a 4-minute or so video of teachers and students who have been pumped up about ARISS.

The committee discussed the ARRL representative responsibilities and the need for an intern or part time assistance.

An information white paper was discussed as a useful addition to the Section Manager workbook. Mark Tharp, the most recent SM on the committee took the lead to develop the document and incorporated committee input.

Since the April 25th meeting the committee is working individual task related to the committee objectives.

Other ARISS related activities:

Hamvention ARISS Forum:

Rosalie White and Frank Bauer, KA3HD moderated the ARISS forum at Dayton Hamvention. Around 120 people were in attendance including ARISS committee members Kris Bickell and Greg Sarratt. Educators, students, hardware team, team leaders, and a donor were the interactive speakers. Rosalie, Frank and the speakers covered a variety of ARISS activities, mostly school contacts and educational activities around the world. This was a very informative and promotional forum for ARISS and Amateur Radio.

ARISS also had a very informational booth containing lots of hardware at Hamvention that was attended by many visitors. Greg and Rosalie talked at length about the needed hardware to replace the problematic ham station on the International Space Station, the budget to do this and other aspects of ARISS.

ARISS Delegates Face-to-Face meeting:

Rosalie White K1STO and Greg Sarratt W4OZK represented the ARRL at the ARISS International (ARISS-I) Delegates meeting, June 25-28 2019 at the Canadian Space Agency in Montreal Canada.

The meeting was dedicated to the memory of ARISS Silent Key Team Members: Owen Garriott, W5LFL, Bill Tynan, W3XO and Keith Pugh, W5IU.

The ARISS International Officers, Chair Frank Bauer KA3HDO, Vice Chair Oliver Amend DG6BCE and Secretary-Treasurer Rosalie White K1STO led the meeting. RAC President Glenn MacDonell, VE3XRA and AMSAT-NA President Joseph Spier K6WAO participated in the meeting.

The attendees included around thirty-five ARISS members from all over the world that discussed ARISS activities to include education, hardware and school contacts. Hams attending from the US totaled 15 and 2 others tied in via GoToMeeting. The ARISS regional Delegates consist of 2 for ARISS-US Region, 2 for ARISS-Russia Region, 2 for ARISS-Canada, Region, 2 for ARISS-Japan Region, 4 for ARISS-Europe Region. The ARISS-US Delegates are Rosalie White (ARRL) and Dave Taylor, W8AAS (AMSAT-NA).

Delegate activity reports were presented and discussed. Education and STEM via astronauts conducting school contacts around the world using the ISS amateur radio continues to be a large, active and important activity. The team reviewed the design and testing of a new multi output power supply to be used on the ISS and brainstormed on future amateur radio hardware.

Canadian Space Agency Gateway Program Manager Ken Podwalski presented details on Lunar Program and Canada's involvement.

The ISS hardware, new Interoperable Radio System, Kenwood Radio and MultiVoltage Power Supply was discussed. The MultiVoltage Power Supply design has completed Phase II Safety Reviews & Safety Data Package, modified flight-identical power supply after finding thermal hot spots (worked with NASA HUNCH mentoring project on new air duct, relocated fan, got approval for redesign), prepared flight-ready units and interconnection cables, testing at Johnson Space Center.

The HamTV hardware is currently at the manufacture for testing and repair.

The actual next radio to be installed on the ISS was presented by JVC Kenwood to the ARISS team. Shin Aota, JL1IBD of JVC Kenwood transferred a new D-710GA to Sergey Samburov, RV3DR. The D-710GA radio will be taken to the International Space Station soon to be added to the Space Station's amateur radio capability.

The ARISS-I team discussed the 2 meter Aeronautical Mobile allocation proposal. This is a serious concern for amateur radio. The proposal if approved would affect many aspects of amateur to include a detrimental impact to ISS operations because ISS uses 2 meters for education, scientific, school contacts, amateur radio and backup communications for ISS around the world.

Other topics discussed were ISS sustainability and funding, PR, education, Deep Space Gateway presentations, crew licensing, crew support, trade studies and Space Agency collaboration. All

presentations and discussions were very informative which will help the ARRL ARISS committee better support the ARISS efforts.

ARISS Outcomes to date are:

- 1st Operational Payload on ISS
- 60-120 Educational Opportunities per Year
- 1,260+ ARISS Connections
- 15K-200K Students Touched Each Year
- 12-15 Million Witness Contacts from Media Sources
- \$5M In-Kind Volunteer Support Per Year
- School contacts made in 48 of 50 States in the USA
- School contacts made in 60 Countries Around the World
- Outreach activities (ie, 11 in the US in 1st and 2nd quarter 2019 such as Space Exploration Educators Conference, Houston TX)

Accomplishments to develop an interactive relationship with ARISS:

- The committee recommends that Rosalie White continue as ARRL representative to ARISS, and the ARISS-US Delegate on the ARISS-International team for ARRL
- Mark Tharp drafted a basic ARISS information page for the SM Workbook and got committee input for the final product. The page was provided for inclusion to SM workbook and to all of the Section Managers via the SM reflector
- With input from the committee, Mark Tharp provided suggested re-ordered for the left dropdown information sections of ARRL ARISS web pages. Kris Bickell made changes to improve the sites
- Rosalie White named some outdated items on ARRL ARISS web pages, Kris Bickell made the edits (further work on this will continue as time allows)
- Rosalie White recommended leaving lists of Amateur Radio resources for teachers that are provided on the ARRL ARISS web pages, along with the ideas on how to use Amateur Radio in classrooms
- Kris Bickell updated and improved the ARISS Donate button that is on the ARRL ARISS web pages
- Rosalie White shared information on videos that have been done recently by ARISS volunteers on best practices for ham clubs setting up equipment for an ARISS contact
- The committee discussed possible ways to help clubs decide if they can support a school interested in ARISS through setting up for the contact and mentoring the students in Amateur Radio activities
- Rosalie White shared information on ARISS guides that help teachers write an ARISS proposal, that help ARISS Technical Mentors with working with schools, and the guidance the ARISS-US Education Committee receives when those teachers mentor newly selected ARISS schools
- The committee is learning about resources ARISS already has on its www.ariss.org web pages, such as a recommended equipment list for a school ARISS contact
- Rosalie White interfaces with Kris Bickell on education ideas, she networks with the TI teachers, and she forwards the many PR hits to Dave Isgur the ARRL PR committee lead

- Dave Isgur will guide PIOs on how to engage the media in regard to ARISS events
- Dave Isgur to review and update the ARRL's news release template for ARISS contacts, and help guide the PICs/PIOs in handling PR specific to ARISS
- Rosalie White co-chaired a successful Hamvention ARISS forum
- Rosalie White and Greg Sarratt participated the ARISS International Delegates meeting

The committee will continue our work on developing an interactive relationship with ARISS.

I am proud to serve on the ARRL ARISS committee with a group of very fine and dedicated amateur radio operators.

Submitted for the Committee by,
Director Greg Sarratt, W4OZK (Chairman)