A Recent ISS Crew Contact Planning, Execution & Learnings Along the Way

Fred Kemmerer, AB1OC
Amateur Radio Contact Leader

Dan Pooler, AC1EN
Faculty Contact Leader

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Topics

- Perspective on an ISS Crew Contact
- ARISS Contact Application
- Education Plan
- Media Plan
- Ground Station Gear and Antennas
- Audio-Visual Elements
- Contact Preparations
- The Contact – An Experience of a Lifetime!
- What We Learned; ARISS Mentor's Perspective

Perspective On Crew Contacts

- Many Schools Worldwide want contacts
  - Approximately 80 contacts worldwide each year
- Application process begins about 18 months before the actual contact
- Schools that create a multi-grade level, high-quality STEM learning experience around the contact get top priority in selection process
- Contacts may be executed via an on-site ground station or via Telebridge to a remote station
- Media and Publicity elements are extremely important to the sustainability of the ARISS program
- Execution of a contact requires good coordination between the school, the AR team, the ARISS organization, and NASA liaisons
  - Good communications and timely execution are essential
- Careful planning and preparation are key to a successful contact
  - Contacts last approximately 10 minutes, do-overs are usually not possible

ARISS
Amateur Radio on the International Space Station

Proposal & Contact Success Factors

- A strong educational plan built around the contact, the ISS, and Space Science
  - Integrated into school curriculum
  - Involving multiple grade levels
  - Engages other schools in the district
- A solid plan for engaging media and the general public in the contact
  - TV Coverage
  - Local Newspapers
  - Social Media plans
- A solid relationship with a capable and committed Amateur Radio team to support the technical elements of the contact
- Timely Development of School Story and Questions
- Contact Scheduling Flexibility

Sample Education Plan Elements

Hudson Memorial School…

- Teachers & students grades 5-8 involved in radio and space-science curriculum
  - Astronomy & STEM Night
  - Skype contact with Astronaut
  - High-Altitude Balloon project and launch
  - Planting seeds from the ISS
  - Visit to the Boston Museum of Science to learn about space exploration
  - Pre-engineering program working on ISS solutions
  - Amateur Radio activities included in STEM nights
- Multi-discipline curriculum - ELA, Social Studies, Math, Science, PLTW
- Learn more here

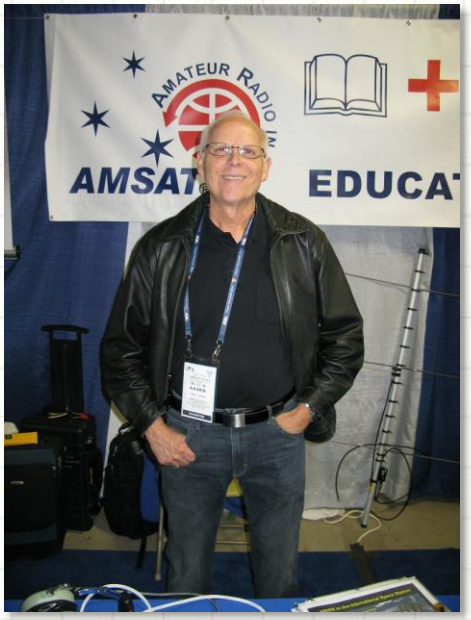
Media Plan

Hudson Memorial School Example

- Coverage by local Community TV Channel
- Articles in local newspapers
- Livestream and photo coverage on School and Radio Club Facebook and Twitter feeds
- Livestream requires advance planning and preparation
  - This can be an great student learning project

Countdown To Contact

An ARISS Perspective



Dave Jordan, AA4KN
ARISS Mentor

- ARISS appoints a Technical Mentor and an Educational Liaison
- School executes their education plan
- School develops a “story” and a set of 15-20 questions for their contact
- Amateur Radio Team builds and tests the contact stations
- ARISS works with NASA to create a list of possible ISS passes; school prioritizes these and a final is selected
- 24-Hour ”Contact Ready” message is sent to ARISS
- Contact!
- Post contact report & media dump provided to ARISS

Ground Station Requirements

- Primary and Backup Stations Required
- Primary Station Requirements
  - Transceiver with 50 – 100w output, 1 KHz Tuning Steps, and 21 split frequency memories
  - Low-loss coax such as LMR-400
  - Mast-mounted preamplifier
  - A 2m, 14 element Yagi with switchable circular polarity
  - Antenna rotator with azimuth (0^o – 360^o) and elevation (0^o – 180^o), with computer interface
  - Computer running tracking software for antenna control (including flip mode operation)
- Backup station with similar transceiver/coax, power amplifier, omni antenna, and a UPS

While not required, it's a good idea to have a 70cm Yagi to enable testing of primary station with LEO satellites

Contact Ground Stations

Primary and Backup

- Transceivers: IC-9100 and IC-910H (100w, dual-band capable)
- Green Heron Az/El Rotator Controller w/Computer Interfaces
- Mac PCs running MacDoppler
- 100W UPS provides power to primary and backup station
- Polarity controls, preamp sequencers, 2m/70cm wattmeters, headsets, …

Contact Antenna Systems

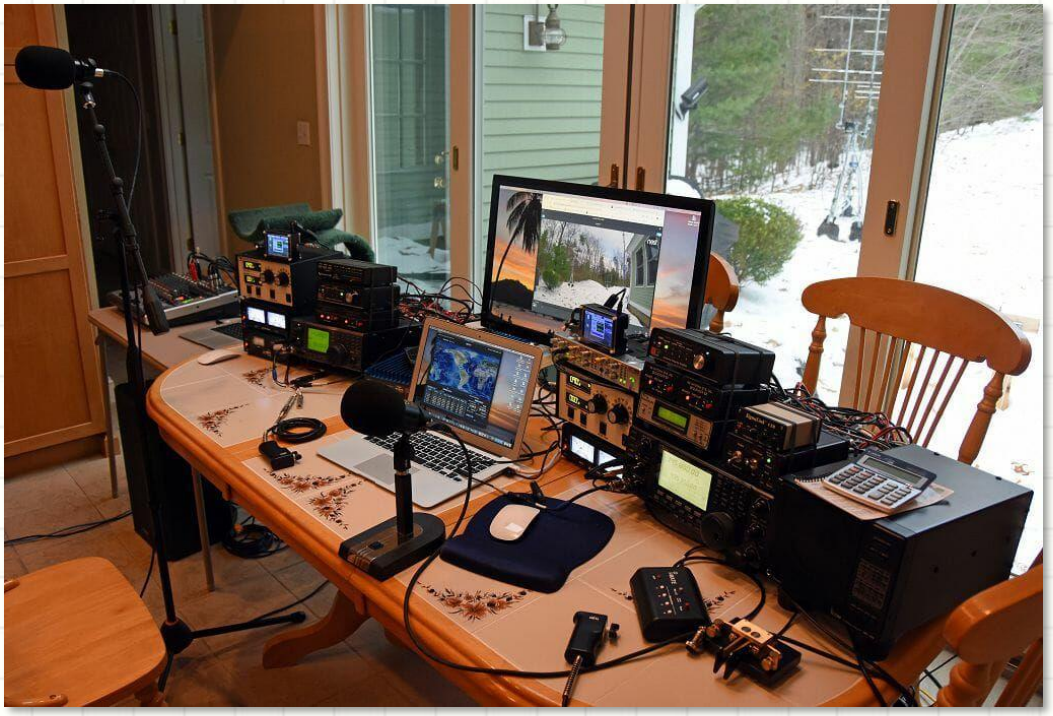
Primary and Backup

- M2 14 Element Yagi for 2m (M2 30 Element Yagi for 70cm), Polarity Switches
  - M2 Leo Pack on backup station
  - ARR Preamps for 2m and 70cm
- Alfa-Spid Az/El Rotator (Yaesu Az/El on Backup)
- Glen Martin 6 ft roof towers rigged for portable use
- 7/8” Hardline Coax Feedlines

A-V Elements

- Pro quality audio gear for contact sound and recording
- Mevo Live-Stream Camera + H-D Camcorders for Video
- Last minute surprise required adaptive room equalizer solution

Contact Equipment Preparations



- Extensive, pre-contact testing reveled several problems
  - Antenna reliability issues
  - Ground loop problems that effected audio
  - Cabling and coax issues
  - On-site testing identified some unique, last minute issues
- Multiple Field Tests during the 8 months prior to contact allowed us to identify and address these problems
- ***Freeze configuration at least 7 – 10 days before the contact***

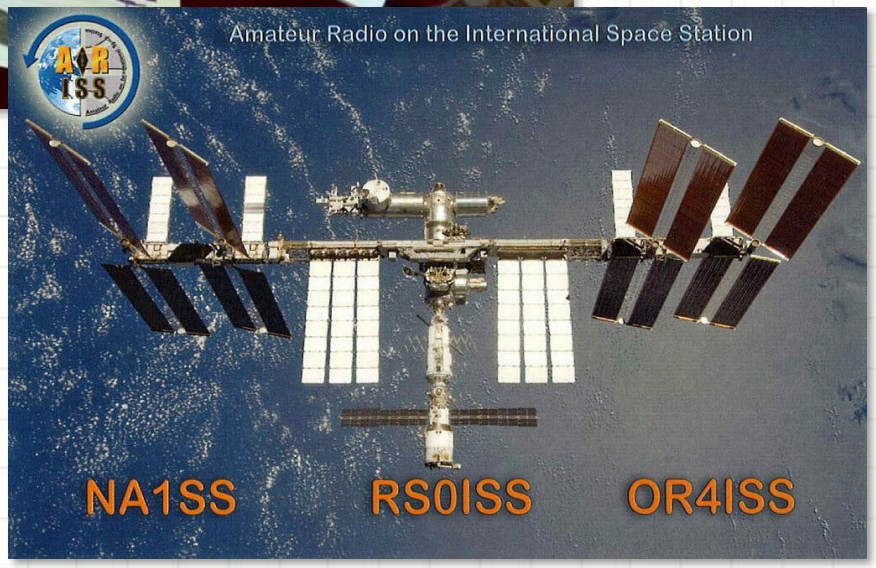
Our Contact

An Experience of a Lifetime!

[Our Contact Video]

What We Learned…

- An ARISS contact sets the stage for an amazing education experience
- Planning, preparation and testing before the contact are key
- Student, Parent, & Faculty response to the event is unforgettable
- Its a lot of work but well worth it!
- An ARISS Mentor's Perspective…



Thank You!

Much more information, pictures,
and video are available on The
Nashua Area Radio Society's website at:

www.n1fd.org