

An aerial view of Earth from space, showing the curvature of the planet and a bright sun flare at the top. The text "ARISS" is centered in the upper half of the image.

ARISS

@

WCTS

How to Make an ARISS contact

... and live to talk about it

A bit of history

- First operation by an Amateur Radio Operator in Space was Owen Garriott W5LFL on STS-9 in 1983
- In 1985 second more organized event conducted with Tony England W0ORE on STS-51F Spacelab



Play VIDEO

<https://www.youtube.com/watch?v=Hf839IfdO90>

HERE



SAREX

- In 1990, NASA, ARRL and AMSAT created the Shuttle Amateur Radio Experiment
- It's key object was to establish contacts putting orbiting astronauts in direct contact with Students for the first time.
- From 1990 through 1998 there were 24 SAREX missions

The background of the slide features a view of Earth from space, showing the curvature of the planet and a thin layer of clouds. A bright, glowing light source, likely the sun, is positioned at the top center, creating a lens flare effect. The text is overlaid on a white rectangular area.

Amateur

Radio

International

Space

Station

What is it?

Created in 1996, the ARISS program is a cooperative venture of NASA, other international space agencies and Amateur Radio Organizations that organizes scheduled contacts via Amateur Radio between astronauts the ISS and Students.

Amateur Radio equipment is permanently installed on the ISS and school contacts are a regular part of missions

What are the Goals of the Program?

- Inspiring an interest in science, technology, engineering and math (STEM)
- Providing an educational opportunity for students, teachers and the general public to learn about space exploration, space technologies and satellite communications
- Providing an educational opportunity for students, teachers and the general public to radio science through Amateur Radio

How did WCTS get involved?

- Fall of 2012 NASA announced they were accepting proposals from schools for events in the 2013-2014 season
- January 22, 2013 we submitted a proposal
- March 22, 2013 we were notified of acceptance
- April 18, 2013 we participated in a training Webinar
- May 3, 2013 we were informed to be ready for the week of October 21 - 27

What did we say we would do?

- “... members will meet once per week during school to plan and revise curriculum to facilitate the ARISS contact.
- “Cross-curricular activities and lessons will be developed to support our construction of a weather balloon with HAM-radio equipment payload.”
- “We will involve a broad cross-section of the school and Warren County by engaging students in our Engineering, Electronics, Physics, Geometry, Graphic Arts, and Digital Media programs.”
- “The weather-balloon and payload will serve to facilitate discussion in geometry classes about calculation of altitude, speed, and heading. Physics classes will be able to calculate various forces of gravity, wind speed, temperature and their effects upon the function of the craft.”
- “We are fortunate to have both a Graphic Arts program and a Digital Media Communications program at WCTS. Both programs will be used to create media for the promotion of various space exploration aspects to students and the community. “

The background of the slide is a high-angle aerial photograph of Earth from space. The sun is positioned at the top center, creating a bright lens flare and illuminating the horizon. The Earth's surface shows a mix of green and brown terrain, with a thin blue atmosphere visible at the top. The text is overlaid in white, serif font.

The Teams

Academic

Technical

Administrative

Academic Team

- Integrate the ISS contact into curriculum
 - Biology – life sciences and life support topics (food, respiration, waste)
 - Chemistry – similar to above but chemical aspects (CO₂ Scrubbing)
 - Physics – Orbital Mechanics (Newton's cannonball)
 - History – The US and Russia (Soviet Union) once had a “Space Race” Now a Russian Soyuz is our only way to get to the ISS
 - Culinary – Talk about what kind of food is served on the ISS

Academic Team

- Cosmo – Best hairstyles for living in Zero-G



Administrative Team

- Mr. Jennette, Mr. Glowacky, Mrs. Vogel
- High Level Coordination
 - Working with the Academic Team to integrate ISS topics into the curriculum
 - Coordination of event resources – Gym, sound equipment, multimedia
 - Media Outreach - press releases, contacting media
 - Public Outreach – inviting elected officials or other county officials and school officials to the event.

Technical Team

- John Metroke, Sean McGeough, Nick Mohr, Kevin Murray, Rob Roschewsk
 - Setup the Amateur Radio Earth Station
 - Assist with any other tasks the Academic Team needs help with (i.e. Near-Space Balloon Project)

The Event

- We get about 1 week notice
- Set up in the gym for a school wide assembly
- Technical team sets up earth station and interfaces with sound system / internet streaming
- Ten Students selected prior to ask questions
- Tech team runs the radios and gives the mike to students with questions

Questions

Since astronauts have perfect vision, is it known whether there is any effect lack of gravity would have on an astigmatism. Do changes to the pressure on the vitreous humor cause any changes to the eyesight of people with perfect vision?

What, if any, changes in mental status can be attributed to the changes in the fluid in the sulci of the brain?

What is the increased rate of kidney stone growth in astronauts and how do they deal with this?

are there any discernible changes to growth patterns by staph or strep bacteria? Do colony sizes or shapes change in extended zero gravity growth?

“ Some of the best I’ve ever seen”

– AMSAT mentor Dave Jordan, AA4KN

A satellite view of Earth from space, showing the curvature of the planet and a bright sun in the upper center. A large, bold, red stamp is overlaid diagonally across the center of the image. The stamp contains the text "GOVERNMENT SHUT DOWN" in all caps. The background shows a detailed view of a landmass with various geographical features like mountains, rivers, and a large body of water.

**GOVERNMENT
SHUT DOWN**

Government Shutdown

- 97% of NASA staff Furloughed
- All “scheduled” contacts would continue
- We were “slotted” but not “scheduled”
- On hold indefinitely

Back to Work

- Our October 21-27 slot gone
- Lobbied hard to get the next available slot
- Eventually slotted and scheduled for November 4th

The Station

- Primary
 - TS2000 100W output on VHF
 - Cushcraft A144-20T Circularly Polarized beam
 - AZ/EL Rotors Alliance HD73 & Alliance U100
 - ARA 20db mast mounted receive preamp
 - 100FT LMR-400
- Backup
 - TS2000 100W output on VHF
 - Cushcraft Dual band vertical
 - 100FT LMR-400

ISS passes for Warren County Tech School, Washington, NJ - week 8 (Nov 4-10)

|----- UTC -----| |----- EST -----|

DATE	RISE	SET	RISE	SET	EL	GEO	ORB	STATION
<Mon 04Nov13	14:08:48	14:19:41	308/09:08:48	09:19:41	50	A-W	1648	US#304
>Mon 04Nov13	19:01:36	19:12:17	308/14:01:36	14:12:17	33	D-E	1651	US#304
*Mon 04Nov13	20:38:25	20:48:56	308/15:38:25	15:48:56	31	D-W	1652	US#304
Tue 05Nov13	13:20:37	13:31:33	309/08:20:37	08:31:33	84	A-W	1663	US#304
>Tue 05Nov13	19:50:12	20:01:03	309/14:50:12	15:01:03	56	D-W	1667	US#304
>Wed 06Nov13	19:02:01	19:12:59	310/14:02:01	14:12:59	82	D-E	1682	US#304
Thu 07Nov13	13:21:16	13:31:57	311/08:21:16	08:31:57	34	A-W	1694	US#304
>Thu 07Nov13	18:13:52	18:24:44	311/13:13:52	13:24:44	49	D-E	1697	US#304
>Fri 08Nov13	19:02:30	19:13:03	312/14:02:30	14:13:03	33	D-W	1713	US#304

T-minus 1 week

- Collect and piece together all the equipment
- Place Antennas on roof prepare cables (RF, Rotor, per-amp power)
- Integrate with the sound system
- Rehearse with the students
- Test
- Test
- Test!!!!









Link Budget

- 100 Watts out of the Radio
- 3db loss in coax = 50W at the antenna
- Antenna gain 13 db = 950W ERP
- Path Loss = 120db = 0.00095 μ W
- Convert Power to volts across 50 Ω
 - 4 μ V at the Antenna
 - (Kenwood TS-2000 Rx Sens. = 0.16 μ V)



COMPUTERS & TECHNOLOGY

DISTANCE



Zero Hour

- Last rehearsal with students using radios
- WA2SME at the podium with students
- KC2VWI Primary radio operator
- KA2PBT Tracking and rotor control
- K2FN, KC2WCQ, KC2SJT on roof
- KD2CXC, KD2DWC Backup radio operators



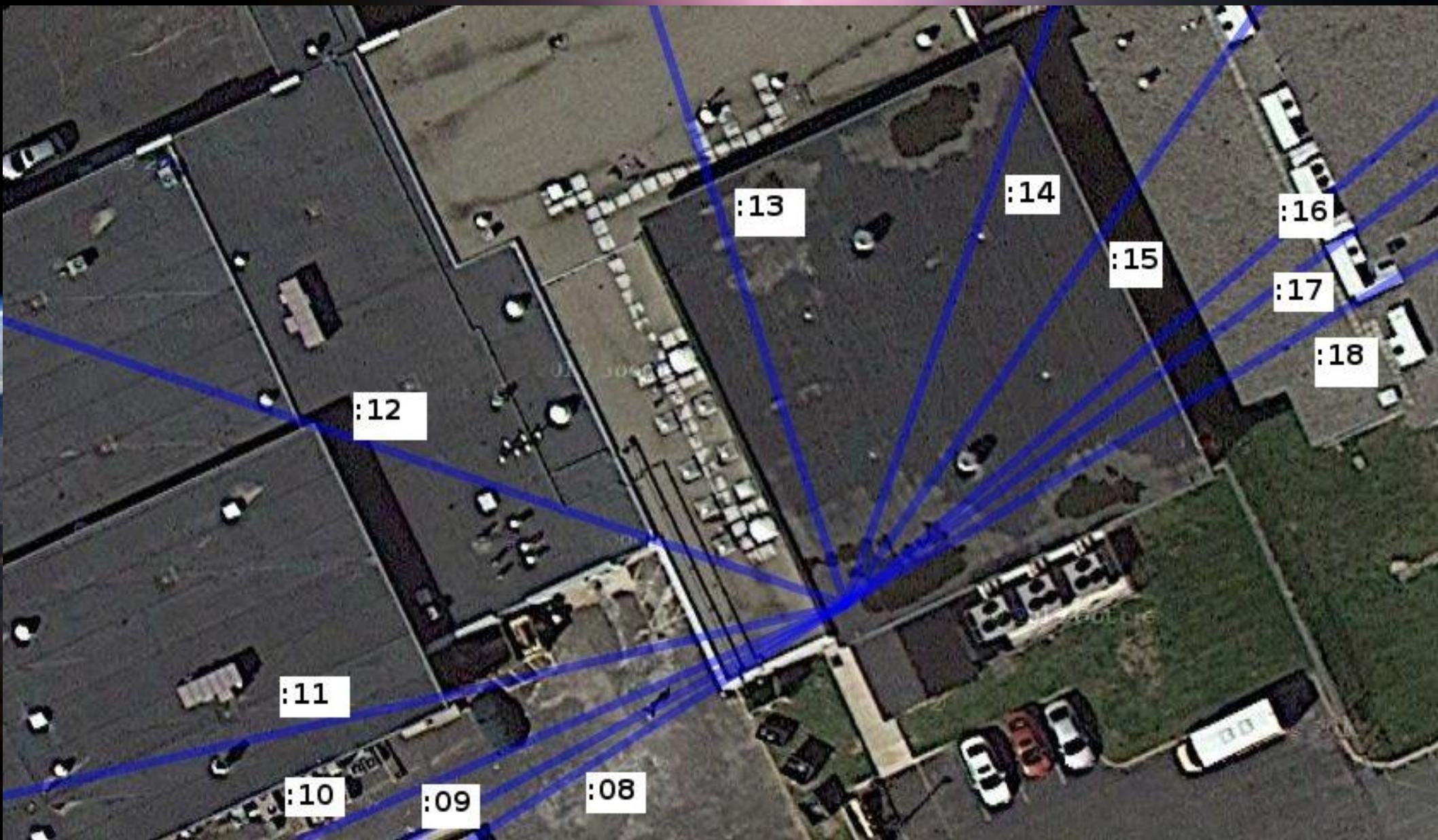
ISS

KC2W



ISS

KC2W/T



Play VIDEO

http://youtu.be/sEtb_5NTK94

HERE



