NA1SS, NA1SS, THIS IS KA7SKY CALLING…..

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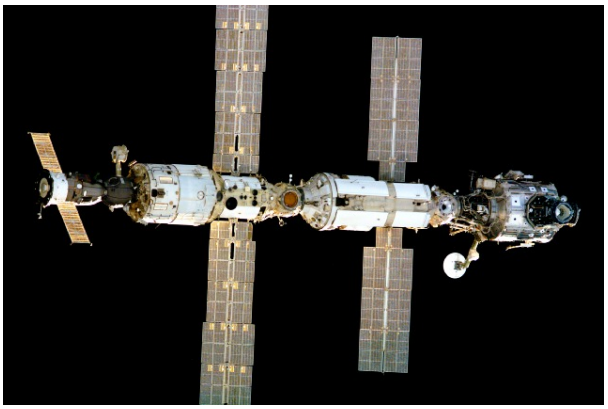
ABSTRACT



On Monday, April 5th, 2004, fourteen exuberant students at Sonoran Sky Elementary School in Scottsdale, Arizona had the unique privilege of a personal chat with an astronaut aboard the International Space Station (ISS).

This ARISS contact was the project of third grade teacher, Carrie Cunningham, N7NFX, an AMSAT member. Classroom representatives from grades 3rd-6th posed twenty-one questions via amateur radio to Expedition 8 astronaut Mike Foale, KB5UAC, as the ISS orbited over the school. ARISS (Amateur Radio on the International Space Station) is a program created through a partnership between NASA, ARRL and AMSAT.

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1. BACKGROUND

Sonoran Sky Elementary was built 10 years ago based on the theme of flight, with each grade level focusing on a particular aspect from bubbles and insects to aircraft and spacecraft. It is a K-6 school with approximately 500 students. The school has a classroom dedicated to the students' special projects relating to flight called the Flight Room.

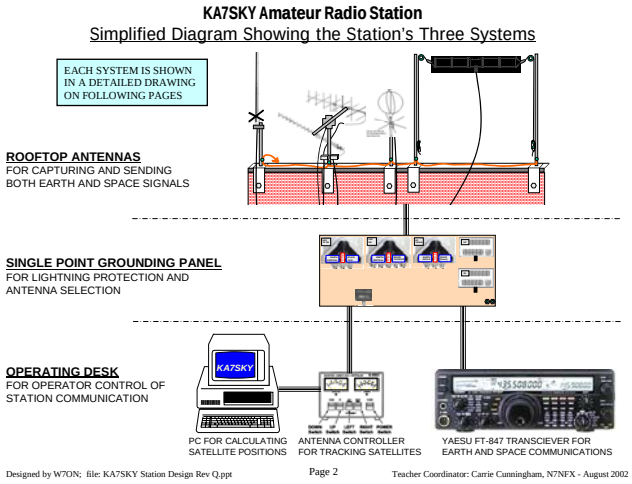
At Sonoran Sky there is an amateur radio station installed in the Flight Room having the appropriate call sign, KA7SKY. In addition to normal HF and VHF contacts with other hams, students have participated yearly in special events such as Kid's Day & JOTA.

It was the opportunity to talk with astronauts in flight that really sparked the students' imagination and was the motivation for installing the station in the Flight Room. But getting ready and being selected for a scheduled ARISS contact was not a quick or easy process. ARISS Schools are selected through a thorough and rigorous application process and generally must wait two to three years for their opportunity.

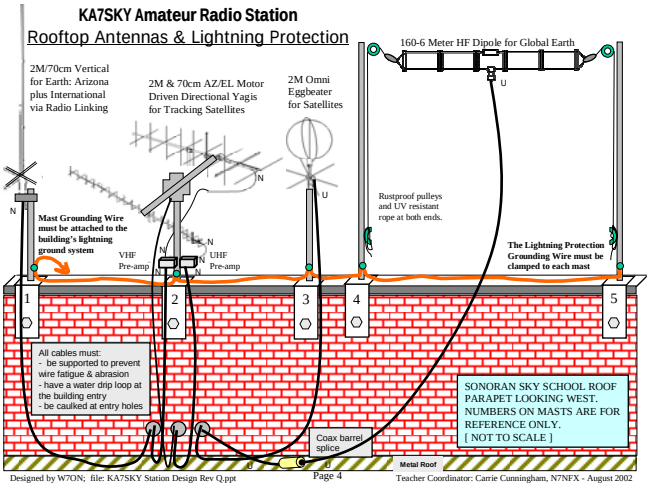
2. FUNDING

Teacher, Carrie Cunningham, N7NFX, submitted grant request applications to local community groups, organizations and businesses. One local community group, Scottsdale Charros, provided the initial funding of $5,000 by donation to Ms Cunningham. The Paradise Valley Unified School District provided much of the coax along with installation materials and labor. Yaesu and Ham Radio Outlet offered generous educational discounts on equipment and antennas. The Sonoran Sky PTO and others in the community donated the remaining needed funds.

3. STATION DESIGN & EQUIPMENT

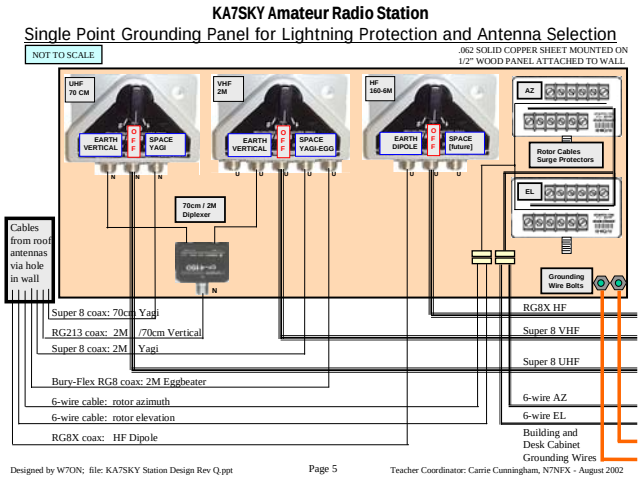


The station for KA7SKY was designed and installed by George Anderson, W7ON. The design consists of three basic systems: Rooftop Antennas, Single Point Grounding Panel, and the Operating Desk. A primary design objective was absolute safety for the children and others at the school while maximizing fun and easy operation.

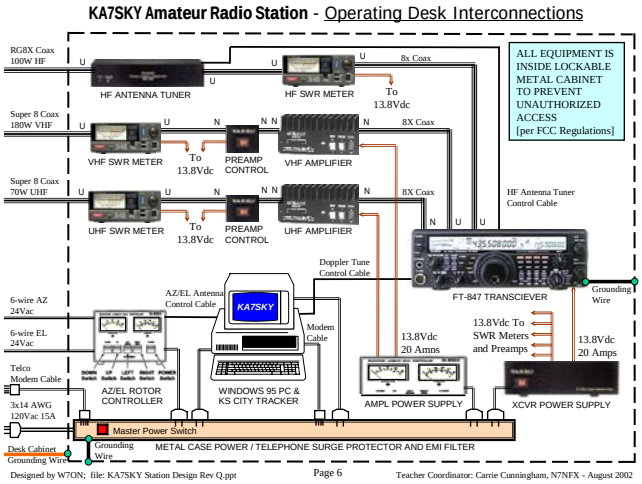


The Rooftop Antennas are mounted on a brick parapet about 50 feet high on top of the school, two for space communication and two for terrestrial communications. The main antenna for the ARISS contact was the 2m & 70cm AZ/EL motor driven Yagis. The ARISS back-up antenna was the 2m Omni Eggbeater. For ongoing terrestrial use of the station by students, there is a 2m/70cm vertical as well as a 160-6m HF folded

dipole. PVUSD employee, Paul Lintz, AA7AQ, spearheaded the design of the sturdy tilt-over mast and construction plus antenna installations.



The Single Point Grounding Panel is used as secondary lightning protection, station safety grounding and antenna selection. The copper panel connects via a large copper strap to a Ufer ground consisting of a steel building column embedded in the concrete slab foundation. Another large strap connects to the steel desktop station cabinet and equipment. Three gas discharge antenna switches select either an earth or space antenna for UHF, VHF or HF and routes the signal to the appropriate transceiver antenna connector. Surge protection is also provided on every line of the AZ/EL rotors.



The Operating Desk equipment consists of three parts: a transceiver with amplifiers and SWR bridges, a personal computer, and an AZ/EL antenna controller. For safety and in compliance with FCC Part 97, all Operating Desk equipment is housed inside a large grounded metal, lockable desktop cabinet.

Although the station normally has one Yaesu FT-847 transceiver, a second one was borrowed as a backup for the ARISS contact. It was identically programmed as a "hot" back-up including a separate power supply and antenna. A large speaker let everyone in the Flight Room clearly hear the receiver. A personal computer was used to track the ISS using NOVA software. Another software program and interface card, Kansas City Tracker, ran the antenna controller, which in turn guided the directional Yagis high on the roof as the ISS orbited above the school.

4. CLASSROOM INTEGRATION

Every student in the school wrote a question to be asked of astronaut, Mike Foale, KB5UAC. Each classroom in grades 3-6 had one representative chosen to read their question. In addition, each representative read a second question, one that was posed by a student in grades K-2.

Teachers were provided with books, posters, photographs and daily information about space exploration, the ISS and amateur radio. Students were provided with information about visible passes of the ISS to share with parents.

Many students had prior experience with amateur radio from previous visits to the KA7SKY station in the Flight Room.

5. ARISS CONTACT PREPARATIONS

Student representatives met with teacher Carrie Cunningham several times prior to the ARISS contact to practice reading their questions. Two days prior to the contact the students conducted a live run-through by cell phone with Frank Bauer, KA3HDO, International Chairman for ARISS. He provided valuable feedback to the students.

Invitations, handwritten by students, were sent to a variety of VIPs including the Governor of Arizona, the Mayor of Scottsdale, the Superintendent of Education, Paradise Valley School Board Members, and PTO Members.

A press release was sent out to TV and radio stations, newspapers, ARRL, and local media.

Arrangements were made to have the event documented by a videographer.

The PVUSD technology department arranged for a live video broadcast of the event throughout the school district.

Sonoran Sky's PTO designed and purchased a large KA7SKY banner for the Flight Room wall.

Bright aqua green KA7SKY shirts, in the school's colors, were given to each classroom representative to wear on the Big Day.

All station equipment and computer antenna tracking were tested, then retested, with the latest Keps and simulated passes. It was a good thing, because about a week before the contact the 2 meter amplifier literally smoked! A new one was rapidly shipped overnight and worked great.

6. THE BIG DAY!

Finally the big day came. On the morning of 05 April 2004 students, parents, press, and dignitaries in the Flight Room and listeners across the school district were filled with excited anticipation. Our antenna was pointing at the horizon, our clock was precisely synchronized with NASA's clock, NOVA was showing the approaching ISS footprint, and the media cameras were rolling. We were ready!

At 1837 UTC, it was our appointed time to attempt contact with Astronaut Mike Foale as the ISS began its pass over Scottsdale, Arizona. After two unanswered calls as the ISS began to peek above the horizon, the third call was greeted by the crackling voice of Mike Foale. In an instant he was loud and clear, and ready for our students' questions.

Photo 1 - Adam asking Mike about his daily chores

During the full 10 minute pass, twenty-one of the twenty-two prepared questions were successfully asked by students and answered by Mike Foale.

Here are the students' insightful questions:

1. Why were you chosen for Expedition 8?
2. What did it feel like when you launched?
3. What did you do to prepare for working with people from other countries?
4. Do you have to wear a space suit all the time?
5. If you were not an astronaut, what job would you have?
6. If you could keep one thing from your mission, what would it be?
7. What is your favorite part of being an astronaut?
8. Do stars and planets look different from the ISS than from Earth?
9. What experiments are you doing?
10. How does the G-force affect your weight during launch?
11. How did you become interested in being an astronaut?
12. What is the most interesting thing you have learned in space?
13. How long does it take the ISS to orbit the Earth and at what speed does it travel?
14. What medical equipment and training do you have if someone is sick or injured?
15. What did you eat for Thanksgiving?
16. What are the pros and cons of living in space for so long?
17. What are some of your daily chores?
18. Do you have to steer the ISS?
19. How do you know what to do while you are up there?
20. What is the temperature inside and outside the ISS
21. How do you wash your clothes?
22. What is the most amazing thing you have seen while in space?

Mike Foale surprised the students with many of his answers. He shared his personal experiences while inspiring them to pursue their studies and dreams.

Photo 2 - Mia asking Mike what job he would have if he were not an astronaut

Photo 3 - Taylor asking Mike about the pros and cons of living in space for so long

Photo 4 - Rylee asking Mike about experiments being conducted on the ISS

7. MEDIA RELATIONS

Photo 5 - Bailey being interviewed by media as Nicholas looks on

The ARISS contact was well attended by a multitude of VIP's including the Mayor of Scottsdale and media personnel. Local representatives from FOX, CNN, NBC, the Arizona Republic, and the Scottsdale Tribune were in attendance. The TV and press coverage given by each of these media was phenomenal. In one case the event was used to promo the TV newscast. Newspapers ran various stories for several days. And, the full story was recently featured in World Radio.

Since the ARISS contact, Ms. Cunningham has given invited presentations to three local Amateur Radio Clubs and at the ARRL Southwest Division Convention.

8. THE FUTURE

Sonoran Sky Elementary School is beginning their very own after school Amateur Radio Club. Sparked by the excitement of the ARISS contact, many students have shown an interested in pursuing their own Amateur Radio experience.

There will be continued linking of the student experience to their classroom instruction for cultural sharing, geography, math, science and the general excitement space communication brings to their imagination. The students getting to know and use AMSAT's new Echo AO-51 satellite will be one of the first activities of our school's new Amateur Radio Club.

9. ACKNOWLEDGEMENTS

Our school's ARISS contact was the culmination of many people and organizations working toward the common goal of enriching our children's education. I would like to acknowledge the tremendous support of the Paradise Valley Unified School District, Sonoran Sky PTO, Scottsdale Charros, Yaesu, and Ham Radio Outlet.

10. DEDICATION

Photo 6 - George Anderson, W7ON, being interviewed about the successful ARISS contact

This paper is dedicated to my father George Anderson, W7ON, AMSAT Life Member, for the countless hours he spent making this ARISS contact possible for my students and myself. His expertise in the field of Amateur Radio and his ongoing dedication to the education of our youth is truly priceless and inspirational.