



Radio Waves

News you can use for license instruction and radio science education

ARRL — The national association for AMATEUR RADIO

Spring 2017

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Don't Miss...

Looking for new ideas for outreach opportunities and building interest in Amateur Radio among young people? Then check out the news item, "Girl Scouts and Guides 'Thinking Day on the Air' Generates Enthusiasm for Ham Radio," on the ARRL website. You can access its helpful tips [here](#).

KID Museum Station Powers Up at Maker Faire

BY CLAIRE COCCIOLE



Kevin, KC3ARU (left), and Valerie, KC3HPJ (right), volunteered at the KM3KID Amateur Radio station being exhibited at a recent Maker Faire. [Richard Hayman, WN3R, photo]

KID Museum (<http://kid-museum.org>), located in the Washington, D.C. area, offers unique, interactive experiences for elementary and middle school-aged children. Exhibits and activities integrate hands-on science, technology, engineering, art, and math learning with an exploration of world cultures and global citizenship. It also boasts its own Amateur Radio station: KM3KID.

KM3KID is supported by seasoned ham radio operators from the community. They encourage younger audiences with interactive demonstrations and offer hands-on workshops that engage youngsters in traditional and cutting-edge wireless communications.

In September, KM3KID traveled to KID Museum's signature event: Maker Faire Silver Spring (MD). Over 15,000 participants enjoyed activities offered by

over 90 makers, including 3D design and print, robotics, computer programming, and RC aviation. KM3KID operated an HF station, consisting of a TEN-TEC Omni V transceiver, an LDG AT-200ProII antenna tuner, and an Alpha Delta DX-EE multiband antenna on 20 meters. Demonstrations also included talking to some children in Saint Lucia using a 2 meter mobile radio over Echolink via the K3WX-R repeater and J69DS-L link.

KID Museum was impressed by the crowd's enthusiasm for its ham radio station and the activities that are natural extensions of radio, like electronics, microcontrollers, sensing, and communications. It proved that deep inquiry is fueled by hands-on engagement — the type that Amateur Radio operation requires.

Claire Cocciole is director of Maker and Community Partnerships for KID Museum.

Amateur Radio Sparks Interest at Elementary School

BY KATHY LAMONT, KM4TAY

In the spring of 2016, local Amateur Radio operators John Meyer, N2DRL, and Terry McCarty, WA5NTI, approached me about the possibility of coming in to talk with some of my 4th and 5th grade students at Antietam Elementary School, Woodbridge, Virginia, about ham radio. I didn't know anything about it, but it seemed like something my students could enjoy.

Fast forward to the fall of 2016: I now have my General class license, and my school's proposal for an ARISS contact has been approved. Our after-school ham radio club at Antietam Elementary (or "Ham-tietam," as my students named it) is actively learning about electronics and participated in its first School Club Roundup in February.

In the fall, we had eight meetings, with about 25 to 30 students attending each one. Every week we learned a little about radio and had some fun, too. We practiced emergency operations in September, which worked well considering the big rains we got the same day! We learned about the phonetic alphabet and practiced spelling things with it. We played around a bit on 2 meters, had some repeater conversations, learned about satellites, and listened to a guest speaker talk about orbital mechanics, which both the students and parents appreciated.

We also enjoyed a whole evening learning about EchoLink and talking with a youth group from Georgia (with Martha Muir, W4MSA). During the holiday season, we talked with "the North Pole" (actually Western New York), and I borrowed my 3rd graders for 30 minutes so they could put in their requests with one of Santa's elves — it was super cute and the kids were thrilled! I also used a video, which I received from the ARRL Teachers Institute I attended this summer, about how to express Ohm's Law and did some work with schematics. We took a walking field trip to our local power lines and had our local utility, Dominion Power, join us to talk about the power lines and alternating current.

In January, one of my 3rd graders and two teachers at the school passed their Technician exams and have helped others become interested, too. As we head into the spring, many of my 3rd- through 5th-grade students are interested in trying for their licenses. We have some work to do in class this spring to make that happen.

We have great things to look forward to as we continue to prepare for our ARISS contact in a few months, and we can't wait!

Kathy Lamont, KM4TAY, has been teaching elementary students for 19 years. She is currently a K-5 gifted education resource teacher in Prince William County, Virginia.



Teacher Kathy Lamont, KM4TAY, gives a radio antenna lesson to her students at Antietam Elementary School. [Vicki Sweet photo]

Making a Good Hobby Better Through Post-Licensing Enrichment

BY TIM BUSCH, NØCKR

Having developed a successful and well-received One-Day Amateur Radio Technician Class, with well over 200 new hams licensed in the past two years, I immediately started receiving requests from the new hams on upgrade classes and “how-to” activities. As a result, I began developing an enrichment program to help our newest hams make their hobby experience even better.

As soon as they become licensed, we encourage all our new hams in the area to check into our Sunday evening “New Ham Net.” On the net, they have an opportunity to learn the phonetic alphabet, establish communication, compare notes with other hams, and ask questions of more experienced operators. The net has been so successful that we’re talking about expanding our one-hour time slot to accommodate more check-ins.

We’ve also had excellent participation at the Get On The Air (GOTA) station during Field Day. GOTA operation is a giant leap toward eliminating mic fright. At our club’s (Cedar Valley Amateur Radio Club) first big Field Day event in 2015 (category 19A), we had 30 new hams stop by the GOTA station.

Beyond these activities, I am putting together a series of mini-classes. Each segment of this new program teaches specific skills related to ham radio. Following is a partial list:

- Programming Radios and Getting on the Air
- Soldering 101
- Multimeter 101
- Build and Use a Roll-Up J-Pole Antenna
- Build and Use a Satellite Antenna
- Foxhunts
- Operating Digital Modes
- Remote Operation
- Software-Defined Radios
- Transitioning from VHF/UHF to HF Operating
- Chasing Awards
- Learn CW
- Contesting
- Build Projects



The kit used in Cedar Valley Amateur Radio Club’s Soldering 101 and Multimeter 101 mini-classes. [Tim Busch, NØCKR photo]

Each class is intended to be no more than two hours at a sitting, so they can be held before a monthly club meeting. The variety of subject matter allows many club members to get involved in leading a topic. Materials kits are prepared in advance, so students walk away with practical items they can use at home.

I’m still in the development stage of several of these sessions, but the overall requirements are not a major undertaking, and they can be delegated among club members.

The best promoters of Amateur Radio are the newest members of the hobby. Keeping them interested and excited will be a nice growth engine for your club. This enrichment program is a great way to encourage more club activity.

I am happy to help others set up classes or answer questions about this program. Drop me an email at NØCKR@ARRL.net for more information.

Tim Busch, NØCKR, is an Amateur Extra class ham and was first licensed in 1974.

Charter School's Young Scholars Reach Great Heights via ARISS

BY THOMAS GLAAB, AJ4UQ

Palmetto Scholars Academy (PSA), a public charter school providing a gifted curriculum to students in grades 6–12 in North Charleston, South Carolina, has a lot of experience with space science. But as we noted in our application for an ARISS contact, all of our mission design, micro-gravity experiments, and other work strictly focused on science. An Amateur Radio on the International Space Station (ARISS) contact would add the human element to our portfolio.

By the spring 2016 ARISS window, the school's Amateur Radio club, K4PSA, had licensed two teachers and two students, and had strong support from local organizations, particularly the Trident Amateur Radio Club (TARC). Local hams involved in the ARISS effort provided two stations, antennas, rotators, computers, feedline, and the experience to run a contact.

While the planning was being done, we were working hard to get more students licensed — our goal was for the students to be the operators for the contact, with the adults simply standing by. We held two-hour classroom sessions on alternate Fridays, with after-school club meetings every Friday. This work paid off, with three more students earning their Technician licenses and several more ready to test.



Students at Palmetto Scholars Academy ask their questions of astronaut Shane Kimbrough, KE5HOD, during the school's ARISS contact. [Joe Bullinger photo.]



ARISS Application Window

ARRL received 35 applications during the spring proposal window that closed April 15. The next proposal window will open September 1 – November 1 for contacts to be scheduled July – December 2018. For information on applying, visit www.arrl.org/hosting-an-ariss-contact.

On the day of the contact, we were ready. The questions had been selected and approved by ARISS. The student hams were familiar with satellite operation and comfortable on the air. They were also learning practical lessons, such as how to safely get heavy equipment onto the school's roof.

The contact was scheduled for Friday, February 10, 2017, after lunch. A local TV station was doing live remotes from the parking lot starting at 4:30 am, and four TV networks sent camera crews. Over 600 students, parents, and community members crowded into the PSA gym. Nineteen students with 21 questions were ready to go.

At 12:59 pm Todd, KN4ADY (now W4TFC), started calling "NA1SS this is K4PSA." After several calls and increasing tension, Station Commander Shane Kimbrough, KE5HOD, returned our call. The entire gym broke out in applause and immediately got quiet to listen to the Q&A. We were not expecting to ask all of our questions in the seven-minute, 38 degree pass, but the students were well-practiced and we made it through the whole pool with time to spare.

The support of the school principal, Dr Tim Gott, and the local amateur community was essential for our success. Teacher Kellye Voigt, KM4MSP, and TARC members Tom Lufkin, W4DAX, and myself led the effort. Shann Ladiser, KV4JJ, and Joel Thompson, KW4NO, contributed key equipment; Steve Behr, KE7OPZ, and Robert Wilhite, AJ5E, spent time in the classroom and after school preparing the students to get licensed and on the air.

Thomas Glaab, AJ4UQ, earned his Amateur Radio license in 2009 after 30 years of procrastination. He enjoys digital, weak signal, and QRP operating.

In the Classroom

Teaching with the Solar Eclipse

The upcoming solar eclipse on August 21, 2017, over the continental United States provides a rare opportunity to study radio wave propagation at LF (30 – 300 kHz) and VLF (3 – 30 kHz). EclipseMob is an effort to collect such signal data on a large scale to better understand how radio waves propagate. The project works by having people (students, teachers, museum groups, ham radio clubs, etc.) collect signals from across the continental US from a common transmitter before, during, and after the eclipse. The primary transmitter for this experiment is WWVB (60 kHz), the transmitter used to set time on clocks and watches throughout much of North America. Since only a receiver is used to collect data, no prior ham radio experience is needed. And, as 60 kHz receivers are uncommon, a simple kit is available for free for educational groups through a grant from the National Science Foundation. Webinars discussing the science and step-by-step construction of the receiver system are offered (sponsored by the Geological Society of America and the National Association of Geoscience Teachers). The webinars are NGSS-aligned and professional development certificates are available upon completion. For details, to view/register for a webinar, or to order a kit, visit www.eclipsemob.org.



Building the EclipseMob LF receiver. [Janet Oputa photo]



Students from the Southport Elementary School's (Kenosha, Wisconsin) radio club, KD9HWN, participate in the February School Club Roundup on a station procured through an ARRL Education & Technology Program equipment grant. It was the first time the school club participated in this event. All the students are in fifth grade and working on their Technician license. [Nathan McCray, K9CPO, photo]

Resources for Instruction

Instructors and teachers looking to introduce the topic of radio in their classrooms will want to check out the following offerings from NASA:

- For more educational ideas related to the eclipse, also see <https://science.nasa.gov/sciencecasts/southern-hem-solar-eclipse>.
- “Radio Waves (1888)” — A video created by NASA and posted on the Kahn Academy site offers a visually appealing introduction to spectroscopy and is posted [here](#).

Instructor Corner — News, Ideas, Support

Instructor Reporting and Recognition Program Gains Momentum

The Instructor Reporting and Recognition Program launched in October 2016 is starting to produce some good information for management. Here is a sampling of data provided through our instructor feedback system on classes listed with ARRL that ended during the month of March:

- 68 classes were listed that ended during the month
- 24 feedback reports were submitted, for a reporting percentage of 35%
- The reports received reflected 451 class hours of instruction provided by 42 instructors
- 31 of the instructors for which activity was reported are registered with ARRL
- 579 volunteer instructor hours were provided
- 199 students completed the classes, with 120 identified as passing their exam

Needless to say, we'd like to increase that feedback reporting percentage and get all active instructors registered with ARRL. If you're not registered with ARRL, here's the link to do so: www.arrl.org/license-instructor-registration. And, once registered, here's the link to print a certificate acknowledging you as a registered instructor: www.arrl.org/instructor-certificate. You'll need to be logged into the ARRL website to access this certificate.

A Passive Method to Learning Morse?

Learning Morse code may be made a little bit easier, according to a news item on *Scientific American's* website, through the use of wearable computers. In a study about haptics (the integration of vibrations or other tactile cues with computing gadgets), Ph.D. student Caitlyn Seim and computer science professor Thad Starner of the Georgia Institute of Technology found significant improvement in ability to tap out a sentence in Morse code in a group that received tactile cues over one that received audio only. For details, see "How to Learn Morse Code—Semiconsciously" posted [here](#).

Brush Up on Boy Scouts Merit Badge Requirements

New Tools for Radio

With the Boy Scouts of America's rules changes for the Radio Merit Badge, the Jamboree team has developed a first draft slide deck for the new requirements. You'll find it online at www.k2bsa.net/jamboree-radio-merit-badge/. It makes use of animations that should keep the Scouts' attention. There's also a Radio Merit Badge FAQ at www.k2bsa.net/radio-merit-badge-2/.



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Announcements, Upcoming Events, Opportunities, and Deadlines

Kids Day, June 18, 2017 — Kids Day gives young people on-the-air experience and provides a chance to interest them in getting a license of their own. For more information, see www.arrl.org/kids-day.

ARRL Field Day, June 24 – 25, 2017 — Information about this opportunity for public outreach can be found at www.arrl.org/field-day.

ARRL International Chair Named 2017 Dayton Amateur of the Year

The Dayton Hamvention has selected Frank Bauer, KA3HDO, the International Chair of the Amateur Radio on the International Space Station (ARRL ARISS) program, to receive its highest award for 2017: Amateur of the Year. Bauer has been a driving force behind the program since its inception. He also serves as AMSAT-NA Vice President for Human Spaceflight.



Bauer attended Purdue University, where he earned its prestigious bachelor's and master's degrees in aeronautics and astronautics. After a long career at NASA, he moved to the private sector aerospace industry. He earned his Amateur Radio license in 1974 and has served as the AMSAT-NA Vice President for Human Spaceflight for many years. Currently, Bauer devotes most of his time and energy to the ARISS program.

Congratulations to Frank Bauer, KA3HDO — and the entire ARISS team — on this honor!

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