

# Teaching the Future with Ham Radio

## Virginia's Chesapeake Public School System introduces Amateur Radio into its electronics classrooms.

### Edith Lennon, N2ZRW

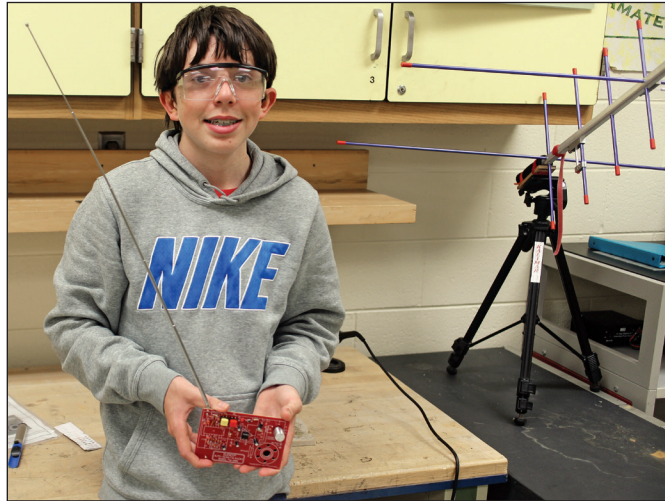
John Bowser, W4RMY, a Career and Technical Education (CTE) teacher at Great Bridge High School (GBHS), in Chesapeake, Virginia, is a man with a plan: to make Amateur Radio an official part of his school system's STEM (Science, Technology, Engineering, and Math) coursework. By developing a curriculum for his high school's electronics classes that incorporates Amateur Radio concepts and hands-on experience, he wants to empower the next generation of technical professionals and innovators. "My teaching philosophy from the beginning was to provide students with a more hands-on and pragmatic learning experience that would give them skills that could be used throughout their lifetime," says Bowser.

Having already put his philosophy and practical approach to work by using Amateur Radio in his own classroom, Bowser is taking the next step. His class is now a pilot program to determine if the curriculum will be implemented in all of his district's high schools.

### Amateur Radio, an Ideal Teaching Tool

Coming from a career that spanned naval aviation, design engineering, and aircraft mechanics instruction, Bowser began teaching basic and advanced electronics as well as wood shop at GBHS in 2012, around the same time he became interested in Amateur Radio.

"In the fall of 2013, I began looking for a good way to teach the advanced electronics class, Electronics II, the following spring," says Bowser. He'd been studying for the General class exam and "noticed quite a lot of similarities between what I was learning for the General test and the state competencies listed for the electronics class." He realized that using radio to teach electronics offered several advantages. "Students use wireless technology every day without thinking about it," says



Lucas Dunham with the FM radio he built for Electronics I, the precursor to Electronics II. [John Bowser, W4RMY, photo]

Bowser, adding that, "wireless technology, and Amateur Radio in particular, provides a hands-on way to illustrate many of the concepts involved." Critically, it also offers many opportunities for future careers.

The Electronics II class typically has about 20 students, ranging from grades 9–12. To gain acceptance for his proposal to incorporate a "wireless technology approach," Bowser first had to demonstrate to the CTE office and the district's curriculum development office that it was a relevant and practical way to teach the subject. Once approval was granted, he developed a pacing guide — a kind of instructional road map — which laid out all the required state competencies through the length of the course. He paired these competencies with material and subject matter involving wireless technology, using Amateur Radio to demonstrate the concepts.

### Support from the Ham Community

The process of integrating radio into the class accelerated when Bowser discovered K4AMG, a local non-profit Amateur Radio group dedicated to teaching electronics and wireless communication through the mentoring of youngsters.

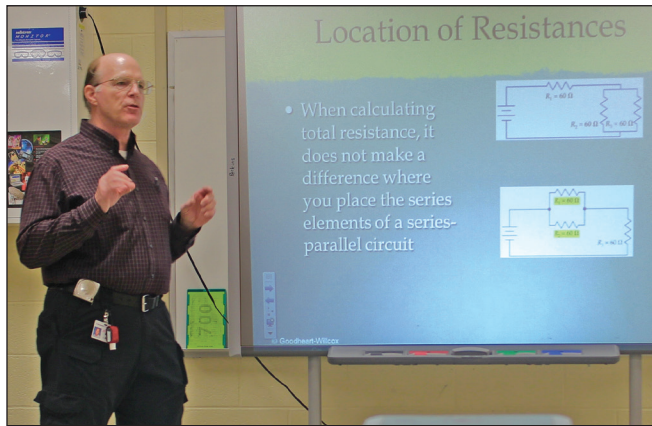
K4AMG was instrumental in getting GBHS' Amateur Radio station operational by purchasing or lending all the equipment needed to get on the air, as well as providing technical support.

Today, for HF operation, the school boasts a Kenwood TS-850 transceiver with an LDG AT-200Pro autotuner, a SignalLink USB sound card interface, and an 80 meter Carolina Windom antenna. VHF operation is via a Yaesu FT-1900R transceiver connected to a J-pole antenna. It's all used by the students, who, along the way, learn related concepts and skills, such as propagation analysis and soldering. Further, by operating from the school's radio club, W4GBH, they learn to understand and comply with governmental regulations.

To offer students a promising career path, Bowser emphasizes digital modes in his hands-on lessons. "I believe that the digital modes are a big part of Amateur Radio's future as well as being an excellent teaching tool for the students and their future in radio communication," he says. Currently, GBHS is operational on PSK31, JT65-HF, packet, and RTTY.

For lesson material and planning, Bowser

received assistance from the ARRL® through its Education & Technology Program (ETP) and Teachers Institute on Wireless Technology (TI) professional development seminar, which he attended in 2014. Both are part of the League's educational outreach to introduce teachers to Amateur Radio as an instructional resource and to provide an educationally sound curriculum focused on wireless communications. Information about the 2015 TI schedule can be found elsewhere in this issue.



John Bowser, W4RMY, teaching a lesson on complex circuits to his Electronics II class. [Josh Brown, KF4HJO, photo]

“One of the challenges was choosing specific activities from the large amount of material I had to pick from,” says Bowser. “The ARRL TI provided a wealth of information and activities, all of which could be used as course material.” Bowser has also been using content from the ARRL licensing manuals to teach concepts such as Ohm’s Law, series and parallel circuits, and component identification.

### Building on Success

After being tasked by Chesapeake Public Schools’ CTE supervisor with developing a curriculum for possible broader implementation, Bowser worked with two electronics teachers from other district high schools to update his original pacing guide and incorporate additional resources for teaching the Electronics II coursework. The goal in revising the curriculum was to

incorporate all of the Virginia Education Resource System Online state competency requirements within the material covered, as well as to increase the pass rate for the industry standard test administered by the National Occupational Competency Testing Institute, which may be taken at the end of the Electronics II class for industry certification.

The spring 2014 semester was the first to see full implementation of Amateur Radio in the Electronics II class and student interest level was greater than even Bowser anticipated. He says students find it fascinating and three have already obtained their licenses. He also learned that two fellow teachers at the school have Amateur Radio licenses and that this has motivated them to upgrade. (Bowser himself now holds an Amateur Extra class license and

is a Volunteer Examiner.)

GBHS’ Electronics II class has now become a pilot program for the district to evaluate how well Amateur Radio performs in the classroom setting. Its implementation at the other high schools will be at the discretion of the school administration. If fully adopted, at least 100 students across seven high schools will likely be exposed to the new Amateur Radio-infused curriculum.

“How this grew beyond my classroom I really can’t say for sure,” says Bowser, “but what I do know is that the school district really wants students to get involved and be interested in learning, and they saw in Amateur Radio a means to accomplish this.”

Edith Lennon, N2ZRW, an ARRL member, has been licensed since 1994 and is especially intrigued by Amateur Radio’s ability to reach around the globe unimpeded by political borders. She is a freelance journalist and a contributing editor to the ARRL Education Services Department’s *Radio Waves* newsletter. Edith can be reached at [edithmlennon@gmail.com](mailto:edithmlennon@gmail.com).



## Ham Radio is for Everyone – Including You!

This article highlights only one aspect of Amateur Radio. Whether you’re interested in electronics or technical experimentation, being of service to your community, connecting with people worldwide, or you just want reliable communication available to you at any time, Amateur Radio offers all this and much more.



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