

Amateur Radio Benefits for High School Students' Education

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North Florida Amateur Radio Club

Alachua County Amateur Radio Emergency Service

Contact the ISS



Astronaut Reid Wiseman, KF5LKT makes personal contacts with hams during the US Field Day exercise in June 2014.

Students with the antennas they built themselves at some of our entry level classes



Background:NFARC/ARES

- Local Alachua County volunteer club, typically retired or experienced workers in all walks of life.
- 4 dozen total members -- 15+ VERY active
- **Dozen Level II FDLE Background Checked to serve in County or State shelters**
- 3 years of publishing Exercises (dozen texts on Amazon)
- >75% of Active hold the very highest Amateur License offered by FCC

Participants in a simulated mass epidemic exercise, held Winter 2019



Experienced

- Years of experience holding Educational Courses for FCC Licenses -- beginner, intermediate, top-level
- Experienced Instructors
- Experienced radio & antenna builders
- Members successful in many careers
- **Department Homeland Security SHARES licensees**
- Only Florida volunteer radio group holding HSEEP-compliant emergency exercises



Educational Goal

- Offer diversified opportunities for high school students to gain exposure to
 - practical STEM **in action**
 - electrical SAFETY
 - experience with government agencies (FCC licensure) --
understanding of the importance of a good clean record toward future opportunities
 - get to know community leaders who can recommend them to colleges
 - understanding of radio (electrical wave) communication that spans cell phones to satellites
 - better understanding of ELECTRONICS and COMPUTERS with lifelong benefit

Space Station Program



ARISS
Amateur Radio on the International Space Station

School can submit an application for your own radio contact with the International Space Station -- as have many schools before you.

Developing the required equipment will teach your students many, many skills

Funding is not really an issue.

Entire school body can be involved!

<https://www.youtube.com/watch?v=Z-yHD9IVbH8>

Hundreds of Schools Have Done This

1366 MAOU Lyceum Nizhny Tagil **Russia 2019-11-30 14:15 direct** R9CT RV3DR Alexander RSØISS
60

1301 No. 39 UTC Skvortsov

1365 Istituto **Merone Italy 2019-11-21 09:12 telebridge** W6SRJ IZ2GOJLuca Parmitano NA1SS 60

1300 Comprensivo Di UTC KF5KDP

Merone -Mons.

A. Pirovano

1364 Istituto San Paolo **MilanoItaly 2019-11-21 09:12 telebridge** W6SRJ IZ2GOJLuca Parmitano NA1SS 60

1300 delle Suore UTC KF5KDP

Angeliche

1363 **Lakeside West Point Utah USA 2019-11-18 19:01 telebridge** IK1SLD W4NTR and Drew Morgan
OR4ISS 60

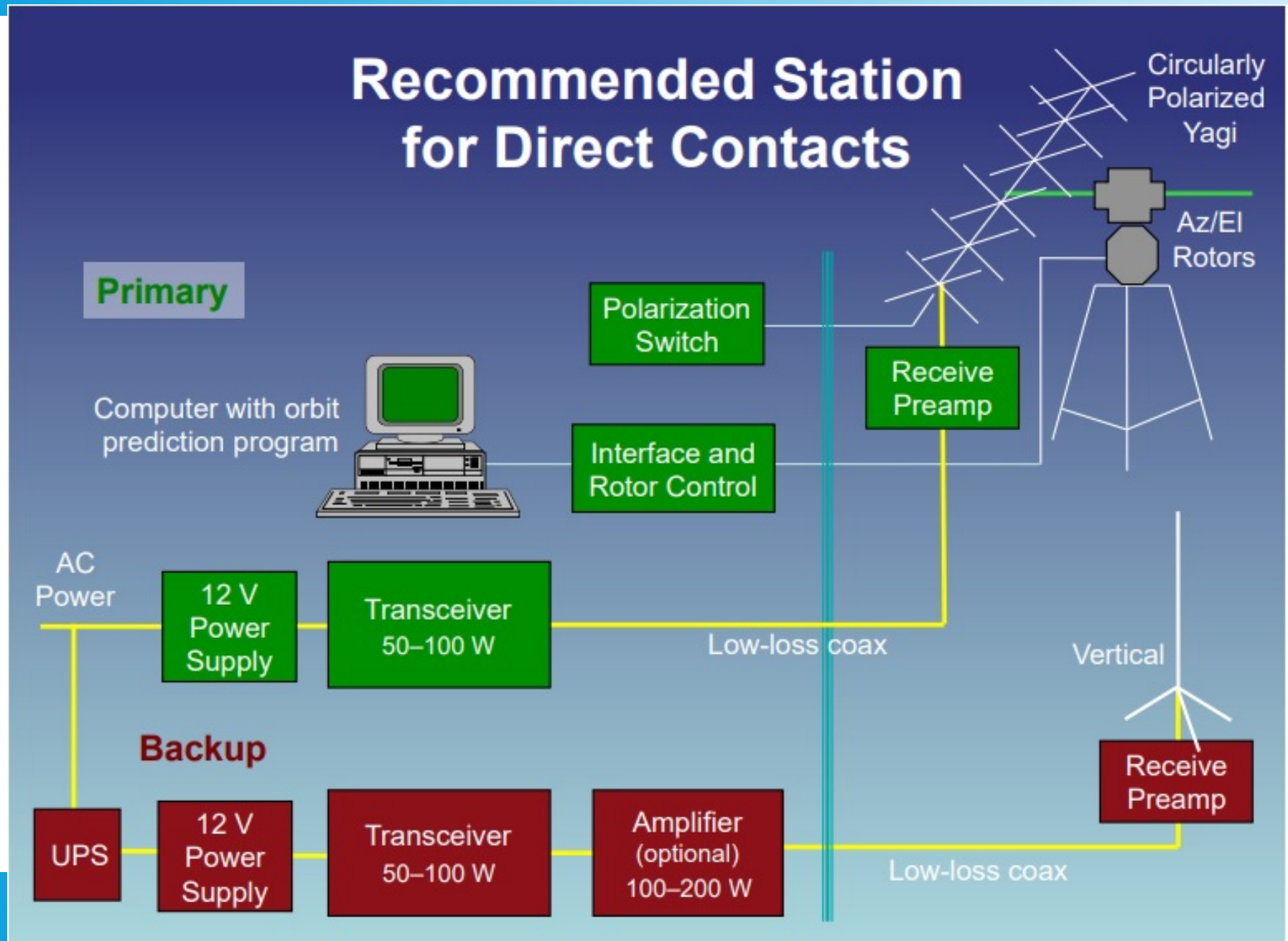
1299 Elementary School UTCW1HQL KI5AAA

1362 I.I.S.S. "**MajoranaPutignano Italy 2019-11-13 09:18 telebridge** K6DUEIKØWGF Luca Parmitano
NA1SS 60

1298 - Laterza" UTC KF5KDP

1361 European High Brindisi Italy 2019-11-13 09:18 telebridge K6DUEIKØWGF Luca

Your students can build this



Benefit: for the STUDENTS

*We have plenty of volunteers
for our current missions.*

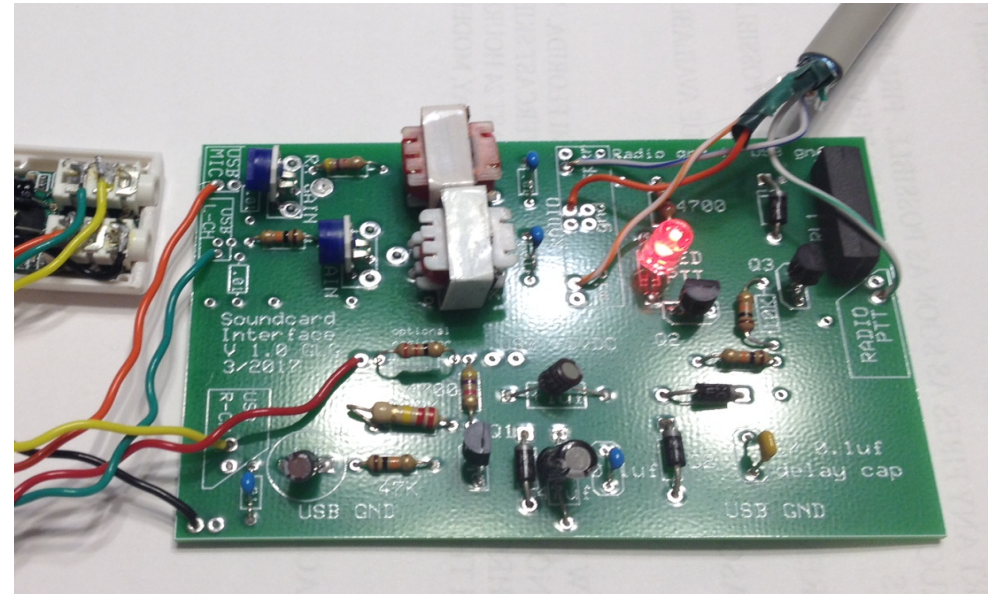
The goal here is not so much to benefit our group, or
amateur radio....

**but to offer new opportunities to a larger number
of young students--**

it doesn't matter whether their eventual career is
directly related, **everyone needs some practical
understanding of the issues we address.**

Everything today has electronics

- Car computers / sensors
- TV / DVR
- Cell phones
- Burglar alarms
- WIFI routers
- Basic understanding of electronics, communications, computers important for modern living



Our own printed circuit board that I designed. Gives our students inexpensive entry into the world of advanced digital modulations. They learn a resistor from a transistor, from a capacitor, how to solder, basic troubleshooting.

BENEFIT: For the Teachers

What is the Education & Technology Program?



National ham radio organization has competitive, fully funded programs to give teachers a multi-day immersion education in STEM in education using amateur radio.

GRANTS are also available for school radio station equipment.

But funding is never really the issue-- there are motivated volunteers in our area who will naturally take care of your school's needs.

Teacher's Dream

SCIENCE-- Electrons, Charges, Fields, Waves, Earth Atmosphere, Ion Layers, Propagation

TECHNOLOGY -- wires, computers, Raspberry Pi, memory, antennas, transmitters, mixers, decoders, advanced digital systems

ENGINEERING -- building circuits, boards and systems exposes students to manual dexterity skills, and the engineering optimization method

MATH -- goes from simple calculations (Ohms Law) through vector trig, and into imaginary numbers, logarithms, exponents

GETTING ALONG: social skills, sense of dignity, self-esteem, collaborative effort, belonging.

(my particular background)

- Trained as an Electrical Engineer, Master's Degree, on National Science Foundation Scholarship.
- Ga. Tech Co-op student with the C.I.A.
- Designed / constructed high power ham radio amplifiers well before college.
- Changed careers --> M.D. Practiced Anesthesiology 35 years, including Liver Transplantation. (Also private pilot, instrument rated.)
- Taught 2+ years High School at local religious school -- Basic Chemistry; A/P Physics; A/P Calculus -- love teaching high school students
- Back to Amateur Radio Emergency Communications as retirement (more volunteering) approaches
- Couple dozen FEMA courses, learned Homeland Security Exercise Evaluation Program; self-published dozen educational texts (Amazon, Kindle) that are slowly impacting volunteer backup disaster comms.
- Volunteer for Florida Baptist Disaster Relief / Alachua County Emergency Management

Modern Ham Radio--diverse options

- Digital communications utilize anything from Raspberry Pi to Windows laptops
- Automated radio email systems impervious to hackers & possibly resistant to EMP
- Ionospheric refraction -- world wide comms
- Repeater systems- cover cities, counties
- Extreme low-signal demodulation systems designed by Nobel prize winners
- and plain old chit-chat with friends!

Suggested Schedule #1

- Weekly after-school 1 hr mentoring by background-checked experienced volunteers who can also mentor teachers -- if desired.
- Work through published license texts.
- **FIRST SEMESTER:**



- Study / Test to obtain FCC Technician Class license
- Includes basic electricity, safety, how radio works
- Sense of accomplishment

Suggested Relationship

Suggest **key teacher** be the faculty leader.

Our group members very familiar with background check systems (all volunteers will be drawn from those Level II checked by Alachua County and badged for shelter volunteer access).

We can mentor both students and teacher(s) -- key will be seeing progress. “FAIL FAST” principles of moving resources to highest benefit for students.

Multiple national mentoring groups offer insight and standards.

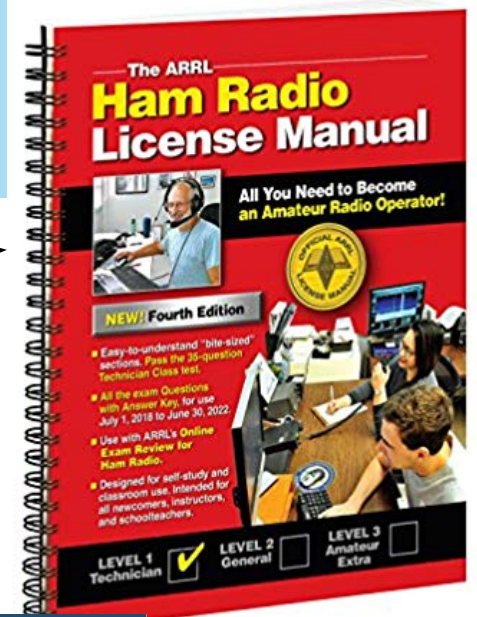
(Funding)

Published entry license text = \$30

Donors provide texts, checked out to students, collected for future use when semester finished.

License exam fee: \$15 -- suggest that students foot that bill so they recognize importance of studying.

With our experience in publishing >dozen books on Amazon, we may eventually write our own study text.



Amateur Radio Digital & Voice Emergency Communications - 2nd Ed.
Gordon L. Gibby KX4Z BEE M5
MD & Barry Isabelle N2DB



Funding: School Station

- We recommend a modest school station in a “lockable” room, to allow real educational demonstrations as well as giving students with more limited home possibilities the chance to experience technology.
- Donations will likely provide all the equipment. (ARRL also has a grant program.)
- The major issues are completely solvable by a committed school: ability to get two coaxial cable lines (similar to Cox Cable) to the outside and install two simple wire-type antennas.

Our members have very significant experience at antennas, having put up > 2 dozen over the last 3 years.

Our entry level classes often involve having students make an antenna out of simple materials, teaching technology and economics at the same time.

We designed and constructed the current backup ham/SHARES antenna used by the Emergency Operations Center.

2nd Semester

- **Build Experience --**
 - Learn basic and disaster communications
 - Experience in equipment building, school radio station
 - Experience in computers / digital communications (windows PC and also raspberry pi Linux)
 - Experience in various types of antennas

2nd Year

- Repeat the sequence
- Returning students study/pass General Class license exam (2nd of 3 license levels)
 - improved electrical / computer understanding
 - move to world-wide communications
- Returning students help mentor NEW students working on their First license

Alternate Schedule

Our club is very experienced at multi-day immersive educational programs -- “bootcamp”



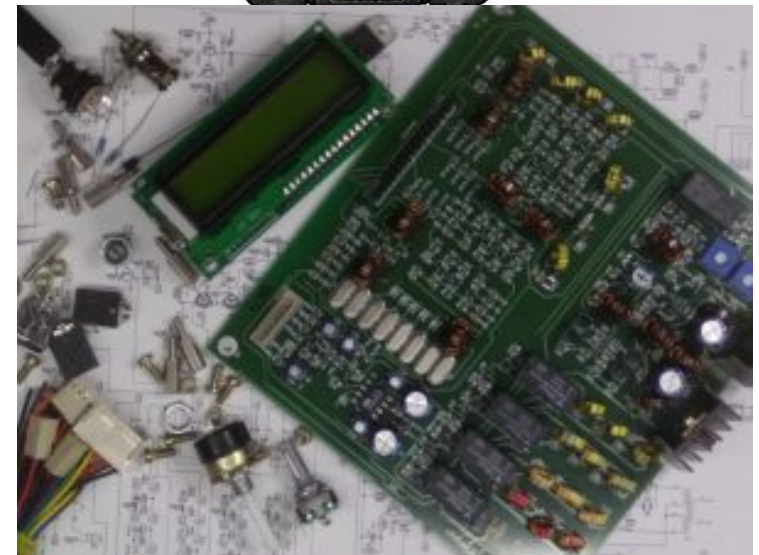
We can easily create a multi-day STEM immersion for non-school weeks that will provide your students with a “license in a week” success....and help them see how technology will play a role in any career choice. We carry our Homeland Security-compliant Full Scale Exercises roughly twice a year -- your students (and their parents!) can jump right into community preparedness.

Benefit: Rub Shoulders

- Students will gain much more than just radio & electronicsbecause
- We have developed a good cadre of instructors **who have successful experience in many walks of life** -- that will rub off on the students.
- All persons involved in training students will be Level II background-checked individuals approved by the local EOC for Shelter Deployment.

Inexpensive Personal Radios

- First license allows use of VHF walkie talkies \$25
- Soldering experience in gaining digital technology
- HF voice/digital radios built indigenously in Indian -- \$129
- Far cheaper than cell phones,and much more educational value



Our Club Comm. Experience

- Because of our disaster comm mission, we have wide-ranging expertise:
 - Satellite Communications - amateur radio satellites
 - VHF / UHF voice short-range
 - Repeater construction & maintenance
 - Short Wave all over the world communications
 - Disaster communications (Hurricane Matthew)
 - Include server stations for DHS & amateur

For Further Information

Contact

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