

Signals

The Amateur Radio Journal of the ARRL
Eastern Pennsylvania Section



Volume 1, Number 1

January 2024

Introducing *Signals*, the EPA Newsletter

As amateur radio operators we know a thing or two about communication. We pride ourselves in being skilled specialists in passing message traffic via voice, CW, RTTY and various digital modes. Unfortunately, we often fall short communicating events about our hobby to each other.

To address this shortcoming we are proud to present the inaugural edition of *Signals*, the *Amateur Radio Journal of the ARRL Eastern Pennsylvania Section*. We will focus on the events and people of the EPA Section in the eastern half of the Keystone State. We will feature departments including *Upcoming Events*, *Club Corner*, *ARES® Activities*, *Youth Activities*, *POTA/SOTA/VOTA Operations*, *Focus on People*, *Digital Operations*, *Antenna Workshop*, *Technology*, *Tools of the Trade* and others.

For this publication to succeed and to be of value to the amateur radio community we will need your support in forwarding information and photos you believe will be of interest to your fellow hams. We will solicit information from club public information officers but anyone may submit articles and photos of activities.

To submit articles or photos, please email them to [Signals Editor](#) ensuring you furnish captioning information including names and callsigns of people in the photos and stories. All submissions will be subject to editing for accuracy, appropriateness and brevity.

Presently, we anticipate a bimonthly publication schedule, issuing one edition every two months. We will make the issues available for everyone on the [EPA website](#) in a pdf format for maximum compatibility. Thank you for your interest and support.

FCC Removes HF Symbol Rate Restrictions

In a November ruling, the FCC unanimously voted to amend Amateur Radio Service rules to replace the baud rate limit on the amateur HF bands with a 2.8 kHz bandwidth limit to permit greater flexibility in data communications.

Following the ARRL's request, the FCC amended the rules replacing the current HF restrictions with a 2.8 kHz bandwidth limit that will allow for additional emissions that were prohibited under the previous baud rate limitations.

ARRL President Rick Roderick, K5UR, hailed the FCC's actions to remove the symbol rate restrictions. Roderick stated that "this action will measurably facilitate the public service communications that amateurs step up to provide, especially at times of natural disasters and other emergencies such as during hurricane season. Digital technology continues to evolve, and removing outmoded data restrictions restores incentives for radio amateurs to continue to experiment and develop more spectrum-efficient protocols and methods."

This rule change will no doubt lead to new digital mode innovations that will enhance data communications on the crowded high frequency bands. It will improve the capability of amateur radio emergency operations in a significant way.

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QTX

Bob Wilson, W3BIG
EPA Section Manager

QTX is Q-code meaning "I will keep my station open for further communication with you."

"No Man is an Island"

Today, 17th century English poet John Donne would probably rephrase that as *no person* is an island. The sentiment, however, is the same. We are all individuals but none of us walks alone. We are all interconnected. As children, we follow in the footsteps of our parents. When older, we learn from friends, teachers and fellow travelers. The essence of what we are as individuals is the sum of what we have learned from and experienced with other people.

Being interconnected is what amateur radio is all about. Without others to communicate our hobby would lack a purpose. What we do is reach out through the magic of radio to make a connection with those who share our passion.

On the fantastic voyage that is amateur radio, many of us have learned from or been helped by fellow amateurs along the way. In the earlier days of amateur radio those who graced us with the wisdom of their experience were called *Elmers*. Today, they are known as mentors. They show us the ropes, assist with the complexities of our technologies and guide us with caring hands and voices.

When I began this journey, as a novice licensee in 1978, I was very fortunate to have a mentor who was a television broadcast engineer with whom my father worked. His name was Harry, not Elmer. He was a wonderful role model with tons of patience. I had just completed assembling my first transceiver – a Heathkit HW-8. After initial testing, I wanted to ensure it was set up on frequency. Harry had a nice test bench in his shack complete with a frequency counter and he invited me over for an alignment session. I recall seeing the HW-8 with its green top cover off as Harry made connections with the probes. After keying the transceiver and glancing at the frequency counter, Harry abruptly raised his eyebrows. I assumed I had really screwed something up, but Harry smiled broadly, stating that, without test instruments, I had the VFO adjusted to within 2 kHz of dead

(continued on next panel)

(No Man is an Island—continued)

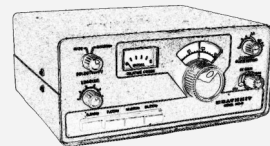
on frequency. I attributed that to the wonderfully precise Heathkit assembly manuals. I had merely followed directions.

I was really lucky to have had a great mentor. Not everyone is so fortunate. Today, though it is really easy to get an FCC license, especially compared with years past when we were tested on both Morse code proficiency and theory elements, way too many new hams fall by the way-side, losing interest, letting their licenses lapse. That's a real travesty.

The culprit in this tragedy is many new hams never fully join our amateur radio community. They fail to make a connection with a mentor who can show them the way, guiding them with experience and wisdom. We need to change that. It's up to us to make the effort to bring them into the fold.

The next time you're at a club meeting, a hamfest or chatting on a local repeater, look around at the fresh faces or listen to the new voices and reach out to them. Encourage questions, make helpful suggestions, volunteer your considerable experience and make a friend for life. Invite them to a social gathering or to your ham shack. Show them how to solder a PL-259 connector or how to program their HT. Remember what it was like when you began this journey and how helpful and edifying it was to have those guiding hands.

And, keep John Donne's sentiment alive in your heart. *"No man is an island."*



Signals



Signals is published bimonthly by the Eastern Pennsylvania Section of the ARRL with the express purpose of communicating information of interest to the Amateur Radio community in the EPA.

Editor: Robert G. Wilson, W3BIG, SM, SEC

Public Information Coord: Robert A. Griffiths, NE3I

Articles, announcements and pictures may be submitted for consideration by emailing the [Editor](#) or [Public Information Coordinator](#). All materials are subject to editing for content, accuracy and brevity.

About the EPA



ARRL Eastern Pennsylvania (EPA) Section Statistics

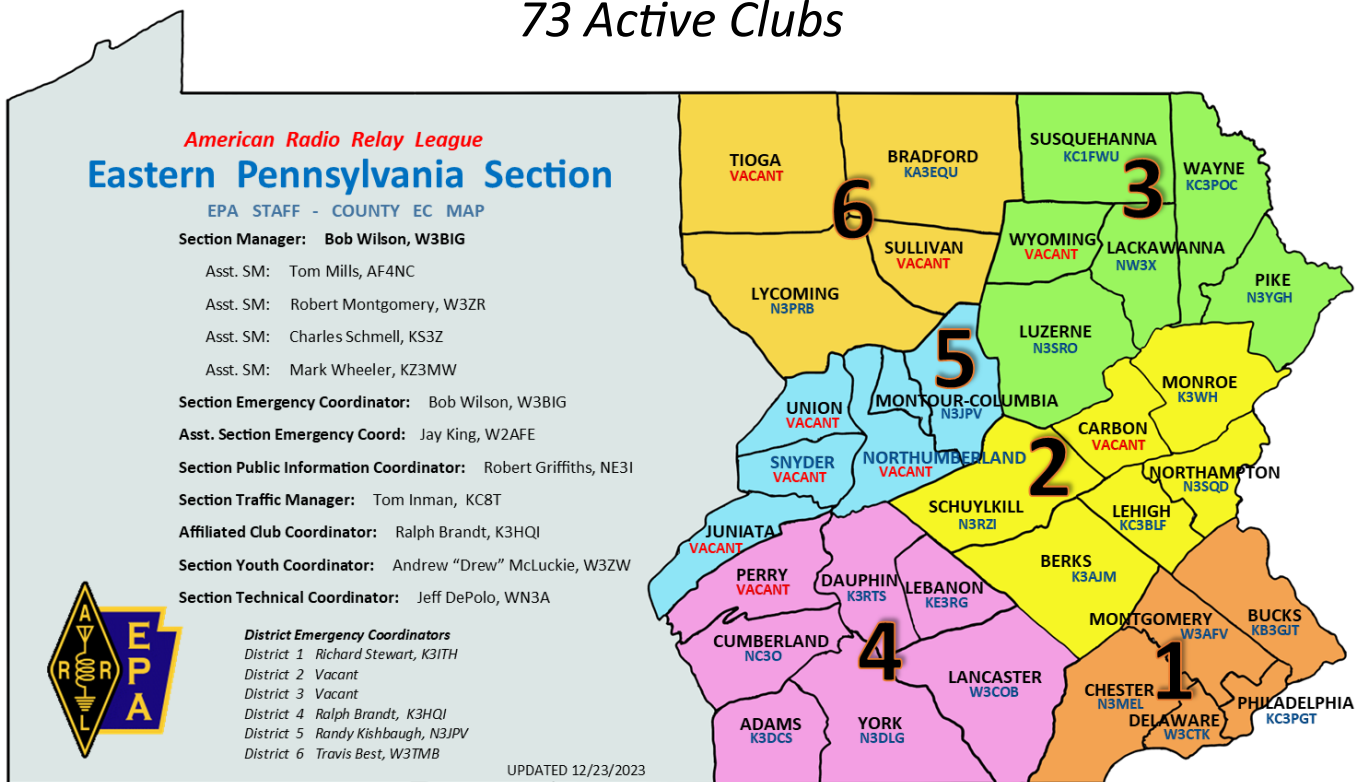
34 Counties

22,000 Square Miles

13,000 plus Licensed Amateur Radio Operators

3,500 plus ARRL members

73 Active Clubs



EPA Districts, County Emergency Coordinators, Leadership Positions

[EPA Website Link](#)

Upcoming Events in the EPA



January 2024

JAN 06 ARRL Kids Day Event (1:00 pm to 6:59 pm) The Pottstown Area Amateur Radio Club, K3ZMC, and the Education Alliance for Amateur Radio, KE3AAR, along with Civil Air Patrol Squadron 904 will host a Kids Day Event at the Quakertown Airport located at 2425 Milford Square Pike in Quakertown. The ARRL offers an event twice a year to promote amateur radio to youth. Share the excitement with your kids or grandkids, a scout troop, a church or the public. Kids Day is designed to give an on-the-air experience to young people to foster interest in getting their own license. It is also designed to permit older hams to share their station and love for amateur radio with their children.

Participation

For Kids: If you are a young person interested in amateur radio, stop by during the event. Take the opportunity to get on the air and learn what amateur radio is all about.

For Civil Air Patrol Members: Stop by and assist in operating the station, expanding your knowledge of communications. An amateur radio license can provide valuable knowledge and experience that can be brought over to CAP in your role as a member or if you desire to pursue a communications specialty track.

For Amateur Radio Operators: Listen on any of the following frequencies, answering any "CQ Kids Day" calls. The suggested exchange is name, age, location and favorite color. Be sure to work the same station again if a young operator has changed. To draw attention, call "CQ Kids Day." *For questions, contact [Walt Skavinsky, KB3SBC](#)*

10 Meters: 28.350-28.400 MHz

12 Meters: 24.960-24.980 MHz

15 Meters: 21.360-21.400 MHz

17 Meters: 18.140-18.145 MHz

20 Meters: 14.270-14.300 MHz

40 Meters: 7.270-7.290 MHz

80 Meters: 3.740—3.940 MHz FT8 will operate on 20 and 40 Meters

Pottstown ARC Repeaters: 147.210+ / 131.8 and 443.550+ / 131.8

JAN 13 Harrisburg Radio Amateurs' Club (HRAC) Winterfest (7:00 am to 11:00 am) The HRAC Electronics Expo and Hamfest will be held at the Vietnam Veterans of America facility, 8000 Derry Street in Harrisburg, PA. Admission is \$5.00 per person and tables are \$5.00 each. DXCC / WAS / VUCC QSL card checking on-site. Coffee and snacks are available. For more information see [Winterfest flyer](#).

JAN 18 Mt. Airy VHF Radio Club "Pack Rats" Program on Pan Adapters & Spectrum Analyzers (7:30 pm) The Mt. Airy VHF Radio Club, the Pack Rats, will host a program on pan adapters and spectrum analyzers at its January 18 meeting. The presenters are Gary, WA2OMY and George, KA3WXV. The program and meeting will be held on Zoom. For further club information and the Zoom credentials, see [Pack Rats link](#).

JAN 27-28 SVARC Winter Field Day 2024 (1900 UTC Saturday to 1859 UTC Sunday) Susquehanna Valley Amateur Radio Club will participate in *Winter Field Day*. The event will be held at the Ridge Runners Rod and Gun Club located at 276 Marsh Creek Road in Wellsboro, Pennsylvania. Operations will be on 160, 80, 40, 20, 15 and 10 Meter HF bands and all bands above 50 MHz. The event is designed to permit operators to practice emergency communications in winter environments that may include conditions such as freezing temperatures, snow, ice and other challenging conditions. Lodging will be in a nice hunting cabin with a kitchen, bathroom, shower and bedrooms. If you're planning to stay the weekend or have questions, contact [James Heath, KC3OXXN](#) for sleeping arrangements.

Club Corner

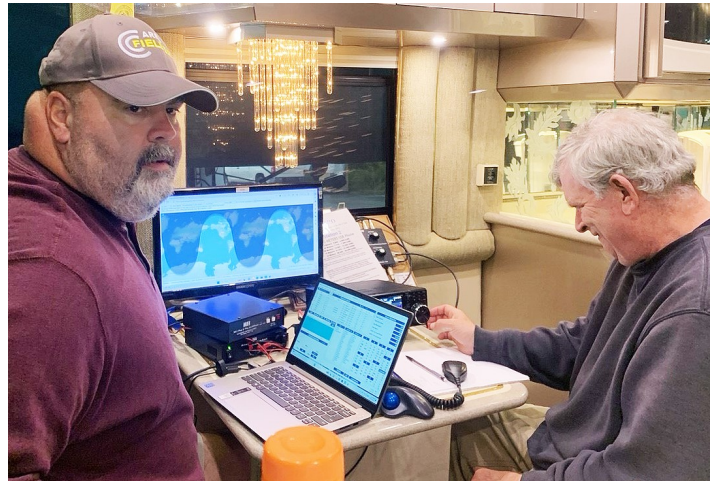


Wayne County ARC Operates County-line Station during Pennsylvania QSO Party

Mark Wheeler, KZ3MW

During the October PA QSO Party on October 14-15, the Wayne County Amateur Radio Club <http://W3ARO.org> set up a portable operation within 100 feet of the junction of the Lackawanna, Susquehanna, and Wayne County geographic intersections. The site enabled the club to operate in the PA QSO Party as a three-county "County Line" station. This location provided QSO score credit for all three counties more than 950 times to stations in 62 Pennsylvania counties, 40 ARRL & RAC sections in North America, and 1 "DX" country. Permission to operate as a County Line station was obtained from the PA QSO Party Association, but the club had to appear before the Forest City Borough Council to obtain approval to use the designated site.

Wayne County ARC operated four HF radio stations in both CW and SSB modes using the Club call W3ARO. Four club members contributed their camper / RV radio stations and located their portable operation and temporary antennas in Forest City, PA. Members participating during the rainy weekend were Chris-KC3ASJ, Bill-KC3EUJ, Charlie-KC3GSV, Keith-KC3NDU, Mark-KZ3MW, Jack N2KUO, Lee-WA3LBR, and Ken-WB2HJQ.



Lee Romich-WA3LBR (L) and Charlie Maas-KC3GSV operate from an RV during the Wayne County PA QSO Party event.



Keith Lynn-KC3NDU operates CW during the Wayne County ARC PA QSO Party site straddling three Pennsylvania counties.



Chummy, the radio dog, who belongs to Ken Katzmann-WB2HJQ, inspects the site during Wayne County PA QSO Party.

Club Corner – Continued



Philadelphia Club Supports Wounded Veterans Through Therapeutic Stamp Collecting Program

Bob Josuweit, WA3PZO

What do you do with the envelopes when you receive about 1000 QSL card requests following the July 13 Colonies Special Event? Do you just throw out the envelope or is there something you can do with the cancelled stamps? This was a question discussed by QSL managers for WM3PEN, the club call of the Holmesburg Amateur Radio Club (HARC).

WM3PEN trustee Bob Josuweit, WA3PZO, learned of a program called *Stamps for the Wounded*. Stamps for the Wounded (SFTW) is a service organization dedicated to providing comfort and stimulating activity to U.S. veterans through stamp collecting. SFTW sends donated U.S. and foreign postage stamps and other philatelic material and supplies to wounded, ill and isolated veterans. SFTW has been helping veterans since 1942.

Just how many stamps has the club shipped? According to Rich Shivers, K3UJ, who coordinates the shipments, HARC has shipped over 68 pounds of stamps. Shivers says approximately 4000 stamps are in a pound. That means the club has shipped about a quarter million stamps to help veterans. For more info follow the link: [SFTW](#)



Holmesburg ARC has shipped a quarter million stamps to help the wounded veterans stamp collecting program.



Operation Toy Train Special Event Station

Walt Skavinsky, KB3SBC

The Operation Toy Train Special Event Station, using the call W3A, was on the air November 17-19 to spotlight the toy collection efforts of the *Operation Toy Train* charity in support of the *Toys for Tots* program. The Allentown and Auburn Railroad hosted the Toy Train event which collected 120 donated toys in 3 hours.

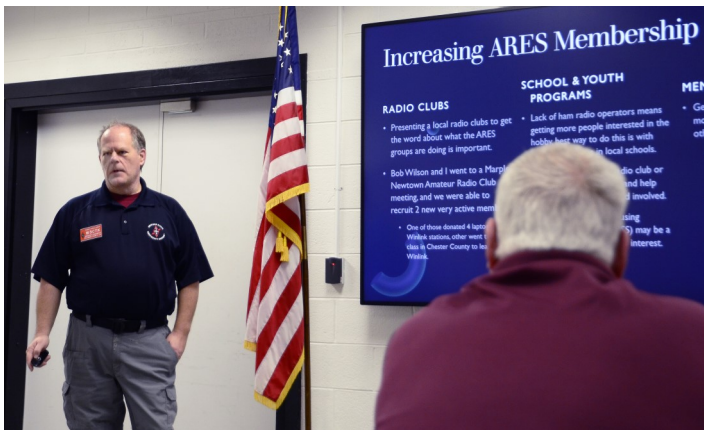
The special event station, W3A, operated from Conrail caboose 21165 as it traveled the rails on a route with several other cars between Tipton and Kutztown, Pennsylvania. Two operators including Walt Skavinsky, KB3SBC, and Auburn Railway conductor Nicholas Hofke, KC3SGN, logged 184 contacts from the United States, Europe and Asia on both SSB and FT8. Numerous QSOs were made in which the stations worked stated it was their first time talking to a train.

The equipment used for the event included an Icom ID-5100 for VHF voice contacts and an Icom IC-7100 for SSB and FT8. The HF antenna was a homemade inverted L stretched over a gondola car with 12 foot masts. This permitted the antenna to remain up while the train was in motion for the trip between Tipton and Kutztown.

Additional photos and information can be found here: [Toy Train](#).



EPA ARES® Activities



Chris Kelleher-W3CTK discusses challenges facing ARES® ECs during the November 18 meeting at the Chester County EOC.

ARES® District 1 Leaders Meet at Chester County EOC

Bob Wilson, W3BIG

ARES® leaders from EPA District 1 met at the Chester County Emergency Operations Center in West Chester on Saturday, November 18 to discuss mutual operations plans and to review their activities during the year.

District Emergency Coordinator Dick Stewart, K3ITH, hosted the meeting along with Chester County EC Glenn Allison, N3MEL. Other ECs attending included Bucks County EC Michael Sabal, KB3GJT, Delaware County EC Chris Kelleher, W3CTK, Montgomery County EC Chuck Farrell, W3AFV and Philadelphia County EC Cliff Hotchkiss, KB3PGT and EPA PIC Robert Griffiths, NE3I. EPA SM/SEC Bob Wilson, W3BIG and Assistant Section Emergency Coordinator Jay King, W2AFV also attended.

Important issues discussed included the challenges of recruiting and retaining ARES® volunteers and the need for developing a district-wide emergency communications plan to facilitate interoperability and mutual assistance in widespread communications emergencies.

ARRL Atlantic Division Director Bob Famiglio, K3RF, spoke on the importance of ARES®, maintaining spectrum allocations and detailed other issues facing the amateur radio community and how they impact emergency communications.

Jay King, W2AFE, Appointed ASEC for EPA Section

Jay King, W2AFE, of Phoenixville in Chester County, has been appointed Assistant Section Emergency Coordinator for the ARRL Eastern Pennsylvania Section. Jay has been a licensed amateur radio operator since 1976, is a U.S. Army veteran and has served with Philadelphia County ARES® for years.

Jay works with the American Red Cross and has been instrumental in designing and implementing exercise plans for the EPA's Simulated Emergency Tests for the past few years. The exercises have been coordinated efforts between the Red Cross and the EPA and have focused on providing digital communications to shelter operations. His leadership in these critically important drills has been superb and his effectiveness has contributed greatly to their success.

Jay's American Red Cross experience enhances his role as Assistant Section Emergency Coordinator. His service as a liaison between ARES® and the Red Cross has benefited both organizations immensely. He will be a great asset to the EPA.



New EPA Assistant Emergency Coordinator Jay King, W2AFE

EPA ARES® Activities (cont'd)



Pennsylvania and Red Cross FEMA Mass Care Exercise Scheduled for Date in May

Jay King, W2AFE

Each year FEMA selects a state for a mass care exercise. In 2024 it's Pennsylvania. The American Red Cross will be providing the sheltering portion of the exercise which includes an emcomm component. Plans are in the early stages, but it looks like there will be 10 to 12 shelters activated across the state along with logistics sites and a headquarters unit. For the emcomm portion of the drill at least 2 amateur radio operators will be required per site. That means as many as 50 radio operators will be needed during the activation period on Monday, May 20 or Tuesday May 21.

Emcomm team members will deploy to Red Cross chapters and shelters. The shelters will be exchanging *Red Cross Daily Shelter Reports* with their host chapters and the chapters will be issuing Red Cross supply requests to logistics centers. Messaging will be via Winlink using the RMS network, on VHF and/or HF as needed.

Pennsylvania has 2 Red Cross Regions. The Southeastern PA Region (SEPA) includes Bucks, Chester, Delaware, Montgomery and Philadelphia Counties. The Greater PA Region (GPA) includes the remaining 62 counties of the state.

If you can deploy with Winlink and are interested in participating in this important exercise, please contact [Jay King, W2AFE](#). Jay King serves as the Assistant Section Emergency Coordinator for the EPA.



Together, we can save a life



Become a Red Cross Emcomm Volunteer

Cliff Hotchkiss, KB3PGT

If you're a skilled amateur radio operator and would like to become a Red Cross emcomm communicator and participate in the upcoming National Mass Care Exercise, read on.

Most of the messaging for Red Cross exercises is passed via Winlink using the RMS network on either UHF/VHF or HF frequencies. It would be very beneficial if you possessed both Winlink equipment and experience.

If you are not already a member of your county's ARES® unit, contact the Emergency Coordinator and volunteer your services. The training and experience is first-rate and all ARES® units will welcome you.

Pennsylvania is divided into 2 Red Cross Regions. Southeastern PA (SEPA) Region includes Bucks, Chester, Delaware, Montgomery and Philadelphia Counties. Greater Pennsylvania (GPA) Region includes the remaining 62 counties.

If you would like to join the ranks of Red Cross Communicators, contact the following:

For SEPA Region: [Cliff Hotchkiss, KB3PGT](#)

For GPA Region: [Dave Herzog, GPA EmComm Lead](#)

Cliff Hotchkiss, KB3PGT, serves as the ARES® Emergency Coordinator for Philadelphia County.

EPA Traffic Handling



National Traffic System EPA Report

Tom Inman, KC8T

The National Traffic System (NTS) in Eastern Pennsylvania is getting healthier. Last November, we were reporting on 4 nets with a total of 441 check-ins. Message traffic across the 4 nets totaled 109 radiograms, a 58 percent increase over the prior year. This November, we were reporting on 5 nets with 521 check-ins.

The Eastern Pennsylvania Emergency Phone and Traffic Net (EPAEPTN) had the most check-ins with 225, handling 62 radiograms. The Pennsylvania Traffic Net (PTN) handled 109 check-ins, nearly a 59 percent increase over the previous year. The PTN showed a 20 percent increase in traffic handled and was able to hold a session every day of November 2023.

NTS in Eastern Pennsylvania would like to see radiograms delivered by a radio operator close to the recipient. This is especially important for the *Welcome to Amateur Radio messages*, because it permits a new ham to find a nearby mentor. Geographic representation is still a challenge. The long-term goal is to have participation by amateurs in each of Eastern Pennsylvania's 34 counties. For section-wide nets, 5 of the 6 districts are covered with amateurs checking in to either the EPAEPTN or PTN on a regular basis.

If you are not a traffic handler, please consider checking in to one of the following traffic nets. You will not be required to take traffic. The nets are good fellowship and practice even when there is no traffic to pass.



What is the National Traffic System ?

The National Traffic System (NTS) is a structure organized under the ARRL that allows for rapid movement of message traffic from origin to destination, training amateur radio operators to handle written traffic and participate in directed nets. These two objectives, which sometimes conflict with each other, are the underlying foundations of the NTS.

NTS operates daily, even continuously with advanced digital links. The National Traffic System is an organized effort to handle traffic in accordance with a plan which is easily understood, and employs modern methods of network traffic handling in general acceptance today.

| TRAFFIC NET NAME | FREQUENCY | TIME | OCCURENCE |
|--|-------------------------------|-------------|---------------------|
| Eastern PA Emergency Phone & Traffic Net | 3918 kHz | 5:00 PM EST | Daily |
| Western PA Emergency Phone & Traffic Net | 3918 kHz | 5:30 PM EST | Daily |
| Pennsylvania Traffic Net (CW) | 3585 kHz | 7:00 PM EST | Daily |
| Luzerne County ARES® Traffic & Training Net | 146.61(-) MHz, tone 82.5 Hz | 8:00 PM EST | Monday |
| Lackawanna County ARES® Traffic & Training Net | 146.715(-) MHz, tone 136.5 Hz | 8:00 PM EST | 1st & 2nd Wednesday |
| | 146.94(-) MHz, tone 127.3 Hz | 8:00 PM EST | 4th Wednesday |
| N3CFK UHF Link Repeater System | 442.55 (+) MHz, tone 100 Hz | 8:00 PM EST | 5th Wednesday |
| N3FCK UHF Link Repeater System | 443.60(+) MHz, tone 100 Hz | 8:00 PM EST | 5th Wednesday |
| N3FCK UHF Link Repeater System | 444.50 (+) MHz, tone 100 Hz | 8:00 PM EST | 5th Wednesday |
| N3FCK UHF Link Repeater System | 441.15(+) MHz, tone 100 Hz | 8:00 PM EST | 5th Wednesday |
| RF Hill ARC Southeastern PA Practice & Traffic Net | 145.130(-) MHz, tone 131.8 Hz | 8:00 PM EST | Sundays, Wednesdays |

Youth Activities



Gracie DeSaro (left) tweaks an IC-9700 transceiver as Aaron Yang and Nandini Narayanan of Council Rock ARC look on during an ARISS contact with NASA astronaut Stephen Bowen, K15BKB, aboard the ISS on its pass over eastern Pennsylvania.

Council Rock South High School ARC Makes Contact with International Space Station

Bob Wilson, W3BIG

A 30-student team from the Council Rock Amateur Radio Club, KC3JND, at Council Rock High School in Holland, Bucks County, made a 10 minute contact with NASA astronaut Stephen Bowen, K15BKB, on the orbiting International Space Station as it passed over eastern Pennsylvania on May 1 at 0843 hours EDT.

The team, comprised of marketing, engineering and systems integration student specialists, had worked on the ARISS (Amateur Radio on the International Space Station) project for more than a year.

Faculty advisor Jerry Fetter, K3OHI along with Joseph Warwick, KB3ZED, both science teachers, worked tirelessly with students preparing for the contact. They were assisted by skilled radio operators from both the Frankford ARC and Warminster ARC including Bill Ballantine, K3FMQ, Irwin Darack, KD3TB, Joe Horanzy, AA3JH, Michael Shanblatt, W3MAS and Andy Vavra, KD3RF, who served as overall manager for ARISS projects over the past 7 years.

The ARISS project was presented in the high school auditorium with an audience of interested students and visitors watching the preparation and actual contact. At precisely 0843 EDT, contact with the ISS was established on the 2-meter band. The speaker connected to the main transceiver, an Icom IC-9700, a specialized UHF/VHF rig designed for weak signal operation, crackled to life with the voice of astronaut Stephen Bowen answering the Council Rock South ARC call, KC3JND.

Just making contact with the ISS would have been thrilling enough, but the students asked a lengthy series of questions, this exercise being an educational endeavor. K15BKB answered all of the questions patiently during a remarkable contact that lasted a full 10 minutes from AOS (Acquisition of Signal) to LOS (Loss of Signal) at 0853 EDT. Most contacts with the ISS last for 6-7 minutes, so this QSO was robust with excellent signal quality.

Besides the obvious educational benefit of the ARISS program, the project has been very successful encouraging students to earn their FCC licenses. Their fascination with and enthusiasm for amateur radio is critical for our hobby in attracting a younger generation of hams to join our community.



Council Rock Amateur Radio Club faculty advisors Jerry Fetter, K3OHI (left) and Joseph Warwick, KB3ZED were instrumental in the success of the ARISS contacts the school club has made with the International Space Station.

ARRL MEMBERSHIP

ARRL is the national association for amateur radio in the U.S. We provide opportunities to discover radio, develop skills, and serve your local community.

Anyone who is active in amateur radio or who wishes to get more involved to pursue interests, public service, or personal enjoyment will benefit from ARRL Membership.

Benefits

To get you involved and keep you up to date with all that amateur radio has to offer!



INFORMATION

As a member, you will gain access to all four digital magazines, several special interest e-newsletters, & personalized answers to your technical and operating questions.



LEARNING

From licensing exam prep, to live training forums; to online training courses for new hams, emergency communicators, and more.



PROGRAMS & SERVICES

License renewal, member recognition programs, contesting opportunities, advocacy efforts, and an active local club system.

Join or renew today at
www.arrl.org/join

[Join ARRL link](#)



WHAT DO YOU WANT TO DO WITH AMATEUR RADIO?

Discover New Interests

Whether you're interested in new technologies, project building, radiosport, emergency preparedness, or public service, ARRL has resources to help you learn, get active, and get on the air.

Your membership provides digital access to all four ARRL publications, with offerings for beginners as well as advanced hams. They include *QST*, the membership journal of ARRL; *On the Air*, an introduction to the world of amateur radio; *QEX*, covering topics related to radio communications experimentation; and *National Contest Journal (NCJ)*, covering radio contesting.

Build & Share Your Knowledge

With online learning courses, members-only web content, and leadership opportunities, you can grow your skills and interest in amateur radio through the many ARRL programs available to members.

Shape the Future

Your membership dollars help to preserve and protect access to frequencies allocated to the Amateur Radio Service.

A Slice of Ham - Focus on People



Dick Stewart, K3ITH's Ham Radio Journey

Dick Stewart, K3ITH, grew up in Havertown in Delaware County. His junior high school had an amateur radio club and station that offered after-school classes to prepare students for a Novice class license. Dick earned that license in 1959.

Six months later, during a school holiday break, Dick's father drove him to the FCC office at the Federal Building in Philadelphia where he earned his General class license, which required both a 13 wpm code and theory test. In 1972, Dick earned both the Advanced and the Extra class license, for which he demonstrated skill at sending and receiving Morse code at 20 wpm. In June of this year, Dick will have been continuously licensed for 65 years.

Following high school, Dick graduated from a 2-year technical school where he also earned his second and first class FCC Radiotelephone licenses. He assumed his career path would be in broadcasting. But, an opportunity popped up and Dick took a position with General Electric Aerospace. He figured it would be a temporary job until he found one in broadcasting. His temporary job lasted 46 years. Dick states it was a fantastic career move and he enjoyed helping military and government customers meet their satellite and ground station requirements. Dick also earned an

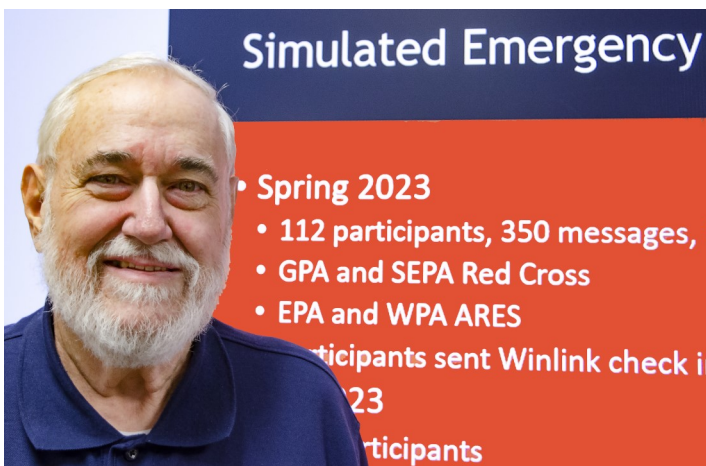
engineering degree from Widener University. Dick says his broadcasting friends often told him he was better off in aerospace.

As a family man, Dick lives in Audubon, in Montgomery County with his wife Cathy. They have 4 children, 6 grandkids and 3 great-grandkids with another one due soon.

Dick is very active with ARES®/RACES in Montgomery County and also serves as the District 1 Emergency Coordinator for the EPA. He manages a district that includes the most populous area in Pennsylvania including Bucks, Chester, Delaware, Montgomery and Philadelphia Counties. Dick has also held numerous positions with the Philadelphia Area Repeater Association (PARA) including President, Vice President, Recording and Corresponding Secretary. He is still very active with PARA. He is also active with the Mid-Atlantic Amateur Radio Club (MARC) and has served as their lead Volunteer Examiner for the past 12 years. In addition to enjoying membership with the Pottstown Area Amateur Radio Club (PAARC), Dick is also active on the Rooster Net which meets every day on 3990 kHz between 0600-0830.

As if Dick's amateur radio pursuits are not enough to keep him busy, he also volunteers with the American Red Cross. One of his other passions is owning and operating a fully refurbished 1914 Pullman heavyweight business railroad car built for executives of the Pennsylvania Railroad. He has taken family, friends and clients travelling with him on trips to many different cities and destinations totaling over 15,000 miles on the rails. Trips have included excursions to upstate New York, Burlington, Vermont, Chicago, South Carolina and Miami. His numerous trips to Pittsburgh included traveling through the famous Horseshoe Curve.

If you have an amateur radio friend you think others would enjoy reading about, please submit an article and photo(s) for consideration. Send your story to [Signals Editor](#).



EPA First District Emergency Coordinator Dick Stewart, K3ITH

From the Public Information Coordinator



Signals Needs Your Articles, Photos to Publish

Robert Alan Griffiths, NE3I

I am reaching out to our readers for assistance. To continue to publish the newsletter on a bi-monthly, or for that matter, any future basis, we need submissions of material from EPA clubs, ARES® units and individual radio amateurs. Any recent amateur radio outing, activity, public service event, equipment evaluation, POTA activation or technical endeavor can provide interesting material for the EPA newsletter. Articles are always appreciated, but, submitted materials can be as simple as a few lines with an action photograph, as opposed to a static line-up photo. We hope that you will think about potential material that you may have, write it up and send it in to the *Signals Editor*. Please CC the [EPA PIC](#) so that I may remain in the loop.

One of the main roles of a Public Information Coordinator, PIC, is to encourage, foster and appoint Public Information Officers, PIOs) at the club and county level. Although the ARRL provides an online course for PIO certification, PR-101, completion of the ARRL PIO course, while encouraged and very helpful, is not always necessary. If you are interested in being appointed as a PIO, review the information about the role of a PIO on the ARRL's web site. Discuss your interest and qualifications with your group's leadership and have the leadership forward your qualifications to me. There is also a link on the [ARRL PIO information page](#) where you can make application for an ARRL appointment directly to the Section Manager.

Another important role of the PIC is the development of a *Speakers Bureau*. We are looking for radio amateurs who are good at making presentations on amateur radio related topics in order to create a list on the EPA web site. Many clubs and ARES® units scramble to find programs for their meetings. Consequently, an EPA Speakers Bureau could provide a means for EPA clubs and ARES® units to exchange presenters and incorporate interesting programs. Many clubs have become adept at using

Zoom and other online modes for bringing guests remotely into their meetings. That's a great way of avoiding the inconvenience and expense of travel.

Finally, media contacts. If you can refer any media contacts that you have found to be receptive to amateur radio activities, please advise. I look forward to reading your submitted materials and providing such assistance as I can. 73!

Helpful Guidelines for Submitting Material

1. Articles should be related to amateur radio. They do not have to be of a technical nature. Human interest stories, articles about operations, public service or other events are always a good choice.
2. When writing stories for publication, keep your articles brief and on topic. Try to avoid jargon unless it helps to explain concepts or details.
3. Avoid flowery or excessive verbiage. Plain language is always preferable.
4. Include full names and call signs of individuals named in articles. Double check the spelling of names and places.
5. When taking pictures for articles, action photos are much more interesting than static line-ups of people. Compose your photos to include faces of people *doing something*.
6. When photographing people outside, employ your camera's fill-flash. This will fill in the harsh shadows from bright sunlight and show more detail. Even your cellphone camera has a fill-flash function. On that subject, your cellphone camera will take great photos. You do not need an expensive DSLR.
7. When submitting photos, include full information for captioning. Names, call signs, locations and other details are important. Identify individuals listing them from left to right.



The Digital Den



The Evolution of Digital Amateur Radio

Barry Feierman, K3EUI

One of the reasons many of us became amateur radio operators was to be able to communicate with other hams all over the world without the benefit of the internet or even without commercial AC power. So, how do we do that?

We all know that one of the most basic and most primitive communications methods was to simply turn an RF carrier on and off in a specific sequence. One could make a short sound (the dit) or a longer sound (the dah) and then use Morse Code to put these transmissions together and perhaps, when lucky, strike up a QSO at maybe 10 to 20 words per minute. It was fairly easy for a receiver to recognize a carrier and then internally beat that with a locally generated BFO (beat frequency oscillator). The result was that the on / off carrier produced a steady pitch of sounds. If we were really lucky, we could enable a narrow bandwidth filter in our receiver to eliminate surrounding stations and get a QSO with no interference from another station sending CW to someone else.

Along came a microphone and we were able to actually talk to other hams, rather than to merely send Morse. The receivers and transmitters were often separate boxes in those days, and if we were really good, we could *zero beat* a station on AM calling CQ and get a QSO. The audio was often communication quality or roughly 300 to 3000 Hz. Again, filtering tended to make the sound wide and full, or narrow and pinched.

By the late 1950s came *Single Side Band* (SSB). You either had to build a unit or spend a fortune to get on SSB in the early days. But, the carrier and its annoying heterodynes disappeared, and the quality of the sound improved. With reasonable power (under 100 Watts) we could use USB on the bands above 10 MHz and LSB on the bands below 10 MHz and work other SSB stations. Filtering got better and the clarity of audio improved.

Then along came FM radios with superb fidelity, compared to SSB. FM tended to ignore the static and QRN of annoying competing signals. Ten meter FM, at the top of the band, was the rage along with expansion into 6 meters, 2 meters and even higher frequencies. The radios were small enough to put in your car and wow, regional coverage with 2 meter FM, 25 Watts and a 19 inch mag mount on a car.

The next real breakthrough was the advent of *sound cards* in desktop computers by the 1990s. Sound cards were plug-ins at first and were quite expensive. But, the technology improved rapidly and miniaturization resulted in sound chips that were built into desktops and laptop computers. One could use the sound card to first generate a specific sound (pitch / intensity) and then use that sound to modulate an SSB radio, just the way you would with a microphone and human voice. Suddenly, the modes exploded and a simple SSB radio and a sound card were able to duplicate the sounds of RTTY and CW. But, the rig was in SSB mode, not in RTTY and not in CW. So, how does that work?

That question is going to lead to a monthly Zoom class the first Saturday morning each month at 1000 local beginning February 3 and also use an HF frequency of 7068 kHz ((VFO dial) to demonstrate the multiple keyboard digital modes such as AFSK RTTY, ASK CW, BPSK31, MFSK, Olivia, THOR and others. The advantages of keyboard digital modes is that they need less signal to demodulate. A phone signal requires about +10dB S/N to copy. A good CW operator can copy a CW signal with a S/N of about 0dB. THOR or Olivia can be copied at -15dB S/N and an FT8 signal can be copied with S/N below -20dB.

HF SSB KEYBOARD DIGITAL MODES ZOOM TRAINING

First Saturday of the month at 1000 Local

40m Band: 7068 kHz

To register email [Barry, K3EUI](mailto:Barry@K3EUI.com)

List your full name, FCC call, email address, City, State, HF rig and soundcard (if any)

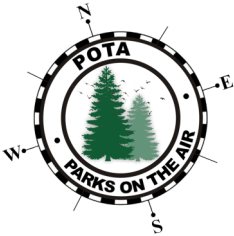
POTA, SOTA, VOTA Activities



POTA Great for Outdoor Radio Fun Year-Round

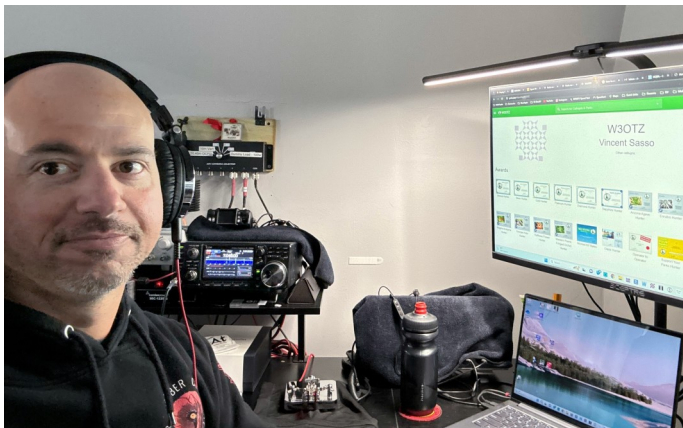
Amateur radio in the great outdoors doesn't have to be a once a year affair during Field Day. With the advent of *Parks on the Air* (POTA), an ARRL program begun in 2016, hams are now enjoying portable operations every day of the year on an international basis from local, state and national parks as well as historical sites throughout the world.

Parks on the Air is now a well organized entity, separate from the ARRL, encouraging activity through an awards program and a useful [website](#). Operators are classified as either *hunters* or *activators*. Hunters can enjoy making contacts from the comfort of their hamshacks with activators who operate portably from a park or public site. Each park has a specific identifier to assist with reporting.

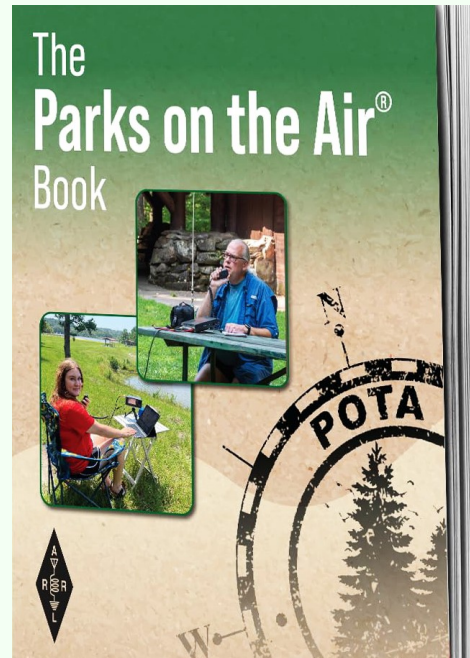


POTA operators use just about any mode. Many QRP POTA activators rely on CW, but there are SSB and digital operators as well. FT8 has become a common POTA mode due to enhanced weak signal capability and auto logging.

If you haven't already become a POTA hunter or activator, join the fun. Field Day should not be the only time you enjoy the thrill of operating outdoors.



Vincent Sasso, W3OTZ, of Schwenksville does much of his POTA hunting on CW from his desk but longs to activate from a park.



ARRL Parks on the Air Book

The Parks on the Air® Book explores the process of activating a park unit and hunting those activations. Through the experiences of 14 operators, it offers advice and motivation for taking your radio out to the park and becoming active in the growing POTA community.

Full-color format brimming with photos!

ARRL Member price: \$19.95 [To Order](#)

Signals Wants Your POTA Photos and Stories

Portable outdoor operation is a fascinating aspect of amateur radio. Your fellow hams enjoy reading about the adventures and challenges of radio in the great outdoors. If you've had recent POTA activations you'd like to share, please send us your pictures and operating description for publication. You don't need to write a huge article. Even one good photo with a paragraph is great. Send your materials [here](#).

POTA, SOTA, VOTA Activities (cont'd)



A SOTA Activation in Western North Carolina

In late November, Bryan Klock, W3BFO, of Salford in Montgomery County, traveled to the summit of Waterrock Knob in the Maggie Valley region of western North Carolina to activate a SOTA (*Summits on the Air*) station. The summit is located off the Blue Ridge Parkway at an elevation of 6,292 feet.

Along with his son, also named Bryan, the pair hiked 3.75 miles up to the summit with his gear. The elevation gain was 1,500 feet. It was an eventful hike, being Bryan's first SOTA activation.

Date: 11/28/2023 **Summit:**W4C/WM-004
(Waterrock Knob) **Callsign:**W3BFO

| Time | Callsign | Band | Mode |
|-------|----------|--------|------|
| 20:17 | N3CHX | 7MHz | SSB |
| 20:17 | NE3I | 7MHz | SSB |
| 20:34 | NC4SC | 144MHz | FM |
| 20:36 | KL4RL | 144MHz | FM |
| 20:37 | K0ILP | 144MHz | FM |
| 20:38 | KD4UYR | 144MHz | FM |
| 20:40 | WW4O | 144MHz | FM |
| 21:01 | KA9OUT | 14MHz | SSB |
| 21:05 | NE3I | 14MHz | SSB |
| 21:07 | K5RQ | 14MHz | SSB |
| 21:08 | KE8WXX | 14MHz | SSB |
| 21:11 | N3EOE | 14MHz | SSB |



Bryan Klock, W3BFO and son at the summit of Waterrock Knob

The gear for the operation was an Icom IC-705 running 10 Watts. Antennas included an Ed Fong 2m / 70cm roll-up J-pole for UHF/VHF and a 40m EFHW for HF. Power was assisted by the sun with a pair of Power Film 30 Watt solar panels, a Genasun charge controller and a 3 AH Bioenno Lithium Iron Phosphate battery.

In most SOTA activations getting there is usually a big part of the challenge. The hike up to Waterrock Knob took 2 hours from a cabin in the Plott Balsam Range. The two Bryans carried all of the gear in an Eberlestock FAC (Forward Air Controller) Track backpack. You can review Bryan's SOTA log at left.



Bryan Klock, W3BFO, sets up a SOTA station at summit W4C/WM-004 on Waterrock Knob, Elev. 6,292 feet in western North Carolina.

The Test Bench



Quick Repair of Alinco DJ-580 UHF/VHF HT

Dave Carroll, N2VUZ

Of the many repairs I have done, this one was unique. I was handed this Alinco DJ-580 HT and was told the audio was low and asked if I could fix it. I said I would take a look at it. The amateur it belonged to said he thought it might be the audio driver chip. I told him that they would either die or work as expected, so it had to be something else.

As expected, the audio was low. Looking at the schematic showed me what it might be. The audio chip was coupled to the speaker through two capacitors that fed each end of terminals. They had to be the surface mount electrolytic capacitors of 47 (see photo 1-Before).

After removing them, I checked them on my LCR meter and they were immediately apparent they were a little low in capacitance but the main issue was their ESR (Equivalent Series Resistance) was about three times what it should be. That was the issue. It was like adding series resistors to the speaker.

Since there was enough space after removing the surface mount capacitors, I installed through-hole capacitors of the same value but higher voltage rating and secured them so they could not move (see photo 2-After). While the HT was open, I replaced the nearly dead backup battery.

After reassembly, the audio was back to normal level. The amateur was very happy with the result and told his friend that had the same model about the fix. I ended up repairing another one of the same model.

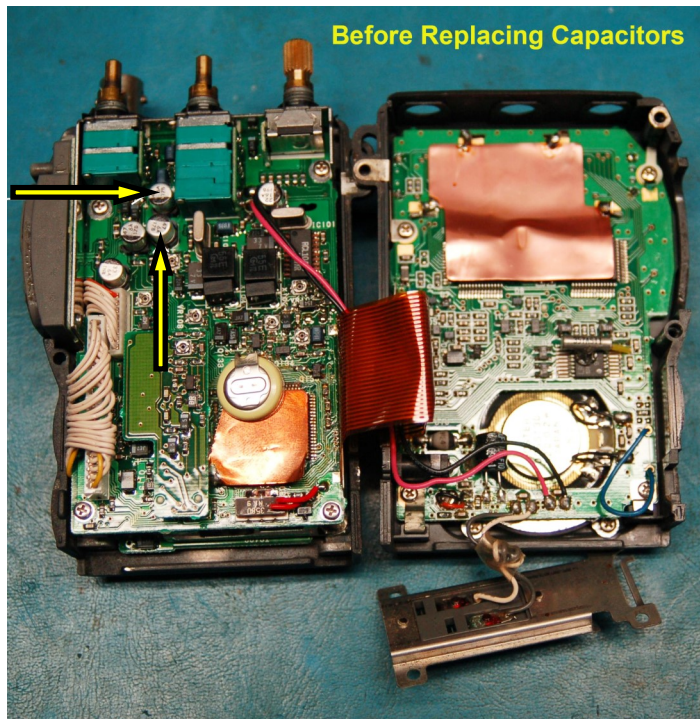


Photo 1 shows the location of original surface mount capacitors indicated by arrows.

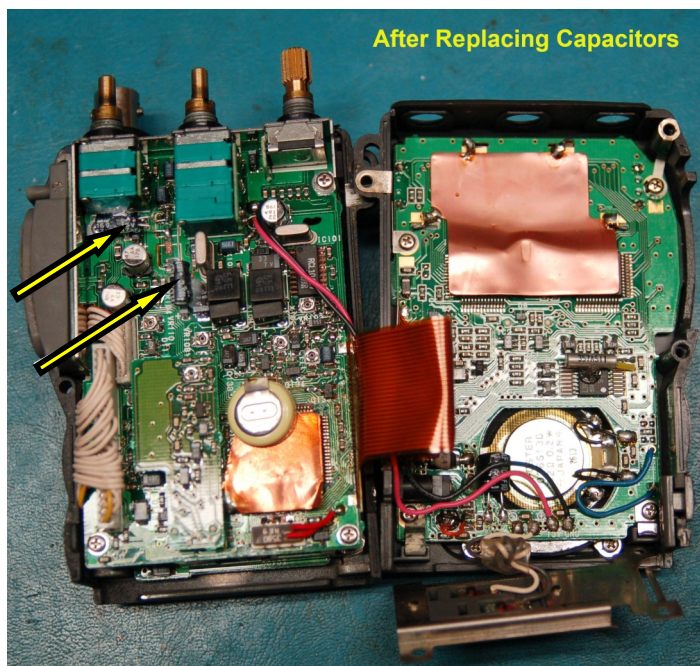


Photo 2 after replacing capacitors and backup battery.

If you have a project or repair you have documented and believe others may be interested in your work, please write it up, photograph if and send it in for possible publication in Signals.



Montgomery County Group to Form Alternate Internet Using Amateur Radio Frequencies

Robert Alan Griffiths, NE3I

“When all else fails,” Amateur Radio operators have repeatedly risen to the occasion and provided interim emergency and auxiliary communications to their communities as a public service. However, the nature of communications utilized by the public and public service agencies have morphed in their sophistication, speed and complexity. Old party land line telephone service and point to point voice radio communications have been replaced by cell phones, *cloud* supported internet and satellite communications. Volumes of data and files would bury the single sentence messages of the past. But what if a Category Four or Five Hurricane, strikes and disrupts all power, cell phone, internet, battery powered portable public service radio and other, now taken for granted forms of communication across an entire state? Remember Katrina?

A group of Montgomery County amateur radio operators have, for the past several years, been working on an alternative internet for just such an event. Utilizing their own financial resources to acquire and convert commercially available Wi-Fi equipment to amateur radio Frequencies, (examples of such equipment you might find in your dentist’s office), these radio amateurs began to create their own Amateur Radio Internet. Direct communications are short range, *line of sight* on amateur radio frequencies. Currently, where direct radio links are not possible, the *nodes* are interconnected by internet *tunnels*. Recently, the group has concluded that it had reached a plateau, that in order to move forward and enhance the network

capability throughout eastern Pennsylvania, funding beyond personal resources would be needed. Some form of formal organization would be required and grant funding obtained.

Unfortunately, at about the same time the group began to formulate an organizational plan, it lost one of its most enthusiastic and valued participants. James “Jim” Fisher, AJ3DI, passed away, becoming a *silent key*. Jim’s favorite motto and words that he lived by were, “Do or Do Not, there is no try.” In recognition of Jim’s past contributions to the project, the group decided to form the *Jim Fisher Memorial Digital Network Association* or, *JFMDNA*. With the help of ARRL Volunteer Counsel and Atlantic Division Director, Robert Famiglio, K3RF, a constitution was prepared, and a Pennsylvania Unincorporated Nonprofit Organization was formed. On Wednesday, October 18th, seven members of the regulatory body of the Association met and signed the official constitution and became its managers.

The managers of the Jim Fisher Memorial Digital Network Association are Tom Nolan, W3EX, Dick Stewart K3ITH, Ben Bowers KE3KQ, Steve Davidson K3FZT, Glenn Nester WA3LAB, Joe Caltabiano AA3JC and Rocky Pistilli N3FKR. The JFMDNA has submitted a grant application to the *Amateur Radio Digital Communications Foundation (ARDC)*, a foundation that supports digital communications and other aspects of the hobby throughout the Amateur Radio Community. For more information about the Jim Fisher Memorial Digital Network Association, contact: jimfishermemorial@gmail.com.



Pictured left to right are Ben Bowers-KE3KQ, Glenn Nester-WA3LAB, Dick Stwaert-K3ITH, Tom Nolan-W3EX, Joe Caltabiano-AA3JC, Steve Davidson-K3FZT, Rocky Pistilli-N3FKR.



Antenna Workshop



The Versatile 10 to 80 Meter G5RV Antenna

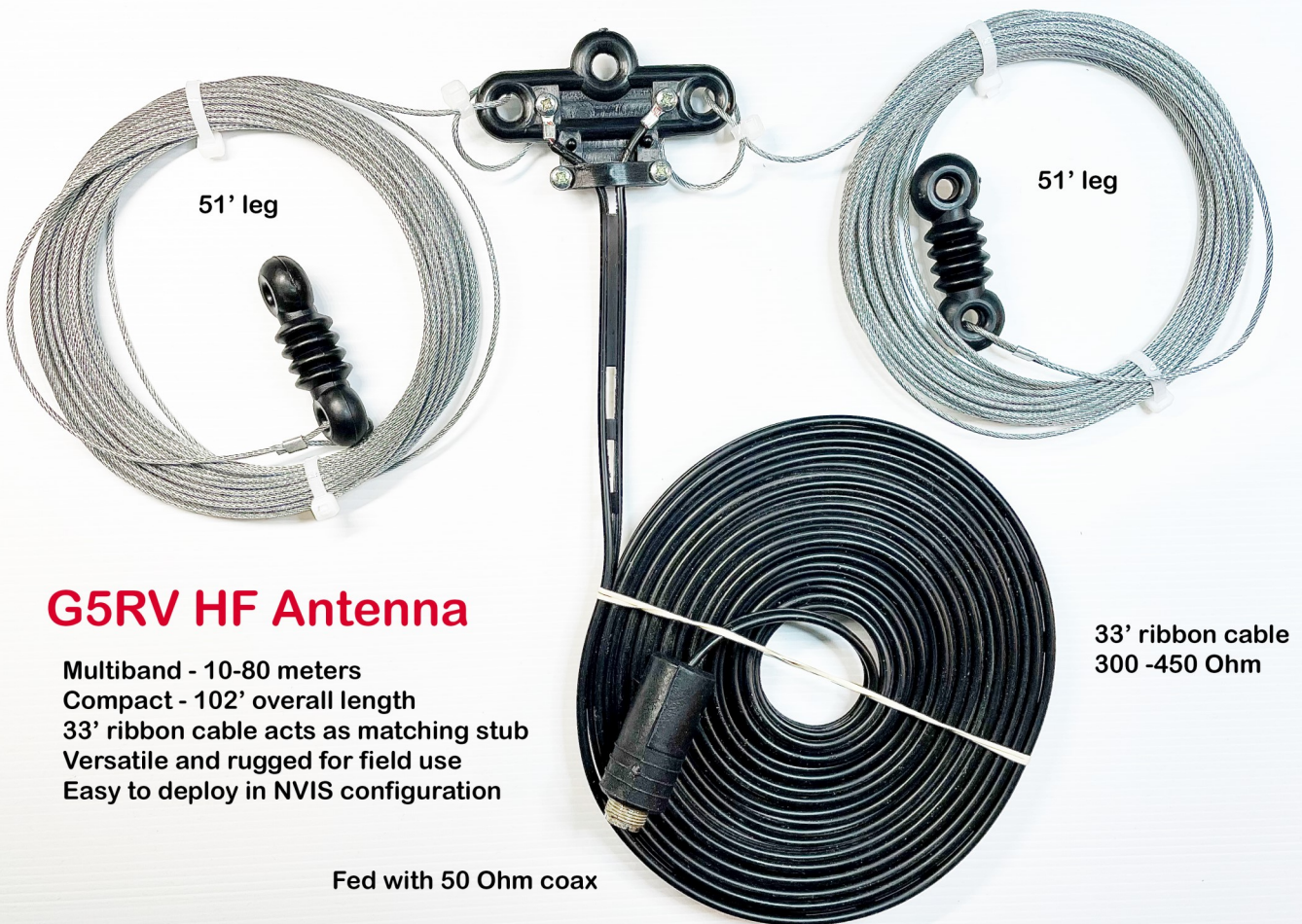
Operating HF in the field can be challenging when it comes to selecting and deploying antennas. Too often space is at a premium. Dipoles cut for 40 and 80 meters are 65 feet and 130 feet long respectively. With a rush to get up and running, whether for an ARES deployment or POTA activation, there usually isn't enough time or space to hang more than one HF antenna.

The venerable G5RV is a great answer to this dilemma and is a wonderful compromise antenna that's been around since it was designed and refined by UK amateur Louis Varney. That's his call sign in the name of the antenna. The G5RV operates quite effectively on 10 through 80 meters. It is compact,

with an overall length of just 102 feet.

The G5RV incorporates a matching section using a length of 300 or 450 Ohm ribbon cable measuring about 33 feet. It is usually terminated with an SO-239 connector and can be fed with 50 Ohm coax in either 45 foot or 90 foot runs. It is advisable to keep the coax in these lengths for matching the line to the antenna although any length will work.

The G5RV can be configured easily for NVIS operation at a height of 10-15 feet. It is usually necessary to use an antenna tuner with a G5RV. That is probably the only drawback to this compact and versatile multi-band antenna that can be quickly deployed in minimum time. You can either purchase a commercially made G5RV or easily make one.



G5RV HF Antenna

Multiband - 10-80 meters
Compact - 102' overall length
33' ribbon cable acts as matching stub
Versatile and rugged for field use
Easy to deploy in NVIS configuration

Fed with 50 Ohm coax

Tools of the Trade – Focus on Equipment



Heil BM-17 Headset Perfect for Emcomm Ops

Bob Wilson, W3BIG

Heil Sound is a legendary manufacturer of top quality microphones and headsets. In the field, a headset is often a great way to avoid fumbling for a microphone and reducing background noise. The headphones also permit focusing on important transmissions that could be lost in the background noise at deployment sites.

A recent addition to the Heil lineup of headsets is the BM-17. Supplied in a bright yellow color, it is a medium-weight headset designed for emergency communications. A convenient feature is that it is available as either a single-side or dual-side model to match your operating preference.

The headset can be purchased with either a dynamic microphone element (BM-17) or an electret element (BM-17iC). The iC electret model is designed to match the low gain audio of many Icom transceivers.

The BM-D dynamic microphone element is 500 Ohms and will work on most amateur radio rigs requiring low-Z impedance. The dynamic element has a frequency response of 120 Hz to 10 kHz. The iC

Heil BM-17 Headset



electret element has a frequency response of 35 Hz to 12 kHz.

The BM-17 headset is furnished with a 1/8 inch mono connector for microphone audio. The headphones terminate with a 1/8 inch stereo plug equipped with a 1/8 to 1/4 inch adapter (included).

To mate the BM-17 headset to your transceiver, an AD-1 series adapter is required. Heil's website has a handy adapter selector to make it a snap to pick the proper adapter for your transceiver.

I have a number of Heil headsets for use with various HF radios, but I found I needed one to mate with the Icom VHF / UHF dual-banders in my portable emcomm station. The BM-17iC headset with the AD-1-iCM adapter was the perfect solution for field use. It is durable, comfortable and can be worn for multiple hours without experiencing fatigue.

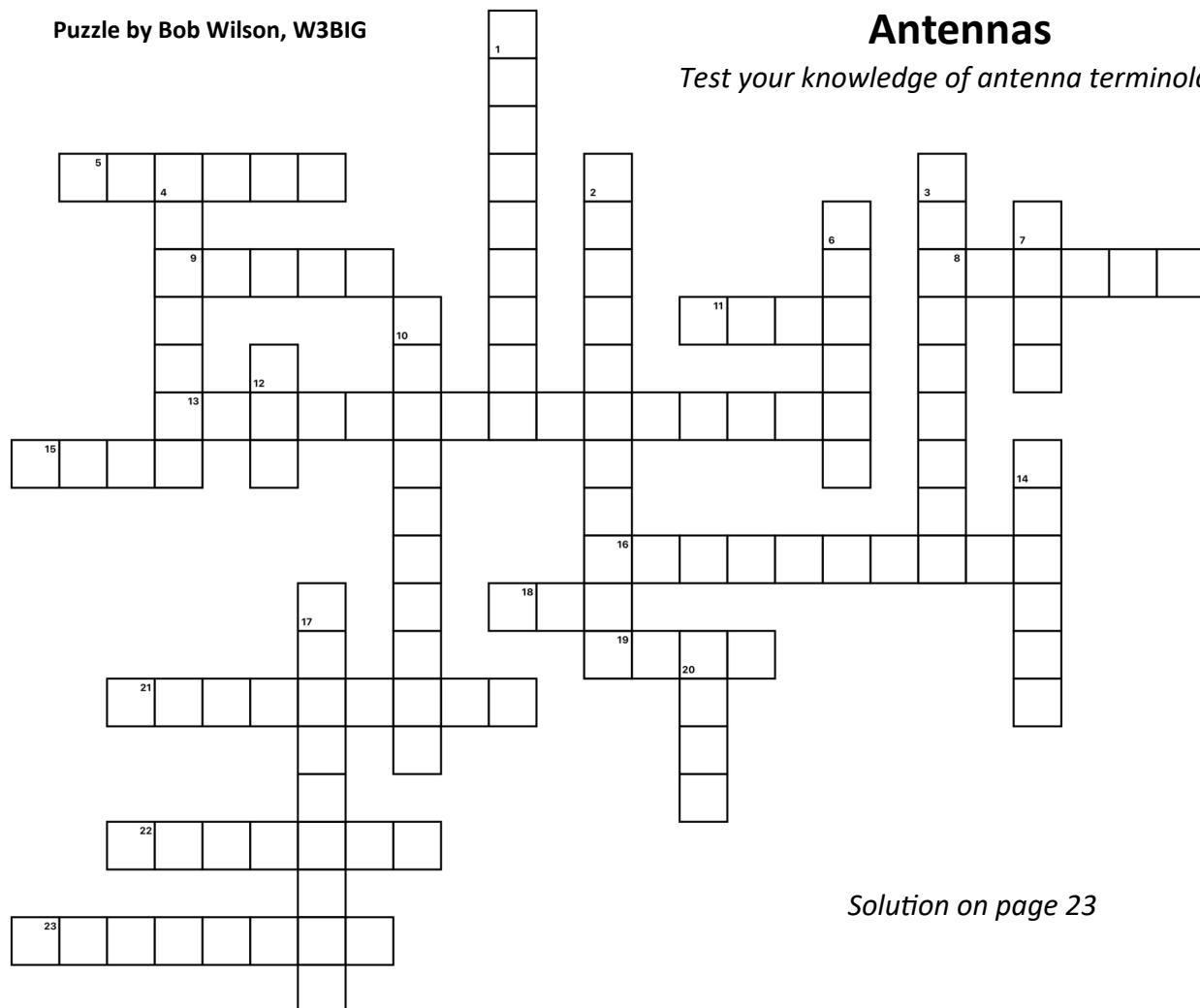
You may also want to add a convenient hand switch for keying the PTT on the transceiver. The Heil HS-2 is the perfect accessory to the headset. It features a comfortable trigger and plugs directly into the mating connector on the BM-17. You will also need a 1/8 inch extension speaker cable for the headset.



Ham Radio Crossword



Puzzle by Bob Wilson, W3BIG



Antennas

Test your knowledge of antenna terminology

Solution on page 23

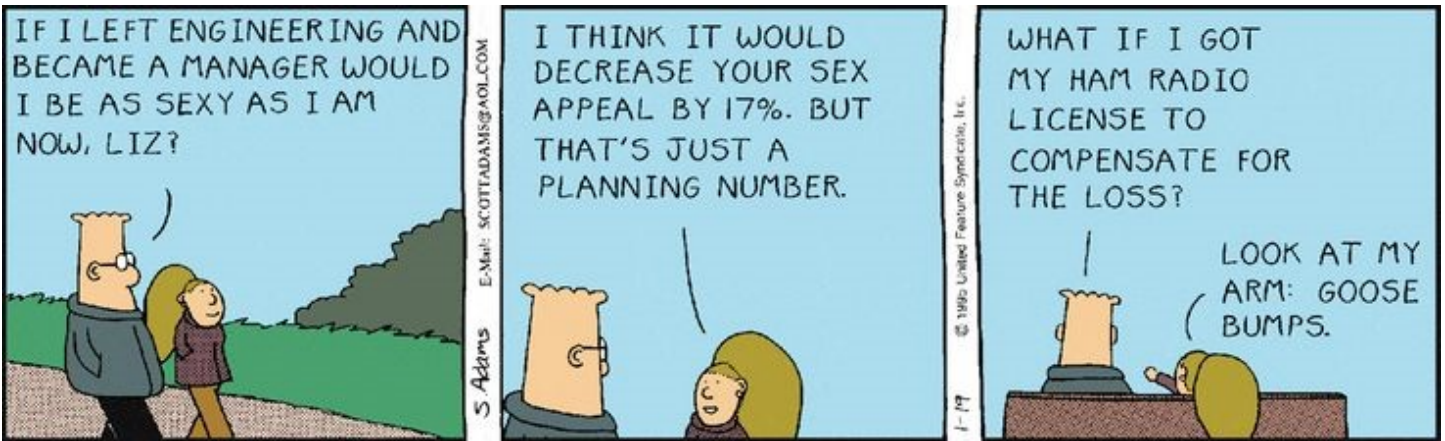
Down

1. The ratio of voltage to current at the input of an antenna (9)
2. The ability of an antenna to focus radiation or reception in a narrow angle (11)
3. The condition where the impedance of an antenna is purely resistive and the voltage and current are in phase at the feed point (9)
4. A device to control the azimuth of a directional antenna (7)
6. Most common HF wire antenna (6)
7. The most common antenna trap (4)
10. A visual representation or calculation of antenna and feedline impedance by frequency (2-words) (10)
12. A type of antenna analyzer measuring network parameters (acronym) (3)
14. Monoband gain antenna with a "curtain" design (6)
17. The range of frequencies over which an antenna operates satisfactorily (9)
20. Factor by which input power is multiplied to provide higher output powered measured in dBs (4)

Across

5. UK amateur who designed the G5RV antenna in 1946 (6)
8. Antenna with both a high and low end (6)
9. A device that matches antenna impedance to a transmitter (5)
11. Popular end-fed antenna with a name indicating its use on dirigibles (4)
13. Radiation pattern of most vertical antennas (15)
15. Important measurement of antenna performance (4)
16. Where most HF radio waves are reflected (10)
18. A capacitive _____ can be added to a mobile whip antenna to make tuning easier (3)
19. Beam antenna designed by Japanese engineer (4)
21. Device that connects an antenna to earth (2-words) (9)
22. A type of electrical cable consisting of an inner conductor surrounded by a concentric shield, the two separated by a dielectric insulator (7)
23. The ratio of a cable's transmission speed to the speed of light is the _____ factor (8)

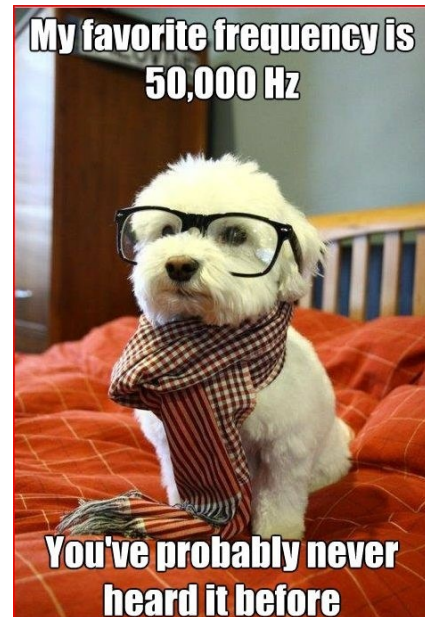
Ham Humor



How does an ham radio operator send a break-up message?

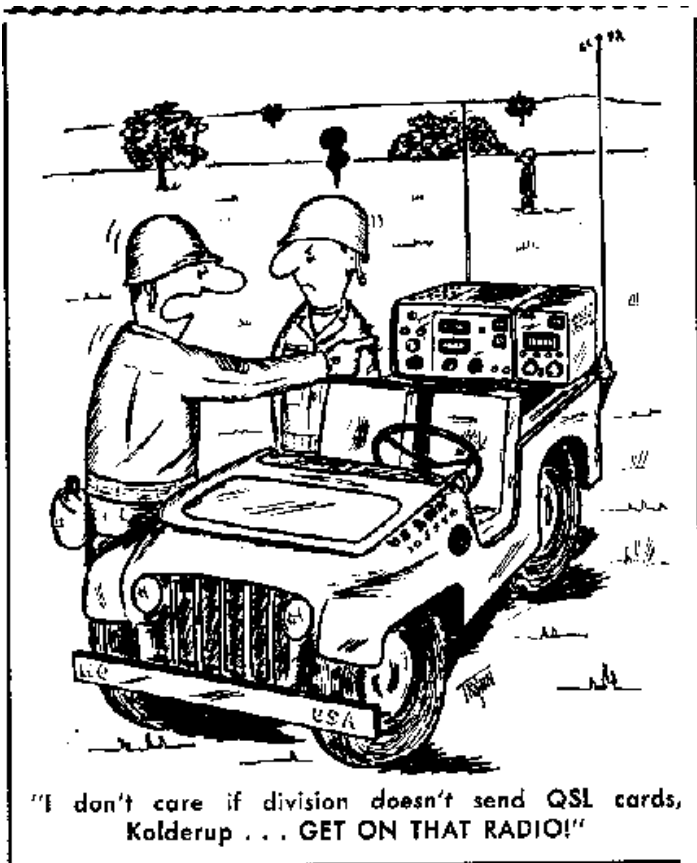
Remorse code

I think my ham radio equipment may have fallen in love with me, It hasn't said anything but I've been picking up signals.



**Automatic Gain Control:
Ham weight loss program**

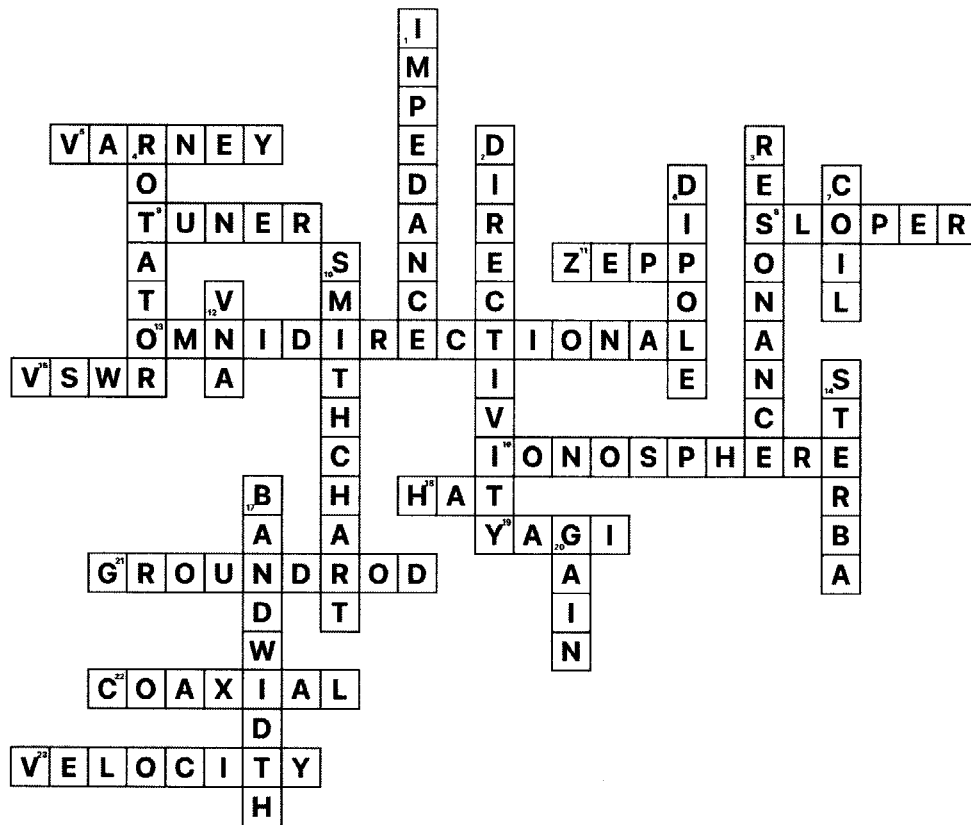
Two antennas met on a roof, fell in love and got married. The ceremony wasn't much but the reception was excellent,



Crossword Solution



Antennas



Signals Wants Your Crossword Ideas

If you have an idea for an amateur radio-related crossword puzzle, we can format the word grid and clues. All we need is a title, the words for the grid and corresponding clues.

Example from the above puzzle, 3 Down:

Grid word: RESONANCE

Clue: The condition where the impedance of an antenna is purely resistive and the voltage and current are in phase at the feed point

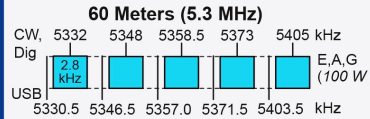
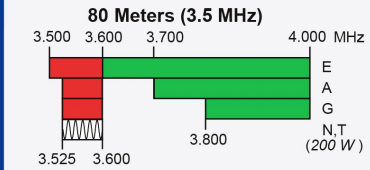
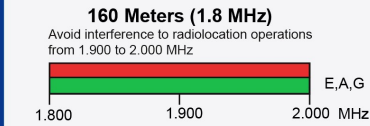
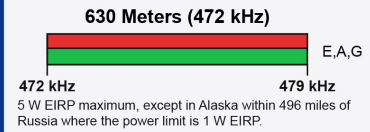
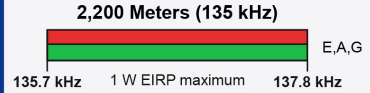
Once you have your puzzle ready, submit it to [Signals Editor](#) and we will do the rest. Make sure you include your full name and FCC call sign so we can give you credit.

US Amateur Radio Bands

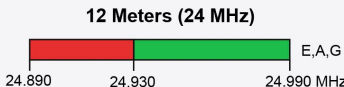
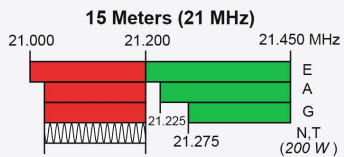
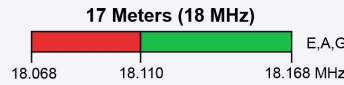
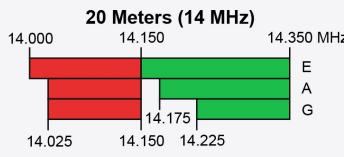
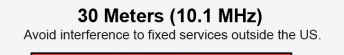
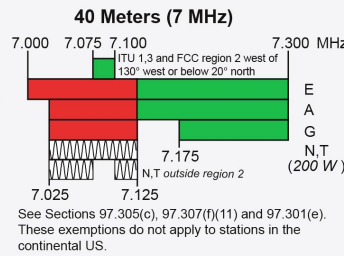
US AMATEUR POWER LIMITS

FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

On March 28, 2017, the Federal Communications Commission adopted rules that will allow Amateur Radio access to 472-479 kHz (630 meters) and to 135.7-137.8 kHz (2,200 meters). However, amateurs cannot use these frequencies until 30 days after the Report and Order is published in the Federal Register and the final procedures for registering stations with the Utilities Telecom Council (UTC) have been approved and announced. At the time this chart was created, the Report and Order had not been published and the UTC online registration site is not yet available. Follow ARRL news for further information. New charts will be published at www.arrl.org/graphical-frequency-allocations when the bands are fully available for use.



General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated power (ERP) of 100 W PEP relative to a half-wave dipole. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III. Only one signal at a time is permitted on any channel.



Effective Date for
2,200 and 630 Meters
to be announced



The national association for
ARRL AMATEUR RADIO

KEY

Note: CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz. Test transmissions are authorized above 51 MHz, except for 219-220 MHz.

- █ = RTTY and data
- █ = phone and image
- = CW only
- █ = SSB phone
- █ = USB phone, CW, RTTY, and data
- █ = Fixed digital message forwarding systems only

- E = Amateur Extra
- A = Advanced
- G = General
- T = Technician
- N = Novice

See **ARRLWeb** at www.arrl.org for detailed band plans.

ARRL
We're At Your Service

ARRL Headquarters:
860-594-0200 (Fax 860-594-0259)
email: hq@arrl.org

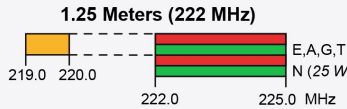
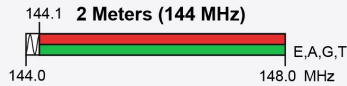
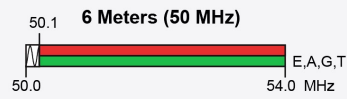
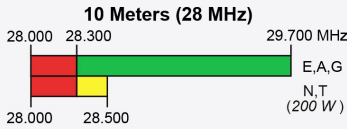
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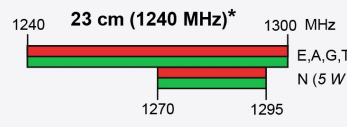
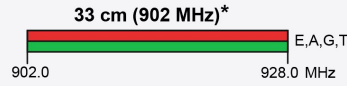
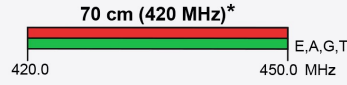
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*Geographical and power restrictions may apply to all bands above 420 MHz. See *The ARRL Operating Manual* for information about your area.



All licensees except Novices are authorized all modes on the following frequencies:

| | | |
|---------------|-----------------|-------------------|
| 2300-2310 MHz | 10.0-10.5 GHz ‡ | 122.25-123.0 GHz |
| 2390-2450 MHz | 24.0-24.25 GHz | 134-141 GHz |
| 3300-3500 MHz | 47.0-47.2 GHz | 241-250 GHz |
| 5650-5925 MHz | 76.0-81.0 GHz | All above 275 GHz |

‡ No pulse emissions

