

Get Ready for 6-Meter Season with a Rotatable Dipole | 30

# QST



DIGITAL EDITION



**ARRL** The National Association for  
**Amateur Radio®**

April 2025

[www.arrl.org](http://www.arrl.org)

DEVOTED ENTIRELY TO AMATEUR RADIO

## Dishing Up EME and Radio Astronomy

### QST Reviews

**KM4CFT** CFT1 Five-Band CW Field Transceiver

**Choyong** LC90 Multi-Band Smart Radio

**REZ Antenna Systems** Recon 40 Portable Vertical Antenna



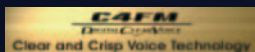
# The New Flagship Mobile **FTM-510DR ASP**

**Front Speaker with AESS Dual Speaker System**  
**Search & Go and Touch & Go Operations**  
**Now ASP for Better Coverage**

## The BIGHEAD



**FM/C4FM Digital 144/430MHz Dual Band 55/50W Transceiver**

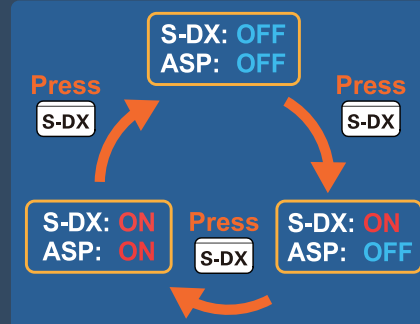


\* BU-5 is required for Bluetooth Operation

### ■ Super-DX+ASP expands the communication range

The Super-DX with the ASP ensures reliable audio quality for weak signals and expands the communication range. ASP AUTO mode is also selectable. In this mode, the ASP is automatically activated when the transceiver detects weak signals in FM analog mode.

**C4FM / Analog FM    Super-DX    Super-DX+ASP**



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# *Carries the Yaesu genes for true RF performance*

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- Powerful RF Front-End & Low Noise Oscillator Enable Phenomenal Multi-Signal Receiving Characteristics\*
  - RMDR : 113dB+      • BDR : 127dB+
  - 3rd IMDR : 102dB+      • TX Phase Noise : -143dBc/Hz
- Band-Pass-Filters dedicated for the amateur bands to eliminate out-of-band unwanted signals
- Built-in High-speed Automatic antenna tuner
- Effective QRM rejection by Dual-core DSP
- AESS (Acoustic Enhanced Speaker System) with SP-40 speaker to create High-fidelity audio output
- 3DSS, real-time 3-Dimensional Spectrum Stream presentation
- High Resolution 4.3-inch TFT Color Touch Panel Display
- VMI (VFO Mode Indicator) shows the current operating mode
- "PRESET" Mode functions most suitable for FT8 operation
- Equipped with the External Display terminal

\*Multi-signal receiving characteristic: 14MHz band/2kHz separation

\*TX Phase Noise: 100W, CW mode

## **FT-710 AESS**

- Includes External Speaker SP-40

## **FT-710 Field**

- Includes Carrying Belt
- To use the AESS function, External Speaker SP-40 (Optional) is required
- Display is not included. The image is shown with an optional third-party external display that may be connected using a DVI-D digital cable.



\* Photo shows the FT-710 AESS

HF/50MHz 100W SDR TRANSCEIVER w/ SP-40

## **FT-710 Aess**

*Acoustic Enhanced Speaker System*

HF/50MHz 100W SDR TRANSCEIVER

## **FT-710 Field**

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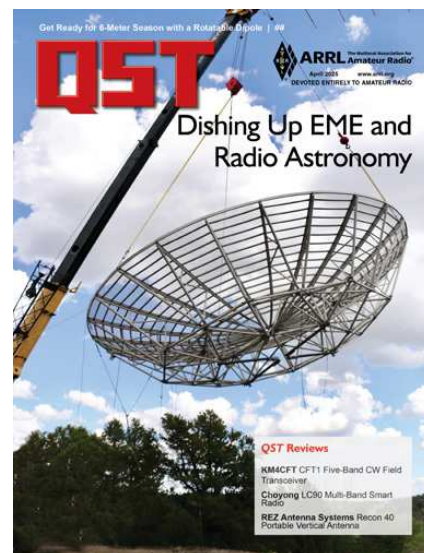
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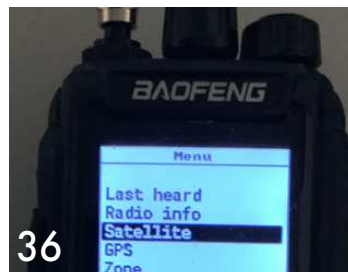
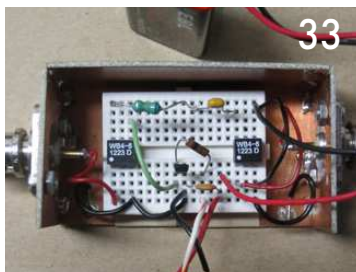
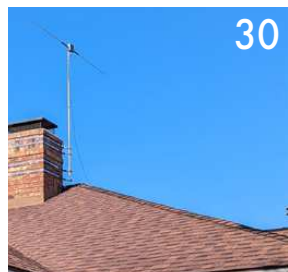
The Deep Space Exploration Society (DSES) in Colorado has enjoyed ham radio and radio astronomy activities since 2009, when they bought a 60-foot dish antenna. More recently, they managed to save a 30-foot parabolic dish that was going to be sold for scrap. Read about the "rescue" of the dish and the group's plans for it in "Saving a 30-Foot Parabolic Dish." [Elaine Hambly, KØARR]

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| <b>Dualband Base Station/Repeater Antennas</b> |                               |               |                    |            |
| X700HNA (4 section)                            | 2m/70cm                       | 24            | 200                | N          |
| X510HD (3 Section)                             | 2m/70cm                       | 17.2          | 330/250            | UHF or N   |
| X300A (2 Section)                              | 2m/70cm                       | 10            | 200                | UHF or N   |
| X200A (2 Section)                              | 2m/70cm                       | 8.3           | 200                | UHF        |
| X50A (1 Section)                               | 2m/70cm                       | 5.6           | 200                | UHF or N   |
| X30A (1 Section)                               | 2m/70cm                       | 4.5           | 150                | UHF        |
| <b>Monoband Base Station/Repeater Antennas</b> |                               |               |                    |            |
| F23H (3 Section)                               | 144-174 MHz<br>(W/ Cut Chart) | 15            | 350                | UHF        |
| F22A (2 Section)                               | 2m                            | 10.5          | 200                | UHF        |
| CP22E (Aluminum)                               | 2m                            | 8.9           | 200                | UHF        |
| F718A (Coax Element)                           | 70cm                          | 15            | 250                | N          |
| <b>Dualband Mobile Antennas</b>                |                               |               |                    |            |
| SG7900A                                        | 2m/70cm                       | 62.2 in.      | 150                | UHF or NMO |
| SG7500A                                        | 2m/70cm                       | 40.6 in.      | 150                | UHF or NMO |
| NR770H Series                                  | 2m/70cm                       | 38.2 in.      | 200                | UHF or NMO |
| MR77 Series                                    | 2m/70cm                       | 20 in.        | 70                 | Mag Combo  |
| AZ504FXH                                       | 2m/70cm                       | 15.5 in.      | 50                 | UHF        |
| AZ504SP                                        | 2m/70cm                       | 15.5 in.      | 50                 | UHF        |
| NR7900A                                        | 2m/70cm                       | 57 in.        | 300/250            | UHF        |
| <b>Monoband Mobile Antennas</b>                |                               |               |                    |            |
| NR22L                                          | 2m                            | 96.8 in.      | 100                | UHF        |
| M285                                           | 2m                            | 52.4 in.      | 200                | UHF or NMO |

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## Second Century

# How ARRL Functions

*It seems like after every Board meeting there are member questions, especially at in-person events, about how ARRL actually functions as an organization. If you are spending time getting your information from the myriad op-ed posts on social media, you are likely poorly informed. I am dedicating this column to hit the highlights, but for the details we have all of this on the ARRL website at [www.arrrl.org/organization-structure](http://www.arrrl.org/organization-structure).*

ARRL is governed by a Board of Directors. These Directors and Vice Directors are elected by you, the members, on a 3-year cycle. In fact, there are only two things, as a member, that you get to vote on: the election of a Director and Vice Director (and Section Manager, which is not a Board position), and the recall of one of those positions. These positions are all volunteers. They are unpaid and manage a modest budget for travel and support of their Division. The workload, especially on Directors, can be daunting. The idea told to me by some members, that Directors are there “only to vote,” is wrong. In theory, you could be a Director who shows up only twice a year to vote, but practically that does not work, and rarely happens.

The Board also has Officers. These positions are elected by the Directors every 2 years. This includes the President, three Vice Presidents, the CEO/Secretary, the CFO, and the Treasurer. The President presides over the Board, providing leadership throughout the year and serving to chair the Board meetings. The President also serves as the face of the organization and is the representative of ARRL to the IARU internationally. The CEO and CFO positions are responsible for the day-to-day operations of ARRL. The Board does not report to the CEO, nor is the CEO “in charge.” None of the Officers of the Board vote on motions presented to the Board.

The Board also maintains an assortment of committees. Today, much of the work of the Board happens in the committees. The complete list of committees, along with the composition of each committee, can be found on the ARRL website at [www.arrrl.org/board-committees](http://www.arrrl.org/board-committees). The most important committees are called *standing committees*, and they represent different aspects of governance and policy-making for the organization. These committees tend to meet four times a year for official meetings, but may have sub-committees that meet more often as the work requires. An example of that is that the Administration & Finance (A&F) Committee has a Revenue Sub-Committee that

may meet as much as once a week in preparation for an upcoming A&F or full Board meeting.

One committee that seems to make its way into the spotlight because of the issues they have to deal with is Ethics & Elections (E&E). This committee is comprised of three Directors who have the responsibility to deal with matters of ethical conduct or the rules and regulations of ARRL elections. Their mandate comes from ARRL By-Law 42. The by-laws are linked from the Articles of Association page found at [www.arrrl.org/arrrl-articles-of-association](http://www.arrrl.org/arrrl-articles-of-association). The E&E Committee routinely comes under scrutiny because it must interpret behaviors or actions and apply ARRL standards as defined in myriad governing documents. It is a thankless job and absurd posts you read online are rarely, if ever, based on the facts — just the desire by some for there to be no rules.

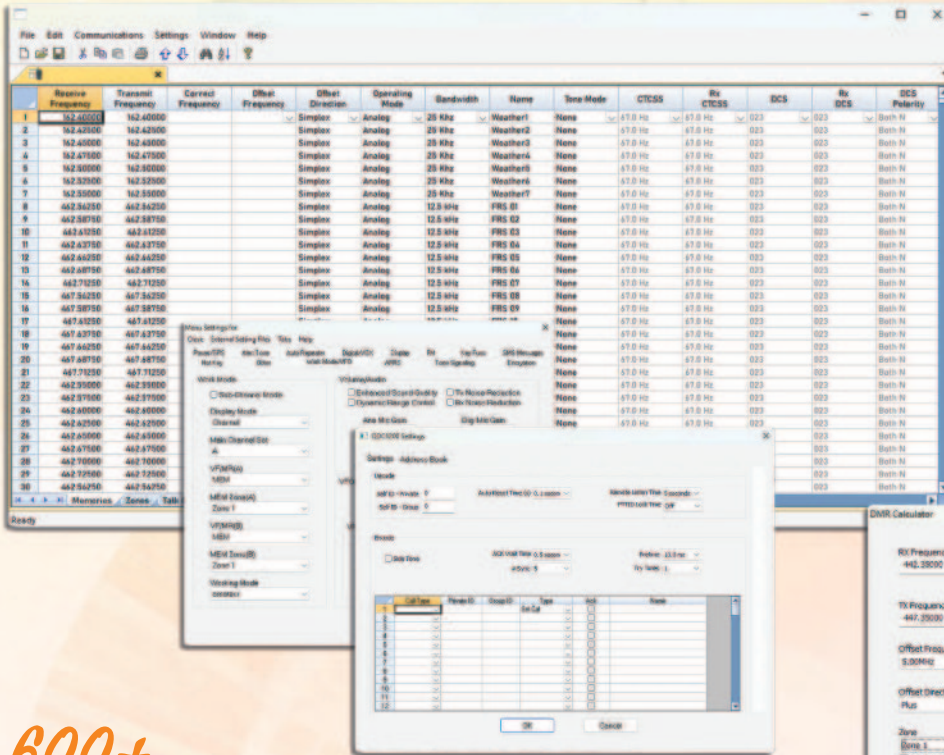
ARRL functions by having well-defined and clear roles for member-volunteers and leaders that ensure our organization serves as the radio amateur’s advocate and witness even as generations of hams come and go; as the science and art evolve; and so new entrants can easily associate themselves with the larger community of radio-active hams. So be radio active by serving your radio community as an ARRL volunteer. Be a connector by suggesting to others whom they can contact within the ARRL structure, especially their Director. And stay positive! Reading the baseless conspiracy theories about ARRL does nothing to promote or protect amateur radio.

David A. Minster, NA2AA  
Chief Executive Officer



# PROGRAMMERS AND CABLES THAT WORK INVENTED BY HAMS, FOR HAMS!

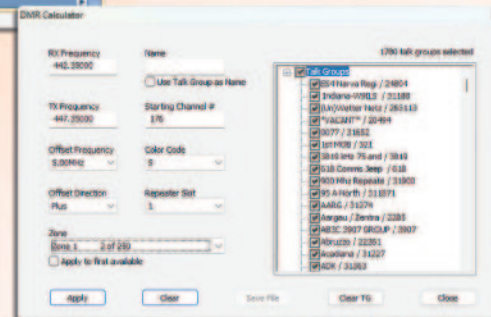
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*"To know that God knows everything about me and yet  
loves me is indeed my ultimate consolation."*

-R. C. Sproul

# Take Your Homebrew Projects to the Next Level with the DPM6000A and TDR-Cable Radar® Pro – Affordable Lab Grade, Precision Tools for Every Ham!



**\$975**

See review in October 2024 QST page 38

## DPM6000A Digital Power Meter

Experience unmatched performance with the DPM6000A Digital Power Meter. Engineered for precision, this meter offers the high accuracy demanded by ham radio operators and engineers, all at an affordable price. With an expansive dynamic range from -60 dBm to +20 dBm (sensor dependent) and a rapid display update rate, it's perfect for tuning applications. The bright, easy-to-read OLED display simultaneously shows both forward and reflected power with clear numeric and bar graph indicators. Unique in its class, the DPM6000A features a built-in, temperature-compensated calibrated power reference, providing a precise 1 mW 0 dBm 50 MHz sine wave with minimal phase distortion. Calibrate your device effortlessly right from the front panel!



**\$775**

See review in October 2024 QST page 43

## TDR-Cable Radar® Pro

Introducing the TDR-Cable Radar® Pro—an advanced upgrade from the CableScout, bringing unparalleled ease and precision to transmission line measurements. Equipped with an improved GUI, faster pulse rise time, and all-new firmware, this affordable TDR pulse generator delivers laboratory-level accuracy for ham radio installations. When paired with a high-bandwidth oscilloscope (100-200 MHz), the TDR-Cable Radar® Pro provides results that rival commercial systems at a fraction of the cost. Simplify your measurements and elevate your setup with the TDR-Cable Radar® Pro today!

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- 45W PEP
- LMR600 Radiation Loop
- Calibrated 6:1 Manual Tuning Dial

**\$535**

**HG3 Pro MLA**  
Remote Control & Auto Tuning

- 80m to 10m \*
- 45W PEP
- LMR600 Radiation Loop
- Integrated SWR Bridge

**\$1,335**

**HG3 QRO-B MLA**  
Precision Remote Control & Auto Tuning

- 80m to 10m \*
- 100W PEP
- LMR600 Radiation Loop
- Integrated SWR Bridge

**\$3,025**

See what our users say on their Facebook Group 'PreciseRF HG3 QRO'

- 1 Convenient, lightweight antenna — great for HOA restrictions!
- 2 MLA can perform as well or even better than a dipole antenna.
- 3 Integrated digital SWR bridge allows auto-tuning (HG3 Series only).
- 4 Designed and built by preciseRF - selected by MIT Haystack Observatory to design and build custom magnetic loop antennas for the 2024 solar eclipse radio propagation study.



# Noise Cancelling In-Line Products

- Use with a loudspeaker or headphones
- Perfect for DXers
- Multiple output options
- Built for radio enthusiasts
- Easy integration
- Advanced noise reduction
- Flexible configuration
- Enhanced listening experience

## Dual In-Line

Advanced DSP noise cancellation from this fully featured In-Line unit that delivers clear audio through versatile inputs and outputs.

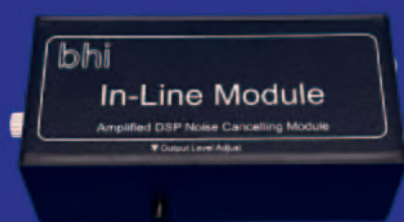
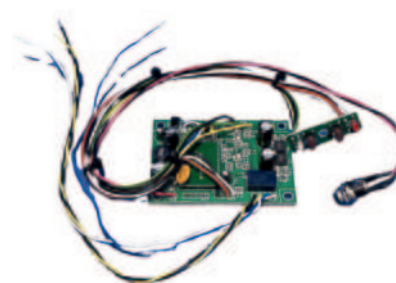


## Compact In-Line

Real-time DSP noise cancelling that reduces interference by up to 40dB. Runs for 40 hours with batteries. Perfect for portable use.

## NEDSP1962-KBD Retrofit Module

Advanced DSP noise cancelling retrofit module turns your existing speaker into a DSP noise cancelling speaker for clear audio.



## In-Line Module

This compact unit installs easily between your radio & speaker & reduces background noise by up to 40dB.

### Testimonial:

I could never go back to all the usual noise listening without my bhi!  
- Mike AD7XI



Made in the UK by bhi-ltd.com

## Member Spotlight

# James Colson, K7KQA

This year marks James Colson's, K7KQA, 32nd year as a licensed ham radio operator. He was first licensed in 1992 at the age of 12, after discovering the hobby through a book he happened to check out from his local library. The book, he recalls, told a story about a young man who got an amateur radio license in the 1950s. Whether by convenience or luck, the right book found its way into James' hands, and from that moment, he began his radio journey and never looked back.

### Generations of Radio Passion

From growing up in southern Washington state with a father who had an interest in electronics and computers, to becoming a father himself to his 13-year-old son, radio operating has been a central part of James' life. James' parents initially thought that his interest in radio operating might be just a passing fad, but now he does his best to involve his son in the hobby whenever possible. As he put it, his son enjoys visiting "Dad's Shack" to experiment with him on HF and watch the spots appear from around the world. The hobby has influenced James both inside and outside the shack. For example, when he celebrated his 25th anniversary as a licensed operator, he took a photo of one of his Earth-moon-Earth (EME) arrays to a tattoo artist and had it permanently inked on his forearm. "I think it turned out great, and it's definitely a conversation starter with both hams and non-hams," he shared.

### Pushing the Limits of EME Communication

Since his early days as an operator, James has had a strong interest in EME communication. He remains fascinated by the challenge of bouncing signals off the lunar surface, saying, "I can't really pinpoint an exact reason why I like the moon so much; I think it's the real challenge of it all." He remembers being a young ham at 12 years old, walking around hamfests, searching for the best Yagis for 2 meters that he could find. Since then, James has continued to embrace the challenges and rewards of EME.

James is particularly passionate about finding cost-effective and practical ways to pursue EME operating, which can get quite pricey. He enjoys building and designing his own equipment, as well as modifying and improving others' work to create EME-capable stations. One standout moment in his ham radio journey was assembling rover stations and providing rare grids to fellow hams. Notably, he gave out the final Fred Fish Memorial Award grid on two separate occasions to fellow operators KO9A and KG5CCI. In 2022, James also helped operator Marshall Williams, K5QE (SK), complete WAS on 222 MHz while he was operating EME portable from Oregon. James' successful portable operations enabled contacts when no 1.25-meter activity was available in the states K5QE needed.

### Continuing the Journey

James Colson's interests extend beyond EME to include meteor-scatter operating, 6-meter grid



chasing, and roving/activating, among others. He's currently looking forward to getting active on the 1296 MHz band and has upcoming travel plans to attend VHF events and meet other hams in the EME and VHF communities. Sharing the knowledge that he's spent decades collecting is an especially rewarding part of the hobby for James: "It's always very exciting when I hear about young people with an interest in moonbounce!"

By trade, James is an online antique book dealer, and he says the flexibility of his job gives him the time and freedom to fully enjoy his hobby. He has always known that amateur radio would be a lifelong pursuit. Even after decades of dedication to the hobby, James remains excited about meeting new hams and learning new techniques. As he put it, "With the ease of technology in today's world, it's fun and rewarding to be part of a hobby that still offers technological challenges."



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ARRL The National Association for Amateur Radio® in the United States: supports the awareness and growth of Amateur Radio worldwide; advocates for meaningful access to radio spectrum; strives for every member to get involved, get active, and get on the air; encourages radio experimentation and, through its members, advances radio technology and education; and organizes and trains volunteers to serve their communities by providing public service and emergency communications (*ARRL's Vision Statement, adopted in January 2016*).

ARRL is an incorporated, noncommercial association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every 3 years by the general membership. The officers are elected or appointed by the Directors.

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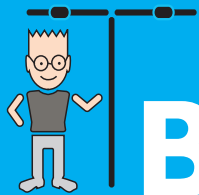
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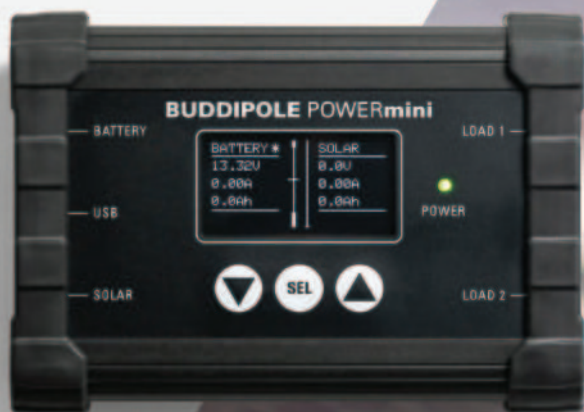
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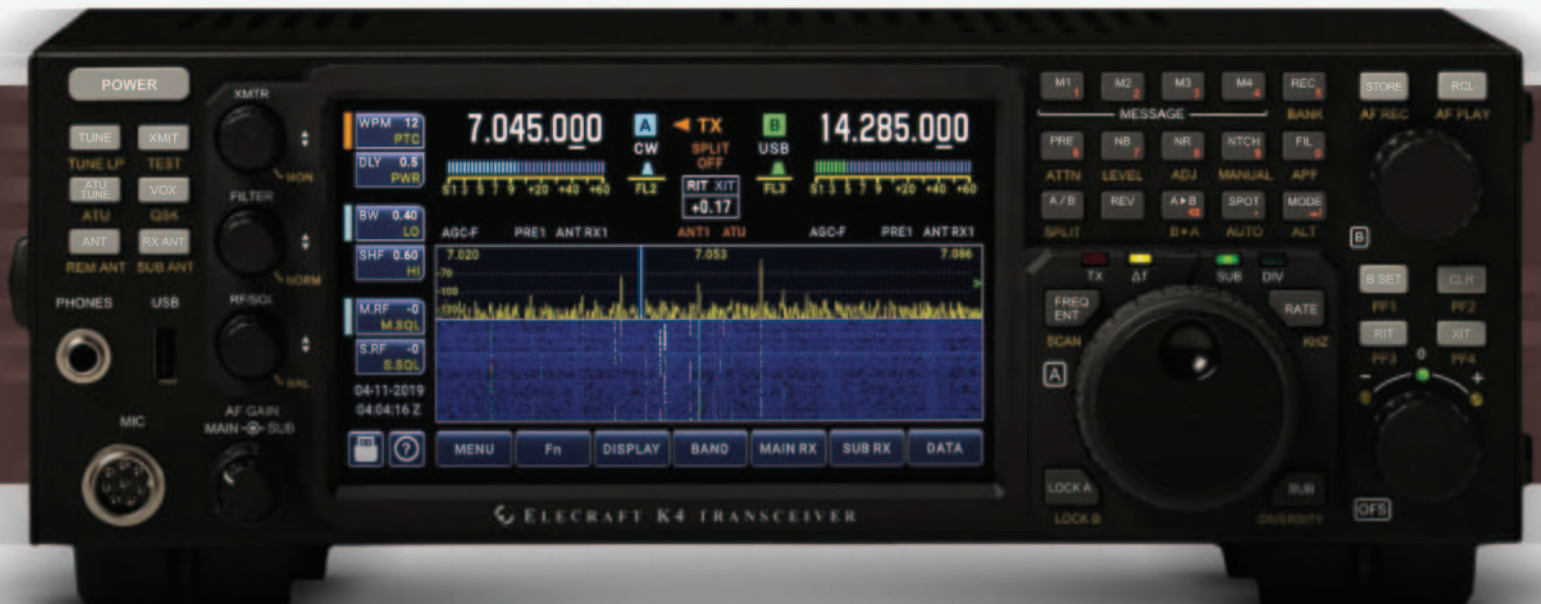
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- Doug Grant, K1DG



# Up Front

## Going POTA in Florence

While visiting Florence, Italy, Chris Diemoz, IX1CKN, located a perfect destination for his POTA station — Fiesole — and it was easy to access with public transportation, just two bus rides away. After a short walk, he reached the protected natural area of Monte Ceceri (IT-1396). Dense vegetation provided shelter from the heat as he climbed to the highest clearing and set up his QRP station — a Xiegu G106 and a quarter-wave vertical antenna planted on the ground. Chris worked mostly 20 meters; his final log shows about 31 QSOs in just over 1.5 hours, with seven park-to-park contacts. Chris said, “I was able to reach my destination by bus and walking, and I felt at home in a park far from my home. That, along with voices of fellow hams surprised to find me activating far from home, makes the growth of Parks on the Air unsurprising.” [Chris Diemoz, IX1CKN, photos]



## The FCC is Cleaning Up

Al Helfrick, K2BLA, shares a ham's worst nightmare: a visit from the FCC — every week! Parent company Fomento de Construcciones y Contratas, after acquiring Waste Recycling Group then merging with Focsa Services, rebranded the company as FCC Environmental Services. [Al Helfrick, K2BLA, photo]



## PSK Reporter

This auto repair shop is not too far from Curt McCormick's, WU3U, QTH. Curt says he laughs every time he drives past it. What does the PSK stand for? Their website answers: “The World May Never Know...” [Curt McCormick, WU3U, photo]



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| Frequency                 | 1.8~150MHz                        | 1.8~150MHz                      | 140~525MHz           |
| Power Range: Forward      | 15/150/1.5KW                      | 20/200/2KW                      | 20W/200W             |
| Power Rating              | 1.5KW (1.8~60MHz)<br>1KW (144MHz) | 2KW (1.8~60MHz)<br>1KW (144MHz) | 200W<br>(140~525MHz) |
| Tolerance                 | ±10% at Full Scale                | ±10% at Full Scale              | ±10% at Full Scale   |
| SWR Measurement           | 1:1~1:∞                           | 1:1~1:∞                         | 1:1~1:∞              |
| SWR Detection Sensitivity | 4W MIN                            | 4W MIN                          | 4W MIN               |
| Input/Output Impedance    | 50 ohms                           | 50 ohms                         | 50 ohms              |
| Input/Output Connectors   | SO-239                            | SO-239                          | SO-239 or N-Type     |

### CN-501 Economy Series

Compact HF/VHF AVG reading SWR/Power Meter Cross needle technology displays:  
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|                           | CN-901HP           | CN-901HP3          | CN-901V/N          | CN-901G            |
|---------------------------|--------------------|--------------------|--------------------|--------------------|
| Frequency                 | 1.8~200MHz         | 1.8~200MHz         | 140~525MHz         | 900~1300MHz        |
| Power Range: Forward      | 20/200/2KW         | 30/300/3KW         | 20/200W            | 2/20W              |
| Tolerance                 | ±10% at Full Scale | ±10% at Full Scale | ±10% at Full Scale | ±10% at Full Scale |
| SWR Measurement           | 1:1~1:∞            | 1:1~1:∞            | 1:1~1:∞            | 1:1~1:∞            |
| SWR Detection Sensitivity | 5W MIN             | 5W MIN             | 5W MIN             | 0.4W               |
| Input/Output Impedance    | 50 ohms            | 50 ohms            | 50 ohms            | 50 ohms            |
| Input/Output Connectors   | SO-239             | SO-239             | SO-239 or N-Type   | N-Type             |

### CN-901 Professional Series

AVG & True PEP power meter .5 second PEP delay to dampen the needle movement with on/off switch:  
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### CS-201

**Frequency Range (up to):** 600MHz  
**Power Rating:** 2.5 kW PEP 1 kW CW  
**VSWR:** Below 1.2:1  
**Insertion Loss:** Less than 0.2 dB  
**Isolation:** 60 dB 600 MHz  
**Connector:** SO 239  
**Output Port:** 2



### CS-201GII

**Frequency Range (up to):** 2 GHz  
**Power Rating:**  
 1.5 kW CW (up to 30 MHz)  
 250 W CW (up to 1 GHz)  
 150 W CW (up to 2 GHz)  
**VSWR:** Below 1.3 at 1.3 GHz  
**Insertion Loss:** Less than 1.2 dB at 1.2 GHz  
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## Correspondence

# Letters from Our Members

### GPS Coordinates Tip

The “Maidenhead Grid Squares to the Rescue” letter in the December 2024 “Correspondence” column piqued my interest. I would like to remind everyone that most (if not all) smartphones have a GPS receiver built into them and don’t require cell service to know your location, as the letter opposes. In lieu of cell service, you can use your ham radio to communicate your GPS location that your smartphone displays.

To figure out your GPS location on an iPhone, first, while you have cell service or Wi-Fi, download the Compass app. Then go into the Settings app on your iPhone, click on **PRIVACY & SECURITY**, then **LOCATION SERVICES**, and make sure the Location Services feature is turned on. From there, scroll down and click on the Compass app and allow it to use location access while using the app. You can also enable Precise Location, which will improve your location detection if there is cell service. Even without this precision, your location is generally known within 100 feet. After setting this up, open the Compass app on your iPhone, and you will see your GPS coordinates even without service or an internet connection.

I am confident other smartphones can be configured in a similar manner.

**Don J. Pearson, KE5GJ**  
Gig Harbor, Washington

### Maintain a Treasured Pastime

When I first became a ham back in the late 1950s, it was common to see pictures of ham shacks with the

walls papered with QSL cards going back to the 1940s and 1930s. It was unheard of for someone to make a contact and not send the QSL card to memorialize it.

Of course, back then, stamps and international postage were much cheaper than they are today. I still find it strange that many hams don’t take advantage of Logbook of The World® (LoTW®), which is free, or eQSL, which is very cheap. My logging program sends my contact information automatically to LoTW and makes it easy to send files to eQSL. Some hams don’t tell you whether they will respond to a direct QSL or participate in one of the inexpensive ways to verify a contact. This forces you to wait a week or so to see if they show up on LoTW or eQSL, and then risk paying the postage to send them a card, hoping for a reply.

I have three binders filled with QSL cards and have started a fourth. If a card comes via eQSL, I print it out so I have a hard copy. I treasure these cards because they memorialize my contacts from around the world. I think all hams should continue this time-honored tradition of sending a QSL card for all contacts.

**Michael Bornstein, K6UMO**  
The Villages, Florida

### Encouraging the Loop Skywire Antenna

In the January 2025 “Ask Dave” column, contrary to Dave’s bottom line in the “Loop Skywire Antenna” question, I think the Loop Skywire antenna is an excellent all-band antenna. I have helped several of

my friends put up a Loop Skywire antenna. In one instance, the loop averaged only 12 – 15 feet in height and still worked very well.

I think the secret is the feed line (ladder line or open wire) and the correct antenna tuner. The tuner should be designed for balanced line where the balun is on the input side of the tuner, not on the output side. An example of this is the Palstar BT1500A antenna tuner, and I believe the MFJ-974 tuner also meets the requirement.

Kirk Kleinschmidt’s, NT0Z, article “A Balanced, Everyday Approach to All-Band Bliss” in the April 2002 issue of *QST* may help to understand this further.

**Paul Sturpe, W3GQ**  
Terrell, North Carolina

### Women Inspiring the Next Generation

Amy Haptonstall’s, AG7GP, article “Building a Sisterhood through SOTA” in the January 2025 issue of *QST* was outstanding! It was an interesting activity, and the article was well written. Because a woman wrote it, I shared it with my 13-year-old granddaughter, who was impressed by it, and she may look into amateur radio now.

**Jon Jones, N0JK**  
Lawrence, Kansas  
Life Member

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# W1AW Schedule

| PAC                      | MTN                     | CENT                    | EAST                     | UTC       | MON                    | TUE       | WED       | THU       | FRI       |
|--------------------------|-------------------------|-------------------------|--------------------------|-----------|------------------------|-----------|-----------|-----------|-----------|
| 6 AM                     | 7 AM                    | 8 AM                    | 9 AM                     | 1300      |                        | FAST CODE | SLOW CODE | FAST CODE | SLOW CODE |
| 7 AM-12 <sup>45</sup> PM | 8 AM-1 <sup>45</sup> PM | 9 AM-2 <sup>45</sup> PM | 10 AM-3 <sup>45</sup> PM | 1400-1945 | VISITING OPERATOR TIME |           |           |           |           |
| 1 PM                     | 2 PM                    | 3 PM                    | 4 PM                     | 2000      | FAST CODE              | SLOW CODE | FAST CODE | SLOW CODE | FAST CODE |
| 2 PM                     | 3 PM                    | 4 PM                    | 5 PM                     | 2100      | CODE BULLETIN          |           |           |           |           |
| 3 PM                     | 4 PM                    | 5 PM                    | 6 PM                     | 2200      | DIGITAL BULLETIN       |           |           |           |           |
| 4 PM                     | 5 PM                    | 6 PM                    | 7 PM                     | 2300      | SLOW CODE              | FAST CODE | SLOW CODE | FAST CODE | SLOW CODE |
| 5 PM                     | 6 PM                    | 7 PM                    | 8 PM                     | 0000      | CODE BULLETIN          |           |           |           |           |
| 6 PM                     | 7 PM                    | 8 PM                    | 9 PM                     | 0100      | DIGITAL BULLETIN       |           |           |           |           |
| 6 <sup>45</sup> PM       | 7 <sup>45</sup> PM      | 8 <sup>45</sup> PM      | 9 <sup>45</sup> PM       | 0145      | VOICE BULLETIN         |           |           |           |           |
| 7 PM                     | 8 PM                    | 9 PM                    | 10 PM                    | 0200      | FAST CODE              | SLOW CODE | FAST CODE | SLOW CODE | FAST CODE |
| 8 PM                     | 9 PM                    | 10 PM                   | 11 PM                    | 0300      | CODE BULLETIN          |           |           |           |           |

W1AW's schedule is at the same local time throughout the year. From the second Sunday in March to the first Sunday in November, UTC = Eastern US time + 4 hours. For the rest of the year, UTC = Eastern US time + 5 hours.

♦ Morse code transmissions: Frequencies are 1.8025, 3.5815, 7.0475, 14.0475, 18.0775, 21.0675, 28.0675, 50.350, and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13, and 15 WPM.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13, and 10 WPM.

Code bulletins are sent at 18 WPM.

For more information, visit us at

[www.arrl.org/w1aw](http://www.arrl.org/w1aw)

♦ W1AW Qualifying Runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted by various West Coast stations on CW frequencies that are normally used by W1AW, in addition to 3590 kHz, at various times. Underline 1 minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any), and complete mailing address. Fees: \$10 for a certificate, \$7.50 for endorsements.

♦ Digital transmissions: Frequencies are 3.5975, 7.095, 14.095, 18.1025, 21.095, 28.095, 50.350, and 147.555 MHz.

Bulletins are sent using 45.45-baud Baudot, PSK31 in BPSK mode, and MFSK16 on a daily revolving schedule.

Keplerian elements for many amateur satellites will be sent on the regular digital frequencies on Tuesdays and Fridays at 6:30 PM Eastern time using Baudot and PSK31.

♦ Voice transmissions: Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59, 50.350, and 147.555 MHz. Voice transmissions on 7.290 MHz are in AM double sideband, full carrier.

♦ Notes: On Fridays, UTC, a DX bulletin replaces the regular bulletins. W1AW is open to visitors 10 AM to 3:45 PM Monday through Friday. FCC-licensed amateurs may operate the station during that time. Be sure to bring a reference copy of your current FCC amateur license. In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW code practice and CW/digital/phone bulletin transmission audio is also available real-time via the *EchoLink Conference Server* W1AWBDCT. The conference server runs concurrently with the regularly scheduled station transmissions. The W1AW Qualifying Run texts can also be copied via the EchoLink Conference Server.

During 2025, Headquarters and W1AW are closed on New Year's Day (January 1), Presidents Day (February 17), Memorial Day (May 26), Independence Day (July 4), Labor Day (September 1), Veterans Day (November 11), Thanksgiving and the following day (November 27 and 28), and Christmas and the following day (December 25 and 26).





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# A Rotatable Medium-Power Dipole for 6 Meters

AD5X built most of this antenna with readily available parts from the home improvement store.

## Phil Salas, AD5X

I have always enjoyed casual 6-meter operation, and a dipole provides everything I normally need to enjoy the Magic Band. It is relatively easy to build a rotatable dipole for 6 meters because the dimensions are reasonable (about 9 feet in total length). The antenna I describe here can handle the 500 W output of my Elecraft KPA500, which can come in handy if I ever need some extra oomph. Because there is a Lowe's® within walking distance of my home, I built most of this dipole with the materials available there.

Table 1 details the necessary components and their prices as of press time. Of course, a dipole needs a 1:1 balun, as well as a UHF connector and some #4 solder lugs, so you will need to find these items elsewhere. Also, my local Lowe's didn't have #4 stainless-steel machine screws, nuts, and lock washers (needed for mounting the UHF connector). Though I specified



Figure 1 — PVC nipple preparation.

Mouser part numbers for some of the hardware components and the balun toroid, these items are available from many other sources.

Table 1 — Parts List

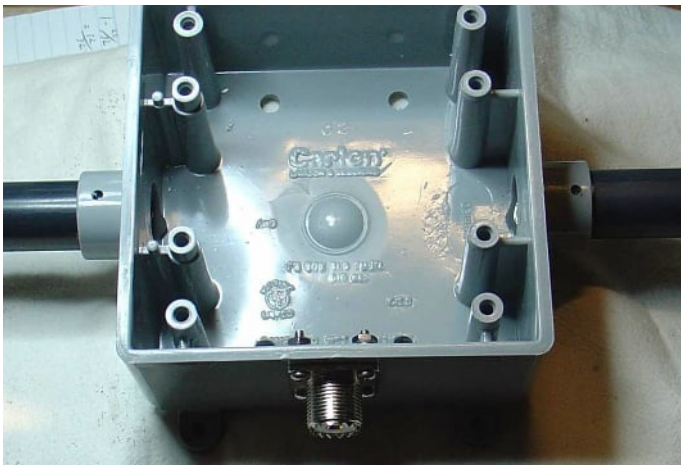
| Quantity | Part Description                                            | Part Number             | Total Cost |
|----------|-------------------------------------------------------------|-------------------------|------------|
| 2        | ½-inch-OD × 3-foot aluminum tubes                           | (Lowe's) 215889         | \$25.96    |
| 2        | ⅝-inch-OD × 3-foot aluminum rods                            | (Lowe's) 216093         | \$14.00    |
| 1        | Two-pack of #4 stainless-steel hose clamps                  | (Lowe's) 625565         | \$1.88     |
| 2        | ¼ × 1¾-inch stainless-steel U-bolts                         | (Lowe's) 1329397        | \$9.36     |
| 2        | ½ × 10-inch sprinkler riser nipples                         | (Lowe's) 5397215        | \$2.90     |
| 1        | 12-pack of ¼-inch stainless-steel split lock washers        | (Lowe's) 409443         | \$2.78     |
| 1        | 2 × ½-inch outdoor electrical box                           | (Lowe's) 145115         | \$8.78     |
| 2        | Five-packs of ½-inch #4 stainless-steel self-tapping screws | (Lowe's) 82834          | \$2.44     |
| 2        | Five-packs of ⅝-inch #4 stainless-steel self-tapping screws | (Lowe's) 136099         | \$2.44     |
| 4        | #4 stainless-steel split lock washers                       | (Mouser) 616-60687-01   | \$0.80     |
| 4        | 4-40 × ½-inch stainless-steel screws                        | (Mouser) 534-9902       | \$0.56     |
| 4        | 4-40 stainless-steel nuts                                   | (Mouser) 534-7248-3     | \$0.64     |
| 3        | #4 solder lugs                                              | (Mouser) 534-7325       | \$0.66     |
| 1        | FT240-31 ferrite toroid                                     | (Mouser) 623-2631803802 | \$8.23     |
| 1        | UHF female connector                                        | (Mouser) 601-25-7350    | \$2.51     |

## Potential for Cost Reduction

While this is a simple 6-meter antenna, I was surprised by the cost. However, there are some ways to save money with this build. As an example, you can purchase 6-foot lengths of ½-inch-outer diameter (OD) and ⅝-inch-OD tubing from Texas Towers for about \$20 plus shipping, also as of press time. You can save even more money by using only two 6-foot, ½-inch-OD tubes, which will eliminate the need for telescoping tubes and hose clamps. In that case, you would need to carefully cut the tubes for resonance.

## Dipole Construction

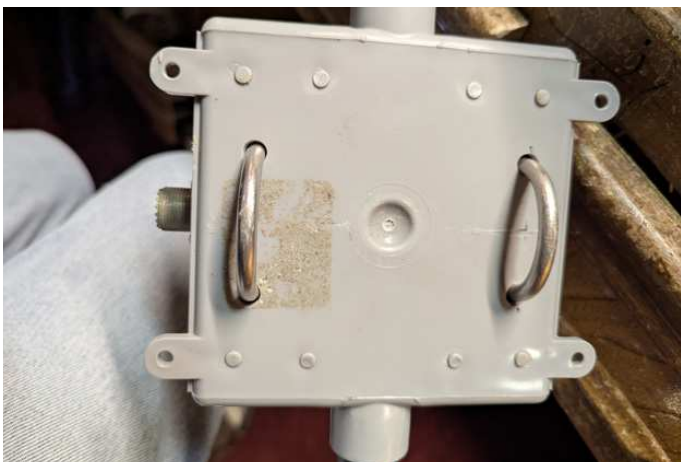
Begin construction by cutting off one of the threaded ends of each sprinkler riser nipple (see Figure 1). Next, insert the cut ends of these nipples into the ½-inch electrical box holes and drill #4 clearance holes (⅝-inch diameter) through the box's ½-inch shoulder



**Figure 2** — The interior of the electrical box showing the mounted UHF connector and the nipple and U-bolt mounting holes.

holes. Finally, drill holes in the electrical box for the U-bolts and UHF connector (see Figure 2). Figure 3 is an exterior view of the electrical box showing nipple, U-bolt, and UHF connector placement. With a hacksaw, cut a roughly 1-inch slit on one end of each of the two 3-foot-long, 1/2-inch-OD tubes (see Figure 4).

Insert the non-slitted tube ends into the PVC nipples in the electrical box. These nipples provide extra support and match the diameter of the aluminum tubing to the size of the electrical box connections. Extend the aluminum tubes about 1/2 inch into the interior of the box. Use a 3/32-inch-diameter drill bit to drill through the previously drilled 1/8-inch electrical box shoulder holes, and fix the aluminum tubes and nipples in place with 1/2-inch #4 self-tapping screws and lock washers. Drill 3/32-inch-diameter holes in the two 1/2-inch extensions of the 1/2-inch-OD aluminum tubes that extend into the box. Next, secure #4 solder lugs to the tubes with the 3/8-inch #4 self-tapping screws and lock washers. Slip



**Figure 3** — Nipple (top and bottom), U-bolt (front), and UHF connector (left) placement.



**Figure 4** — Telescoping tube preparation.

the 3/8-inch rods into the split ends of the 1/2-inch tubes for a total length of about 4 1/2 feet on each side of the dipole. Secure with the hose clamps. You will adjust the length later for best standing

wave ratio (SWR) at 50 MHz. If you have some available, use an anti-corrosion compound like Noalox® at the joint.

For the balun, I wound four turns of RG-316 (because I had some on hand) crossover-style on the toroid. RG-58 should be fine for up to 500 W SSB or CW. Use zip ties to hold the coax to the toroid, and attach the coax to the element solder lugs and UHF connector. I used hot glue to firmly hold the balun to the box. The completed dipole feed assembly interior is shown in Figure 5.

## Final Assembly and Tuning

Attach the U-bolts to the box using 1/4-inch stainless-steel split lock washers and the included U-bolt nuts. Now you can firmly attach your mast of choice to the electrical box before securely attaching the box cover. I also drilled a few 1/8-inch-diameter holes in the bottom of the box so condensation can drain.



**Figure 5** — The completed feed assembly for the 6-meter dipole.

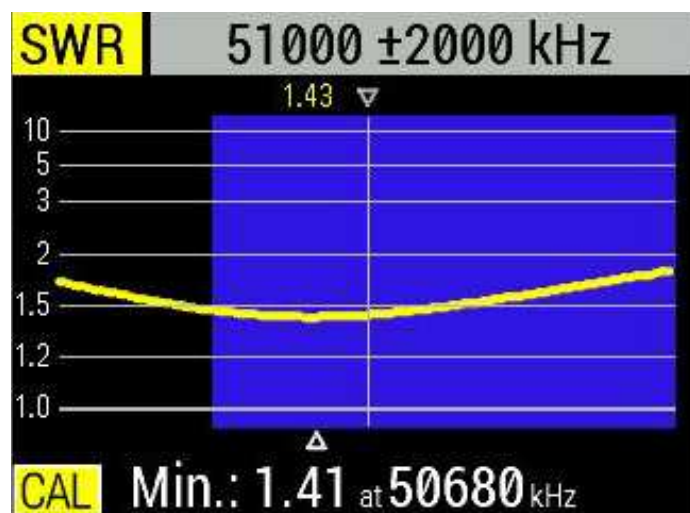




**Figure 6** — The completed antenna in a temporary setup for taking measurements.

I mounted the dipole on an 8-foot, 1½-inch-OD mast and leaned it against a fence to complete the initial testing and adjustment with an antenna analyzer. Make sure you keep both dipole elements the same length as you adjust them. Figure 6 shows the setup, and Figure 7 shows the measured SWR prior to mounting. It is less than 1.5:1 at 50 – 51.3 MHz.

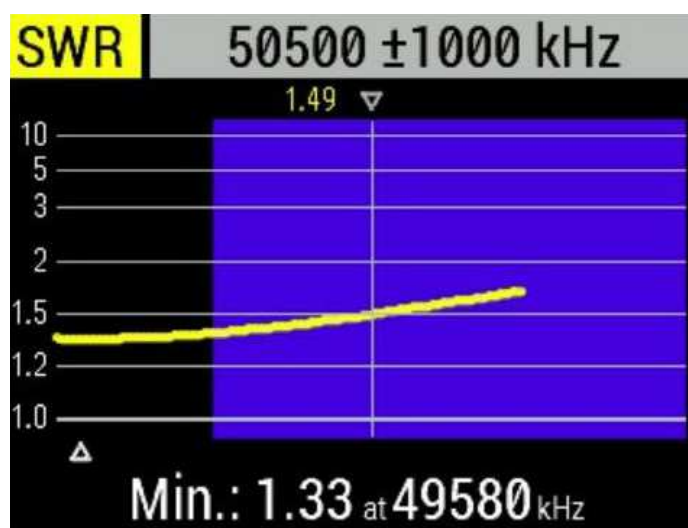
Finally, I attached the mast to the chimney mount on my roof (see Figure 8). I oriented the antenna east/west, as I am in the center of the US, and this gives me access to both coasts with no rotator. The antenna is



**Figure 7** — The initially tuned SWR.



**Figure 8** — The final dipole location.



**Figure 9** — The SWR of the dipole after the author mounted it on his chimney.

light, but even if you use a lightweight TV-type rotator, you may wish to use something sturdier than your chimney as the mast support. Figure 9 shows the final SWR measurement. When I mounted it in a more open space, the resonant frequency dropped. However, I haven't bothered to readjust the dipole's resonant frequency, as the SWR in the popular 50.1 – 50.2 MHz region is better than 1.4:1.

All photos provided by the author.

Phil Salas, AD5X, an ARRL Life Member, has been licensed continuously since 1964. His interest in ham radio led him to pursue BSEE and MSEE degrees from Virginia Tech and Southern Methodist University, respectively, followed by a 35-year career in RF, microwave, and lightwave design. Now fully retired, Phil enjoys tinkering with ham radio projects. You can contact Phil at [ad5x@arrrl.net](mailto:ad5x@arrrl.net).

For updates to this article, see the **QST Feedback** page at [www.arrrl.org/feedback](http://www.arrrl.org/feedback).



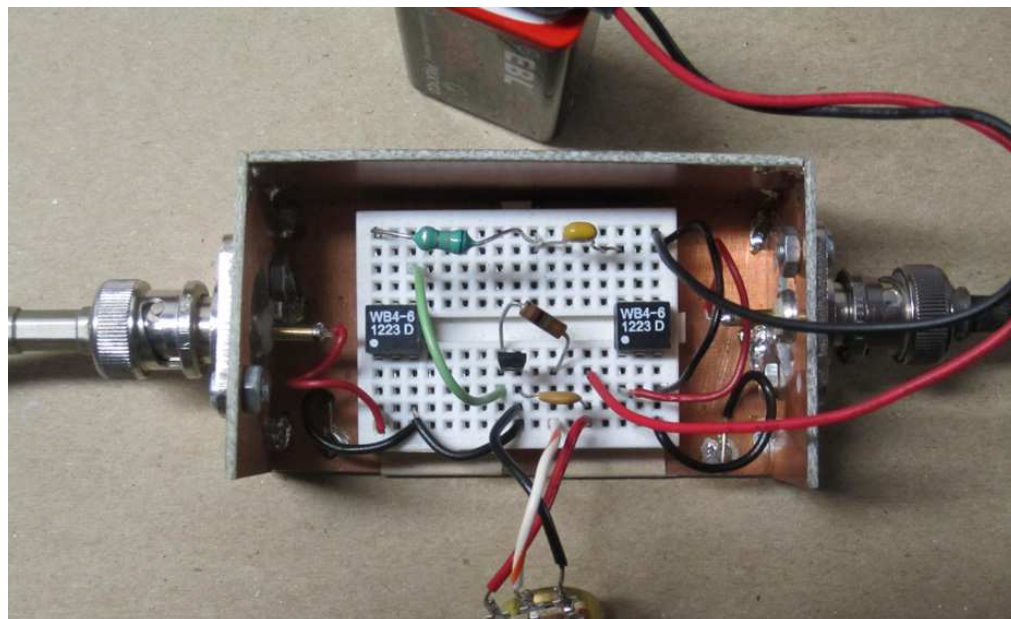
# A Low-Cost Tunable RF Preselector Using a Varicap Diode

Filter out unwanted signals inexpensively with this passive preselector that works on multiple bands.

**Dr. George R. Steber,  
WB9LVI**

Homebrew and inexpensive commercial shortwave receivers often lack good front-end RF selectivity. Adding a band-pass RF filter between the antenna and receiver can help reject strong out-of-band noise or signals that might overload the receiver input. Here, I describe an effective passive design for an RF preselector tuned with a voltage-controlled capacitor — specifically, a low-cost varicap. For those interested in more theory and analysis, a detailed version of this article is available in the March/April 2025 issue of *QEX* (see the sidebar, “Expanded Version of This Article in the March/April 2025 Issue of *QEX*”).

In “A Tunable RF Preamplifier Using a Variable Capacitance Diode” in the January/February 2018 issue of *QEX*, I presented a design for an active, two-stage, varicap-tuned RF preamplifier. The passive varicap-tuned preselector I describe here is not as selective as the amplifier version, and it will have several more dB of insertion loss. However, these are not important



The RF tunable preselector prototype.

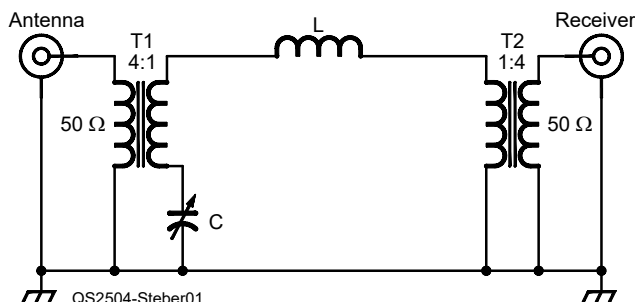
factors with adequate receiver RF amplification. This design requires few parts and is easily built for \$25 or less.

## RF Preselector Basics

A classic tunable preselector is shown in Figure 1. Variable capacitor  $C$  and inductor  $L$  form a resonant circuit.  $C$  varies the filter's center frequency. Typically, a mechanical variable capacitor is used. The filter is designed for a nominal  $50\ \Omega$  antenna and a receiver with a  $50\ \Omega$  input. The resonant L-C circuit alone would work, but the band pass would be broad. Wideband 4:1 impedance transformers  $T1$  and  $T2$  improve the filter selectivity. Higher-ratio transformers can further increase the selectivity, but at the cost of increased insertion loss.

## Tunable RF Preselector Design

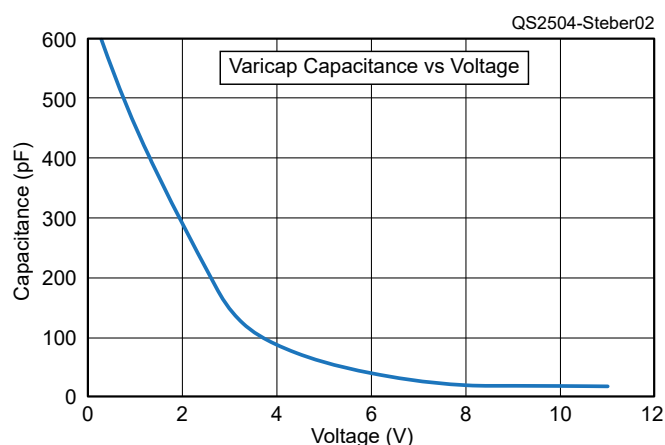
Like the design in my earlier *QEX* article, a *varicap* is used for tuning. A varicap is a type of solid-state diode operated in a reverse-biased state. The reverse bias voltage controls the thickness of the depletion zone and, therefore, the PN junction capacitance. The



QS2504-Steber01

**Figure 1** — A schematic for a basic tunable preselector.



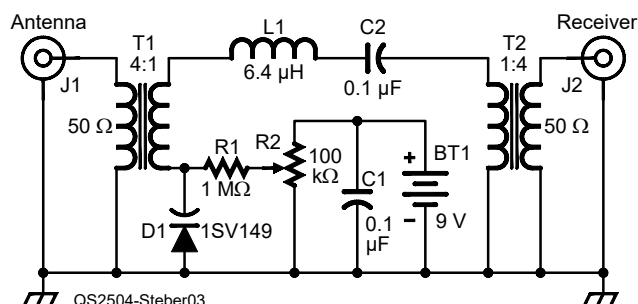


**Figure 2** — Varicap capacitance versus applied dc voltage for the 1SV149 diode. This data was taken from the manufacturer's data sheet.

greater the applied voltage, the greater the depletion zone and the smaller the capacitance. Most diodes exhibit this characteristic to some extent, but varicaps exploit this effect and increase the capacitance variation range. And besides the benefit of a lower cost, the variable resistor controlling the dc voltage across the varicap has a larger angle of rotation (320 degrees) than a mechanical capacitor (180 degrees), which may provide finer control.

The 1SV149 varicap used in this project was designed to replace the tuning capacitor in AM radios. It has a Q factor of greater than 200, a small footprint, a high capacitance ratio, and low-voltage operation. Best of all, it can be found on the internet for less than a dollar! The 1SV149 capacitance variation versus applied dc voltage is shown in Figure 2; notice that most of the capacitance range occurs at less than 9 V.

Figure 3 shows the complete schematic of the tunable preselector. With the values shown, this passive design covers the frequency range of about 2.5 – 12.0 MHz. I designed this circuit using the *LTspice* simulator prior to construction. After I built the breadboard circuit, I used a spectrum analyzer with a tracking generator to



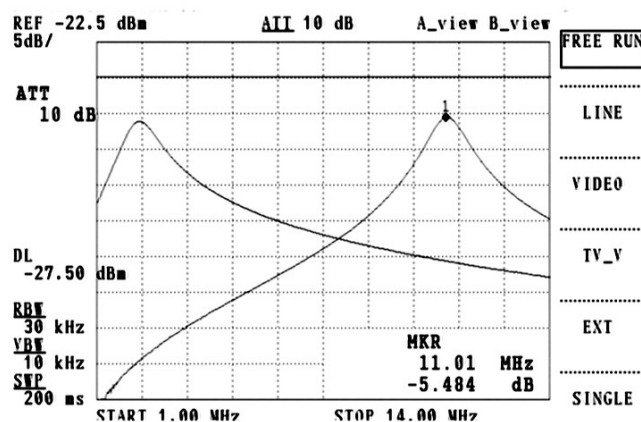
**Figure 3** — The final schematic for the tunable preselector.

| Quantity | Label  | Value              | Description             |
|----------|--------|--------------------|-------------------------|
| 2        | C1, C2 | 0.1 $\mu$ F        | Ceramic capacitors      |
| 1        | L      | 6.8 $\mu$ H        | Mouser 77F6R8K inductor |
| 1        | R1     | 1 M $\Omega$       | ¼ W 5% resistor         |
| 1        | R2     | 100 K $\Omega$     | Potentiometer           |
| 1        | D1     | 1SV149             | Varicap                 |
| 1        | T1, T2 | 4:1 RF transformer | Coilcraft WB4-6L        |
| 2        | J1, J2 | N/A                | BNC connectors          |

analyze it. There was close agreement between the *LTspice* simulation and the hardware. More information about the *LTspice* simulation and changes for other tuning ranges are discussed in my March/April 2025 *QEX* article.

As in Figure 1, inductor L and varicap D1 form a series resonant circuit between the antenna and the receiver. C2 blocks dc from the varicap circuit. Because C2 has much higher capacitance than D1, the D1 capacitance dominates, as C2 and D1 are in series. C1 bypasses any RF that might find its way into the circuit. R2 tunes the peak frequency by varying the dc voltage to D1 through R1. T1 and T2 (the 4:1 RF transformers) each introduce about 0.5 dB insertion loss. The 9 V battery current consumption is low, at only about 90  $\mu$ A. However, you may desire an on/off switch in series with the battery. Table 1 lists the necessary components. As of press time, the 1SV149 is available on eBay, Ali-Express, and Amazon. Contact me should this or any other part become unavailable.

The lead photo shows my breadboard. I constructed it inside a case made from copper printed circuit boards. You can see the small varactor in the center and the RF transformers on the left and right. The battery is at



**Figure 4** — The measurement taken with a spectrum analyzer and tracking generator. Note the peaks at the tuning range extremes.

the top, and the potentiometer is at the bottom. Figure 4 shows the actual measured performance. The two peaks correspond to the extremes of the varicap tuning range.

To use the preselector, turn off the receiver's automatic gain control (AGC) and adjust resistor R2 until the received signal is the loudest. If you are using decoding software that has a spectrum analyzer

display, you will see a pronounced increase in the signal as you approach the peak. After tuning, remember to turn the AGC back on.

## A Fun Build for a Handy Device

This RF tunable preselector can prove helpful in a variety of interference situations, especially with low-cost receivers. Projects like this are both enjoyable and educational. Consider demonstrating this application of a varicap in a teaching situation, such as a presentation at your local ham club, or use it as an outreach tool at your local high school science class.

### Expanded Version of This Article in the March/April 2025 Issue of QEX

A more detailed version of "A Low-Cost Tunable RF Preselector Using a Varicap Diode" can be found in the March/April 2025 issue of QEX, which is available to all ARRL members at [www.arrl.org/qex](http://www.arrl.org/qex). The QEX version goes into more technical detail regarding the tunable RF preselector, including an LTspice performance simulation based on the component values. This allows readers to see how the simulation and the actual measurement compare. The QEX article also provides information about the USB-chargeable 9 V battery used by the author, in addition to details about modifying the preselector's tunable range for frequencies other than 2.4 – 12 MHz.

Dr. George R. Steber, WB9LVI  
11052 N. Riverton Ct., Mequon, WI 53092 | [steber@execpc.com](mailto:steber@execpc.com)

### A Low-Cost Tunable RF Preselector Using a Varicap Diode

A new version of the classic RF preselector that improves  
the front end selectivity of your short wave receiver.

A tunable RF preselector can be a useful addition to an HF receiver. It reduces adjacent channel interference by providing a bandpass function for the band of interest. Tuning to the desired band is done by adjusting a single variable capacitor. But many preselector designs require an expensive mechanical rotary capacitor for tuning. Described here is a straightforward passive design that replaces the rotary capacitor with a low-cost varicap, often called a varicap.

Operating ham receivers, like the NanoSBB RX described in QEX Nov/Dec 2021, inexpensive commercial short-wave sets like the low cost ATSD-55B receiver, or software-defined radios (SDR), can be fun but also challenging. Often, in the interest of receiver design simplicity, the benefits of good front-end RF selectivity may have been overlooked.

For these cases adding a bandpass RF filter between the antenna and receiver as shown in Figure 1 can help a lot. Filtering signals from the antenna provides for rejection of strong out-of-band signals which otherwise might overload the input. This filter can also prove to be highly beneficial in situations where there is a lot of noise or interference, for example from a local computer.

If you're only interested in a single band, say 30 meters, a fixed RF filter for that band is easily constructed. But if you like to hop around on the bands, when listening to shortwave, a tunable preselector may be the way to go. Back in 2018, I presented a

design in QEX (Jan/Feb 2018, pp. 11-14) for a very selective tunable RF preamplifier. It was enormously popular as attested to by the volume of email received over time. That design used a varicap tuning element and a two stage buffer amplifier.

Over the years many have wondered if it were achievable to design a passive (without amplifier), tunable preselector. As this article shows, it is possible to build a passive varicap-tuned preselector that has many of the characteristics of the amplifier version in the Jan/Feb 2018 QEX article. Downsides of this design are that it is not as selective as the amplifier version and has an insertion loss of a few dB. For many cases, like the NanoSBB or ATSD-55B receiver, where there is adequate RF amplification, these are not important factors. These radios will perform better with a preselector by rejecting extraneous signals that would cause the AGC to reduce the desired signal. A big upside for this design is that it requires few parts and is easy to build, even without a PCB.

It shows you a design that covers the frequency range of about 2.5 MHz to 120 MHz. But other ranges are possible, and I'll show you how to change component values to cover the band of frequencies of your own interest. I'll also show you an LTspice ([www.linear.com/designtools/software](http://www.linear.com/designtools/software)) simulation and spectrum analyzer view that proved useful in verifying the operation. A single 9V battery is used for operation. As noted above, this design uses a variable capacitor diode, a varicap. This tunable preselector should find use in many interference situations.

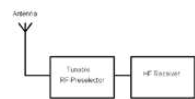


Figure 1 – A tunable RF preselector is placed between the antenna and the receiver.

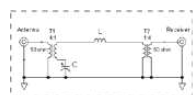


Figure 2 – Schematic of the tunable preselector.

QEX March/April 2025



Click here to watch ARRL Lab Digital RF Engineer John McAuliffe, W1DRF, build the RF tunable preselector and test it with a spectrum analyzer.

All photos provided by the author.

George R. Steber, PhD, WB9LVI, is Professor Emeritus of Electrical Engineering and Computer Science at the University of Wisconsin-Milwaukee. He is now retired, having served more than 35 years, though he still lectures occasionally at the university. George has also worked for NASA and the US Air Force. He is a Life Member of ARRL and IEEE, and he is a professional engineer. George has written numerous articles for *QST*, *Nuts and Volts*, and *Circuit Cellar*. His book, *Invisible Visitors from Outer Space: The Story of Cosmic Rays*, is available on Amazon. George enjoys WSPR, JT9, astronomy, and jazz. You may reach George at [steber@execpc.com](mailto:steber@execpc.com) with "Preselector" in the subject line and the email mode set to text.

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# Using *OpenGD77* Firmware to Work FM Satellites

This free firmware provides your analog/DMR radio with satellite capability, including Doppler tuning and AOS and LOS information.

## Richard “Rick” Lawn, W2JAZ

After I had developed a tape-measure Yagi kit for the South Jersey Radio Association, some members asked about using it for amateur satellites. The Radio Amateur Satellite Corporation bulletin board put me in contact with David Spoelstra, N9KT, who had made hundreds of contacts using a 2-meter tape-measure Yagi and a handheld with *OpenGD77* firmware. If you’ve wanted to experiment with satellite operation but have hesitated due to the cost of equipment, start with this simple, inexpensive setup.

## OpenGD77

After Radioddity marketed the GD-77 analog/DMR dual-band handheld, Australian ham Roger Clark, VK3KYY, developed open-source firmware for it and other similar handhelds. This new software makes an inexpensive handheld into a satellite-capable transceiver that provides pass predictions, orbital paths, acquisition of signal and loss of signal (AOS and LOS) information, and Doppler tuning, so there is no need to manually change uplink or downlink frequencies during a satellite pass.

Many radios can use the new firmware, and a continually updated list is available ([www.opengd77.com](http://www.opengd77.com)). Some vendors are now selling radios with the *OpenGD77* software installed. Just make sure you are using the correct code plug software (CPS) version to make modifications. AnyTone has new firmware available (V3.04, as of press time) that provides satellite operation for the AT-D878 and AT-D578 series radios. They both have a GPS system, so it is unnecessary to input coordinates when you change locations. I found that my AnyTone AT-D878 would lock up when it lost the GPS signal. However, my modified Baofeng DM-1701 — purchased specifically for this project — never locked up.

I recommend that you read the most recent documentation to ensure that your radio, or the one you plan to purchase, is compatible with the firmware. Many helpful YouTube videos, other resources, and photos are provided at [www.arrl.org/qst-in-depth](http://www.arrl.org/qst-in-depth).

I easily and quickly modified my Baofeng with the help of YouTube tutorials and the *OpenGD77* manual. My friend and fellow club member Tony, N2ATB, and I modified several radios with no issues. Before installing modified firmware, be sure to make a backup of the factory firmware in your radio, as well as any code plug that you installed prior. If your radio does not provide GPS capability, once you install the firmware, you must use the menu to select **RADIO INFO** and enter the date, time, grid square, and GPS coordinates.

## Code Plug Software

The *OpenGD77* software package includes new CPS that can load satellite Keplerian data sets from the internet. With this data, your handheld can tell which FM satellites will enter your area and show their maximum elevation with real-time tracking (see Figures 1, 2, and 3). Once a pass begins, the radio will tune automatically to accommodate Doppler shift!

## How It Performs

After updating my DM-1701, Tony and I moved to his driveway in a wooded neighborhood for an SO-50 pass with a maximum elevation of 9 degrees. We directed our tape-measure Yagi toward the satellite’s AOS direction. A few minutes later, I heard a contact on SO-50 via my handheld. I took the handheld and

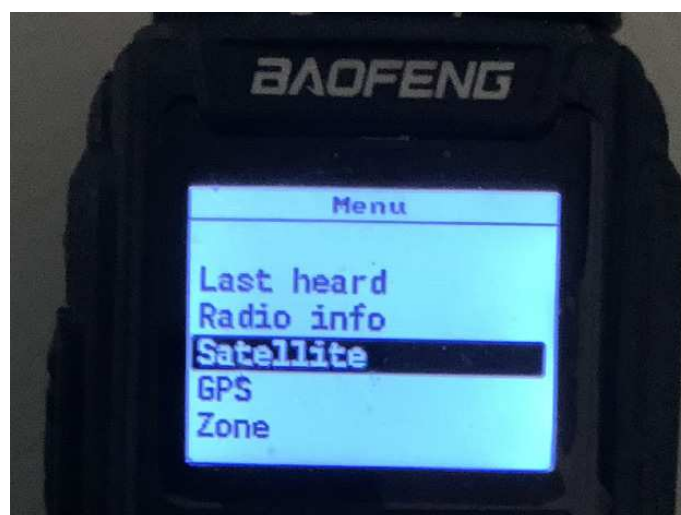
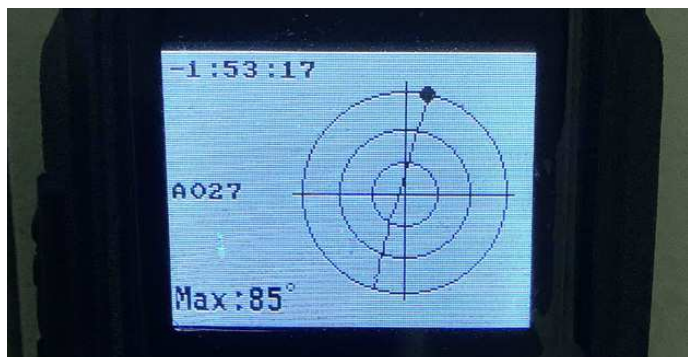


Figure 1 — Opening the *OpenGD77* menu.



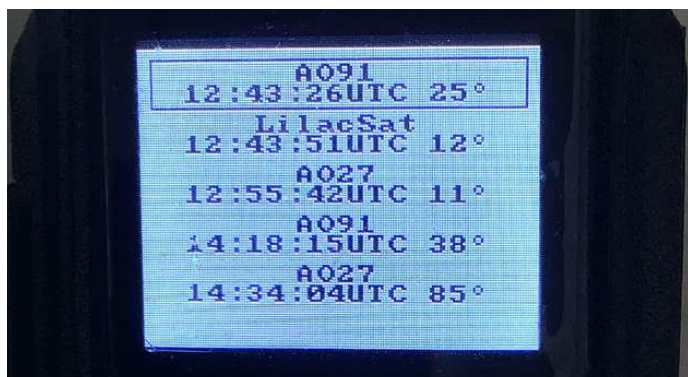
**Figure 2** — The orbital path that will be shown once you select **SATELLITE**. The maximum elevation and time until AOS are also indicated.

the Yagi home and went outside. At mid-pass, I made my first contact! The standing wave ratio at the 2-meter Yagi uplink frequency is low, and the Yagi works well enough on 70 centimeters to hear the downlink frequency. In the summer, my wife and I go to the Poconos in Pennsylvania. With the DM-1701 handheld and an Arrow Antennas dual-band antenna, I have made one or more contacts per satellite pass each time I have gone outside there — primarily on SO-50 and the International Space Station.

## Satellite Operator Tips

The handheld is *not* full duplex, but with 5 W, it can work the FM satellites. Now that you have a budget-friendly way to do so, keep the following suggestions in mind:

- 1** FM satellites are single-channel repeaters, so they can serve only one station at a time. Remember that they are often busy with many operators trying to get into the satellite.
- 2** You won't hear your own downlink, so don't transmit until you hear signals on the satellite.



**Figure 3** — A scrolling list of satellite passes along with the AOS time in UTC and the maximum elevation.

**3** Once you hear stations, make a brief transmission in between other stations. Listening and timing are critical.

**4** Make short transmissions, such as “W2JAZ handheld FN21.”

**5** Calling a strong station can be a successful approach.

**6** Mentioning the handheld often clears the way. Courteous operators will call you, much like when you're operating low power.

**7** With the Yagi in one hand and the handheld in the other, you can't easily keep a log. Use a smartphone to record your activity, and then log it later.

**8** Your phone can find GPS coordinates using one of many available apps.

**9** Don't try to use passes that are much below 20 degrees of elevation. Trees and buildings can block low-angle signals.

**10** Don't give up when the satellite gets close to LOS. Satellite signals can be very strong as they approach the horizon.

Thanks to Roger Clark, VK3KYY, and David Spoelstra, N9KT, for inspiration and help with this article.

## See QST in Depth for More!

Visit [www.arrl.org/qst-in-depth](http://www.arrl.org/qst-in-depth) for the following supplementary materials and updates:

- ✓ YouTube videos about *OpenGD77* installation and AnyTone modification
- ✓ Firmware downloads and resources
- ✓ Additional photos

All photos provided by the author.

Richard “Rick” Lawn, W2JAZ, is celebrating his 60th year in amateur radio in 2025. Rick has authored reviews and articles for *QST* and *CQ* magazines and currently serves as President of the South Jersey Radio Association. He holds undergraduate and graduate degrees from the Eastman School of Music and has performed with Chuck Mangione, Lionel Hampton, and a host of other noted performers and ensembles. Rick can be reached at [rjlawn@gmail.com](mailto:rjlawn@gmail.com).

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## Product Review

# CFT1 Five-Band CW Field Transceiver by KM4CFT

Reviewed by Phil Salas, AD5X

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If you're interested in POTA, SOTA, or just leisurely portable operation, there are more and more transceiver options becoming available. A recent entry is the CFT1 five-band CW transceiver by KM4CFT. The CFT1 covers the 40-, 30-, 20-, 17-, and 15-meter bands.

### Overview

The CFT1 is available in kit form, or fully built and tested. It provides smooth break-in CW, and it includes all the features you would expect to see in a full-featured transceiver, readily available through a single-level menu. The CFT1 does not include a built-in speaker, so you must use earphones or an external powered speaker. Also, there is no S-meter indication. See Table 1 for the manufacturer's specifications and the performance parameters as measured in the ARRL Lab.

### Building the Kit

This kit is considered intermediate level. You should also have a reasonable level of electrical knowledge, as you will need to make electrical measurements and use some test equipment to get the CFT1 up and running. If you are uncomfortable winding the toroid inductors and transformers, you can purchase these pre-wound. For this review, ARRL provided me with a kit and the pre-wound toroid transformer and inductors.



Figure 1 — The CFT1 kit of parts.



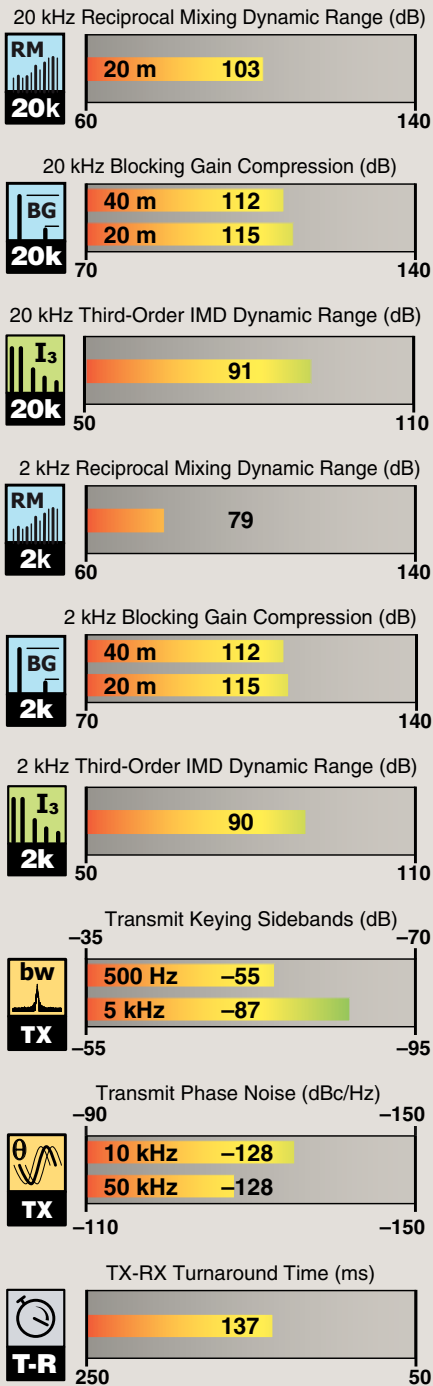
The two printed circuit boards (PCBs) contain pre-installed surface-mount device components. As you can see in Figure 1, there are quite a few through-hole components that must be installed. These include 53 electrical components and numerous additional hardware pieces. The assembly and operating manuals are available at [www.hamgadgets.com](http://www.hamgadgets.com). The assembly manual is well written and includes plenty of pictures, but it will take you some time to get everything built, and you will need a fine-point soldering iron. One thing I really like is that most of the PCB pads for the through-hole components are very large, making soldering easy. There is one caution, however. If the four crystals that make up the crystal filter are mounted against the PCB, there is a chance that the crystal cases can short to the pins. This was not mentioned in the manual. I pointed this out to HamGadgets, and they said this had occurred with one user, so they suggested I mount the crystals with some clearance. To do this, I folded a piece of paper (twice, to give four layers) and installed it under the crystals, two at a time, and then pressed down on the crystals and soldered them in place. Then I simply pulled out the paper (see Figure 2). The manufacturer informed us that the current assembly manual does mention the need to add clearance for the crystals to prevent shorts.

### Bottom Line

The CFT1 CW transceiver is an excellent addition for those who enjoy portable operation.

## CFT1 5-Band CW Field Transceiver by KM4CFT

### Key Measurements Summary



QS2504-PR178

**Table 1—**  
**CFT1 Five-Band CW Field Transceiver by KM4CFT (Firmware V1.10.5)**

### Manufacturer's Specifications

Frequency coverage:  
Receive: 6.90 – 8.60 MHz;  
9.30 – 11.80 MHz; 13.50 – 16.00 MHz;  
17.00 – 20.00 MHz; 20.00 – 24.00 MHz;  
Transmit: 7.00 – 7.30 MHz;  
10.1 – 10.15 MHz; 14.00 – 14.35 MHz;  
18.068 – 18.168 MHz; 21.00 – 21.45 MHz.  
Power requirement: 8 – 14 V dc.  
Transmit: 600 – 1500 mA (800 mA typical).  
Receive: 60 – 80 mA (backlight off);  
80 – 100 mA (backlight on).

Mode of operation: CW only.

### Receiver

CW sensitivity:  
–125 to –135 dBm.

Blocking gain compression dynamic range:  
Not specified.

Reciprocal mixing dynamic range:  
Not specified.

### ARRL Lab Two-Tone IMD Testing (500 Hz bandwidth)

| Band   | Spacing | Measured<br>IMD Level | Measured<br>Input Level | Measured<br>IMD DR |
|--------|---------|-----------------------|-------------------------|--------------------|
| 14 MHz | 20 kHz  | –132 dBm              | –41 dBm                 | 91 dB              |
| 14 MHz | 5 kHz   | –132 dBm              | –42 dBm                 | 90 dB              |
| 14 MHz | 2 kHz   | –132 dBm              | –42 dBm                 | 90 dB              |

Second-order intercept point: Not specified. 14 MHz, +65 dBm.  
Receiver processing delay time: Not specified. 1.76 ms.

Spurious and image rejection:

IF rejection: Not specified.  
Lower image rejection: Not specified.  
Upper image rejection: Not specified.

Audio output: Not specified.

IF/audio response: 300 – 400 Hz.

### Transmitter

Power output: At 12 V dc: 7 MHz; 8 W,  
10 MHz; 5W, 14 MHz; 4.7 W,  
18 MHz; 4.3 W, 21 MHz; 3 W.

Spurious and harmonic suppression:

Not specified.  
CW keyer range: 5 – 50 WPM.

Transmit-receive turnaround time:

Not specified.

CW keying characteristics: Not specified.

Transmit phase noise: Not specified.

Size (height, width, depth): 1.5 × 4 × 2.75 inches, not including protrusions.

Weight, 0.5 pound.

### Measured in the ARRL Lab

Receive: 4.25 – 12.50 MHz;  
5.50 – 13.20 MHz; 7.50 – 20.40 MHz;  
9.00 – 21.10 MHz; 10.80 – 26.25 MHz.  
Transmit: As specified.

At 13.8 V dc.

Transmit: 702 mA.

Receive: 68 mA (no signal, max. volume,  
backlight off);

86 mA (no signal, max. volume, backlight on).

As specified.

### Receiver Dynamic Testing

Noise floor (MDS), 500 Hz BW:

|            |                         |
|------------|-------------------------|
| 7.02 MHz   | –126 dBm / 0.11 $\mu$ V |
| 10.12 MHz  | –131 dBm / 0.06 $\mu$ V |
| 14.02 MHz  | –132 dBm / 0.06 $\mu$ V |
| 18.088 MHz | –125 dBm / 0.13 $\mu$ V |
| 21.020 MHz | –130 dBm / 0.07 $\mu$ V |

Blocking gain compression dynamic range,  
500 Hz BW:

|         | 20 kHz offset | 5/2 kHz offset |
|---------|---------------|----------------|
| 7.0 MHz | 112 dB        | 112 / 112 dB   |
| 14 MHz  | 115 dB        | 115 / 115 dB   |
| 21 MHz  | 116 dB        | 115 / 115 dB   |

14 MHz, 20/5/2 kHz offset: 103/99/79 dB.

14 MHz, +65 dBm.

1.76 ms.

14 MHz, 86 dB.

115 dB.

67 dB.

45 mW into 8  $\Omega$  @ 1% THD<sup>1</sup>.

323 Hz.

### Transmitter Dynamic Testing

At 13.8 V dc: 7 MHz; 12.5 W, 10 MHz; 8.5 W,  
14 MHz; 6.5 W, 18 MHz; 5.4 W, 21 MHz; 5.0 W.

At 8 V dc: 14 MHz; 2.3 W.

7 MHz (worst case), –48 dBc.

Meets the FCC limits for spurious emissions.

As specified, iambic A and B.

Default = 10 WPM.

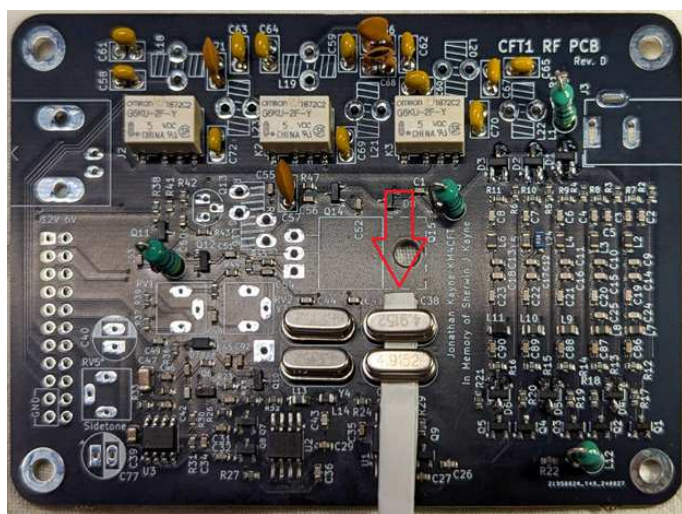
S-9 signal, 137 ms.

See Figures A and B.

See Figure C.

<sup>1</sup>Audio output jack intended for earphones and not external speaker.





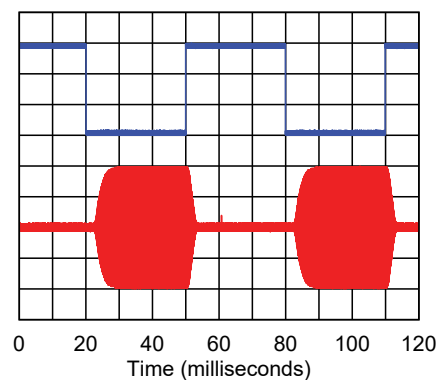
**Figure 2** — Phil Salas', AD5X, solution for crystal mounting using a piece of paper.

It took me about 4 hours to assemble the kit. Had I needed to wind the toroids, I estimate it would have taken me another 30 minutes or so. After the kit was assembled, the manual directs you to make some basic resistance checks and adjust the display contrast. Then the boards are assembled into the case. Everything fit together nicely. Figures 3 and 4 show the display board and the RF board mounted in the case.

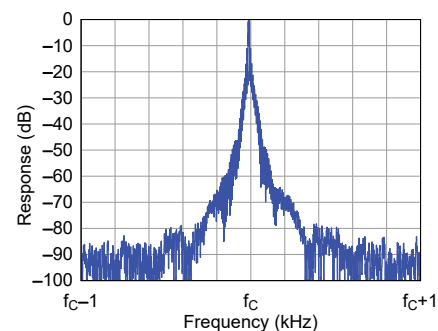
You can mount the front panel, but the rear panel must stay off for now. For the test and alignment, you will need a multimeter with mini-grabber leads, a wattmeter capable of reading QRP levels, a dummy load, a separate HF receiver or spectrum analyzer, and an RF signal generator. A tinySA Ultra satisfies the last two items. The receiver alignment is all done through the calibration menu and the rotary encoder using the secondary receiver and signal generator. Transmitter testing and alignment require the multimeter, dummy load, and QRP wattmeter. There are two potentiometers to adjust. The final adjustment is to set power output to 5 W on 20 meters. The entire test and alignment procedure took about an hour, with much of that time involved with setting up the test equipment. Once all alignment was complete, the back cover was installed. As part of this back cover installation, you must place the supplied thermal pad over the field-effect transistor (FET) and then insert a screw through the cover, the pad, and the FET and mounting post. This is kind of tricky, as trying to line up the thermal pad properly and then inserting the screw was difficult. However, I found an easy way to do this. Insert the screw through the cover and screw hole in the thermal pad. The friction fit of the screw will hold one end of the thermal pad in place. On the extreme left of the thermal pad, add a small piece of electrical tape to hold it in place. Just make sure that the electrical tape does not interfere with the FET/thermal pad interface (see Figure 5).

## Operation

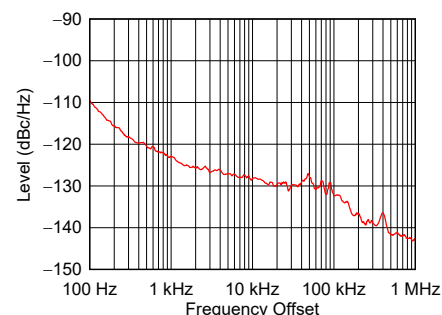
The CFT1 is easy to operate. I read through the operation manual once, and I doubt if I'll need to look at it again. There are just a few buttons and controls, so mastering the radio is easy. The



**Figure A** — CW keying waveform for the KM4CFT CFT1 showing the first two dits using external keying. Equivalent keying speed is 40 WPM. The upper trace is the key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 5 W output on the 14 MHz band. The first-dit rise time is 3.2 ms; the fall time is 1.6 ms. The second-dit rise time is 3.3 ms; the fall time is 1.5 ms. The first-dit on delay is 4.8 ms; the off delay is 1.6 ms. The second-dit on delay is 4.8 ms; the off delay is 1.7 ms.



**Figure B** — The spectral display of the KM4CFT CFT1 transmitter during keying sideband testing. Equivalent keying speed is 40 WPM using external keying. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 5 W PEP output on the 14 MHz band, and this plot shows the transmitter output  $\pm 1$  kHz from the carrier. The reference level is 0 dBc, and the vertical scale is in dB.



**Figure C** — The spectral display of the KM4CFT CFT1 transmitter output during phase noise testing. Power output is 5 W on the 14 MHz band. The carrier, off the left edge of the plot, is not shown. This plot shows phase noise 100 Hz to 1 MHz from the carrier. The reference level is  $-90$  dBc/Hz, and the vertical scale is 10 dB per division.

**MENU/BACK** button permits entering and leaving the settings menu. The **M1-M4** buttons are for the four CW message memories. A short press plays the saved message, while a long press enables beacon playback (message repeat). Momentary presses on the **BAND/XIT** button cycle the CFT1 through the five bands, while a long press enables or disables XIT. And besides changing the frequency, the **TUNE** knob also changes the tuning rate with a short press (the tuning digit has a cursor over it), and enables or disables RIT with a long press.

When you enter the menu, you can cycle through the different settings with the **TUNE** control. If you want to change a setting, tap the **TUNE** control and then use it to modify the setting. When done, tap the **TUNE** button or the **MENU** button to exit the menu. The most used menu option will probably be CW speed (shown in WPM), and it is the first menu item. Less frequently used menu settings are keyer mode (straight, iambic A or B), CW pitch, normal/reverse paddle, CW messages (for entering the messages), beacon interval, beacon timeout, and LCD backlight on/off. There is also a calibration menu that you probably will get into only once if you build the kit, and never if you buy the fully built and tested unit. The calibration procedure is provided in both the operations manual and the assembly manual. Finally, you can use the CFT1 for code practice. Just tune out of band and you'll still hear the side tone, but there will be no RF output.

## On the Air

Because of its simple user interface, the CFT1 is easy to use. From home, I operated on all five bands using my 43-foot vertical. I had no problems at all on any of the bands. If I could hear them, I could work them. I also operated portable on 20 meters in a nearby park, using my end-fed center-fed antenna (see “An End-Fed Center-Fed 20-Meter Portable Antenna” in the May 2022 issue of *QST*). I used a mini powered speaker



**Figure 3** — The CFT1 completed display board.

## Lab Notes: CFT1 Five-Band CW Field Transceiver by KM4CFT

While the CFT1 is configured to only transmit within the US amateur bands, our unit as configured could be tuned far above and below the selected band. Reception will taper off about 4 MHz below and 5 – 10 MHz above the selected band, but there is no software limit on the ability to tune. Reception on different bands can overlap, and this can be confusing when switching between bands if the tuner is set to the same frequency on multiple bands. There is no expedient way to return the tuner to a spot within the selected band once tuned far outside of it. We also noticed that the CW sidetone frequency shifted from band to band and was never equal to the 700 Hz setting. The few Hz off may or may not be noticeable. The sidetone frequency can be set to a very wide range of values, but we found a software bug when setting it to 2 kHz; the keyer speed setting was changed to 132 WPM. Upon sending the manufacturer our test results, they promptly fixed the above issues with a firmware update, version 1.10.7, which will be installed on every new unit shipped by the time this review is published. There is no ability for users to update firmware, so for units already in the field, KM4CFT Technologies will update those units for free, exclusive of shipping fees.

— George Spatta, W1GKS, ARRL Lab Manager

(less than \$15 at Amazon), and a 10-cell AA battery pack with rechargeable 2800 mAh NiMH batteries. This provided a full-charge voltage of 13.5 V dc. After about 5 hours of weekend operating, the battery pack still hadn't dropped to 10 V dc, the battery pack discharge point. Of course, I do a lot more listening than transmitting. But as the CFT1 display provides continuous monitoring of the battery voltage, I always had confidence that I wouldn't lose power in the middle of a QSO. Finally, I can't speak highly enough about the excellent silent break-in keying. There are relays in the CFT1, but they are used for only band-change filters.



**Figure 4** — The CFT1 completed RF board.



## Final Thoughts

Building the kit is time-consuming, but if you are comfortable soldering and you have the right test equipment, it is not a difficult process. If you build the kit, I recommend winding the toroid inductors and transformer yourself. Frankly, if you are going to spend an additional \$30 for pre-wound toroids, you might as well add another \$50 and get the fully assembled and tested CFT1. But whether you go with the kit or built unit, you'll have a transceiver that you'll be very happy with.

**Manufacturer:** KM4CFT Technologies. Exclusive distributor: HamGadgets, 6493 Thompson Dr., Fort Collins, CO 80526, [www.hamgadgets.com](http://www.hamgadgets.com). Price: CFT1 kit, \$319.95; CFT1 pre-wound toroids, \$30; CFT1 wired and tested, \$399.95.



**Figure 5** — Black electrical tape on the thermal pad helps to hold it in place while installing the back cover.

# Choyong LC90 Multi-Band Smart Radio

Reviewed by Steve Ford, WB8IMY  
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Receivers that combine over-the-air broadcast reception with the ability to play audio from internet “radio” sources are not new. However, the Choyong LC90 is one of the first to include shortwave broadcast coverage among its listening options — and do it all in a package just 6 × 1.5 × 4 inches and weighing slightly less than a pound.

## Adapting to Change

The age of the internet has been hard on shortwave broadcasters. With the proliferation of smartphones and other internet-connected devices, most listeners no longer turn to shortwave for news and entertainment. In response, the overwhelming majority of shortwave broadcasters have left the airwaves in favor of streaming their content over the internet. The same trend is beginning to impact AM and FM broadcasters, though not as dramatically — yet.

With the LC90, Choyong has chosen the “If you can’t beat them, join them” approach. The LC90 offers medium-wave AM reception from 522 to 1710 kHz; FM reception between 64 and 108 MHz; AM and SSB shortwave from 2.3 to 26.1 MHz, and long wave from 153 to 279 kHz.

But in addition to its radio features, the LC90 offers two methods of tapping into internet audio streams: Wi-Fi and 4G cellular. The LC90 can even establish a Blue-



tooth link that allows it to function as a wireless speaker for another device such as a smartphone.

## Unpacking

The Choyong LC90 comes nicely packed within a form-fitting foam block that’s nestled inside an attractive outer box. In addition to the radio, the package includes a USB-C cable (used for battery charging and firmware updates), a cloth carrying bag, and a tiny manual.

I suspect many *QST* readers will need eyeglasses or magnifying glasses to read the manual. The alternative is to download the PDF version from the Choyong website and then enlarge the text on your computer monitor.

I'm sorry to say, however, that these efforts will not be well rewarded. This is more of a quick-start guide than a user manual, and much is left unexplained. The LC90 desperately needs a detailed manual, even if it is available only as a PDF.

Speaking of the Choyong website, the address shown in the manual links to a site with Chinese text only. Unless you can read simplified Mandarin fluently, the better destination is **www.choyongradio.com**.

## Outside and Inside

A bright, colorful screen occupies a 2½-inch (diagonal) space on the right-hand front panel. Beneath it you find a number of pushbuttons that have somewhat intuitive functions according to their labels, though a few are confusing and not well explained in the user manual. The functions of some buttons apply exclusively to the LC90's internet features, including the sizable **MENU** button. (It is used to access the directory of internet "radio stations" and, oddly, the upper/lower sideband functions for SSB reception.)

The left-hand portion of the front panel houses the speaker system. Rather than a single speaker, there are two speakers and a woofer membrane. The result is surprisingly impressive, as I'll describe shortly.

On the opposite side of the enclosure there are three knobs: a volume control, a coarse-tuning control, and a fine-tuning control. Adjacent to the tuning knobs are 3.5-millimeter jacks for an external antenna and headphones. On this side of the radio there is also a USB-C port for battery charging and data transfers.

Along the bottom edge you encounter two small slots: one for a memory card (the LC90 can accommodate up to 32 GB of storage) and another for a cellular SIM card.

The telescopic whip antenna extends to 40 inches in length. According to the manual, the LC90 also has an internal ferrite-bar antenna. I was curious about its size and placement, so I grabbed a torque screwdriver and disassembled the rear panel to take a peek.

As you can see in Figure 6, there is indeed a rather small ferrite-bar antenna adjacent to the speaker bay. You'll also see an inconspicuous circuit board in the

lower left corner of the image. All of the LC90's radio components are on this board. Most of the remaining interior space is devoted to the speaker system and the rechargeable batteries.

The battery set consists of two type 18650 lithium-polymer cells (see Figure 7). At first glance they look like AA batteries, but the 18650s are ¾ inch in diameter and 2½ inches long, making them bigger than AAs. Their combined capacity is 5000 mAh, which provides up to 48 hours of continuous operation. The batteries are replaceable, but you will need a torque screwdriver to remove the access panel.

## On the Air

A 3-second press of the red power button brought the radio to life. A quick press of the **FM** button brought me to the FM broadcast band, where the reason for the speaker system design became obvious. As I increased the volume, I was treated to audio fidelity that surpassed anything I had ever encountered in a radio of this size. The bass frequencies were full bodied, and the mid-range and high-end frequencies were clear and crisp. With 15 W output (according to the manufacturer's specifications), there was plenty of audio power to spare.

The LC90 provides FM stereo reception when used with headphones, though the manual doesn't mention this and nothing in the display indicates when stereo decoding is taking place. Nevertheless, when I plugged in a set of headphones and tuned to a stereo broadcast, I was rewarded with excellent right- and left-channel separation.

The LC90 exhibited good sensitivity in the FM broadcast band overall. With the telescoping antenna I was able to easily pull in distant stations.



**Figure 6** — The interior of the Choyong LC90. The modest ferrite-bar antenna is visible at the upper right. At the lower left is the circuit board.

## Bottom Line

The Choyong LC90 radio is feature rich and compact with great audio. It covers many bands, and with its internet capabilities you can listen to endless online content.





**Figure 7** — The LC90 is powered by two rechargeable type 18650 lithium-polymer batteries. They may look like AAs, but they are noticeably larger.

While exploring the band I made effective use of the LC90's search feature. With a long press of the **FM** button, the radio begins scanning the entire band and logging signals in consecutive memories. This clever search function is also available for medium-wave and shortwave frequencies. While testing the search function on shortwave, I discovered that the LC90 is capable of tuning beyond the specified frequency limit of 26.1 MHz. The scan blew right past that frequency and continued all the way to 29.999 MHz.

As sterling as FM reception was, medium- and long-wave reception was a serious disappointment. The internal ferrite-bar antenna was largely ineffective. In fact, it exhibited no directionality when I rotated the radio. I was able to receive only a couple of local AM broadcast stations, and those were much weaker than they should have been. I heard nothing but noise on long wave.

Shortwave performance was significantly better. With just the telescoping antenna I was able to listen to several broadcasts, as well as National Institutes of Standards and Technology station WWV at 10 and 15 MHz. Attaching an external antenna greatly improved shortwave reception, which was to be expected, although it did little to help medium wave.

You can select from various receiving bandwidths, but the manual doesn't explain how to do this. By accident I discovered that pressing the **FINE-TUNING** knob allowed me to scroll through, and select, preset bandwidths.

I'm afraid the LC90 misses the mark, however, when it comes to SSB reception. I was able to eavesdrop on several amateur SSB signals, but the lack of frequency stability in this mode was bothersome. Within seconds after tuning in an SSB signal, the radio began to drift,



**Figure 8** — Using the LC90's Wi-Fi capability to listen to an internet audio stream from WUNH in New Hampshire.

requiring frequent adjustment of the **FINE-TUNING** control to keep the voices sounding normal.

## Internet Radio

If you grow tired of listening to radio, the LC90 allows you to surf among thousands of audio streaming sources available on the internet. As mentioned previously, you have two internet connection options: Wi-Fi or 4G. For this review I chose Wi-Fi. Having cellular access is handy when Wi-Fi isn't available, but that requires installing a SIM card, usually at an additional charge from your cellular provider.

As with most Wi-Fi-connected devices, the first step is to enter the password of your chosen network. This process is cumbersome with the LC90, but you only need to do it once (unless you change to another location with a different network). You enter the password by using the tuning knobs to scroll through the alpha-numeric combinations, selecting each letter or number by either pushing on the knobs or pressing the front-panel **OK** button.

Once the LC90 is connected to the network, a single press of the **MENU** button opens a built-in database of internet streaming sources. Sources are sorted by region, country, and area — such as a province or state. Again, you select by pressing the tuning knob or the **OK** button.

The database is vast, and you can spend a great deal of time just bouncing from one stream to another. My first stop was a stream in New Hampshire (see Figure 8), but I soon found myself sampling music from Nigeria, China, Australia, and much more. Some streams were of better quality than others, both in terms of audio and reliability.

The database appears to have been compiled by Choyong; it isn't one of the better-known online lists. The manual doesn't mention whether the database is updateable.

On the front panel there are shortcut keys that purport to take you directly to music, news, or podcasts. In my experience, however, the buttons merely brought up lists of sources that may or may not have the specified content. For example, choosing WALM in the podcast list brought me to a pleasant classical music stream, but not a podcast. The **LANG** button did a respectable job of sorting streams by language, which was convenient. A long press of the **LANG** button triggered a voice-recognition search feature, but while a microphone icon and a text prompt appeared in the display, I was never able to get this feature to work. Maybe the LC90 didn't like my voice!

Favorite internet streams, as well as over-the-air radio frequencies, can be added to memory by simply pressing the button with the heart symbol. Entries can be removed from the list, but it takes a little investigation to figure out how to do it. You can also manually enter the URLs of internet streams not in the database.

## Conclusion

The Choyong LC90 is rich in features, but the overall design remains a work in progress. There are features that need revisions to make them more effective and "friendly." And then there is the abysmal medium-wave sensitivity and sub-par SSB stability. With the ability to

## Lab Notes: Choyong LC90 Multi-Band Smart Radio

Receivers that cover a wide range of the AM, FM, and multiple shortwave bands have been around for many decades. The Choyong LC90 is one of several available modern versions of this type of receiver. With added features such as Bluetooth, .mp3 playback from a TF card, and quick ways to access podcasts and other pre-programmed internet music and news channels, the LC90 offers more to listen to than receivers of old. Although the LC90 has all of the above-mentioned features packed into a small and relatively inexpensive form factor, some receive capabilities do not perform nearly as well as products sold specifically for amateur radio use. While performing tests on the LC90 in the ARRL Lab, the receiver exhibited some odd anomalies that prevented us from making any usable measurements on the unit. The front end of the receiver overloaded quite easily at lower levels than expected. It was observed to have some frequency drift as well that caused problems trying to measure basic things such as sensitivity. The LC90 does receive OTA signals on all the modes/bands as specified, but don't expect it to perform as well as a receiver designed for amateur use.

— George Spatta, W1GKS, ARRL Lab Manager

upload new firmware, it is possible that many of these shortcomings may be addressed in future iterations.

**Manufacturer:** Choyong Radio, [www.choyongradio.com](http://www.choyongradio.com). **Price:** \$249. Available directly and on <https://amazon.com>.

# REZ Antenna Systems Recon 40 Portable Vertical Antenna

Reviewed by John Leonardelli, VE3IPS  
[ve3ips@gmail.com](mailto:ve3ips@gmail.com)

The REZ Antenna Systems Recon 40 portable vertical antenna is a high-performance HF antenna using a base-loaded coil capable of tuning 40 meters (whip and radials sold separately). What makes this antenna interesting is the innovative approach to providing a toggle switch to choose 40 meters or 20- to 10-meter coverage. It is a fast and easy two-band vertical antenna system. This antenna would improve my 40-meter results and offer other bands as a bonus.

My go-to antenna has always been an inverted-V linked dipole up 18 feet with a 1:1 balun. I also use various other dipole and vertical antennas depending on where





I am deploying. I need an antenna that has multi-band performance, simplicity, ruggedness, and signal efficiency. The links on the V dipole are set to 40 and 20 meters, offering excellent capability for daytime or nighttime propagation. I have found that these two bands allow me to make contacts from portable locations every time. Contesters call these the “money bands.”

Now that I set up multiple antennas for my park and portable activations, I had great interest in a dual-band vertical.

I can use the Recon 40 on 40 meters using the required 17-foot telescopic whip with the base coil. I activate the toggle switch to bypass the coil for the 20-meter band using the same telescopic whip. REZ Antenna has indicated that the telescopic whip can be adjusted for any frequency between 20 and 10 meters; however, the 40-meter coil does need the whip at full length.

I was curious to try out my dual-antenna approach to hear better and maybe work better DX or pull a few QRP or weak signals out of the noise. The premise is that most stations would be worked better on 40 meters using the dipole, where on 20 meters, a low angle of radiation provided by the vertical allows the working distance to be greatly increased. However, I have had many cases where the 40-meter vertical is better or a dipole on 20 meters is better, depending on propagation conditions and the antennas at the other end contacting you.

This antenna set up for a 40/20-meter deployment would match perfectly with my linked dipole. Don't forget the switch, or in some cases I use a radio with a built-in antenna switch, such as the Icom IC-7300. When I want to switch bands, I switch my inverted V to the band I want, walk over to the Recon 40, flick its switch, and go back and operate.

## Description

The Recon 40 is a high-performance HF antenna coil capable of tuning the 10- to 40-meter bands when paired with the REZ Antenna [Z]-17 17-foot telescoping whip. The unit ships with a Recon 40 loading coil base, the [Z]QD Radial Puck, and an insulating mount (see the lead photo). The whip is sold separately.

### Bottom Line

The Recon 40 is well built and is an ideal portable antenna solution for 40 meters that allows the operator to quickly switch to another band using the coil bypass switch.

You can add your own components (whip and radials) or buy it as a complete package. You do need to add four 34-foot radials to complete the system. If you have already bought the Ranger 80, like me, then all you need is the telescopic whip.

The coil body is made from Delrin and 6061 anodized aluminum, all CNC-machined in the US. It is 100% weather resistant thanks to its unique design, which incorporates the use of O-rings and gasket seals at each joint. The coil's machined wire groove provides mechanical support and optimal spacing to ensure a low-loss coil. Made with 14-gauge enameled copper wire, the Recon 40 is rated for use at up to 500 W SSB, 300 W CW, and 200 W digital (50% duty cycle). This pairs nicely with several solid-state 200 and 300 W mobile amplifiers. All threading is the standard 3/8"-24 NF (National Fine), so it's compatible with lots of mounting and whip antenna options.

One thing is for certain — you need to have the 17-foot telescopic whip, as the base coil is designed to use that radiating length with the radials. Adjustments can be made to move the sweet spot to the frequency of interest by increasing or decreasing the telescopic whip in 1-inch increments.

The included [Z]QD Radial Puck allows up to eight radials to be connected using standard 4-millimeter banana plugs.

The optional [Z]Pod can also be used to deploy the antenna on sidewalks or pavements where grass or sand is not available. This accessory would make a nice addition to your antenna deployment kit.

The optional ground spike is also a very rugged mounting solution for grassy and sandy areas.

For more details about the Recon 40, see Table 2 for the manufacturer's specifications.

## Design and Build Quality

The Recon 40 is a coil to be used as a vertical antenna. The toggle switch allows you to switch the coil in or out of the circuit. On 40 meters, it will operate as a base-loaded eighth-wave vertical, and it does need the [Z]-17 telescoping whip to match the coil inductance. For the other bands, the antenna will operate as a quarter-wave vertical without the coil, and you need to adjust the telescopic whip length for best SWR. On 20 meters, the telescopic whip will be extended at almost its full length. On 10 meters, for example, the whip length will be around 8 feet. I use a Milwaukee 9-foot pocket tape measure for measurements.

The antenna requires a mounting solution. You can use the REZ Antenna ground spike (see Figure 9), the [Z] Pod tripod, or whatever 3/8"-24 stud mount you have in your junk box. Mobile antenna brackets or magnet mounts cannot be used from a strength perspective and for having a proper ground. It is designed for use with its 34-foot radial length.



**Figure 9** — The Recon 40 grassy deployment using a ground spike.

When operating outside, weather can ruin your day from an equipment perspective. The Recon 40 features a completely sealed body for use in harsh weather. The use of O-rings and a custom SO-239 gasket ensures a reliable seal between components. This was very effective, and the control method proved the antenna coil remained dry. You have to use a sealant at the coax connector end, as the coaxial cable is not water resistant. I had a couple of downpours, and no water leaked in using electrical tape as the sealing solution.

The included [Z]QD Radial Puck screws onto the base coil, allowing quick and easy attachment of the radials using standard 4-millimeter banana connectors.

To achieve consistent tuning results, use the supplied plastic insulating mount. The purpose of this mount is to electrically isolate the antenna from the mounting point. This is very important to avoid tuning issues. Depending on the mount used, it can affect the tuning of the antenna. This is because the mounting stud is electrically connected to the ground side of the system. Using the insulating mount ensures only the radials attached are active in the ground system.

The antenna is very rugged and continues in their Ranger 80 “built like a tank” construction philosophy. It is CNC-machined from premium materials: a Delrin body, black anodized 6061 aluminum, and all stainless-steel hardware. The quality shows itself when holding the coil in your hands as well as via the premium price. REZ Antenna Systems has chosen to build products with the highest-quality materials and construction

methods in mind; they are investment products. This base coil is so rugged and heavy at almost 2 pounds that I am confident that it will be durable.

## Ground-Mounted Deployment

Many operators will use this antenna in a park or beach setting. The ground spike mount is ideal for this. Use a rubber mallet to drive the ground spike mount into the ground. Screw on the base coil with the radial puck to the ground spike. Spread out the 34-foot radials, and connect them to the puck. Now install the whip, and extend it to its maximum length. Make sure the toggle switch is in the coil position; usually the SWR will be less than 2:1. Changing the whip length in 1-inch increments will make adjustments to the resonant frequency.

Make sure the ground spike is inserted at least 8 inches to avoid toppling in loose ground conditions. I would consider a set of lightweight guys using 2-millimeter paracord (orange for easy visibility) and a rubber ring to be used in heavy winds installed at the 6- to 8-foot mark.

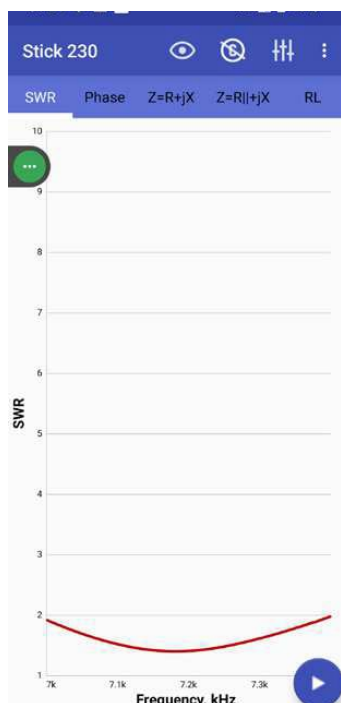
Like all short ground-mounted verticals, the ground conditions will affect the SWR and thus the required inductance for an acceptable match. After several deployments, the SWR was in range after testing it in different parks. I find the long radials’ lengths to be very effective on 40 meters with more wire in the ground to help with radiation efficiency.

The antenna was typically 1 to 2 S-units lower in signal strength reports, and at times was comparable to my full-size (33-foot) quarter-wave 40-meter antenna. As expected, the performance on 40 meters with the longer radiating length was advantageous over other antennas on 40 meters with an 8-foot radiator. Deploying this antenna was fast and easy with great bandwidth. Did I mention you can leave the antenna tuner at home?

REZ recommends using this antenna with 16 radials. The benefit of increasing the radial count from four to 16 provides a 1.5 dB improvement in relative gain. This will not be of interest to QRO operators, but at QRP levels every bit helps. I am looking to try this out and hope to get 544 feet of wire and eight male banana plugs at the next hamfest. I will put these in a marked pouch and can also use it with other antennas. Remember, the required space for this deployment is 68 feet in diameter (worth the effort for improved results).

I forgot to bring the telescopic whip on one activation, so I used one of the radials folded back on itself to make the 17-foot length, connected it to the coil with a bolt, and ran it horizontally and also on a 75-degree angle (for NVIS). It worked. I did have to adjust the





**Figure 10** — The Recon 40 40-meter SWR sweep.

antenna length to bring the lowest SWR to my operating frequency.

I did not bother with elevated radials, which can help reduce ground losses. But due to their length they are a hassle to deploy, and dogs and humans often trip over them regardless of the orange cones or flash tape affixed for visibility. The black radial wire color hides very well, but maybe bright orange would be a better color choice to increase visibility.

I am looking at this as a fast and easy way to add a vertical to my deployments, but more so to partner with my inverted-V antenna. When I switch the coil out of the circuit, the 17-foot telescopic whip becomes my 20-meter vertical. I walk over to my dipole and switch the legs to 20 meters as well.

I now can switch between the two antennas from my operating position. When I want to QSY to the other band, I just walk over, flick the toggle switch, and flick the slide switch, and both antennas are now on 40 meters. I love how easy this makes it for me to choose the best antenna for each contact. I am a big fan of spending little time erecting proper antennas so I can spend more time managing POTA pileups.

Does this lead to single operator two antenna (SO2A) for POTA? Yes, it does. If I choose to operate on 40 and 10 meters with the vertical, then there is an extra step involved. On 40 meters, the telescopic whip is fully extended and the coil is engaged. For 10 meters, I need

to flick the toggle switch, taking the coil out of the circuit, and adjust the telescopic whip to be the correct length for, say, 28.400 MHz. If I go back to 40 meters, I need to flick the switch again and extend the whip. The manual band changes are easy enough and very fast once you get the hang of it. I tried the lazy approach and let the tuner sort it out, but efficiency suffered.

## Tripod-Mounted Deployment

Sometimes you will operate from a parking lot or a patio. REZ Antenna Systems offers a tripod mount. It is more beneficial than the average camera tripod because the weight of the antenna is low to the ground, helping with stability. It's just as fast and easy to deploy. The long radials take up a wider operating area, so I always look for a corner at the parking lot to set up a couple of radials on the grass and a couple on the asphalt.

You may need to use the insulating mount connector to ensure the ground side of the antenna is isolated from your three-legged mount. Supplied with your Recon 40 is a plastic insulating mount. The purpose of this mount is to electrically isolate the antenna from the mounting point. Depending on the mount used, it can affect the tuning of the antenna. This is because the mounting stud is electrically connected to the ground side of the system. Using the insulating mount ensures only the radials attached are active in the ground system.

Without the isolating connector, the tripod will be treated as a radial or ground that could skew antenna resonance. This will affect the SWR, but you can make easy adjustments.

## Ranger 80 Add-On Scenario

If you already own the Ranger 80, then all you need is the Recon 40 kit and a telescopic whip with the [Z]Pod, ground spike, and radials that are already in the backpack. The backpack has a lot of room for the additional antenna components.

## Backpack Scenario

If I use my Icom IC-703 or the IC-705 with its own backpack, I will use antennas that mount to the side of the backpack, allowing talking while walking. This antenna coil is too heavy and too long to be used with this scenario. I tried it with the ALICE pack frame backpack that has a metal frame, but the antenna is not intended to be deployed in this manner. However, I tried using a 17-foot wire instead of the telescopic whip, and it worked out okay, but the coil is heavy and you may choose to lighten your load accordingly with a different antenna. Also, it is highly preferred to operate your station outside of the radial area to avoid detuning and RF exposure.

**Table 2 — REZ Antenna Systems Recon 40 Portable Vertical Antenna**

**Manufacturer Advertised Specifications (not tested in the ARRL Lab)**

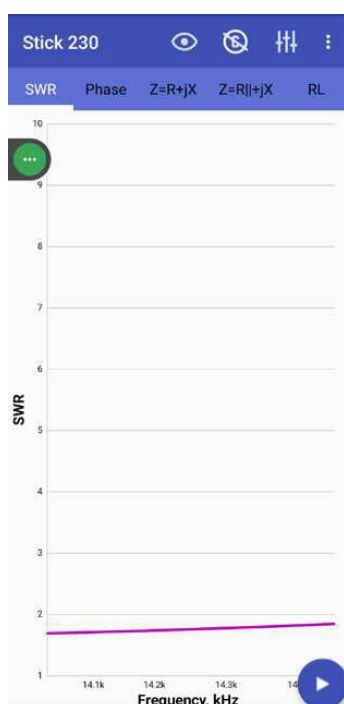
|                         |                                                                  |
|-------------------------|------------------------------------------------------------------|
| Base coil length:       | 10 inches (25.4 centimeters)                                     |
| Base coil max diameter: | 2.5 inches (6.4 centimeters)                                     |
| Material:               | Delrin, 6061 aluminum, clear acrylic, enameled 14 GA copper wire |
| Hardware:               | Stainless steel                                                  |
| Coax connector:         | SO-239                                                           |
| Base coil weight:       | 1 pound 9 ounces (0.7 kilogram)                                  |
| Power limits:           | 500 W SSB, 300 W CW, 200 W digital (50% duty cycle)              |

Thus, the recommended coaxial cable length is 40 to 50 feet. I use RG8X as my standard.

## Performance

Operating in the field, the antenna consistently provided the expected signal reception and transmission reports across various HF bands. Whether operating on 20 or 40 meters, the Recon 40 demonstrated appropriate low SWR and wide bandwidth. I was able to tune up and down the band without concern to make antenna adjustments. I can focus on squeezing out contacts and not worrying if my SWR is too high.

I did some quick tests using propagation tools like Weak Signal Propagation Reporter (WSPR) and Reverse Beacon Network (RBN), and they consistently showed that the Recon 40 was getting out farther and stronger over my shorter base coil-loaded verticals. This is to be expected due to the longer radiating length.



**Figure 11** — The Recon 40 20-meter SWR sweep.

See Figures 10 and 11 for the SWR sweeps that show excellent bandwidth across the 20- and 40-meter bands.

## Portability

I pack the antenna into the REZ backpack, which keeps the Ranger 80 and the Recon 40 components all in one place. Operators can decide how they wish to carry everything, and gram counters will find the antenna to be too heavy for their operations. Everyone else will be happy transporting the antenna in their vehicle.

## Ease of Use

The eight-page illustrated user guide shows how easy it is to deploy the antenna. I had some teenagers set up the antenna for me, and they were able to get it operational with just verbal instructions.

The use of standard 3/8"-24 threads for the various components allows versatility in mounting options, including ground spikes, flat surface, tripod mounts, and a Jaws clamp, which adds to the ease of deployment in diverse environments.

## Conclusion

The Recon 40 is a rugged, efficient, and packable antenna solution for outdoor operators who want the best signals on 40 meters. I found the 40- and 20-meter band-switch ability to be ideal for my operating style but was happy to know I could adjust the antenna for other bands in between. The longer radial length was beneficial in signal efficiency, and I can imagine improvements if you choose to go all out and deploy 16 radials; the extra 10 minutes of deployment time will reward you accordingly. The build quality communicates a long-term investment in its waterproof and stainless-steel design. Radio clubs and ARES users will find that anyone can deploy the antenna, extend the telescopic whip, and lay out the radials without reading the manual, and no time is spent fiddling around trying to get things to work. The product comes with a 1-year warranty providing peace of mind. I have made hundreds of contacts with my Ranger 80, and after a year of use, it's performing with no issues. I expect the Recon 40 to be just as awesome.

*Manufacturer:* REZ Antenna Systems, 3422 Business Center Dr., STE 106-101, Pearland, TX 77584, [www.rezantenna.com](http://www.rezantenna.com). Price: \$299 (coil only). Complete kits are available with pricing ranging from \$529 to \$549.



## Ask Dave

Get more information from the “QST: Ask Dave” YouTube playlist at <https://bit.ly/3z2MBMI>.

# Quartzfest Questions

*As I write this, I am at Quartzfest, a gathering of a few hundred hams in Arizona’s Sonoran Desert, several miles south of Quartzsite, Arizona. We have to bring everything we need to camp for a weeklong stay in the desert. I solicited questions from fellow attendees for this month’s column.*

### Counterpoise Purpose

**Q** Nancy Crowley, KK7GGA, asks: What is a counterpoise?

**A** A counterpoise is a part of an antenna system. The dictionary definition equates the counterpoise with a vertical antenna’s radials, but hams tend to speak of a counterpoise more broadly. Often, a counterpoise is thought of as something for the antenna to work against.

Think of someone lifting a heavy box off the floor. During the motion, the person is lifting the box up, and at the same time, the equivalent force is pushing the floor down. The lifter is technically working against the floor (in a strict sense, the lifter moves the box up and pushes the Earth slightly away from its center — the Earth’s movement is immeasurably small, but it can be calculated).

Think of a vertical antenna in the same way. Often, these can be thought of as half a dipole above the Earth, with the Earth acting as a virtual mirror. While this is a good analogy, the energy in the mirror has to go somewhere for safekeeping while energy from the positive cycle goes into the antenna. The ground acts as a resistor and dissipates some of the energy as heat, so we use radials. The radials store the mirror energy and release it during the next half cycle. The radials need to be reactive rather than resistive to store and release energy. We say the antenna is working against the radials. The radials imitate a great disk of copper spread around the base of the antenna. This forms a capacitor with the ground.

There is some debate about the proper length and number of radials, as well as whether they should be insulated and lay on the ground or be buried. My personal preference is that the length of each can be random, they should be insulated, and they should lay

atop the ground. Note that the radials can be grounded where they come together at the antenna’s feed point, and the RF voltage can be high at the end of each radial, so keep children and pets away. You can hold the radials in place with landscaping staples, and grass will grow over them in a year or two.

There are cases where the idea of a counterpoise goes beyond radials. Some end-fed half-wave antennas need counterpoises. However, the outside of the coax feed line serves the same purpose. For those living in apartments, an artificial ground is created using a tuned counterpoise.

### Grounding and Bonding

**Q** Jeff Cain, KQ6UT, asks: Why is it so important to connect your station ground rod to the electrical utility ground rod?

**A** There are two ways of looking at this. First, amateur radio best practices in the 2nd edition of *Grounding and Bonding for the Radio Amateur*, available from the ARRL Store (<https://home.arrl.org/action/Store/Product-Details/productId/133989>), require it. Hooking the two ground rods together is called *bonding*. The bonding wire needs to be #6 AWG or thicker. All connections are made with mechanical (compression) connections or by welding the copper to copper. I recommend stranded, bare wire, available from your local hardware store, and it should be buried. Never run a bonding wire in your house or basement!

Second, if there is a large voltage transient nearby (lightning), and all the household and station grounds are bonded, the entire system stays at the same voltage. This will significantly reduce transient-induced damage in your station. If you have a tower ground or a ground rod at the bottom of your vertical antenna (I have one), then these ground rods should be bonded to your station ground and the household ground.

The primary purpose of grounding our stations is for transient protection. It is best practice to have a properly grounded lightning surge protector attached to your station ground rod where the cables enter your house. Of course, if you live in a high-lightning area,

you may want to physically disconnect your radio from everything when you're not using it.

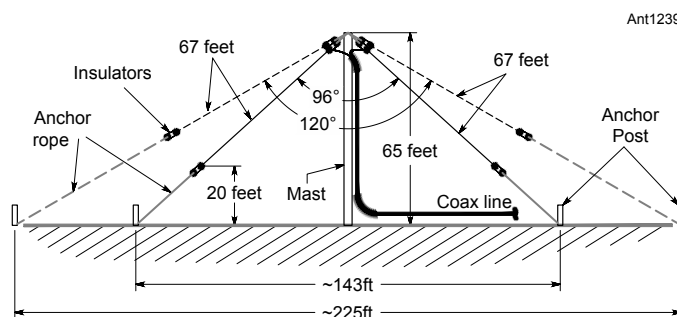
There is a secondary reason for grounding, which I'll illustrate from my own experience. I installed a vertical antenna with several grounded radials and connected the coax straight to my radio. The noise was abominable and well over S9. As an experiment, I used a simple barrel connector between the cable and a jumper to the radio. The noise disappeared when I touched this connector (connected to the coax's outer shield) to the ground rod. In the years since, I've refined the grounding system. I now use a KF7P entry panel to house all the lightning protection devices, directly contact the station ground rod, and provide a watertight entry for all my cables. We live in a rural area, and with all this grounding, noise at my station on HF is around S1 or S2 — very quiet indeed!

## NVIS Propagation

**Q** Tom Kilgore, KG7HUP, asks: What is NVIS, when is it useful, and how does it work?

**A** NVIS is a propagation mode that has some special properties. The N stands for *near*, and the V stands for *vertical*, which means your signal is sent nearly straight up. In fact, it can be off as much as 45 degrees from being vertical. The I stands for *incidence* and means hitting the ionosphere. There are many different types of ionospheric propagation. In the case of NVIS, the propagation is usually one bounce off the ionosphere, so the S stands for *skywave*.

The use case here is for reliable communications over distances from 0 to about 200 miles. NVIS operators normally use 80 meters at night and 40 meters during the day. Any HF rig can be used. The trick comes with the antenna. The transmission should be nearly straight up. This means that a vertical antenna won't do because these usually send their signal out to the side. A horizontal dipole can do the job, particularly if it's no more than about a quarter wavelength above the ground. For 80 meters, that's 66 feet. A more common height for NVIS would be 25 feet. On 40 meters, a



**Figure 1** — Figure 11.3 from *The ARRL Antenna Book for Radio Communications*. Two different configurations for 80-meter inverted-V dipoles are shown — one for a 120-degree apex angle and one for a 96-degree apex angle.

25-foot height will also work fine. Some folks put the antenna even lower, but remember to place it high enough that it does not present a hazard. An inverted-V antenna will also work, as shown in Figure 1. I recently did a video about NVIS dipoles that you can view at <https://youtu.be/lpIHJxqYH6M>.

NVIS signals can be remarkably steady with little fading. This can be helpful for statewide emergency communications. NVIS can be particularly good at getting into mountainous areas, such as in Colorado, where VHF line-of-sight communications don't work so well.

NVIS signals are not foolproof. Because they involve the ionosphere, a solar flare can cause all HF communications to cease, including NVIS.

The advantages of NVIS communications include ease of setup (a low antenna) and a relative lack of fading. NVIS is a propagation mode and can be used for any emission type, such as CW, FT8, SSB, or net participation. You can use it to call CQ to catch those stations that can otherwise be in the skip zone.

Send your questions to [askdave@arrrl.org](mailto:askdave@arrrl.org). I answer some questions here, and some via videos on my YouTube channel ([www.youtube.com/davecasler](http://www.youtube.com/davecasler)), or during my weekly livestream on Thursdays at 6:45 to 8:15 PM Mountain Time on my channel.



## Microwavelengths

# Microwave Beacons

There has been an increased interest in microwaves in the southeast US, with a number of new stations. The Southeast is a large area, and the stations are widely dispersed, with long distances separating many of them. As a result, an interest has grown in beacons for testing and aligning microwave systems, monitoring propagation, and antenna pointing for rover stations.

### Overview

A beacon is a transmitter that provides a reliable signal from a known location that stations within its range can hear. A high and clear location provides a much larger range, especially at microwave frequencies. This signal is very useful for rovers. Upon a rover's arrival at a new location, it provides a known direction for calibrating antenna pointing and assures the receiver is working.

A beacon should also have accurate frequency control so that all stations have the same frequency reference, allowing stations without accurate frequency calibration to coordinate frequency and find each other.

Beacon transmitters are required to send call letter identification in CW, and adding the grid square location makes direction calibration easier.

An ideal beacon would be one that is strong enough to be easily found but also weak enough to assure that the receiver is working properly. From my location in Maidenhead grid square FN34uj, the VE2TWO 10 GHz beacon in FN25uk averages 18 dB above

the noise floor. Last summer, it became consistently weaker. I found that my transverter sensitivity reduced (the noise figure increased). After some troubleshooting, I was able to repair it to normal in time for the ARRL 10 GHz and Up Contest.

### Equipment

The first 10 GHz beacons in the northeast US used a crystal oscillator with moderate frequency accuracy, followed by either a string of frequency multipliers or a surplus phase-locked loop (PLL) brick to reach the operating frequency. (The frequency of one local beacon was so temperature-sensitive, it was more useful as a thermometer than a beacon.)

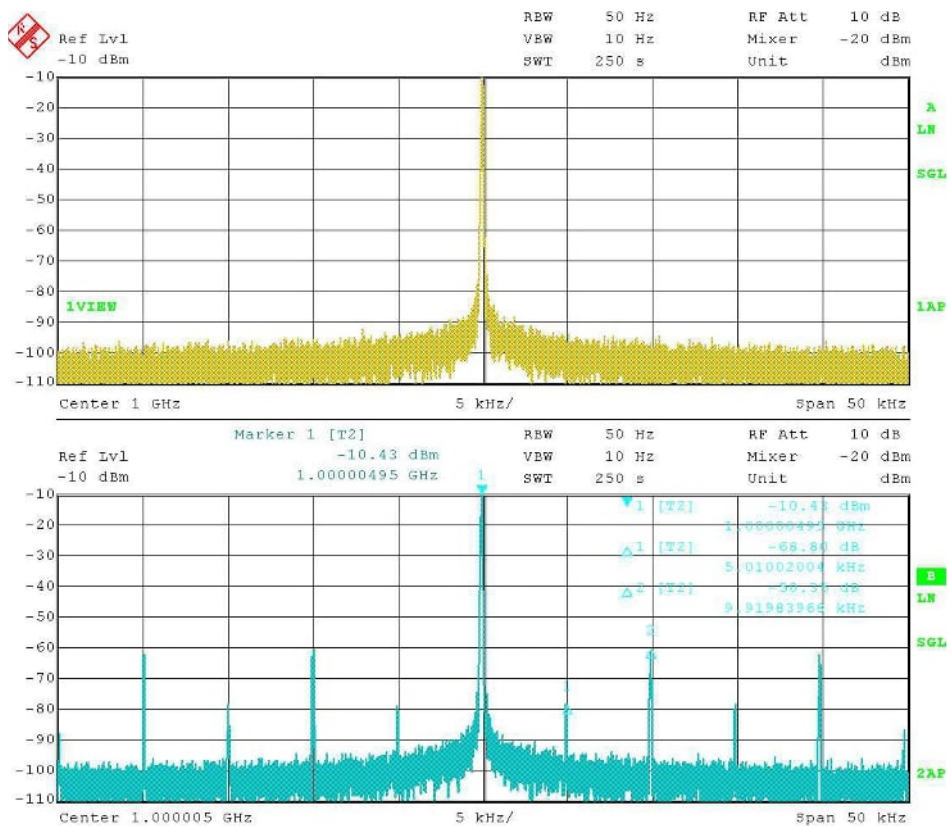
In 2014, the North East Weak Signal (NEWS) Group installed a 10 GHz beacon on Mount Washington in New Hampshire, the highest point in the northeast US. The beacon filled two rack panels, which required indoor installation in the building shown in Figure 1, with the antenna in one of the cylindrical radomes on the roof. Mount Washington also experiences extreme weather, including the second-highest recorded wind speed ever (note that the building is tied down with chains). Later, a severe windstorm blew the commercial radome off the building, putting the beacon off the air. Once the building was torn down, the repeater location was lost.

Modern beacons use a microwave frequency synthesizer for signal generation, either at the operating frequency or at an easily multiplied frequency. The synthesizer has an accurate frequency reference, often GPS, so the transmitted frequency is stable and accurate. Some inexpensive frequency synthesizers produce spurious outputs at arbitrary frequencies. Signals are much cleaner when the internal PLL is operated in integer-N mode, where the output and reference frequencies have a common integer divisor, as shown in Figure 2. This limits operation with a clean signal to some magic frequencies that may be calculated or determined experimentally.

A simple frequency synthesizer was recently developed by Colin Durbridge, G4EML, using a tiny, inexpensive version of the Raspberry Pi single-board computer, the RP2040-Zero, to control inexpensive synthesizer modules ([https://github.com/g4eml/RP2040\\_Synth](https://github.com/g4eml/RP2040_Synth)). Figure 3 shows two synthesizer

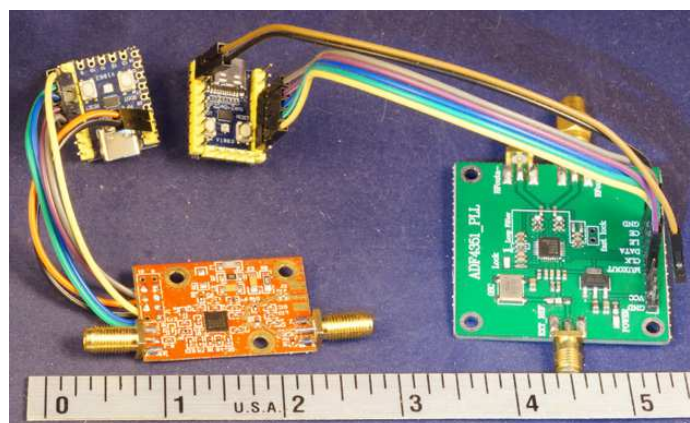


**Figure 1** — Dave Olean, K1WHS; Tom Cefalo, W1EX, and Don Twombly, W1FKF, after installing the 10 GHz beacon inside the building on Mount Washington in New Hampshire. The cylinders on top of the building are radomes with antennas inside. [Paul Wade, W1GHZ, photo]



**Figure 2** — Phase noise plots of a frequency synthesizer with integer-N PLL at 1.0 GHz and fractional-N PLL at 1.005 GHz showing spurious outputs every 5 kHz. [Image courtesy of Mario Hellmich [www.mariohellmich.de/index.html](http://www.mariohellmich.de/index.html)]

modules using an ADF4351 chip that is good up to 4.4 GHz, each controlled by an RP2040-Zero (other chips are good up to 20 GHz). Once the Arduino sketch (software) is loaded into the RP2040-Zero, the synthesizer operates independently from a computer, starting on the programmed frequency at power up. The synthesizer frequency can be changed using a simple terminal emulator connected to the USB port of



**Figure 3** — Raspberry Pi RP2040-Zero boards (upper left) controlling an ADF4351 frequency synthesizer (bottom left) purchased from [www.sv1afn.com](http://www.sv1afn.com) and another ADF4351 frequency synthesizer from eBay (right). [Paul Wade, W1GHZ, photo]

the RP2040-Zero, and an identification string for a beacon could also be added.

This simple combination can form the heart of an easy-to-build and inexpensive beacon by adding an accurate frequency reference and an amplifier. It could be mounted in a small weatherproof box on a tower or pole and possibly powered by solar panels to enable more possible locations.

The identification for most beacons was originally CW, on/off keying. A few beacons have had hard keying, resulting in onerous key clicks and sometimes making communications at nearby frequencies difficult. A better technique to use is frequency shift keying (FSK). When both frequencies are in the passband, the S-meter signal level is constant, allowing easier signal peaking. The CW identification is easily read by zero beating one frequency.

The most recent beacons include a digital mode identification in addition to CW, enabling detection at greater distances where signals become very weak. The simple beacons shown in Figure 3 can generate an identification using either FSK CW or digital FT4G mode, but it is difficult to generate the required FT4 tone spacing at microwave frequencies due to the synthesizer chip's limited frequency resolution.

A new NEWS Group repeater in New England uses a small RFzero board (<https://rfzero.net>) to generate a 2-meter signal with both CW and Q65-60D digital identification, which is better for weak signal detection. The signal is converted to the microwave frequency by the transmit section of a transverter or potentially multiple microwave bands by additional transverters.

The other critical part of a beacon is the antenna, which will be discussed in a future column.



# Saving a 30-Foot Parabolic Dish

A Colorado nonprofit organization adds another dish to their amateur radio and radio astronomy explorations.

**Elaine Hambly, KØARR**

The Deep Space Exploration Society (DSES), located in Haswell, Colorado, is a unique nonprofit organization that combines amateur radio and radio astronomy. DSES is a purely voluntary organization entirely dependent on donations and club dues. The average age of membership is 70. DSES's activities include radio science observations of pulsars, Jupiter, and its moon Io, and HF operating. The organization is involved in outreach projects, such as judging at the Pikes Peak Regional Science and Engineering Fair and hosting an annual open house.

In 2009, a few members heard about a 60-foot parabolic dish antenna for sale in Haswell, Colorado, and bought it. That was the beginning of the amateur radio and astronomy alliance at DSES. Volunteers have completely restored the 60-foot radio dish, and it is now fully operational. It was once part of a Cold War-era tropospheric-scatter communication research project. Now it performs various functions as a powerful tool for amateur radio scientific discovery and public outreach, such as observing hydrogen line emissions at 1.42 GHz, mapping the Milky Way, detecting pulsars, monitoring space weather and solar activities, bouncing radio signals off the moon to communicate globally via Earth-moon-Earth (EME) operations, and operating as a remotely controlled station and supporting emergency communications.

In early 2024, members heard about a smaller, 30-foot parabolic dish used by Robert Clark, KØYW (SK), in Ignacio, Colorado, that needed saving before being torn down and sold for scrap. This additional dish antenna would help DSES continue to keep up interest in radio astronomy and ham radio.

Myron Babcock, KL7YY, spearheaded the project by putting out a successful plea for donations to raise



The 30-foot dish in the sideways position. This position presented the first challenge to the crew and the crane operator.

money for the venture and organized the dismantling, transportation, crane rental, and accommodations and meals for the crew. Thanks to the generosity of our donors, we collected sufficient funds to save the dish.

Over the course of several meetings, the crew devised a plan to retrieve the dish on June 23, 2024. This was one of the most challenging off-site projects DSES had worked on in years.

## Deconstruction

Eight people hauling equipment, tools, provisions, and trailers arrived to begin work. They saw what they thought might be an impossible feat because the 30-foot dish was parked sideways, pointing at the horizon instead of being in the traditional birdbath position. Adding to the difficulty level, the weather each day was an oppressive 90°F or more with no clouds in the



Myron Babcock, KL7YY, and Ray Uberecken, AAØL, in the boom lift working on the front of the dish.

sky until early evening. The team spent the first day planning how to disassemble the dish and tower.

It was necessary to document the disassembly by labeling and photographing the struts, tower, counterweights, and pedestal to make reassembly easier. Myron marked the struts with numbers using paint markers, and I shot hundreds of photographs. We used plastic tubs to save every salvageable nut and bolt. We rented a boom lift that RC Teal, AIØRC, and Roger Oakey, W3MIX, took turns operating while Ray Uberecken, AAØL, and Myron stood on it to remove the higher parts, such as the feed and the counterweights. We used a crane to bring those parts to the ground safely.

One of the scariest moments was when the crane hoisted the dish into the air after it was disconnected from the pedestal and made its way safely to the ground. The venture could have been over if it had come loose and fallen. Once the dish was on the ground, the crew began dismantling the jungle gym of struts.

After 3.5 days, once disassembly was finished and the area was policed for hardware, the crew loaded three trailers with every piece of the 30-foot dish for the 5.5-hour drive back to the Colorado Springs area.

## Storage

Then on July 6, 2024, several members hitched up their trailers of dish parts again and traveled to the DSES site in Haswell, Colorado, where everything was unloaded and stored for safekeeping.

We had to determine the right spot to store the antenna so that the parts would be safe without interfering with the flow of traffic around the new building that is

going up. Then unloading began. RC, Ray, and Vlad Fomitchev, KX4TH, stacked the pieces that comprise the bottom section of the dish's pillar on the ground until the only piece left was the heavy upper pillar section with the dish's huge az/el rotor. Ray, Chas Barrett, WDØC, RC, and Vlad hooked one end of a chain between the pillar on the flatbeds of two trucks. With careful jockeying, the tower easily slid off onto the waiting timbers that held it off the ground.

Next came the petals and struts that Rick Hambly, KØGD, brought on his trailer. Ray and RC dragged some used Rohn 25 tower sections next to the small dish antenna to keep the main dish components off the ground. Rick, Ray, RC, Vlad, and Bill Miller, KCØFHN, removed the petals and large struts from the trailer and stacked them on their sides using a ladder to keep them upright.

Finally, we unloaded the remaining struts, cables, weights, and feeds from Ray's trailer, tucked them in with the petals, and lashed them together. Lashing them together also served as loss prevention for all the parts and pieces. Once we were done, we left the site knowing the dish was safely stored for future assembly.



The dish lifted in the air by a crane and rotated to the birdbath position while being lowered to the ground.





The larger 60-foot dish in the birdbath position. The pieces of the 30-foot dish are stored behind the trailer on the right.

## The Dish's Future

We are very excited about this project because it will allow DSES to continue to motivate interest in ham radio, radio astronomy, and science for everyone. DSES will use the 30-foot dish primarily for EME communications, which will free up the 60-foot dish for more science experiments. It will also be a backup for science experiments when the 60-foot dish is undergoing maintenance. Once the 30-foot dish is operational, we want to consider remotely operating this antenna so other radio astronomy or EME enthusiasts can enjoy this asset from different locations around the world.

Our original plan was to reassemble the dish in the fall of 2024 once the summer heat lessened and before the winter weather arrived. However, many other projects planned for the next 12 months, including putting finishing touches on our new building, delayed the immediate reconstruction of this dish. The Board of Directors decided to delay the immediate reconstruction of this dish until we complete the other planned and funded projects. There is also an issue with the final location of where to set up the dish on our property. Decisions on whether and how much cement will be needed for the foundation still need to be made. Once the board decides where to place this dish and the engineering analysis and design for constructing a proper foundation are done, DSES will seek donations for the appropriate funds to start the assembly.



Chas Barrett, WDOC, watching the dish being lowered to the ground.

Visit [www.youtube.com/watch?v=dzi3YFLwk4o](https://www.youtube.com/watch?v=dzi3YFLwk4o) to watch a slideshow of additional photos from the antenna's recovery.

All photos provided by the author.

Elaine Hambly, K0ARR, earned her first call sign, KA3RXV, as a Novice in 1976 in Ithaca, New York. After moving to Maryland in 1987, she upgraded to the Technician license, with a new call sign, N3HMMW, and then to the General license. In 2021, Elaine moved to Colorado and changed her call sign to K0ARR. She is a member of ARRL and the Tri-Lakes Monument Radio Association, W0TLM. In 2023, Elaine became involved with the Deep Space Exploration Society. She can be reached at [elaine@cnssys.com](mailto:elaine@cnssys.com).

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# Reaching New Heights: Operating from a Spanish Summit

This first-time SOTA attempt brought great learning opportunities.

## **Maria Polyanska, VE3OMV**

Having already tried the exciting activity of Parks on the Air (POTA) in my home country of Canada, I was captivated by the idea of taking my radio operations to new heights by venturing onto a mountain. The elevated location provides an ideal vantage point for transmitting and receiving signals, allowing connections with hams across vast distances. I wanted to elevate my passion for Summits on the Air (SOTA) to another level by embarking on an adventure halfway across the world in the picturesque landscapes of the Sierra Bermeja mountain range in southern Spain. I picked the south of Spain because it is a dream destination for a vacation and a SOTA operation. I previously operated POTA in cold weather, so I wanted a change of scenery to a warm, coastal location. With a mix of seaside towns, the Spanish language, beaches, and history, it was a beautiful place to spend time. As the day of my adventure grew closer, my anticipation levels soared. The prospect of standing atop a Spanish mountain, radio in hand, ready to connect with fellow operators around the world filled me with excitement.

## **Preparations**

Before departing for Spain, I was issued a European Conference of Postal and Telecommunications Administrations (CEPT) amateur radio license to operate in Europe, but first, I had to upgrade to the Canadian Advanced license to obtain a CEPT license.

Then I started brainstorming what equipment would be necessary to bring. My father, Yuriy Polyanskyy, VA3UKR, and I kept in mind that we were doing this as an experiment rather than to compete or achieve a record. We planned to take our reliable and field-tested Yaesu FT-450D without an antenna tuner, so the antennas had to be tuned beforehand. I wanted to create a 20-meter dipole, so we graphed the plans. We tried to be frugal, and everything was homemade. I really enjoyed using the extra wires and materials we had laying around! For this trip, we planned to test three different antennas: a delta loop for 20 meters, a vertical for 15 meters, and a dipole for 10 meters. However, for our flight we brought only a modest carry-on whose dimensions were strictly regulated. Because of this, we made sure that we were not taking any extra



Maria Polyanska, VE3OMV, at Los Reales de Sierra Bermeja Natural Park. [Yuriy Polyanskyy, VA3UKR, photo]

or unnecessary items. Anything that was not essential had to be left behind. We took some wires, a portable CW paddle, our 12 Ah lithium battery, a compact fishing rod, and our FT-450D transceiver.

After landing at the Málaga-Costa Del Sol Airport in Spain, we hopped in our rental car and headed toward our destination. We settled in and were excited for the week. Soon, I would operate SOTA for the first time in my life! Or so I thought.

## **Operation Day**

We were shocked that the whole week was filled with extremely high temperatures. I thought a mountain 1,450 meters (4,757 feet) in elevation would have cooler temperatures — maybe even snow — so we brought warm jackets and soon discovered we were very wrong. When we got to Los Reales de Sierra



Bermeja Natural Park, the car's dashboard thermometer read 44°C (111.2°F). Despite the heat, we embarked on our journey to the summit. There was a narrow road that you could drive on to get to the summit; it was filled with switchbacks, and even though it was meant to be a two-way road, it had space for only one car at a time. The whole drive was like a roller coaster, and I was scared we would fall off the cliffside.

When we finally arrived at the summit, it was time to assemble our station. We took our fishing pole out and tied it to a eucalyptus tree, attached our portable CW key to the top of our rig, and were ready to set up our 20-meter delta loop. But when we searched the car, our bags, and everywhere we could think of, somehow we forgot to put it in the car. The 20-meter antenna was supposed to be the main event. Thankfully, we had a vertical antenna and some extra wires. My father had a brilliant idea to take the unfinished wire antenna and assemble it right there on the spot. We had the fishing pole and the wires, but there was no device we could use to see the SWR or the frequency resonance. We resorted to our experience and tried constructing the mathematically perfect quarter-wave ground-plane antenna, which worked!

Operation EA7/VE3OMV was in action. It was nice to look up my call sign on the Reverse Beacon Network (RBN) and see my signal coming from a different point

in the world. Although the RBN heard me, nobody came to my CW call. After advertising our activation on the SOTA portal and calling CQ for about 20 minutes, I did not work CW at all. I find CW an easier mode to work than SSB, which is why I was so persistent in attempting to make a few CW contacts. But I switched to SSB, where I got all my contacts, most of which were on my spontaneous 20-meter antenna; only one contact was made on 10 meters. Overall, it was an amazing experience!

On our way back down the mountain, I saw something was off from this almost picture-perfect landscape. In 2021, Los Reales de Sierra Bermeja endured a devastating wildfire. We could still see the burnt trees. Despite the devastation, nature had begun its journey toward recovery. Signs of new life emerged as nature gradually replenished the land. The scenery changed more as we descended, displaying an untamed beauty that appeared unaffected. The heat made the far-off horizon shimmer, putting us in the middle of an exotic landscape.

After relaxing on the beaches of Costa del Sol and enjoying the culture, it was time to return home. Even though we did not have the chance to operate on the beach, EA7/VE3OMV made some contacts from the balcony where we were staying.



Maria Polyanska, VE3OMV, selecting a spot for the new vertical antenna. [Yuriy Polyanskyy, VA3UKR, photo]



Maria Polyanska, VE3OMV, operating SSB on what she thought would be a SOTA activation. [Yuriy Polyanskyy, VA3UKR, photo]

## Realizing Our Mistake

According to SOTA rules, you cannot have any equipment in a car for your activation to count, which is something we unfortunately overlooked. I never even realized that until some fellow operators told me a couple of months later. Initially, we had not planned on setting up our equipment in the car. We thought we would have to hike up to a certain point. When we got there, the paved road was very convenient, and it ended right at the peak where the communication tower was located, so we kept our gear in the car. Because of this, our activation was not really an activation at all. However, it was a great experience. I learned a lot and, most importantly, had a lot of fun! That means that my first real SOTA activation is still yet to come.

If you dare, push the boundaries of what's possible, gear up, and embrace the elements as you embark on your next summit operation. Remember to stay safe, respect the environment, and leave no trace in nature after your operation. SOTA and operating portable offer an opportunity to explore the natural wonders and amateur radio's boundless possibilities. Embrace the challenge and let the world of ham radio elevate you to new heights in ways you never thought possible.

Maria Polyanska, VE3OMV, was first licensed in September 2021 and upgraded to the Advanced license in April 2023. She is a current member of CWops and enjoys operating all modes, especially CW. Maria is currently a ninth-grade student and can be reached at [ve3omv@gmail.com](mailto:ve3omv@gmail.com).

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## Field Organization Reports — January 2025

### Public Service Honor Roll

This listing recognizes radio amateurs whose public service performance during the month indicated 70 or more points in six categories. Details on the program can be found at: [www.arrl.org/public-service-honor-roll](https://www.arrl.org/public-service-honor-roll).

|                     |                                |                                                                                                                       |                                                                                      |                                                            |                                                                                                                         |                                                            |                                       |                                 |                                        |
|---------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------|---------------------------------|----------------------------------------|
| 575<br>AD8CM        | 200<br>KT5SR<br>W0PZD<br>K7OED | 147<br>KC8T                                                                                                           | 128<br>W1LEM                                                                         | 108<br>W5RFY                                               | 92<br>WB8R                                                                                                              | 85<br>KF7GC                                                | 74<br>KM4WXX<br>W7MIN<br>NJ5R<br>W3ZR | 71<br>K1CJV<br>KD2TDG<br>WB8RGE | 70<br>K2PHD<br>W5XX<br>KB0DTI<br>K3EAM |
| 359<br>AC8AL        | 190<br>ND8W                    | 145<br>WB2YYS<br>WM2C                                                                                                 | 127<br>N2DW                                                                          | 107<br>W1CMH                                               | 91<br>W4TTO                                                                                                             | 84<br>WW3S                                                 |                                       |                                 |                                        |
| 345<br>N9VC         | 181<br>KD2QAR                  | 143<br>KE8DON                                                                                                         | 125<br>W2PAX<br>WA3QLW<br>N1ILZ                                                      | 105<br>WB9QPM                                              | 90<br>KT5EM<br>KB9GO<br>KC9UC<br>WA3QPX                                                                                 | 83<br>N2GS<br>K1YBO<br>KC1SLQ                              |                                       |                                 |                                        |
| 335<br>AC8NP        | 180<br>KO4KUS                  | 140<br>KA9IKK<br>KB3YRU<br>W8MAL                                                                                      | 124<br>WA3EZN                                                                        | 100<br>WJ3P<br>NX9K<br>WB9EDL<br>AD4DO                     | 82<br>WX2DX<br>K8ED<br>W2QMI<br>WD8SDH<br>W8GSR<br>N8OD<br>K3RC<br>K8KRA<br>KL7RF<br>K2MJR<br>WB4ZDU<br>KN4AAG<br>N1CVO | 80<br>KR4ST<br>W2ITT<br>KG5AOP<br>KB4OLY<br>KA8BJA<br>AA3N |                                       |                                 |                                        |
| 305<br>W7EES        | 177<br>KD2NMG                  | 135<br>W9GRG<br>W3YVQ<br>N8SY<br>W02H<br>N3GE                                                                         | 120<br>WA4VGZ<br>KC9FXE<br>WB9WKO<br>K3JL<br>WC4FSU<br>W2AH<br>K8MDA<br>NA7G<br>N7IE | 108<br>W4EDN<br>W4KX<br>N1LAH<br>KC1KVY<br>W1TCD<br>WA2BBS | 89<br>W8JM<br>KE8HKA<br>N7UWX                                                                                           | 79<br>N2TSO                                                |                                       |                                 |                                        |
| 286<br>KE8BYC       | 175<br>KV2J                    | 133<br>N0JAR<br>WV5Q                                                                                                  | 118<br>KY2MMM                                                                        | 99<br>KC1HHO                                               | 88<br>KT4WX                                                                                                             | 77<br>AJ7B                                                 |                                       |                                 |                                        |
| 281<br>W5WMC        | 170<br>WD8USA<br>N4CNX         | 130<br>AG9C<br>K9LGU<br>K5OB<br>KD8ZCM<br>KE4RS<br>KD0HHN<br>N2JBA<br>W2OOD<br>KY2D<br>WK4WC<br>KW1U<br>N1UMJ<br>WZ0C | 110<br>AD3J<br>KM4WHO<br>WB8TQZ<br>KD8UUB<br>N1IQI<br>NW3X                           | 98<br>WB2VUF                                               | 87<br>K1XFC<br>W2ARP                                                                                                    | 76<br>N4NOA<br>K8RDN                                       |                                       |                                 |                                        |
| 275<br>KC8YVF       | 165<br>W4DNA                   | 155<br>AC0Q                                                                                                           | 109<br>W8ROY<br>W1RVY                                                                | 97<br>NI2W                                                 | 86<br>AE5MI                                                                                                             | 75<br>WB3FTQ<br>K4DH                                       |                                       |                                 |                                        |
| 250<br>N2LC<br>KT2D | 160<br>W9RY                    | 150<br>KR4PI<br>W9FE                                                                                                  |                                                                                      |                                                            |                                                                                                                         |                                                            |                                       |                                 |                                        |
| 232<br>W7PAT        | 159<br>KB5PGY                  | 148<br>KN4WX                                                                                                          |                                                                                      |                                                            |                                                                                                                         |                                                            |                                       |                                 |                                        |

The following stations qualified for PSHR in these previous months, but have not been recognized in this column yet: (Dec. 2024) N9VC 410, KK4PUX 225, AG9G 150, K9LGU, WB9WKO, KW1U, N1UMJ, WZ0C 130, NA7G, N7IE, KC9FXE 120, W4CAC 118, WD0BFO, N1IQI, W1RVY, N1LZ 110, NX9K, N1LAH, KC1KVY, W1TCD 100, KC1HHO 99, KB9GO, KC9UC, N3SW, N1CVO 90, N1HAN 86, KA0DBK 74. (Nov. 2024) KK4PUX 225, N3SW 82. (Oct. 2024) KK4PUX 225, W4CAC 147. (Sept. 2024) KK4PUX 215, W4CAC 135, N3SW 90.

### Section Traffic Manager Reports

The following Section Traffic Managers reported: AR, AZ, CO, CT, DE, EMA, ENY, EPA, GA, IL, KS, KY, LA, MDC, ME, MI, MO, MS, NC, ND, NFL, NLI, NM, NNJ, NNY, OH, OR, RI, SFL, SJV, STX, TN, UT, VA, WCF, WI, WMA, WNY, WPA, WWA, WY.

### Brass Pounders League

The BPL is open to all amateurs in the US, Canada, and US possessions who report to their SMs a total of 500 or more points or a sum of 100 or more origination and delivery points for any calendar month. Messages must be handled on amateur radio frequencies within 48 hours of receipt in standard ARRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow.

W2AH 1,918, KY2D 1,802, NX9K 1,152, NS7K 910, WB9WKO 798, WA3QLW 691, KW1U 636, KB9GO 624, AG9G 541, W8MAL 535.

The following stations qualified for BPL in Dec. 2024, but have not been recognized in this column yet: NX9K 1,665, NS7K 1,237, WB9WKO 771, KW1U 757, KB9GO 620, N9VC 585, N9CK 548.



# Turn Your Vertical Antenna into a Rotatable Beam

Laser-like 3-degree beamwidth thanks to a carbon fiber slotted sleeve.

## Jay Kolinsky, NE2Q

Many hams who use vertical antennas are dissatisfied with their performance, compared to their buddies who use directional beam-type antennas that concentrate their RF emissions over a narrow area of 50 to 80 degrees. There is no doubt that the azimuth antenna pattern for vertical radiators is basically a perfect circle. Your transmitted RF is spreading equally over a 360-degree circle. This is a significant waste of energy because you talk to only a station in a pinpointed area. Using a vertical antenna for receiving demonstrates that signals are received from all directions, just like interference, man-made, and atmospheric noise. Most of us have heard two common phrases: "Verticals radiate poorly in all directions" and "Verticals are very noisy antennas."

## My First Antenna

I read the full-page advertisements by Gotham that used to appear in *QST*. The ads featured the V-80 vertical. I ordered one, and it came in a long, skinny carton. It consisted of two aluminum tubes, one smaller than the other to telescope into the larger tube. It was held together at the joint with a hose clamp and was about 21 feet long when fully assembled. There was also an air-wound coil about 3 inches in diameter. The idea was to put an alligator clip on the center of the coax feed line and tap the coil at different points for operations on 10 through 80 meters. I installed the antenna on the side of my father's summer home in Mohegan Lake, New York, and it worked. I made contacts but heard very few signals outside of the US. I used it until 1962, when I built a two-element 20-meter quad antenna using bamboo arms with a fiberglass tape coating. The quad outperformed my V-80 on 20 meters.

I've always been a creative thinker and developed new products over the years. Some of my early inventions are in the Smithsonian Institution in Washington, DC, and I even have a few US patents. One day, I was thinking about the shortcomings of verticals. I wondered, "How about turning a single vertical element into a narrow beamwidth directive aerial?"



**Figure 1** — The carbon fiber tube placed over Jay Kolinsky's, NE2Q, magnetic mount antenna on his car.

## Carbon Fiber to the Rescue

I heard someone mention that carbon fiber tubing will distort RF antenna patterns, which made me realize that a sleeve of carbon fiber slipped over a vertical element might severely restrict RF from escaping from a vertical. I quickly obtained a 10-foot tube of carbon fiber 2 inches in diameter and decided to experiment. I installed my  $\frac{1}{4}$ -wave, 2-meter magnet-mount vertical antenna on the center of the roof of my car, and took readings with my field strength meter 50 feet away. I ran 25 W and recorded the 20% field strength needle



**Figure 2** — The field strength meter displays no reading.

deflection. Then I slipped a 20-inch-long carbon fiber tube over the 19-inch whip, as shown in Figure 1, and I was shocked. The field strength meter showed no reading at all, as shown in Figure 2, even with 100 W to the antenna.

### The Slot

I quickly removed the carbon fiber tube and headed to my basement for my table saw. I cut a  $\frac{1}{16}$ -inch-long slot across the entire length of the 20-inch tube, as shown in Figure 3. My theory was that the slot would allow the RF to escape through the narrow opening and in the direction of the slot. I placed the slotted

sleeve back over the magnet mount and did more field strength tests. I carefully rotated the slot in the tubing so it would face the exact direction of the field strength meter. To my amazement, the field strength meter pinned at full max. I started to lower the transmitter power and was able to get the same reading I got with no sleeve



**Figure 3** — The carbon fiber tube with a  $\frac{1}{16}$ -inch-long slot cut down the length of the entire tube.

installed on 25 W, but now I was transmitting with only 1 W! Obviously, the theory proved to work, and I now have a vertical beam that would send my RF to a very narrow portion of the globe depending on where the open slot was facing.

### Narrow Beamwidth

Calculations for a 2-inch-diameter pipe show a circumference of about 6.8 inches. Because there are 112 individual  $\frac{1}{16}$ -inch segments in a 6.8-inch circumference, a  $\frac{1}{16}$ -inch slot provides close to a mind-boggling 3-degree vertical plane beamwidth. This is significantly smaller than typical results with common beam antennas and provides concentrations of RF energy into very narrow portions of the globe when using this concept with HF verticals.

### On-the-Air 20-Meter Performance

I like to chat with distant DX stations, so I tried the slotted sleeve concept on a new  $\frac{1}{4}$ -wave 20-meter vertical ground plane antenna with the base about  $\frac{1}{2}$  wave above ground. With the open slot facing Europe, it outperformed my five-element 20-meter Yagi by an astounding 5 to 6 S-units. Receiving was very quiet, and the power line and atmospheric noise were eliminated over a 357-degree arc. I am now working on a small direct current motor that will allow remote rotation of the slotted sleeve to any part of the globe. The concept is easy to duplicate, and I suggest that anyone who has been disappointed by their vertical try their own slotted sleeve. After 2 years of use on 20 meters, many hams have asked what the name of the antenna is. For short, I call it the LLS (Loof Lirpa Slot).

### Caution: Extreme RF Exposure

Do not stand near the open slot when running more than 5 W because you will probably exceed the RF energy exposure levels referenced by the FCC mandates.

All photos provided by the author.

Jay Kolinsky, NE2Q, was licensed in 1958 and is still very active on most of the HF bands. Ham radio was the principal factor for Jay to start his own electronics manufacturing company, Kolin Industries, Inc. at the age of 22. His first product was the NL-1 noise limiter advertised in QST in 1962. He has several inventions, including the electronic sirens used worldwide on most fire and security alarm systems. Jay can be reached at [ne2q@arri.net](mailto:ne2q@arri.net).

For updates to this article, see the **QST Feedback** page at [www.arri.org/feedback](http://www.arri.org/feedback).

**VOTE**

If you enjoyed this article, cast your vote at [www.arri.org/cover-plaque-poll](http://www.arri.org/cover-plaque-poll)



# Adventure with Low Power on the Ohio and Erie Canal

Operating at a National Historic Landmark that was once crucial to the trade industry.

## Mike Bryce, WB8VGE

I wanted to add more adventure to my portable operating. Operating from my deck is fine, but there are lifetimes of history to be explored around my home. I am within 3 miles of what was once the most extensive public and private works project ever created: the Ohio and Erie Canal.

The Ohio and Erie Canal was used to transport goods long before the first locomotive tracks were laid. The canal was built from 1825 to 1832 and remained active through the 1860s. The Ohio and Erie Canal Historic District is a 4-mile section of the Ohio and Erie Canalway National Heritage Area. The towpath on which mules once pulled heavy barges is now a walking, jogging, and bicycle path. A remaining section of the canal is located in Summit County, Ohio, and it is maintained as a water supply for local industries.

## Preparations

I planned to get on the towpath, hang a wire from a 100-foot-tall oak tree, and call CQ. Instead of my Yaesu FT-817, I went with an Icom IC-703. Its 10 W proved necessary because the HF bands didn't cooperate. I brought a CW paddle, a 7.5 A gel-cell battery, and my MFJ portable antenna coupler. My favorite portable antenna is a random-length wire. Even though the IC-703 has an internal antenna coupler, it can't handle the high impedance that the radio sees with my random-length wire. (Call me old fashioned, but I don't care for automatic tuners; I like to twist dials and knobs.) About an hour before my trip, I couldn't find my portable paddles. So, I brought my brass Bencher paddles.

I decided the trees looked the best at a spot that had a small observation area. My tool of choice for launching antenna lines is a slingshot. A 5/8-inch bolt makes a perfect projectile. First, I attached a 50-pound test

fishing line, picked the perfect limb, pulled back the strap, and let the line fly. Several attempts later, I had my fishing line over a limb. It's a bit more time-consuming than shooting a line with the wire already attached, but this method has worked for me in the past with great success.

The lead-acid battery stayed in its carrying pouch, a repurposed nylon carrier that used to carry a larger amp/battery. The pouch had a cigarette jack on one end, but I took it out and put Anderson Powerpoles on the battery's terminals instead. I always use a fuse — in this case, I used a 5 A fuse.



One of the many historical markers along the Ohio and Erie Canal towpath.





Mike's setup at the Ohio and Erie Canal: the Icom IC-703, battery, antenna coupler, and Bencher key.

There was a wooden bench in the observation area. I put the rigs and tuner on one end, while I sat on the opposite end. The battery pack provided an excellent prop to raise the radio a bit. I brought a small notebook to take some notes because even though I've been a ham for decades, I have yet to master the fine art of copying CW in my head. I can get most of the copy; however, I need to write it down to have a conversation after the name and RST are exchanged.

### Operating the Ohio and Erie Canal Portable

My random-length wire worked as well as it should. Sometimes, it was a hassle to get a reasonable standing wave ratio, depending on the band. I found that laying out an equal counterpoise length sometimes helped, especially on 40 meters. I used a no-kink Teflon-coated wire for the counterpoise. This wire and the battery's negative lead were connected at the rear-mounted ground terminal of the antenna coupler.

As you would expect, 40 meters was the money band. Lucky for me, the Maryland-DC QSO Party was run-

ning in full force, and contacts on SSB were quite easy with 10 W. CW was also successful as contact after contact was made. It's a good thing a contest was going on because I wasn't only a QRP station; I also was worth two points!

Twenty meters didn't work as well as I had hoped. The Maryland-DC QSO Party wasn't happening on this band. I was too close for 20 meters and couldn't hear any other contesting. I checked into the Maritime Mobile Service Net on 14.300 MHz with a 5 × 5 report. Several strong SSB stations did come back to me. The lowest power I tried was a hair under 1 W on 20 meters. The 10- and 15-meter bands were not open. I didn't try 17 meters.

I didn't bring a logbook. If I had thought of it, and found my portable key paddle, I could have taken my iPad because it had a logging program installed.

### Notes for Next Time

Next time, I'd like to try a portable vertical antenna. I have one, but I'd need to bring an antenna analyzer to



set it up. A portable loop antenna would be an interesting experiment, too.

My random-length wire antenna has several advantages. It's easy to set up. The other antennas are much more of a hassle to set up and tear down. A simple dipole, while very effective when up in the air, requires more work. Even in an inverted-V configuration, you need to keep both ends up. Sometimes, that's not as easy as one would think.

My battery was heavy, considering the power-to-weight ratio. Lithium batteries would provide a higher energy density, although I didn't even put a dent in the lead-acid 7.5 A gel-cell battery. Next time, I'll go with a lithium battery.

The Icom IC-703 was designed to work all the way down to 9 V, so an NiMh or old-school NiCD RC battery pack would be ideal to carry. A deep canopy of trees grew over the towpath, so a small solar panel wouldn't have provided me with any sufficient power unless I moved to a sunnier location.

I didn't carry my 2-meter handheld either. I'm too far north to connect to the local 147.18 MHz repeater, but a portable J-pole antenna would have worked wonders. I'll take both along the next time I go. Maybe I'll bring

the Yaesu instead due to its ability to operate HF, VHF, and UHF, and leave the Icom at home.

FT8 wasn't available at the time of my trip, but I'd give it a try in a heartbeat. I have an HP Netbook laptop, so I might try the digital modes while operating portable. The only problem is that my \$20 Timex watch keeps time better than the HP. I'll sync with the standard time before I leave and hope for the best because most digital modes require precise time between stations.

All in all, I made nearly 50 contacts. They were mostly QSO party contacts, but I'm not picky. I had a blast. I made contacts up and down the east coast and a few in New Mexico and Colorado. Looking back, I should have posted on the internet that I'd be out and about running low power from the Ohio and Erie Canal — another thing I'll be sure to do next time.

Mike Bryce, WB8VGE, was licensed in 1975 and holds an Amateur Extra-class license. He retired after nearly 50 years at Republic Steel. Mike runs low power on the low end of 40 meters. When the bands fold, you'll find him fixing a broken radio. Mike's spare time is divided between keeping the water levels topped off in the batteries for his solar power station and working in his greenhouse. He is the author of numerous ham radio and solar power articles and the ARRL book *Emergency Power for Radio Communications*. You can reach Mike at [prosolar@sssnet.com](mailto:prosolar@sssnet.com).

For updates to this article, see the *QST* Feedback page at [www.arrl.org/feedback](http://www.arrl.org/feedback).



## ARRL Amateur Radio Innovation Award

2024 Recipient

*John Albert, WA9FVP*

For the article "The RAS2 — A Remote Antenna Switch," published in the May 2024 issue of *QST*.

The ARRL Amateur Radio Innovation Award is given to the author of the best article published by ARRL in the previous calendar year for an innovation that advanced amateur radio technically or advanced the enjoyment of amateur radio.

This \$1,000 yearly award was endowed with an initial gift by John Karickhoff, MD, AA4JJ.



John Albert, WA9FVP  
New Lenox, Illinois

# IARU: A Century of Global Service

April 2025 marks the 100th anniversary of the creation of the International Amateur Radio Union.

## Dave Sumner, K1ZZ

Hiram Percy Maxim's important role as the founding president of ARRL is well-known to most radio amateurs. Mr. Maxim's early recognition of the need for an organization to represent and coordinate the work of radio amateurs worldwide is less heralded but equally essential to the existence of amateur radio today.

## History

The 1920s were an exciting time for radio. Technical and operating achievements came out one on top of another. For amateurs, the transition from spark to continuous wave transmitters using vacuum tubes led to the first two-way transatlantic contact in November 1923, followed by a flurry of achievements as the short waves, or frequencies above 3 MHz, began to be explored.

Mr. Maxim's vision of a network of relay stations to overcome the limitations of spark technology led to the creation of the American Radio Relay League. Now that amateur stations had a global reach, he foresaw the need for an international organization to promote and protect access to the radio spectrum by amateur experimenters. A personal trip to Europe in March 1924 allowed him to confer in Paris with leaders of the European radio community. A committee was formed, with Mr. Maxim as president, to organize a congress held in Paris during the Easter holidays the following year to establish an International Amateur Radio Union (IARU) representing amateurs interested in two-way communications.

The April 1925 congress was a great success, with attendees from 25 countries. An initial IARU constitution based on individual memberships was adopted, the concept being that a national section would be organized once a sufficient number of amateurs in a country had joined. This approach proved to be problematic, so a new constitution based on a federation model took effect in 1929. Since then, the IARU has been composed of member-societies, one per country or separate territory. Today, there are 170 member-societies, and each has been duly admitted by vote of the membership.



From its creation to the present day, the IARU headquarters, currently referred to as the International Secretariat, has been provided by ARRL. Because of World War II, activity was suspended from December 1941 to December 1945; the official IARU newsletter, called the "Calendar," documented amateurs' gradual postwar return to the bands. In 1950, several member-societies in Western Europe, perceiving a need for greater collaboration, organized the IARU Region 1 Division and held periodic in-person conferences. Region 1 consists of Europe, Africa, northern Asia, and the Middle East. Regions 2 and 3 followed in 1964 and 1968, respectively. Region 2 consists of the Americas, while Region 3 includes the remainder of Asia and the Pacific. The regions correspond to the three regions defined by the ITU for frequency allocation purposes. In 1984, a revised IARU constitution was adopted, formally incorporating the regional organizations into the global structure and establishing an Administrative Council to carry out IARU policy and management (see the "IARU Administrative Council" sidebar).

## IARU Administrative Council

Officers and regional representatives as of early 2025:

President Tim Ellam, VE6SH/G4HUA; Vice President Thomas Wrede, DF200; Secretary Joel Harrison, W5ZN; Region 1 President Sylvain Azarian, F4GKR; Region 1 Secretary Mats Espling, SM6EAN; Region 2 President George Gorsline, VE3YV; Region 2 Secretary Rod Stafford, W6ROD; Region 3 President Wisnu Widjaja, YB0AZ, and Region 3 Secretary Ken Yamamoto, JA1CJP.

## IARU's Role

The IARU's primary mission is to maintain and, if possible, expand useful access to the radio spectrum for licensed radio amateurs. This doesn't just happen; it requires effective representation at the International Telecommunication Union (ITU), regional telecommunications organizations, and other standards-setting



bodies. This important function is carried out almost entirely by qualified volunteers who devote thousands of hours annually preparing for and attending meetings in person and remotely. Expenses are covered by dues paid by member-societies to the IARU Regions supplemented by ARRL, with several member-societies also funding representatives on their administrations' delegations. In short, the individual members of IARU member-societies are the source of financial support that makes it possible to represent amateur radio when critical decisions are made.

The IARU has achieved significant successes, particularly at ITU World Radiocommunication Conferences (WRCs), formerly World Administrative Radio Conferences. Here are some highlights:

- New band at 21 MHz (1947)
- Recognition of the amateur-satellite service (1971)
- New high-frequency (HF) bands at 10, 18, and 24 MHz and improvement of the 1.8 MHz band (1979)
- Additional amateur-satellite and microwave allocations (1979)
- Successful defense against HF broadcasting expansion (1992)
- Major improvement to the 7 MHz band (2003)
- Easing some restrictions to facilitate disaster communications (2003)
- New bands at 136 kHz (2007), 472 kHz (2012), and 5 MHz (2015)
- Major improvement to the 50 MHz band in Region 1 (2019)

With the radio frequency spectrum fully allocated up to 275 GHz, the opportunities for additional gains are limited. However, given the pressure for greater commercial spectrum utilization, the IARU needs to remain actively involved in the ITU. It is a continuous process. Preparation for the next WRC begins right at the close of the previous one. It requires the IARU member-societies to engage with their telecommunications administrations and the IARU regions with the respective regional telecommunications organizations.

Spectrum allocations are only half the battle. A growing threat to radio reception comes from man-made sources of interference, ranging from the wall warts that power the ubiquitous devices found in every home and business to schemes for wireless power transmission to recharge vehicles and other purposes. The IARU works through the ITU, standards organizations such as the International Electrotechnical Commission and its radio interference committee Comité International Spécial des Perturbations Radioélectriques, and national regulators and representatives of other radio services, such as broadcasters, to make the case for limits on sources of spectrum pollution.

## Other Activities

Through its regional organizations and member-societies, the IARU directly supports a variety of programs and activities. Here are just a few:

- Intruder Watch (formerly IARU Monitoring System) to document and report non-amateur stations operating on amateur bands contrary to regulations
- Frequency coordination of amateur satellites
- International coordination of emergency communications
- Amateur Radio Direction Finding (ARDF): a field event to locate hidden hidden transmitters that is popular with young people in many countries
- Youth on the Air (YOTA) offering international summer camps as well as operating activities
- High-speed telegraphy (HST) competitions for receiving and sending Morse code at speeds beyond what can be heard on the air
- Development of band plans to serve as guidelines for cooperative use of crowded bands
- The IARU HF World Championship: an annual contest in July that is also used by the World Radio-sport Team Championship (WRTC)
- QSL Bureau System for exchanging QSL cards at a reasonable cost, which grows increasingly difficult

Learn more about the many facets of the IARU by visiting the website at [www.iau.org](http://www.iau.org).

## IARU Centenary

Any organization that reaches 100 deserves a celebration! In late April 2025, IARU officials, member-society representatives, and invited guests will gather in Paris, where it all began, to celebrate the centenary and the 75th anniversary of IARU Region 1. Several member-societies are organizing special on-the-air events during the month, including on World Amateur Radio Day on April 18.

## Looking Ahead

Telecommunications developments offer new challenges and opportunities for amateur radio, and the IARU must keep up with the accelerating pace. With that in mind, a plan for restructuring the IARU is underway to improve decision-making speed and efficiency and to make the best possible use of limited resources. Stay tuned!

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Retired ARRL CEO Dave Sumner, K1ZZ, has been continuously involved with the IARU since 1972, including 22 years as Secretary and as Assistant Secretary for the remainder of the time. He has been licensed since 1962 and enjoys operating from his home station in rural eastern Connecticut, shared with his spouse Linda, KA1ZD. Dave can be reached at [k1zz@arri.net](mailto:k1zz@arri.net).

# ARRL Board Approves By-Law Changes and Establishes a New Committee

The ARRL Board of Directors met in Windsor, Connecticut, for its Annual Meeting on January 17 – 18, 2025.

ARRL First Vice President Kristen McIntyre, K6WX, presided in place of President Rick Roderick, K5UR, who could not attend. Vice President McIntyre welcomed new Board members, including New England Division Director Tom Frenaye, K1KI, and Vice Directors David Galletly, KM2O, of the Hudson Division; Andrew Milluzzi, KK4LWR, of the Southeastern Division, and Joshua Long, W9HT, of the Central Division. She also recognized Central Division Director Brent Walls, N9BA, who previously served as Vice Director.

Prior to the meeting, Board committees met on January 16, highlighting the following actions:

The Programs & Services Committee and ARRL Headquarters staff from the Radiosport Department are moving ahead with creating a new DXCC award called DXCC Trident. This award will recognize those who achieve DXCC using CW, phone, and digital modes. Higher achievement endorsements can be earned at the 200, 300, and Honor Roll levels. The DXCC Trident award is intended to spur greater on-air operating and inspire those using digital modes to develop their skills in and practice CW and SSB.

The Administration & Finance Committee discussed and approved the 2025 operating plan, amending

it with an additional \$200,000 for Washington, DC, advocacy. This includes continuing work to advance the Amateur Radio Emergency Preparedness Act (the bills, H.R.1094 and S.459, were reintroduced to the US House and Senate in February). The committee also agreed that an additional year will be granted to those incoming QSL bureaus that still require financial support from all ARRL members to operate.

The Emergency Communications and Field Services Committee established an initiative to track and report clubs' activities nationwide. This initiative will help ARRL better understand the scope of these activities and improve club leadership tools. The committee also adopted a rewrite of the ARRL Active Club Primer, a tool for radio club leaders, and a rewrite of the rules and regulations for ARRL hamfests and conventions.

The Historical Committee is expanding the ARRL Heritage Museum's online collection, which currently features more than 3,000 images and documents, by adding a new virtual component. This virtual museum and research library will continue to grow, showcasing ARRL's historical collection and other significant items from the history of amateur radio.



The Board Meeting was called to order at 9 AM EST. [Sierra Harrop, W5DX, photo]



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## Highlights

Board members discussed motions proposed by the committee that was established by unanimous approval during the January 2024 Annual Meeting. This committee was tasked with evaluating proposed changes to By-Law 46, the Board's Conflict of Interest Policy, and By-Law 42, the Ethics & Elections Committee charter. The committee returned with a lengthy motion that some Directors believed they had insufficient time to review and comment on. Despite broad support for passing the committee's motion, the Board approved delaying the vote until the July 2025 Second Meeting of the Board of Directors. Directors have until April 21, 2025, to file their comments with the committee for consideration in the final motion.

The Board also approved two motions involving elections. ARRL has had a confusing set of documents defining the election process. The rules in By-Law 18 require at least a two-thirds vote for approval, whereas the rules and regulations found in less formally controlled documents published on the ARRL website require only a simple majority. This motion moved most of the language from the rules and regulations into By-Law 18. The Board also approved changes driven by shortcomings that came to light during the 2024 election cycle. These changes are primarily intended to ensure that elections are conducted at a Division level where the members vote, and not at a national level.

The Board approved a change to By-Law 20. This change provides greater discretion regarding the previous requirement for a member of the Ethics & Elections Committee to observe ballot processing at the third-party election processing company — an expense now considered unnecessary.

## Government Relations

The Board approved a motion to sunset the Governmental Affairs Committee and authorized the CEO to partner with West Gulf Division Director John Robert Stratton, N5AUS, who is currently working with ARRL's lobbyists in Washington, DC. It also requires the CEO to be responsible for reporting the progress being made on certain legislation with quarterly reports to the Administration & Finance Committee.

The Board briefly discussed fundraising for the Legislative Issues Advocacy Fund. This included an appeal by Director Stratton for every Director and Officer to donate. Nearly every Director and Officer donated to the fund less than a week after the Board meeting.

The Board approved the formation of a new Technical Standards Committee to oversee the successful Clean

Signal Initiative (CSI) and to develop future initiatives, including amateur radio receiver standards.

The Board heard a report from ARRL Foundation President and Delta Division Director David Norris, K5UZ. The Foundation provides philanthropic support for amateur radio through the ARRL Foundation Scholarship Program, Club Grant Program, Division Convention Grant Program, and other grants and funds. In 2024, the Foundation awarded 126 scholarships totaling \$709,500 through the generosity of Amateur Radio Digital Communications, individuals, and radio clubs. The Foundation also saw a return of the Club Grant Program and awarded 37 club grants totaling \$500,502. In 2024, 110 applications were received requesting \$1,593,580.24. Director Norris also reported that the Foundation awarded 25 grants valued at \$47,434 and two Division Convention grants for \$12,250.

## Elections

Dakota Division Director Bill Lippert, AC0W; Midwest Division Director Art Zygielbaum, K0AIZ; Roanoke Division Director Jim Boehner, N2ZZ, and Rocky Mountain Division Director Jeff Ryan, K0RM, were re-elected to the Executive Committee (EC). Great Lakes Division Director Scott Yonally, N8SY, was newly elected to the EC.

Northwestern Division Director Mark Tharp, KB7HDX; New England Division Director Tom Frenaye, K1KI; previous Central Division Director Kermit Carlson, W9XA, and ARRL CEO David A. Minster, NA2AA, were elected to the ARRL Foundation Board.

ARRL Chief Financial Officer Diane Middleton, W2DLM, estimated during her report that 2024 will end the year with a deficit from operations of \$750,000.

ARRL Treasurer John Sager, WJ7S, said the ARRL investment return was \$3.44 million, or 9.6%, in 2024. John stated that the investment policy objective for the ARRL investment portfolio is the rate of inflation plus 3%. With the year-over-year increase in the Consumer Price Index reported at 2.9%, the ARRL portfolio returns more than achieved this goal in 2024. The balance of the ARRL investment assets was \$38,136,854 as of December 31, 2024.

The complete minutes of the 2025 Annual Meeting of the ARRL Board of Directors is available on the ARRL website at [www.arrl.org/board-meetings](http://www.arrl.org/board-meetings).

**The next meeting of the ARRL Board of Directors is scheduled for July 18 – 19, 2025.**

## Happenings

# Amateur Radio Emergency Preparedness Act Being Re-Introduced

US Senators Roger Wicker (R-MS) and Richard Blumenthal (D-CT), and Representatives August Pfluger (R-TX) and Joe Courtney (D-CT) announced their joint re-introduction of legislation in the Senate and House to restore the right for amateur radio operators to install the antennas necessary to serve their communities.

Homeowner association (HOA) rules often prevent amateur radio operators from installing antennas at their homes, even though amateur radio has proven essential in emergencies and natural disasters — such as hurricanes — when other means of communication fail. Senator Wicker said:

Mississippians should have access to every possible means of warning for natural disasters, including amateur radio operators. In an emergency, those warnings can mean the difference between life and death. The Amateur Radio Emergency Preparedness Act would remove unnecessary roadblocks [to] help keep communities safe during emergencies like tornadoes, hurricanes, and fires.

Senator Blumenthal said:

When disaster strikes, amateur radio operators provide vital, often life-saving information, which shouldn't be hindered by prohibitive rules or confusing approval processes. The Amateur Radio Emergency Preparedness Act eliminates obstacles for ham radio enthusiasts, allowing them to continue their communications and serve their communities in the face of emergencies.

Congressman Pfluger said:

Natural disasters and other emergency situations that hinder our regular lines of communication are unfortunately unavoidable, which is why we must bolster our emergency preparedness by removing the barriers amateur radio operators often run into when installing antennas. Amateur radio plays a vital role in public safety by delivering critical information to people at all times. My district is home to dozens of amateur radio operators ready to volunteer in the event of an emergency, and I am proud to lead this legislation.

And Congressman Courtney said:

As we know from recent natural disasters, amateur radio operators in Connecticut can be a critical component of disaster response and emergency management. It is in our communities' best interest that we give them the capabilities to operate at the highest level, and with the re-introduction of this bill, we've taken a strong step in that direction.

The Amateur Radio Emergency Preparedness Act of 2025 (H.R. 1094 and S. 459) would require HOAs to accommodate the needs of FCC-licensed amateur radio operators by prohibiting the enforcement of private land use restrictions that ban, prevent, or require the approval of the installation or use of amateur radio station antennas. HOAs have often prevented installation and use of such antennas through private land use restrictions. This has hindered voluntary training for emergency



situations and blocked access to necessary communications during disasters.

Among other provisions, this legislation would:

- Prohibit HOA rules that would prevent or ban amateur radio antennas
- Specify an approval process for installing amateur radio antennas
- Provide a federal Private Right of Action to amateur radio operators in disputed cases

On behalf of America's amateur radio licensees, ARRL President Rick Roderick, K5UR, reconfirmed ARRL's full support for the passage of the Amateur Radio Emergency Preparedness Act of 2025 and extended his thanks to Senators Wicker and Blumenthal and Congressmen Pfluger and Courtney. He appreciates their unflagging leadership of the bipartisan effort to support and protect the rights of all amateur radio operators.

The text of the House version can be read at [www.arrl.org/files/file/Advocacy/HR1094%20House%20Private%20Land%20Use%20Bill.pdf](http://www.arrl.org/files/file/Advocacy/HR1094%20House%20Private%20Land%20Use%20Bill.pdf).



## Ham Radio Demonstration Helps Youth Survivors of Violence at Camp

Camp Family Justice serves pediatric survivors of violence in Contra Costa County, California, by providing them with an opportunity to enjoy the outdoors in a safe environment surrounded by support services, including a medical clinic. The camp provides a chance for children to decompress, learn resiliency skills, and build a path forward. Children who applied this year and attended last year worked diligently in school to earn the privilege of attending Camp Family Justice for a second year.

Spencer Holmes, KM6SJO, contributes to Camp Family Justice. He is a popular science teacher at Heritage High School in Brentwood and an adviser for the school's amateur radio club, W6HHS.

This past January, Holmes brought a box full of radios to the camp. "The kids were excited," he said. "They had a lot of questions, and two of the campers took two GMRS radios and talked to each other for hours." Holmes also set up a mini HF station. He was able to contact several stations, and he allowed the youth to talk on a first-name basis with other amateur radio operators.



Spencer Holmes, KM6SJO (right), shows two students (left and middle) at Camp Family Justice how to use an amateur radio handheld.

"Clearly, it was chaotic fun," he added. "But it allowed them to enjoy a safe environment and a sense of community." Holmes is one of the only teachers in the state to receive a national supporting grant from ARRL to facilitate radio communication education.

Some of the kids will be attending Camp Family Justice again this year. Holmes thinks he might start teaching them how to become amateur radio operators.

Holmes is known for his dedication to education and his long-standing

commitment to the East County community. What makes this year at Camp Family Justice especially meaningful for Holmes is an unexpected reunion with Registered Nurse Adrianna Goyette. Goyette, it turns out, was once Holmes' student at Heritage High School. Both are now giving back to the community by contributing their time and expertise to the camp's violence prevention program. Their story reflects the strength of East County, the power of mentorship, the lasting impact of education, and a tip of the hat to amateur radio.

## ARRL Club Grant Program Awards Half a Million Dollars to Grow Ham Radio

Thirty-seven amateur radio clubs benefitted from \$500,502 in grants through the ARRL Foundation Club Grant Program to implement projects that educate, recruit, train, and promote amateur radio in their communities. Funding for the grants comes from Amateur Radio Digital Communications (ARDC).

There were 110 applications to the 2024 Club Grant Program. Applicants were from all ARRL Divisions and 40 states, and requests totaled nearly \$1.6 million in support, with

amounts ranging from as small as \$1,000 to as large as the maximum \$25,000. Funds were distributed to the clubs in December 2024.

Some examples of the work that will be accomplished thanks to these grants include upgrades to antennas within Flor-



A map of the 2024 ARRL Club Grant Program awardees. The states in green are the ones in which grants were awarded; some states had multiple awardees.

ida's SARnet, a statewide linked UHF repeater network that is used extensively by emergency managers during hurricanes; enhancement of amateur radio-based telemetry systems onboard Illinois Space Society projects, and many programs targeting youth outreach.

"These grants are possible because of the strong partnership between ARRL and ARDC," said ARRL Director of Development Kevin Beal, K8EAL, "and they provide transformational impact for the next generation of amateur radio clubs."

### Hurricane Watch Net Turning 60, Seeking Net Control Operators



The Hurricane Watch Net (HWN), founded on Labor Day weekend in 1965, is celebrating its 60th anniversary in 2025. The net, known for relaying surface observations to the National Hurricane Center, is also seeking volunteers to serve as net control operators (NCOs).

Net Manager Bobby Graves, KB5HAV, reports that HWN is preparing for what could be, yet again, an above-average hurricane season, and that the net needs more amateur radio operators to help.

"We are starting early this year in preparations and looking to add more net control stations to our roster," said Graves. "We are looking for dedicated new members willing to train to become NCOs. While being bilingual is not a requirement, being fluent in Spanish and English or French/Creole and English is a plus."

If you are interested in training to become an NCO for HWN, please visit the net control information page at [www.hwn.org/about-us/nco\\_info.html](http://www.hwn.org/about-us/nco_info.html).

### Section Manager Nomination Notice

To all ARRL members in Colorado, Eastern Washington, Georgia, Los Angeles, Sacramento Valley, San Francisco, South Texas, West Virginia, and Western Washington. You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 16 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the Sections concerned. It is advisable to have a few more than five signatures on each petition. A sample nomination form is available on the ARRL website at [www.arrl.org/section-terms-nomination-information](http://www.arrl.org/section-terms-nomination-information). Nominating petitions may be made by facsimile or electronic transmission of images, provided that upon request by the Field Services Manager, the original documents are received by the manager within 7 days of the request. It is acceptable to submit signatures that have been sent via email or mail under the following guidelines: The petition copies must be made from the original form supplied by ARRL or downloaded from the ARRL website. The form must be exactly the same on both sides (i.e., autobiographical information should appear exactly the same on all copies). All forms/copies must be submitted together.

Candidates may use any of the available electronic signature platforms such as DocuSign, Dropbox Sign, and Signed PDF. Candidates who use an electronic signature platform to be nominated, as described above, do not have to send in original paper copies of the nominating documents. The packet that is sent to ARRL Headquarters must be complete. Multiple files or emails for a single petition will not be accepted.

We suggest the following format:

(Place and Date)

Field Services Manager, ARRL

225 Main St.

Newington, CT 06111

We, the undersigned full members of the \_\_\_\_\_ ARRL Section of the \_\_\_\_\_ Division, hereby nominate \_\_\_\_\_ as candidate for Section Manager of this Section for the next 2-year term of office.

(Signature \_\_\_\_\_ Call Sign \_\_\_\_\_ City \_\_\_\_\_ ZIP \_\_\_\_\_)

Any candidate for the office of Section Manager must be a resident of the Section, an amateur radio licensee of Technician class or higher, and a full member of ARRL for a continuous term of at least 2 years immediately preceding receipt of a nominating petition. Petitions must be received at Headquarters by 4:00 PM Eastern Time on June 6, 2025. If more than one member is nominated in a single Section, ballots will be mailed from Headquarters no later than July 1, 2025, to full members of record as of June 6, 2025, which is the closing date for nominations. Returns will be counted August 19, 2025. Section Managers elected as a result of the above procedure will take office October 1, 2025.

If only one valid petition is received from a Section, that nominee shall be declared elected without opposition for a 2-year term beginning October 1, 2025. If no petitions are received from a Section by the specified closing date, such Section will be resolicited in the October issue of QST. A Section Manager elected through the resolicitation will serve a term of 18 months. A Section Manager vacancy occurring between elections is filled through appointment by the Field Services Manager. — *Mike Walters, W8ZY, Field Services Manager*

Because no nomination petitions were received for the Arkansas, Montana, and Wyoming Section Manager election by the nomination deadline of December 6, 2024, nominations are hereby resolicited. See above for details.





# Amateur Radio World

## French and South African 2025 Centenary Events

### Réseau des Emetteurs Français

The year 2025 marks the centenary of Réseau des Emetteurs Français (REF), the French International Amateur Radio Union member-society. To commemorate the event, REF is offering a radio challenge to amateurs throughout the world.

The challenge runs from April 1 to June 30, 2025, and it requires contacts with participating French stations. Contacts made on any mode on 160 meters – 3 centimeters are eligible.

Participating amateurs in French departments and territories will be using call signs in the following formats:

- TM01REF – TM95REF for the departments of metropolitan France.
- TK2aREF and TK2bREF for Corsica.
- TOxxxREF and TXxxxREF for overseas departments and territories (e.g., TO971REF).
- TM100REF for the REF organizing team during the commemoration period.

Every contact counts once per band and mode toward the following certificates:

- Basic: Twenty-five contacts with at least 15 different call signs among TMxxREF, TK2aREF, TK2bREF, TOxxxREF, and TXxxxREF stations.
- Ticket 50: Fifty contacts with at least 25 different call signs among TMxxREF, TK2aREF, TK2bREF, TOxxxREF, and TXxxxREF stations.
- Ticket 75: Seventy-five contacts with at least 35 different call signs among TMxxREF, TK2aREF, TK2bREF, TOxxxREF, and TXxxxREF stations.
- Ticket 100: One hundred contacts with at least 45 different call signs among TMxxREF, TK2aREF, TK2bREF, TOxxxREF, and TXxxxREF stations, and at least one contact with TM100REF.



A trophy and a commemorative book about the history of REF will be presented to the top stations in each mode category: SSB, CW, digital, and full (all modes). Visit <https://web.r-e-f.org> or the TM100REF QRZ.com web page for more information.

### South African Radio League

The South African Radio League (SARL) is celebrating its 100th anniversary this year with a Centenary Marathon QSO Party. The yearlong event started on January 1 and will continue through December 31.

Amateurs worldwide can accumulate points and win awards by working South African stations. Throughout the year, SARL members will also be on the air with special event call sign ZS100SARL, as well as permanent call signs ZS6SRL and ZS9HQ.

Qualifying contacts can take place on 160 meters – 23 centimeters using phone, CW, or digital modes. Points are awarded for every unique South African amateur radio station contacted, regardless of band or mode, as follows:





## Turkish Radio Amateurs Society Participates in Disaster Drill

Members of the Turkish Radio Amateurs Society closed out 2024 by providing communications support during a simulated disaster. The drill took place on December 20 and simulated the aftermath of a 7.0-magnitude earthquake centered around Tokat and Niksar.

Members of the Turkish Radio Amateurs Society provided communications support during a simulated disaster centered around Tokat and Niksar. [Turkish Radio Amateurs Society photo]

- ZS100SARL, ZS9HQ, and ZS6SRL = 5 points.
- ZS/ZR/ZT prefix = 1 point.
- Special event call signs other than ZS100SARL = 2 points.
- ZU prefix = 3 points.

There are several awards available:

- SARL100 Bronze Award (SARL100): 100 points.
- SARL100 Silver Award (SARL100-200): 200 points.
- SARL100 Gold Award (SARL100-300): 300 points.
- SARL100 Platinum Award (SARL100-400): 400 points.
- SARL100 Diamond Award (SARL100-500): 500 points.

For more information, visit [www.mysarl.org.za/centenary-marathon](http://www.mysarl.org.za/centenary-marathon).

## Israeli Radio Programming Workshop

Earlier this year, the Israel Amateur Radio Club announced a series of workshops. The series began with a seminar in late January, conducted by Zvika Segal, 4Z1ZV, at the Herzliya Science Center. Zvika's seminar appealed to new amateurs in particular, with lectures on programming various VHF/UHF transceivers, as well as other aspects of modern transceiver technology.

Attendees were encouraged to bring their transceivers, laptops, and cables for hands-on programming instruction.

Vehicles and personnel were sent to the Akkuş and Aybastı districts of Ordu Province to assess communication

disruptions and set up centers to coordinate activities. Another amateur radio team established a communication hub at their Provincial Crisis Center. According to government officials, the radio teams performed extremely well and helped ensure the smooth transfer of critical information throughout the area.

## Radio Club of Costa Rica Gets a Power Boost

Radio Club of Costa Rica station TIØRC in San Jose received a surprise gift, courtesy of Carlos Páez, TI2CC: an ACOM 2000A 1.5 kW linear amplifier. This donation will no doubt raise the signal profile of the club station in contests during 2025. The Radio Club of Costa Rica makes its station available to all members and visiting guests.



The Radio Club of Costa Rica station TIØRC. [Radio Club of Costa Rica photo]



# 2025 ARRL Straight Key Night Results

*"The bands were hopping and chirpy like the good old days!"*

— Paul Roche, K3STX

## Paul Bourque, N1SFE, ARRL Contest Program Manager

Morse code (CW) enthusiasts from across the world look forward to the yearly tradition of Straight Key Night (SKN). As the calendar turned to 2025, 144 participants joined in the fun of hand-sent Morse code, reporting a total of 945 contacts. While many are seasoned CW operators, some participants noted that they made their first CW contacts in many years during this year's event.

Roger Gray, W8VE, participated in SKN this year for the first time since he was licensed in 1961. He reported that it had been 63 years since he used a straight key. Randy Smith, W4AUB, dusted off his old J-38 key and participated in his first SKN this year. He completed his first straight key contact in 50 years with Enrique Preciado, HP1IBF. Daniel Camp, AF7O, reported that he made his first CW contact in more than 20 years during the event.

It was also wonderful to see some newcomers operating CW for the event. Dan Flanagan, W3DF, reported a 30-minute-long contact with 9-year-old Maggie Flowers, KE2AIZ. Maggie, who has been licensed since she was 7, comes from a family of hams and is currently working on upgrading to the Extra-class license.

Some participants prefer to use their own home-brewed keys in favor of off-the-shelf models. Igor Zdorov, W0IZ, used a key that he made from a wooden clothespin. He used the key to operate a 1970 vintage Yaesu FT-200 transceiver that he restored. Sumner Weisman, W1VIV, used a key that he made from an old relay by adding a knob to the top. By tapping on the knob, he could send Morse code as well as with a commercially manufactured Morse code key.

## Best Fist and Most Interesting QSO

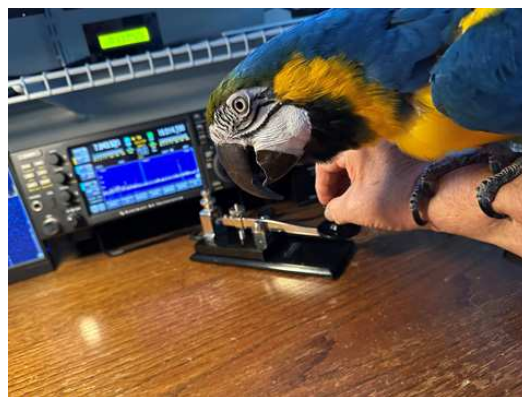
Each year, we ask SKN participants to cast their votes for "Best Fist" and "Most Interesting QSO." This year's vote for "Best Fist" is a five-way tie between Dennis Monticelli, AE6C; Robert Null, N4QR, and Ron Farris, WA1RF, operating at the Marconi-RCA Wireless Museum in Chatham, Massachusetts, using the call sign W1WCC, and Michael Marx, WB0SND, and J.

Parke Allen, VY1JA. For "Most Interesting QSO," there is a tie between Dennis Monticelli, AE6C, and Ron Farris, WA1RF. The next ARRL Straight Key Night will be held on January 1, 2026.

## Participating Stations

AA8UU, AB8FJ, AE3A, AE7AX, AE7CG, AF7O, AJ6T, AL7JK, AL7LO, K1EEE, K2AL, K2GBH, K2TV, K3BVQ, K3KKA, K3MD, K3STX, K3SWZ, K4CBW, K4ESE, K4RCW, K5IX, K5MBA, K5NZ, K5RIX, K5SOH, K6CTW, K6DF, K6KQV, K6TY, K8BZ, K8CU, K8NB, K9MMS, K9PFA, KA4WJB, KA7T, KA8HOK, KA0LDG, KB8TXZ, KB9W, KC2LM, KD8RV, KE1R, KE5NJ, KE0TT, KF8KS, KG7BF, KI4EZX, KI5JF, KI5PED, KJ7BS, KQ9J, KR4EE, KW3U, KW6G, N2BE, N2COP, N3EQF, N4ARY, N4GG, N4UJ, N5BF, N6KZ, N7CQR, N7ZZ, N8GU, N9OL, N0ENO, N0KWA, NC6Q, NE3I, NF8M, NI0R, NM8U, NY0O, VA2GJ, VA3RKM, VE2KZW, VE3CBK, VE7CNF, VE7NI, VO1NA, W1BF, W1DGL, W1ETC, W1TS, W1VIV, W1WEF, W2IY, W2NTN, W3DF, W4AUB, W4CMG, W4LSV, W4QLF, W4RK, W5ESE, W5NZ, W6LX, W6PAP, W7AIT, W7HB, W7IY, W7QH, W8AWE, W8MND, W8VE, W8VQ, W8WTS, W8WZ, W9ABD, W9TOX, W0BTS, W0EJO, W0ESE, W0IZ, W0OJW, W0UI, WA1CFX, WA1PMA, WA2CHV, WA6ARA, WA9ZBW, WA0JLY, WB3CEG, WB6AAJ, WB7AEA, WB7EHX, WB8CFO, WB8RFB, WB9HFK, WB0B, WB0CJB, WB0CNK, WB0IXV, WD4ERM, WD5ABC, WD6EGW, WD8RIF, and WY2U.

DX stations included HP1IBF, JA5EXN, and JH5OJH.



Robert Auiler, W4QLF, received some assistance from his pet macaw, Bo, during the 2025 ARRL Straight Key Night. Bo likes to sit on his wrist while he's sending Morse code. [Robert Auiler, W4QLF, photo]

# 2024 ARRL September VHF Contest Results

Check out the results of the event, held September 14 – 16, 2024.



Mike Lewis, K7MDL/R, operated from Lion Rock overlook in Washington during the 2024 ARRL September VHF Contest. He completed 92 contacts to take first place in the Northwestern Division in the Classic Rover category. [Mike Lewis, K7MDL, photo]

This year, 646 logs were received, which is down 8.5% from the 706 logs received in 2023. Since 2019, participation has been steady, with 600 – 700 logs received each year, apart from the stay-at-home spike in 2020. Conditions this year were challenging, but that's somewhat expected in September on the VHF bands.

Among the entry categories, Single Operator, Low Power retains its supremacy, holding steady with more than 200 logs since 2019, and this year, it was 37% of all the logs. Single Operator, High Power and Single Operator, Three-Band declined somewhat during that same period. Within those totals, the Analog Only categories have bolstered participation but haven't taken off. See the full results article at <https://contests.arrl.org> for further information.

Rover participation has been steadily declining since 2020. Limited Rover has held its own, with 27 entries in 2024, but Classic Rover declined from 24 entries in 2023 to 13 entries in 2024. Rovers are the heart of VHF contesting. We encourage you to pack up your gear and start roving!

Longtime VHF contesting stalwart Larry Lambert, NØLL, reported to the ARRL contest soapbox that this was his 150th ARRL VHF Contest in a row! Excellent work, Larry.

## Full Results Online

You can read the full results of the contest online at <https://contests.arrl.org>. You'll find detailed analysis and more play-by-play, along with the full line scores. Improve your results by studying your log-checking report, too.

The next September VHF Contest will be held September 13 – 15, 2025.

## Logs Received by Year

| Year | Number of Logs |
|------|----------------|
| 2017 | 473            |
| 2018 | 569            |
| 2019 | 696            |
| 2020 | 833            |
| 2021 | 745            |
| 2022 | 672            |
| 2023 | 706            |
| 2024 | 646            |

## Entries by Category

| Category                                 | Number of Entries |
|------------------------------------------|-------------------|
| Classic Rover                            | 13                |
| Limited Rover                            | 27                |
| Unlimited Rover                          | 8                 |
| Single Operator, High Power              | 136               |
| Single Operator, Low Power               | 196               |
| Single Operator, Analog Only, High Power | 25                |
| Single Operator, Analog Only, Low Power  | 42                |
| Single Operator, Portable                | 12                |
| Single Operator, Portable, Analog Only   | 11                |
| Single Operator, Three-Band              | 108               |
| Single Operator, Analog Only, Three-Band | 21                |
| Single Operator, FM Only                 | 17                |
| Limited Multioperator                    | 15                |
| Unlimited Multioperator                  | 14                |
| Checklog                                 | 1                 |
| Total                                    | 646               |

## Contacts by Band

| Band       | CW/SSB/FM | Digital | Total  |
|------------|-----------|---------|--------|
| 50 MHz     | 2,870     | 21,208  | 24,078 |
| 144 MHz    | 5,205     | 9,822   | 15,027 |
| 222 MHz    | 1,837     | 685     | 2,522  |
| 432 MHz    | 2,974     | 1,804   | 4,778  |
| 902 MHz    | 409       | 9       | 418    |
| 1.2 GHz    | 857       | 60      | 917    |
| 2.3 GHz    | 208       | 3       | 211    |
| 3.4 GHz    | 120       | 1       | 121    |
| 5.7 GHz    | 100       | 0       | 100    |
| 10 GHz     | 127       | 0       | 127    |
| 24 GHz     | 22        | 0       | 22     |
| 47 GHz     | 4         | 0       | 4      |
| 123 GHz    | 4         | 0       | 4      |
| Light      | 10        | 0       | 10     |
| Total      | 14,747    | 33,592  | 48,339 |
| % of Total | 30.51%    | 69.49%  |        |



## Top Ten

|                      |        |  |                                  |       |  |
|----------------------|--------|--|----------------------------------|-------|--|
| <b>Classic Rover</b> |        |  | <b>Single Operator, Portable</b> |       |  |
| VE3OIL/R             | 77,625 |  | K5ND                             | 2,304 |  |
| N7GP/R               | 70,966 |  | KM6RNJ                           | 1,080 |  |
| K2QO/R               | 37,228 |  | KE6GLA                           | 630   |  |
| K0BAK/R              | 4,788  |  | WQ6D                             | 480   |  |
| KC8JPZ/R             | 4,371  |  | N0SUW                            | 125   |  |
| AG4V/R               | 3,978  |  | N0JK                             | 121   |  |
| KC0IYT/R             | 3,480  |  | K6CLS                            | 114   |  |
| K7MDL/R              | 3,379  |  | KN6ZOO                           | 100   |  |
| N2MAK/R              | 3,072  |  | VA2VT                            | 63    |  |
| KC0P/R               | 1,980  |  | K4DMN                            | 32    |  |

|                      |        |  |                                               |       |  |
|----------------------|--------|--|-----------------------------------------------|-------|--|
| <b>Limited Rover</b> |        |  | <b>Single Operator, Portable, Analog Only</b> |       |  |
| KG9OV/R              | 25,564 |  | W7JET                                         | 2,175 |  |
| KM4OZH/R             | 13,986 |  | WB2AMU                                        | 1,647 |  |
| W5OC/R               | 9,292  |  | NT1D                                          | 795   |  |
| N6GP/R               | 6,360  |  | AF7GL                                         | 560   |  |
| AA2SD/R              | 5,890  |  | AF4JF                                         | 351   |  |
| N5ZY/R               | 4,922  |  | WA0CNS                                        | 200   |  |
| K8JH/R               | 4,865  |  | WN1C                                          | 190   |  |
| KF8QL/R              | 4,305  |  | KK0U                                          | 45    |  |
| KA7RRA/R             | 2,728  |  | W1RCK                                         | 25    |  |
| KD6EFQ/R             | 2,380  |  | WX4DAT                                        | 9     |  |

|                        |        |  |                                    |        |  |
|------------------------|--------|--|------------------------------------|--------|--|
| <b>Unlimited Rover</b> |        |  | <b>Single Operator, Three-Band</b> |        |  |
| KG6CIH/R               | 48,111 |  | W5TRL                              | 28,726 |  |
| N2SLN/R                | 13,386 |  | KO9A                               | 26,532 |  |
| KK4BZ/R                | 13,110 |  | K1HC                               | 18,744 |  |
| NV4B/R                 | 5,814  |  | W3FAY                              | 11,529 |  |
| KJ1K/R                 | 2,870  |  | CE6UFF                             | 11,232 |  |
| WB2VVQ/R               | 1,674  |  | NA2NY                              | 9,639  |  |
| W7GLF/R                | 319    |  | W1DYJ                              | 7,544  |  |
| VE7AFZ/R               | 276    |  | K2LNS                              | 5,406  |  |
|                        |        |  | N3MWQ                              | 5,375  |  |
|                        |        |  | KA2BPP                             | 5,096  |  |

|                                    |         |  |                                                 |       |  |
|------------------------------------|---------|--|-------------------------------------------------|-------|--|
| <b>Single Operator, High Power</b> |         |  | <b>Single Operator, Analog Only, Three-Band</b> |       |  |
| K1RZ                               | 150,096 |  | N7QOZ                                           | 2,856 |  |
| K1KG                               | 75,920  |  | K6MI                                            | 1,530 |  |
| K3SK                               | 48,735  |  | N1JD                                            | 1,288 |  |
| N8LRG                              | 39,015  |  | K7CX                                            | 732   |  |
| WB2RVX                             | 37,950  |  | W1SRH                                           | 663   |  |
| N2JMH                              | 35,819  |  | KQ2N                                            | 275   |  |
| N3MK                               | 32,809  |  | N9OBB                                           | 195   |  |
| N8HRZ                              | 26,288  |  | AJ6LG                                           | 144   |  |
| N4SV                               | 23,326  |  | N1XKT                                           | 120   |  |
| VA3IKE                             | 22,248  |  | KB6A                                            | 102   |  |

|                                   |         |  |                                 |       |  |
|-----------------------------------|---------|--|---------------------------------|-------|--|
| <b>Single Operator, Low Power</b> |         |  | <b>Single Operator, FM Only</b> |       |  |
| WN3A                              | 100,534 |  | N6UTC                           | 2,645 |  |
| NR2C                              | 66,780  |  | AF6GM                           | 800   |  |
| WB1GQR (W1SJ, op)                 | 63,568  |  | KM6Z                            | 350   |  |
| N2WK                              | 62,484  |  | N1TEN                           | 300   |  |
| N2OA                              | 50,193  |  | KO6ASF                          | 270   |  |
| N2SCJ                             | 29,110  |  | KW6RON                          | 260   |  |
| KA2ENE                            | 28,785  |  | KN6FKQ                          | 252   |  |
| WA2VNV                            | 20,999  |  | K1CT                            | 180   |  |
| W8DPK                             | 14,499  |  | KG5UNK                          | 162   |  |
| N1YCQ                             | 14,352  |  | VE7JH                           | 138   |  |

|                                                 |        |  |                              |         |  |
|-------------------------------------------------|--------|--|------------------------------|---------|--|
| <b>Single Operator, Analog Only, High Power</b> |        |  | <b>Limited Multioperator</b> |         |  |
| WZ1V                                            | 49,788 |  | AA4ZZ                        | 198,024 |  |
| W2FU                                            | 37,636 |  | N2NT                         | 130,892 |  |
| K1TR                                            | 27,675 |  | KE8FD                        | 81,718  |  |
| VE3ZV                                           | 21,156 |  | K5N                          | 56,120  |  |
| W2KV                                            | 17,860 |  | W2LV                         | 54,750  |  |
| WA1PBU                                          | 13,440 |  | VE3MIS                       | 43,136  |  |
| K5LLL                                           | 11,786 |  | W9VW                         | 35,230  |  |
| W0GHZ                                           | 5,661  |  | WA3EKL                       | 19,829  |  |
| N6RO                                            | 4,914  |  | W1QK                         | 11,685  |  |
| W1GHZ                                           | 4,900  |  | N9UHF                        | 10,098  |  |

|                                                |        |  |                                |         |  |
|------------------------------------------------|--------|--|--------------------------------|---------|--|
| <b>Single Operator, Analog Only, Low Power</b> |        |  | <b>Unlimited Multioperator</b> |         |  |
| AF1T                                           | 92,170 |  | W2SZ                           | 322,857 |  |
| WB2JAY                                         | 24,640 |  | W2EA                           | 95,160  |  |
| WB2VVV                                         | 7,968  |  | N8GA                           | 69,216  |  |
| AC1J                                           | 7,683  |  | KV1J                           | 42,864  |  |
| K2RMX                                          | 5,043  |  | WD9EXD                         | 41,588  |  |
| K2GMY                                          | 4,200  |  | W4NH                           | 41,363  |  |
| N6ZE                                           | 2,714  |  | WE1P                           | 37,206  |  |
| KG9AP                                          | 2,475  |  | KD2LGX                         | 36,951  |  |
| VA7SC                                          | 2,398  |  | VA2WA                          | 24,576  |  |
| W4RAA                                          | 2,262  |  | KE1LI                          | 19,320  |  |

## Division Winners

|                      |          |        |
|----------------------|----------|--------|
| <b>Classic Rover</b> |          |        |
| Atlantic             | K2QO/R   | 37,228 |
| Dakota               | KC0P/R   | 1,980  |
| Delta                | AG4V/R   | 3,978  |
| Great Lakes          | KC8JPZ/R | 4,371  |
| New England          | KC0IYT/R | 3,480  |
| Northwestern         | K7MDL/R  | 3,379  |
| Southwestern         | N7GP/R   | 70,966 |
| Canada               | VE3OIL/R | 77,625 |

|                      |          |        |
|----------------------|----------|--------|
| <b>Limited Rover</b> |          |        |
| Atlantic             | AA2SD/R  | 5,890  |
| Central              | KG9OV/R  | 25,564 |
| Dakota               | W0RRC/R  | 372    |
| Great Lakes          | K8JH/R   | 4,865  |
| Northwestern         | KA7RRA/R | 2,728  |
| Roanoke              | KM4OZH/R | 13,986 |
| Rocky Mountain       | AA5PR/R  | 1,395  |
| Southwestern         | N6GP/R   | 6,360  |
| West Gulf            | W5OC/R   | 9,292  |
| Canada               | VA7OTC/R | 2,136  |

|                        |          |        |
|------------------------|----------|--------|
| <b>Unlimited Rover</b> |          |        |
| Atlantic               | N2SLN/R  | 13,386 |
| New England            | KG6CIH/R | 48,111 |
| Northwestern           | W7GLF/R  | 319    |
| Roanoke                | KK4BZ/R  | 13,110 |
| Southeastern           | NV4B/R   | 5,814  |
| Canada                 | VE7AFZ/R | 276    |

|                                    |        |         |
|------------------------------------|--------|---------|
| <b>Single Operator, High Power</b> |        |         |
| Atlantic                           | K1RZ   | 150,096 |
| Central                            | N4SV   | 23,326  |
| Dakota                             | K0AWU  | 7,425   |
| Great Lakes                        | N8LRG  | 39,015  |
| Hudson                             | N2GHR  | 19,516  |
| New England                        | K1KG   | 75,920  |
| Northwestern                       | N7EPD  | 10,965  |
| Pacific                            | N6KOG  | 940     |
| Roanoke                            | K3SK   | 48,735  |
| Rocky Mountain                     | W9RM   | 2,184   |
| Southeastern                       | WB2FKO | 16,878  |
| Southwestern                       | K7KMR  | 5,194   |
| West Gulf                          | W5PR   | 4,224   |
| Canada                             | VA3IKE | 22,248  |

|                                   |                   |         |
|-----------------------------------|-------------------|---------|
| <b>Single Operator, Low Power</b> |                   |         |
| Atlantic                          | WN3A              | 100,534 |
| Central                           | N9YK              | 5,568   |
| Dakota                            | W0ADL             | 420     |
| Delta                             | AJ6T              | 11,060  |
| Great Lakes                       | W8DPK             | 14,499  |
| Hudson                            | WA2VNV            | 20,999  |
| Midwest                           | N0LL              | 2,542   |
| New England                       | WB1GQR (W1SJ, op) | 63,568  |
| Northwestern                      | WZ8T              | 3,780   |
| Pacific                           | K6USY             | 4,092   |
| Roanoke                           | KB4OLM            | 10,586  |
| Rocky Mountain                    | N4XD              | 63      |
| Southeastern                      | W4MAA             | 5,865   |
| Southwestern                      | N7IR              | 9,185   |
| West Gulf                         | N0LD              | 12,054  |
| Canada                            | VA2IW             | 11,502  |

|                                                 |        |        |
|-------------------------------------------------|--------|--------|
| <b>Single Operator, Analog Only, High Power</b> |        |        |
| Atlantic                                        | W2FU   | 37,636 |
| Dakota                                          | W0GHZ  | 5,661  |
| Great Lakes                                     | K2YAZ  | 527    |
| Hudson                                          | W2KV   | 17,860 |
| New England                                     | WZ1V   | 49,788 |
| Northwestern                                    | K7YO   | 1,584  |
| Pacific                                         | N6RO   | 4,914  |
| Roanoke                                         | NT4RT  | 286    |
| Southeastern                                    | WB4WXE | 2,345  |
| Southwestern                                    | W0IS   | 464    |
| West Gulf                                       | K5LLL  | 11,786 |
| Canada                                          | VE3ZV  | 21,156 |

|                                                |        |        |
|------------------------------------------------|--------|--------|
| <b>Single Operator, Analog Only, Low Power</b> |        |        |
| Atlantic                                       | W2FDJ  | 850    |
| Central                                        | KG9AP  | 2,475  |
| Dakota                                         | N0UK   | 126    |
| Great Lakes                                    | K8BB   | 480    |
| Hudson                                         | WB2JAY | 24,640 |
| New England                                    | AF1T   | 92,170 |
| Northwestern                                   | N6ZE   | 2,714  |
| Pacific                                        | K2GMY  | 4,200  |
| Roanoke                                        | AD4IE  | 24     |

|                |       |       |
|----------------|-------|-------|
| Rocky Mountain | WJ7L  | 72    |
| Rocky Mountain | NJ7A  | 72    |
| Southeastern   | W4RAA | 2,262 |
| Southwestern   | N7RK  | 858   |
| West Gulf      | N5LUL | 360   |
| Canada         | VA7SC | 2,398 |

|                                  |        |       |
|----------------------------------|--------|-------|
| <b>Single Operator, Portable</b> |        |       |
| Dakota                           | N0SUW  | 125   |
| Midwest                          | N0JK   | 121   |
| Pacific                          | KE6GLA | 630   |
| Southeastern                     | K4DMN  | 32    |
| Southwestern                     | KM6RNJ | 1,080 |
| West Gulf                        | K5ND   | 2,304 |
| Canada                           | VA2VT  | 63    |

|                                               |        |       |
|-----------------------------------------------|--------|-------|
| <b>Single Operator, Analog Only, Portable</b> |        |       |
| Central                                       | WN1C   | 190   |
| Delta                                         | N3AWS  | 1     |
| Hudson                                        | WB2AMU | 1,647 |
| Midwest                                       | AF4JF  | 351   |
| New England                                   | NT1D   | 795   |
| Northwestern                                  | AF7GL  | 560   |
| Roanoke                                       | WX4DAT | 9     |
| Southwestern                                  | W7JET  | 2,175 |

|                                    |        |        |
|------------------------------------|--------|--------|
| <b>Single Operator, Three-Band</b> |        |        |
| Atlantic                           | W3FAY  | 11,529 |
| Central                            | KO9A   | 26,532 |
| Dakota                             | K0VG   | 170    |
| Delta                              | N9TF   | 221    |
| Great Lakes                        | N8DZR  | 1,472  |
| Hudson                             | NA2NY  | 9,639  |
| Midwest                            | K0PHP  | 3,000  |
| New England                        | K1HC   | 18,744 |
| Northwestern                       | WB6JJJ | 1,020  |
| Pacific                            | KH2TJ  | 522    |
| Roanoke                            | N4WY   | 3,526  |
| Rocky Mountain                     | KC7QY  | 130    |
| Southeastern                       | N4NM   | 2,112  |
| Southwestern                       | N6VH   | 91     |
| West Gulf                          | W5TRL  | 28,726 |
| Canada                             | VE3AKS | 1,550  |

|                                                 |       |       |
|-------------------------------------------------|-------|-------|
| <b>Single Operator, Analog Only, Three-Band</b> |       |       |
| Atlantic                                        | KQ2N  | 275   |
| Central                                         | N9OBB | 195   |
| Hudson                                          | W2MWH | 56    |
| New England                                     | N1JD  | 1,288 |
| Northwestern                                    | N7QOZ | 2,856 |
| Pacific                                         | K6MI  | 1,530 |
| Roanoke                                         | KV4ZY | 42    |
| Southeastern                                    | AE4JB | 20    |
| Southwestern                                    | KB6A  | 102   |
| West Gulf                                       | K5EI  | 70    |

|                                 |        |       |
|---------------------------------|--------|-------|
| <b>Single Operator, FM Only</b> |        |       |
| Hudson                          | KE2CCG | 15    |
| Northwestern                    | KK7A   | 6     |
| Pacific                         | W6KKO  | 60    |
| Roanoke                         | WA4WZQ | 15    |
| Southeastern                    | K3TW   | 1     |
| Southwestern                    | N6UTC  | 2,645 |
| West Gulf                       | KG5UNK | 162   |
| Canada                          | VE7JH  | 138   |

|                              |        |         |
|------------------------------|--------|---------|
| <b>Limited Multioperator</b> |        |         |
| Atlantic                     | WA3EKL | 19,829  |
| Central                      | W9VW   | 35,230  |
| Delta                        | NE5BO  | 168     |
| Great Lakes                  | KE8FD  | 81,718  |
| Hudson                       | N2NT   | 130,892 |
| New England                  | W1QK   | 11,685  |
| Roanoke                      | AA4ZZ  | 198,024 |
| West Gulf                    | K5N    | 56,120  |
| Canada                       | VE3MIS | 43,136  |

|                                |        |         |
|--------------------------------|--------|---------|
| <b>Unlimited Multioperator</b> |        |         |
| Atlantic                       | W2EA   | 95,160  |
| Central                        | WD9EXD | 41,588  |
| Great Lakes                    | N8GA   | 69,216  |
| Hudson                         | WE1P   | 37,206  |
| New England                    | W2SZ   | 322,857 |
| Northwestern                   | AI7ID  | 8,475   |
| Southeastern                   | W4NH   | 41,363  |
| West Gulf                      | KC5MVZ | 2,257   |
| Canada                         | VA2WA  | 24,576  |

## Regional Leaders

LM = Limited Multioperator; R = Classic Rover; RL = Limited Rover; RU = Unlimited Rover; SO-ALG-3B = Single Operator, Analog Only, Three-Band; SO-ALG-HP = Single Operator, Analog Only, High Power; SO-ALG-LP = Single Operator, Analog Only, Low Power; SO3B = Single Operator, Three-Band; SOFM = Single Operator, FM Only; SOHP = Single Operator, High Power; SOLP = Single Operator, Low Power; SOP = Single Operator, Portable; SOP-ALG = Single Operator, Portable, Analog Only; UM = Unlimited Multioperator

## West Coast Region

(Pacific, Northwestern, and Southwestern Divisions; Alberta, British Columbia, and NT Sections)

|          |        |      |       |       |           |        |       |           |        |       |           |
|----------|--------|------|-------|-------|-----------|--------|-------|-----------|--------|-------|-----------|
| N7GP/R   | 70,966 | R    | K7IU  | 2,442 | SOHP      | VA7SC  | 2,398 | SO-ALG-LP | KH2TJ  | 522   | SO3B      |
| K7MDL/R  | 3,379  | R    | W7MEM | 1,944 | SOHP      | K6RE   | 1,650 | SO-ALG-LP | AB9BH  | 168   | SO3B      |
| W1LJ/R   | 364    | R    | N7IR  | 9,185 | SOLP      | N7RK   | 858   | SO-ALG-LP | N7QOZ  | 2,856 | SO-ALG-3B |
| N6GP/R   | 6,360  | RL   | N7VD  | 5,104 | SOLP      | KM6RNJ | 1,080 | SOP       | K6MI   | 1,530 | SO-ALG-3B |
| KA7RRA/R | 2,728  | RL   | K6USY | 4,092 | SOLP      | KE6GLA | 630   | SOP       | K7CX   | 732   | SO-ALG-3B |
| KD6EFQ/R | 2,380  | RL   | WZ8T  | 3,780 | SOLP      | WQ6D   | 480   | SOP       | AJ6LG  | 144   | SO-ALG-3B |
| VA7OTC/R | 2,136  | RL   | W7GLF | 2,760 | SOLP      | K6CLS  | 114   | SOP       | KB6A   | 102   | SO-ALG-3B |
| VA7USD/R | 880    | RL   | N6RO  | 4,914 | SO-ALG-HP | KN6ZOO | 100   | SOP       | N6UTC  | 2,645 | SOFM      |
| W7GLF/R  | 319    | RU   | K6WIS | 2,730 | SO-ALG-HP | W7JET  | 2,175 | SOP-ALG   | AF6GM  | 800   | SOFM      |
| VE7AFZ/R | 276    | RU   | K7YO  | 1,584 | SO-ALG-HP | AF7GL  | 560   | SOP-ALG   | KM6Z   | 350   | SOFM      |
| N7EPD    | 10,965 | SOHP | WO1S  | 464   | SO-ALG-HP | WB6JJJ | 1,020 | SO3B      | N1TEN  | 300   | SOFM      |
| KD7UO    | 5,610  | SOHP | K2GMY | 4,200 | SO-ALG-LP | K7VIT  | 690   | SO3B      | KO6ASF | 270   | SOFM      |
| K7KMR    | 5,194  | SOHP | N6ZE  | 2,714 | SO-ALG-LP | WA7PVE | 550   | SO3B      | A17ID  | 8,475 | UM        |

## Midwest Region

(Dakota, Midwest, Rocky Mountain, and West Gulf Divisions; Manitoba and Saskatchewan Sections)

|          |       |      |        |        |           |        |        |           |        |        |           |
|----------|-------|------|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|
| KC0P/R   | 1,980 | R    | W9RM   | 2,184  | SOHP      | NJ7A   | 72     | SO-ALG-LP | KA5PMV | 713    | SO3B      |
| N0HZO/R  | 1,232 | R    | N0LD   | 12,054 | SOLP      | WJ7L   | 72     | SO-ALG-LP | N5UM   | 342    | SO3B      |
| W5OC/R   | 9,292 | RL   | KM5RG  | 3,139  | SOLP      | K5ND   | 2,304  | SOP       | K5EI   | 70     | SO-ALG-3B |
| N5ZY/R   | 4,922 | RL   | N0LL   | 2,542  | SOLP      | N0SUW  | 125    | SOP       | KG5UNK | 162    | SOFM      |
| AA5PR/R  | 1,395 | RL   | N5EKO  | 1,638  | SOLP      | N0JK   | 121    | SOP       | K5N    | 56,120 | LM        |
| WA5AZQ/R | 420   | RL   | WB5TUF | 1,032  | SOLP      | AF4JF  | 351    | SOP-ALG   | W5AC   | 375    | LM        |
| W0RRC/R  | 372   | RL   | K5LLL  | 11,786 | SO-ALG-HP | WA0CNS | 200    | SOP-ALG   | KC5MVZ | 2,257  | UM        |
| K0AWU    | 7,425 | SOHP | W0GHZ  | 5,661  | SO-ALG-HP | KK0U   | 45     | SOP-ALG   |        |        |           |
| W0ZQ     | 4,469 | SOHP | WA5LFD | 364    | SO-ALG-HP | W5TRL  | 28,726 | SO3B      |        |        |           |
| W5PR     | 4,224 | SOHP | N5LUL  | 360    | SO-ALG-LP | K0PHP  | 3,000  | SO3B      |        |        |           |
| N0FJP    | 3,036 | SOHP | N0UK   | 126    | SO-ALG-LP | AA5AM  | 740    | SO3B      |        |        |           |

## Central Region

(Central and Great Lakes Divisions; Ontario East, Ontario North, Ontario South, and Greater Toronto Area Sections)

|          |        |      |        |        |           |        |        |           |        |        |           |
|----------|--------|------|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|
| VE3OIL/R | 77,625 | R    | N4SV   | 23,326 | SOHP      | K2YAZ  | 527    | SO-ALG-HP | NT9E   | 2,142  | SO3B      |
| KC8JPZ/R | 4,371  | R    | VA3IKE | 22,248 | SOHP      | KG9AP  | 2,475  | SO-ALG-LP | W9ZB   | 2,013  | SO3B      |
| KG9OV/R  | 25,564 | RL   | K9KLD  | 17,017 | SOHP      | VE3RWJ | 1,518  | SO-ALG-LP | N9OBB  | 195    | SO-ALG-3B |
| K8JH/R   | 4,865  | RL   | W8DPK  | 14,499 | SOLP      | K8BB   | 480    | SO-ALG-LP | KE8FD  | 81,718 | LM        |
| KF8QL/R  | 4,305  | RL   | VE3SMA | 9,628  | SOLP      | WB8WUA | 15     | SO-ALG-LP | VE3MIS | 43,136 | LM        |
| AK4U/R   | 198    | RL   | KE8R   | 8,128  | SOLP      | WN1C   | 190    | SOP-ALG   | W9VW   | 35,230 | LM        |
| W9FZ/R   | 170    | RL   | N9YK   | 5,568  | SOLP      | KO9A   | 26,532 | SO3B      | N9UHF  | 10,098 | LM        |
| N8LRG    | 39,015 | SOHP | N8CWU  | 4,653  | SOLP      | WE9R   | 3,520  | SO3B      | N8GA   | 69,216 | UM        |
| N8HRZ    | 26,288 | SOHP | VE3ZV  | 21,156 | SO-ALG-HP | K0PG   | 3,354  | SO3B      | WD9EXD | 41,588 | UM        |

## Southeast Region

(Delta, Roanoke, and Southeastern Divisions)

|          |        |      |        |        |           |        |       |           |        |         |           |
|----------|--------|------|--------|--------|-----------|--------|-------|-----------|--------|---------|-----------|
| AG4V/R   | 3,978  | R    | AJ6T   | 11,060 | SOLP      | K4DMN  | 32    | SOP       | W4XP   | 15      | SO-ALG-3B |
| KM4OZH/R | 13,986 | RL   | KB4OLM | 10,586 | SOLP      | WX4DAT | 9     | SOP-ALG   | WB4HXF | 15      | SO-ALG-3B |
| K8AAT/R  | 1,550  | RL   | W4MAA  | 5,865  | SOLP      | N3AWS  | 1     | SOP-ALG   | WA4WZQ | 15      | SOFM      |
| KD4O/R   | 300    | RL   | WA4LDU | 3,724  | SOLP      | N4WY   | 3,526 | SO3B      | K3TW   | 1       | SOFM      |
| KK4BZ/R  | 13,110 | RU   | K4FJW  | 3,182  | SOLP      | K3FR   | 3,306 | SO3B      | AA4ZZ  | 198,024 | LM        |
| NV4B/R   | 5,814  | RU   | WB4WXE | 2,345  | SO-ALG-HP | KK4ZUU | 2,755 | SO3B      | W4AD   | 6,028   | LM        |
| K3SK     | 48,735 | SOHP | NT4RT  | 286    | SO-ALG-HP | K4SO   | 2,280 | SO3B      | NE5BO  | 168     | LM        |
| N3MK     | 32,809 | SOHP | W4AMP  | 85     | SO-ALG-HP | N4NM   | 2,112 | SO3B      | W4NH   | 41,363  | UM        |
| KK4MA    | 19,055 | SOHP | W4RAA  | 2,262  | SO-ALG-LP | KV4ZY  | 42    | SO-ALG-3B |        |         |           |
| K1HTV    | 18,860 | SOHP | AD4IE  | 24     | SO-ALG-LP | AE4JB  | 20    | SO-ALG-3B |        |         |           |
| WB2FKO   | 16,878 | SOHP | AD4SA  | 4      | SO-ALG-LP | K4BSK  | 16    | SO-ALG-3B |        |         |           |

## Northeast Region

(New England, Hudson, and Atlantic Divisions; Maritime and Quebec Sections)

|          |         |      |            |         |           |        |        |           |        |         |           |
|----------|---------|------|------------|---------|-----------|--------|--------|-----------|--------|---------|-----------|
| K2QO/R   | 37,228  | R    | N2JMH      | 35,819  | SOHP      | WB2VVV | 7,968  | SO-ALG-LP | KQ2N   | 275     | SO-ALG-3B |
| K0BAK/R  | 4,788   | R    | N2GHR      | 19,516  | SOHP      | AC1J   | 7,683  | SO-ALG-LP | N1XKT  | 120     | SO-ALG-3B |
| KC0YT/R  | 3,480   | R    | WN3A       | 100,534 | SOLP      | K2RMX  | 5,043  | SO-ALG-LP | W2MWH  | 56      | SO-ALG-3B |
| N2MAK/R  | 3,072   | R    | NR2C       | 66,780  | SOLP      | VA2VT  | 63     | SOP       | KE2CCG | 15      | SOFM      |
| KB2YSI/R | 84      | R    | WB1GQR     |         |           | WB2AMU | 1,647  | SOP-ALG   | N2NT   | 130,892 | LM        |
| AA2SD/R  | 5,890   | RL   | (W1SJ, op) | 63,568  | SOLP      | NT1D   | 795    | SOP-ALG   | W2LV   | 54,750  | LM        |
| KE5NJ/R  | 1,060   | RL   | N2WK       | 62,484  | SOLP      | W1RCK  | 25     | SOP-ALG   | WA3EKL | 19,829  | LM        |
| KG6CIH/R | 48,111  | RU   | N2OA       | 50,193  | SOLP      | K1HC   | 18,744 | SO3B      | W1QK   | 11,685  | LM        |
| N2SLN/R  | 13,386  | RU   | WZ1V       | 49,788  | SO-ALG-HP | W3FAY  | 11,529 | SO3B      | W1FM   | 2,288   | LM        |
| KJ1K/R   | 2,870   | RU   | W2FU       | 37,636  | SO-ALG-HP | NA2NY  | 9,639  | SO3B      | W2SZ   | 322,857 | UM        |
| WB2VVQ/R | 1,674   | RU   | K1TR       | 27,675  | SO-ALG-HP | W1DYJ  | 7,544  | SO3B      | W2EA   | 95,160  | UM        |
| K1RZ     | 150,096 | SOHP | W2KV       | 17,860  | SO-ALG-HP | K2LNS  | 5,406  | SO3B      | KV1J   | 42,864  | UM        |
| K1KG     | 75,920  | SOHP | WA1PBU     | 13,440  | SO-ALG-HP | N1JD   | 1,288  | SO-ALG-3B | WE1P   | 37,206  | UM        |
| WB2RVX   | 37,950  | SOHP | AF1T       | 92,170  | SO-ALG-LP | W1SRH  | 663    | SO-ALG-3B | KD2LGX | 36,951  | UM        |
|          |         |      | WB2JAY     | 24,640  | SO-ALG-LP |        |        |           |        |         |           |



# April 2025 Frequency Measuring Test

## Paul Bourque, N1SFE, Contest Program Manager

There will be two transmitting stations for the April Frequency Measuring Test (FMT) — W8RKO in Ohio and K5CM in Oklahoma. Transmissions will be made on 40 and 80 meters (in that order). The FMT will start with a “call up” by K5CM at 0230 UTC on April 18 (Thursday evening in North America). If the scheduled frequency is busy, transmissions will be on frequencies close to the published frequency, so be prepared to tune.

Measure the transmitted frequency and report your results at <http://fmt.arrl.org>. Results must be submitted by 0200 UTC on April 21, at which time they’ll be published on the website. Stations submitting measurements within  $\pm 1$  Hz for all transmissions from K5CM or W8RKO will be listed in the “Green Box” of the results.

Although the call up is scheduled to start at a specific time, both stations will try to start earlier. Every effort will be made to start key down at the published time. The call-up period will last 4 minutes, and the key-down period will be 1 minute.

## April 18 Frequency Measuring Test Schedule

### K5CM

40 meters near 7064 kHz

02:30 Call up

02:34 Key down

02:35 End 40-meter run

### K5CM

80 meters near 3598 kHz

03:00 Call up

03:04 Key down

03:05 End 80-meter run

### W8RKO

40 meters near 7065 kHz

02:45 Call up

02:49 Key down

02:50 End 40-meter run

### W8RKO

80 meters near 3599 kHz

03:15 Call up

03:19 Key down

03:20 End 80-meter run

## Write for QST

The membership journal of ARRL is always open to manuscript submissions from ham radio operators.

QST looks for material that appeals to a broad cross-section of readers within the diverse amateur radio community. Feature articles published in QST fall into one of two broad categories: *technical* and *general interest*.

Technical articles outline a construction project or a technical concept. General interest articles are “everything else” that’s not technical: recaps of DXpeditions, grid expeditions, or public service activities, or personal accounts of trying a new mode or style of operating — anything relating to operating or the ham radio avocation.

Whether your manuscript has a technical or general focus, a strong “how-to” component will make it stand

out. Readers should come away from the article with specific ideas for recreating your experience.

General interest submissions should be in the range of 1,200 – 1,800 words, with 3 – 5 high-resolution images. Technical article submissions may be longer and include more images, as the subject matter requires (for example, if there are step-by-step instructions for a build project). Please submit images as separate attachments (rather than embedded in your manuscript), and include caption information for all images at the end of your manuscript. Send all manuscripts, with images, to [qst@arrrl.org](mailto:qst@arrrl.org).

For even more information on what QST is looking for, and further details on how to submit manuscripts, see our Author Guide at [www.arrrl.org/qst-author-guide](http://www.arrrl.org/qst-author-guide).

# Contest Corral

# April 2025

Check for updates and a downloadable PDF version online at [www.arrl.org/contest-calendar](http://www.arrl.org/contest-calendar).

Refer to the contest websites for full rules, scoring information, operating periods or time limits, and log submission information.

| Start - Finish |           |           |           | Bands          | Contest Name                             | Mode      | Exchange                                                 | Sponsor's Website                                                                                      |
|----------------|-----------|-----------|-----------|----------------|------------------------------------------|-----------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Date-Time      | Date-Time | Date-Time | Date-Time |                |                                          |           |                                                          |                                                                                                        |
| 2              | 2000      | 2         | 2100      | 3.5            | UKEICC 80m Contest                       | Ph        | 6-char grid                                              | <a href="http://www.ukeicc.com/80m-rules.php">www.ukeicc.com/80m-rules.php</a>                         |
| 3              | 0000      | 4         | 0300      | 7              | Walk for the Bacon QRP Contest           | CW        | Max 13 WPM; RST, SPC, name, mbr or pwr                   | <a href="http://qrpcontest.com/pigwalk40">qrpcontest.com/pigwalk40</a>                                 |
| 3              | 1700      | 3         | 2000      | 3.5            | SARL 80m QSO Party                       | Ph        | RS, serial, grid locator or QTH                          | <a href="http://www.sarl.org.za">www.sarl.org.za</a>                                                   |
| 3              | 1800      | 3         | 2200      | 28             | NRAU 10m Activity Contest                | CW Ph Dig | RS(T), 6-char grid                                       | <a href="http://nrau.net">nrau.net</a>                                                                 |
| 5              | 0000      | 6         | 2359      | 1.8-28         | YBDXPI SSB Contest                       | Ph        | RS, serial                                               | <a href="http://contest.ybdxpi.net">contest.ybdxpi.net</a>                                             |
| 5              | 1200      | 6         | 1200      | 3.5-28         | EA RTTY Contest                          | Dig       | RSQ, province or serial                                  | <a href="http://concursos.ure.es">concursos.ure.es</a>                                                 |
| 5              | 1200      | 6         | 1200      | 1.8-28         | RSGB FT4 International Activity Day      | FT4       | Signal report                                            | <a href="http://www.rsgbcc.org">www.rsgbcc.org</a>                                                     |
| 5              | 1200      | 6         | 2359      | No WARC        | Georgia State Parks on the Air           | CW Ph Dig | RS(T), park nbr or SPC                                   | <a href="http://gaparks.org">gaparks.org</a>                                                           |
| 5              | 1400      | 6         | 0200      | 1.8-28,50,144  | Louisiana QSO Party                      | CW Ph Dig | RS(T), LA parish or SPC                                  | <a href="http://laqp.louisianacontestclub.org">laqp.louisianacontestclub.org</a>                       |
| 5              | 1400      | 6         | 0200      | 1.8-28,50,144  | Mississippi QSO Party                    | CW Ph Dig | RS(T), MS parish or SPC                                  | <a href="http://www.arlmiss.org">www.arlmiss.org</a>                                                   |
| 5              | 1400      | 6         | 2000      | 1.8-28,VHF/UHF | Missouri QSO Party                       | CW Ph Dig | RS(T), MO county or SPC                                  | <a href="http://www.w0ma.org">www.w0ma.org</a>                                                         |
| 5              | 1400      | 6         | 2200      | 3.5-28         | Florida State Parks on the Air           | CW Ph Dig | Park nbr or SP                                           | <a href="http://flspota.org/rules">flspota.org/rules</a>                                               |
| 5              | 1500      | 6         | 1500      | 1.8-28         | SP DX Contest                            | CW Ph     | RS(T), SP province or serial                             | <a href="http://spdxcontest.pzk.org.pl">spdxcontest.pzk.org.pl</a>                                     |
| 7              | 1900      | 7         | 2030      | 3.5            | RSGB 80m Club Championship, CW           | CW        | RST, serial                                              | <a href="http://www.rsgbcc.org">www.rsgbcc.org</a>                                                     |
| 12             | 0000      | 12        | 0600      | 1.8-28         | QRP ARCI Spring QSO Party                | CW        | RS, SPC, mbr or pwr                                      | <a href="http://qrparki.org">qrparki.org</a>                                                           |
| 12             | 0700      | 13        | 1300      | 1.8-28         | JIDX CW Contest                          | CW        | RST, JS prefecture or CQ zone                            | <a href="http://www.jidx.org">www.jidx.org</a>                                                         |
| 12             | 1200      | 13        | 1100      | 3.5-28         | DIG QSO Party, CW                        | CW        | RST, mbr (if member)                                     | <a href="http://diplom-interessen-gruppe.info">diplom-interessen-gruppe.info</a>                       |
| 12             | 1200      | 13        | 1159      | 1.8-28         | OK/OM DX Contest, SSB                    | Ph        | RS, OK/MO county code or serial                          | <a href="http://okomdx.crk.cz">okomdx.crk.cz</a>                                                       |
| 12             | 1200      | 13        | 1159      | 1.8-28, sat    | Yuri Gagarin International DX Contest    | CW Ph     | RST, ITU zone                                            | <a href="http://gccontest.ru">gccontest.ru</a>                                                         |
| 12             | 1200      | 13        | 1800      | 3.5-28         | IG-RY World Wide RTTY Contest            | Dig       | RST, 4-dig yr first licensed                             | <a href="http://www.ig-ry.de">www.ig-ry.de</a>                                                         |
| 12             | 1300      | 13        | 1259      | No WARC        | Texas State Parks on the Air             | CW Ph Dig | RST, park nbr or SPC                                     | <a href="http://www.tspota.org">www.tspota.org</a>                                                     |
| 12             | 1400      | 13        | 0200      | 1.8-28,50,144  | New Mexico QSO Party                     | CW Ph Dig | Name, NM county or SPC                                   | <a href="http://www.newmexicoqsoparty.org">www.newmexicoqsoparty.org</a>                               |
| 12             | 1500      | 12        | 1800      | 3.5-14         | Africa FT4 DX Contest                    | FT4       | Signal report, 4-char grid                               | <a href="http://www.sarl.org.za">www.sarl.org.za</a>                                                   |
| 12             | 1800      | 13        | 1800      | 1.8-28,50,144  | North Dakota QSO Party                   | CW Ph Dig | RS(T), ND county or SPC                                  | <a href="http://ndarrlsection.com">ndarrlsection.com</a>                                               |
| 12             | 1800      | 13        | 2359      | 1.8-28,50      | Georgia QSO Party                        | CW Ph     | RS(T), GA county or SPC                                  | <a href="http://gaqsoparty.com">gaqsoparty.com</a>                                                     |
| 13             | 1800      | 13        | 2359      | 3.5-28         | ARRL Rookie Roundup, SSB                 | Ph        | Name, 2-dig yr first licensed, state/province/XE area/DX | <a href="http://www.arrl.org/rookie-roundup">www.arrl.org/rookie-roundup</a>                           |
| 14             | 0000      | 14        | 0200      | 1.8-28         | 4 States QRP Group Second Sunday Sprint  | CW Ph     | RS(T), SPC, mbr or pwr                                   | <a href="http://www.4sqrp.com">www.4sqrp.com</a>                                                       |
| 14             | 2300      | 15        | 0600      | 144            | 144 MHz Spring Sprint                    | CW Ph Dig | 4-char grid                                              | <a href="http://sites.google.com/site/springvhfupsprints">sites.google.com/site/springvhfupsprints</a> |
| 16             | 1900      | 16        | 2030      | 3.5            | RSGB 80m Club Championship, SSB          | Ph        | RS, serial                                               | <a href="http://www.rsgbcc.org">www.rsgbcc.org</a>                                                     |
| 17             | 0000      | 18        | 0300      | 14             | Walk for the Bacon QRP Contest           | CW        | Max 13 WPM; RST, SPC, name, mbr or pwr                   | <a href="http://qrpcontest.com/pigwalk20">qrpcontest.com/pigwalk20</a>                                 |
| 17             | 1900      | 17        | 2000      | 3.5-14         | NTC QSO Party                            | CW        | Max 25 WPM; RST, mbr or "NM"                             | <a href="http://pi4ntc.nl">pi4ntc.nl</a>                                                               |
| 18             | 2100      | 19        | 2059      | 3.5-28         | World Wide Holyland Contest              | CW Ph     | RS(T), 4X area or serial                                 | <a href="http://tools.iarc.org/wwhc">tools.iarc.org/wwhc</a>                                           |
| 19             | 0500      | 19        | 0859      | 3.5,7          | ES Open HF Championship                  | CW Ph     | RS(T), serial                                            | <a href="http://erau.ee">erau.ee</a>                                                                   |
| 19             | 0600      | 20        | 0559      | 3.5-28         | Worked All Provinces of China DX Contest | Ph        | RS(T), BY province or serial                             | <a href="http://www.mulandxc.com">www.mulandxc.com</a>                                                 |
| 19             | 0700      | 20        | 0659      | 3.5-28         | YU DX Contest                            | CW Ph     | RS(T), YU/YT county or serial                            | <a href="http://www.yudx.yu1srs.org.rs">www.yudx.yu1srs.org.rs</a>                                     |
| 19             | 0700      | 19        | 1900      | 1.8-28         | Dutch PACCDig Contest                    | Dig       | Signal report, 2-char PA province or serial              | <a href="http://www.veron.nl">www.veron.nl</a>                                                         |
| 19             | 0800      | 19        | 1800      | 3.5-28         | QRP to the Field                         | CW Ph     | RST, SPC, name/station code (see rules)                  | <a href="http://www.zianet.com">www.zianet.com</a>                                                     |
| 19             | 0900      | 20        | 2359      | 3.5-28         | CQMM DX Contest                          | CW        | RST, continent abbr, mbr code (if any)                   | <a href="http://www.cqmmdx.com">www.cqmmdx.com</a>                                                     |
| 19             | 1100      | 20        | 2259      | 1.8-28,VHF/UHF | Nebraska QSO Party                       | CW Ph Dig | NE county or SPC (FT4/FT8: 4-char grid)                  | <a href="http://nebraskaqqsoparty.com">nebraskaqqsoparty.com</a>                                       |
| 19             | 1600      | 20        | 0400      | 3.5-28         | Michigan QSO Party                       | CW Ph     | RST, MI county or SPC                                    | <a href="http://miqp.org">miqp.org</a>                                                                 |
| 19             | 1700      | 20        | 1200      | 3.5-28         | EA-QRP CW Contest                        | CW        | RST, category, "M" if mbr                                | <a href="http://www.eaqrp.com">www.eaqrp.com</a>                                                       |
| 19             | 1800      | 20        | 1800      | 1.8-28,50,144  | Ontario QSO Party                        | CW Ph     | RS(T), ON county or SPC                                  | <a href="http://www.va3cco.com">www.va3cco.com</a>                                                     |
| 20             | 1200      | 20        | 2200      | 3.5-28,50,144  | Quebec QSO Party                         | CW Ph     | RS(T), QC zone or SPC                                    | <a href="http://wp1.quebecqsoparty.org">wp1.quebecqsoparty.org</a>                                     |
| 20             | 2300      | 21        | 0100      | 1.8-28         | Run for the Bacon QRP Contest            | CW        | RST, SPC, mbr or pwr                                     | <a href="http://qrpcontest.com/pigrun">qrpcontest.com/pigrun</a>                                       |
| 21             | 1500      | 21        | 1729      | 3.5,7          | DARC Easter Contest                      | CW Ph     | RS(T), DOK or serial                                     | <a href="http://www.darc.de">www.darc.de</a>                                                           |
| 22             | 2300      | 23        | 0600      | 222            | 222 MHz Spring Sprint                    | CW Ph Dig | 4-char grid                                              | <a href="http://sites.google.com/site/springvhfupsprints">sites.google.com/site/springvhfupsprints</a> |
| 24             | 1900      | 24        | 2030      | 3.5            | RSGB 80m Club Championship, Data         | Dig       | RST, serial                                              | <a href="http://www.rsgbcc.org">www.rsgbcc.org</a>                                                     |
| 26             | 0001      | 27        | 2359      | 28             | 10-10 Int'l Spring Contest, Digital      | Dig       | Name, mbr or "0," SPC                                    | <a href="http://www.ten-ten.org">www.ten-ten.org</a>                                                   |
| 26             | 1200      | 27        | 1200      | 3.5-28         | SP DX RTTY Contest                       | Dig       | RST, SP 2-letter province or serial                      | <a href="http://www.pkrv.org">www.pkrv.org</a>                                                         |
| 26             | 1200      | 27        | 1200      | 3.5-28         | UK/EI DX Contest, CW                     | CW        | RST, UK/EI district code, serial                         | <a href="http://www.ukeicc.com">www.ukeicc.com</a>                                                     |
| 26             | 1600      | 27        | 2159      | 7,14,21,28     | Florida QSO Party                        | CW Ph     | RS(T), FL county or SPC                                  | <a href="http://floridaqsoparty.org">floridaqsoparty.org</a>                                           |
| 28             | 1900      | 28        | 2100      | 3.5-28         | RSGB FT4 Contest                         | Dig       | Signal report                                            | <a href="http://www.rsgbcc.org">www.rsgbcc.org</a>                                                     |
| 30             | 2000      | 30        | 2100      | 3.5            | UKEICC 80m Contest                       | CW        | 6-char grid                                              | <a href="http://www.ukeicc.com">www.ukeicc.com</a>                                                     |
| 30             | 2300      | 1         | 0600      | 432            | 432 MHz Spring Sprint                    | CW Ph Dig | 4-char grid                                              | <a href="http://sites.google.com/site/springvhfupsprints">sites.google.com/site/springvhfupsprints</a> |

There are a number of weekly contests not included in the table above. For more info, visit: [www.qrpfoxhunt.org](http://www.qrpfoxhunt.org), [www.nccsprint.com](http://www.nccsprint.com), and [www.cwops.org](http://www.cwops.org). All dates and times refer to UTC and may be different from calendar dates in North America. Contests are not conducted on the 60-, 30-, 17-, or 12-meter bands. Mbr = Membership number. Serial = Sequential number of the contact. SPC = State, Province, DXCC Entity. XE = Mexican state. Listings in blue indicate contests sponsored by ARRL or NCJ. The latest time to make a valid contest QSO is the minute listed in the "Finish Time" column. Data for Contest Corral is maintained on the WA7BNM Contest Calendar at [www.contestcalendar.com](http://www.contestcalendar.com) and is extracted for publication in QST 2 months prior to the month of the contest. ARRL gratefully acknowledges the support of Bruce Horn, WA7BNM, in providing this service.



## Public Service

# Upgraded EmComm Training Opportunities

New and updated courses in emergency communications topics should be of interest to ARES®, RACES, and other amateur radio EmComm practitioners involved in serving local, county, and state emergency management agencies and other entities. ARRL continually renews its commitment to resource development for amateur radio emergency communications education. For example, ARRL Director of Emergency Management Josh Johnston, KE5MHV, was picked to serve on SAFECOM's AUXCOMM Emergency Communications Task Force, specifically its Education and Outreach standing committee. SAFECOM is managed by the Cybersecurity and Infrastructure Security Agency (CISA) to improve emergency communications interoperability across government entities and levels.

### New and Revised ARES® Training Courses

The *ARRL Basic EmComm* course is newly designed to provide basic knowledge and tools for any emergency communications volunteer. The Basic EmComm course contains three modules and 11 topics, including required prerequisites, and is expected to take approximately 10 – 20 hours to complete. When you have completed the coursework, take the final assessment for this Basic EmComm course to receive a certificate.



Mike Harding, KN4YGT, is heavily involved with the vibrant ARES® emergency communications program in hurricane-prone Columbia County in northern Florida.

The *ARRL Intermediate EmComm* course provides more in-depth knowledge and tools for any emergency communications volunteer. The course contains six modules and 30 topics, including required prerequisites, and is expected to take several hours to complete. The final assessment consists of 35 questions randomly chosen from a large question pool. The passing grade for this course is 74% or better to receive certification.

An advanced ARRL EmComm course is under construction and should be available by the end of the year.

### New ARES Position Task Book

The new ARRL task book is a working document that enables those ARES communicators electing to participate in the ARRL training plan to track and document their training plan elements as they are completed toward the various levels of increasing proficiency. The task book should contain all training plan items, completion dates, and sign-offs as the ARES communicator transitions through the three skill levels. Each ARES communicator is responsible for maintaining their task book and having it with them during training and assignments. The task book also contains sections with definitions of the communicator levels, as well as common responsibilities. Each ARES communicator should feel free to adapt it to the needs and requirements of their geographical region.

ARES members can become trained as auxiliary communicators in a broader sense, for service in AUXCOMM and the Incident Command System's (ICS's) Communications Unit as Communications Unit Leaders (COMLs), Communications Unit Technicians (COMTs), and Radio Operators (RADOs).

### AUXCOMM Training

The AUXCOMM workshop is designed for the amateur radio/auxiliary communicator who provides communications backup support for planned or unplanned incidents at a state, tribal, regional, or local level. This offering is designed for amateur radio operators/organizations who work with public safety and cross-disciplinary emergency response professionals and

coordination/support personnel with an amateur radio background.

In Florida, the statewide department of emergency management (FDEM) plans and supports this course through its Statewide Interoperability Coordinator (SWIC). AUXCOMM programs are used by event planners, public safety officials, and emergency managers at all levels of government. Instructors are qualified by the Department of Homeland Security's Emergency Communications office, who have extensive experience both in incident response and as COMLs.

As this is written, an AUXCOMM class will be conducted in Orlando, Florida, February 3 – 5, 2025, prior to Orlando HamCation®. This is one of the best classes to take to foster understanding of where we fit into the overall National Incident Management System (NIMS)/ICS structure. For Florida licensees interested in deployment outside of their home counties, this course is mandatory per the Florida Department of Emergency Management.

Prerequisite courses for the AUXCOMM class are: *An Introduction to the Incident Command System*, *Basic Incident Command System for Initial Response*, *ICS for Single Resources and Initial Action Incidents*, and *An Introduction to the National Incident Management System*. All courses are available on FEMA's Emergency Management Institute website at <https://training.fema.gov/is>.

## **FEMA Emergency Support Function #2 — Communications (ESF2) Course (IS-802A) Updated**

Revised just this past year, this course introduces Emergency Support Function (ESF) #2 — Communications, which coordinates government and industry efforts for the reestablishment and provision of critical communications infrastructure and services, facilitates the stabilization of systems and applications from malicious activity, and coordinates communications support to response efforts. Visit <https://training.fema.gov/is>.



A certificate of completion for the AUXCOMM course.

## **Call for Manuscripts for the July 2025 Special Issue on EmComm**

Every July, *QST* publishes a special issue with an EmComm focus. This issue is a perfect opportunity for your ARES group to share your experiences doing exercises and drills, as well as participating in responses, so other groups will benefit from your experience. Here's what *QST* is looking for:

- 1,200 to 1,800 words — Tell the story of your participation in an exercise or response with a "how-to" angle. For example, if your club designed an exercise, talk about the rationale that led to the choice of the exercise scenario and parameters.
- 2 – 5 high-resolution images — Include captions that explain what's happening in the photos, the names and call signs of any hams pictured, and the name (and call sign, if applicable) of the person who took each photo.
- Send the manuscript and photos to [qst@arrrl.org](mailto:qst@arrrl.org) by May 1.



## Club Station

# The ARRL *Club News* Newsletter

*Find out what other clubs are up to by subscribing to the free ARRL Club News e-newsletter. You can even send stories and photos for possible use in future issues!*

Many clubs across the country keep their members informed and motivated with club newsletters. These newsletters come in different forms and formats, although today the majority are email publications. This is entirely understandable, as the costs of printing and postage have increased substantially in recent years.

ARRL has its own version of a club newsletter that we call *Club News*. It builds on the tradition of the “Activity Reports” that used to be published in *QST*.

*Club News* is not a calendar of upcoming events, but rather a source of ideas and inspiration by clubs, for clubs. Our goal is to highlight what other clubs are doing to attract and retain members. You can borrow their ideas and put them to work in your organization. Of course, we invite you to share your items as well.

### What We’re Looking For

ARRL *Club News* emphasizes stories that detail how a club approached a particular project, what obstacles were encountered, and how those obstacles were overcome. Here are summaries of some of the items we’ve published in *Club News*...

### **Tape Measure VHF Antenna Building Event**

The South Jersey Radio Association (SJRA) hosted a hands-on workshop at the Gibson House, where 10 enthusiastic members gathered to build VHF antennas using everyday materials. Participants built their antennas and then checked the SWR on the VHF band. The process involved careful attention to detail and hands-on problem-solving, soldering wires and assembly using PVC pipe and hose

clamps, reflecting the club’s commitment to practical learning.

### **HARC Promotes Amateur Radio at Northeast Philadelphia History Fair**

The Holmesburg Amateur Radio Club (HARC) attended the Northeast Philadelphia History Fair as a means to promote the city’s history via the annual 13 Colonies Special Event in July. The club was invited to show the historical significance of amateur radio in the town and also to set up a demonstration station.

### **Old Barney Amateur Radio Club Founders Celebrate 50th Field Day**

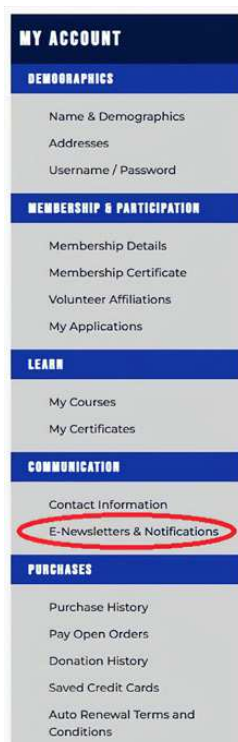
Two longtime Old Barney Amateur Radio Club (OBARC) members in Manahawkin, New Jersey, commemorated their 50th year of participating in ARRL Field Day. Bob Schenck, N2OO, and Steve Sullivan, KZ2I, joined the club’s current members for the event held at Wells Mills Park in Waretown. Notably, their first Field Day as a group occurred in Warren Grove, New Jersey, and this shows the continuity of amateur radio. The club formed just after that first Field Day.

### Send Photos Too

Everyone enjoys seeing photos, and *Club News* is no exception. We’re happy to consider any photos you may want to include with your story. See the example in Figure 1.



**Figure 1** — Members of the Meriden (Connecticut) Amateur Radio Club enjoying Parks on the Air.



**Figure 2** — Look for “E-Newsletters & Notifications” under **COMMUNICATION** in the **MY ACCOUNT** bar.

Include a caption for each image that describes what is taking place and the names and call signs of the individuals shown. Avoid images that show only the backs of your members — we want to see their faces! — and try to get close-up shots rather than distant images.

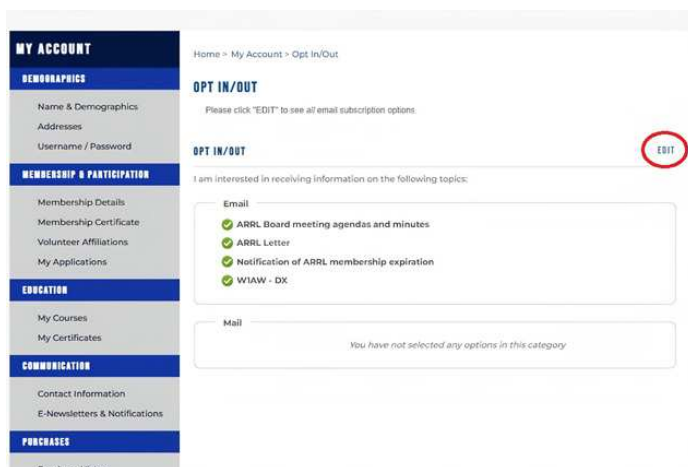
Please don’t send “posed” photos. Try to show activity and action whenever possible. The exceptions are images of individuals receiving awards or other honors.

Send your photos as separate files, not as images embedded in a document file. Use images that have a reasonable amount of resolution; don’t compress the files for emailing. Submit your photos and stories to **clubs@arrl.org**.

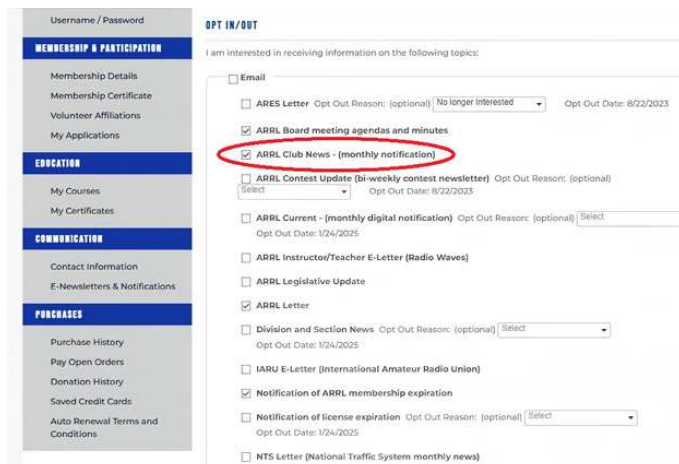
## Sign Up Today

If you’ve never experienced ARRL *Club News*, sign up now to see what you’ve been missing. It is free to all ARRL members.

Just go to the ARRL website (**www.arrrl.org**) and sign in. Once you’ve signed into the site, click on your name at the top of the page. This will take you to your account page. On the left side of the page in the **MY**



**Figure 3** — Click the **EDIT** link (circled in red in this image) that appears to the right of **OPT IN/OUT**.



**Figure 4** — When the page expands, select *Club News* and any other newsletters you wish to receive. They’re all free! When you are finished, don’t forget to click the **SAVE** button at the very bottom of the page.

**ACCOUNT** bar, scroll to **COMMUNICATION** and look for “E-Newsletters & Notifications.” Click that link (see Figure 2).

On the next page, click the **EDIT** link that appears to the right of **OPT IN/OUT** (see Figure 3). The page will expand downward, and you will see the list of available e-newsletters. Select *Club News* (see Figure 4) and any other newsletters that you wish to receive. Make sure to go to the bottom of the page and click **SAVE** to save any changes. *Club News* will be emailed to the address that’s on record for your account. It is published on the third Tuesday of every month.

## ARRL Special Service Clubs

ARRL offers the Special Service Club (SSC) program for clubs that demonstrate that they’re working to improve the amateur radio community by completing special projects, holding license classes, and working with local groups on events, among other activities. Visit **www.arrrl.org/ssc-application** for more information about this program. Below is a list of new and renewing SSCs as of February 10, 2025.



### Renewing SSCs

Bolingbrook ARS, K9BAR  
Carson Valley Radio Club, W7DEM  
High Point ARC, W4UA  
Uniontown ARC, W3PIE

Bolingbrook, IL  
Minden, NV  
High Point, NC  
Uniontown, PA



## Ham Media Playlist

# HamRadio 24-7

There is no shortage of YouTube channels out there, and those focusing on amateur radio seem to increase daily. Not all channels that are relatively new, however, are new to creating content and having a positive impact on ham radio. One such channel is HamRadio 24-7 ([www.youtube.com/@Ray-W2RE](https://www.youtube.com/@Ray-W2RE)).

HamRadio 24-7 is run by Ray Higgins, W2RE, who is relatively new to posting regular content on YouTube but has been prolific in posting material on Facebook. His content on Facebook averages 3 – 4 million views per month. Ray made the decision to use YouTube for his long-form content, and his channel has since taken off.

Ray's three main reasons for creating content are: educating and sharing ham radio with a wide audience, promoting the hobby and inspiring new people to get involved, and creating new opportunities for his tower and remote business while supporting the community. Ray has a sincere focus on helping young people engage in amateur radio, but more about that later. To Ray, it is all about giving back, creating growth, and building something meaningful.

### Tower Installations

When you peruse Ray's YouTube channel, you notice an obvious theme — towers. One of his most popular videos is titled "HAM RADIO Antennas Up! A Two-Day Tower Installation Adventure!" (<https://tinyurl.com/w2re-tower>), in which Ray climbs a tower with a camera on, allowing viewers to see as he safely ascends to 75 feet. This video makes it clear why hams must be extremely careful and attentive when climbing. The antenna installation requires significant



Ray, W2RE, gives viewers a look at the antenna that he and his crew are preparing to mount on the newly installed tower.



Ray, W2RE, shows some of the additional equipment needed for a successful installation of a tower and antennas.

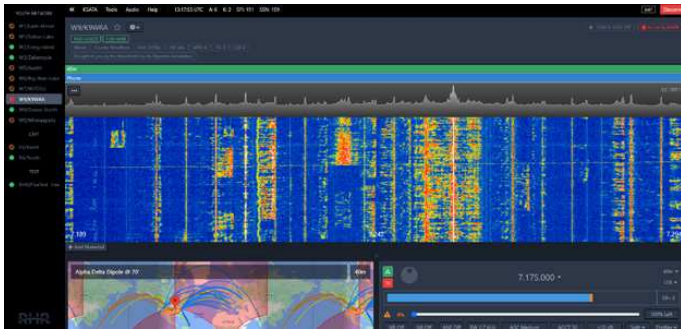
physical strength and endurance, emphasizing the importance of safety and preparation.

There are very few cuts and edits during the parts of the video where work is being done, so viewers get to witness the installation in a seamless fashion, in addition to the spectacular views offered from the top of the tower. Ray points out areas where viewers can save money by doing things themselves, such as building the dipole antennas rather than purchasing them. He also points out that it is often better to build antennas before beginning the installation and transport them assembled. This video serves as a reminder that good planning is essential to a successful installation.

Perhaps you are considering having a tower put up and want to get an idea of the additional materials you will need. In the video titled "How To: Ham Radio Material List To Build a Rohn Tower" (<https://tinyurl.com/w2re-equipment>), Ray points out that, while this project is an 80-foot-tall Rohn 45 tower, the additional materials are essentially the same for most towers. In addition to giving the materials list, he also discusses ways to save time on-site by pre-assembling elements.

### Helping Young Hams Engage in Amateur Radio

While Ray is a popular content creator, there are things about him that are less commonly known. Ray, through his company Remote Ham Radio (RHR), provides incredible opportunities for youth.



The Remote Ham Radio Youth Program console.

Working with partners Rockwell Schrock, WW1X, and Lee Imber, WW2DX, Ray created the Remote Ham Radio Youth Program with a single goal — to give back and help get young operators on the air. This program started by providing simple access to RHR but has quickly grown beyond what they could have ever imagined. This program is near and dear to me, as I regularly encourage young hams to get on the air. Through this program young people are given opportunities to operate 13 different stations that are dedicated to the youth program. This gives young people a chance to operate stations all over the country at no cost to them.

The program has been growing so quickly that RHR lowered the age of access from 26 to 21, just to be able to keep up with the demand. Thousands of young hams have taken advantage of the program and gotten on the air using RHR Youth stations. Most of these hams are based in the US, but RHR Youth also has CEPT stations in Croatia and Slovenia. Hundreds of young hams overseas have earned their FCC license as a result of the work done by the Remote Ham Radio Youth Program.



Ray, W2RE, coordinates with his son as he prepares to hoist equipment up a tower.

Ray, Rockwell, and Lee give freely of their time to provide opportunities to those who may not have them otherwise. In fact, the stations that are part of the Remote Ham Radio Youth Program are made possible by several generous station owners who believe in the mission of getting young people on the air and active early on. RHR does not actively solicit support for these stations, but they are constantly adding more stations to the program just to keep up with the demand.



Ray, W2RE, working on an antenna installation at a height of 75 feet.

The young hams who regularly operate RHR Youth stations do more than operate world-class amateur radio stations — they make friends. These young hams forge relationships and create a community of their own, one in which their interests in amateur radio take a central role. Whether those interests are in operating FT4/FT8, CW, SSB, or contesting, these young hams have a venue where they can discuss and celebrate successes with each other.

The opportunities provided by Ray and the Remote Ham Radio Youth Program are change makers. These young hams get to operate stations without significant financial outlays. This model gives young hams the chance to try various modes and styles of operating, helping them to make wise decisions when it comes time for them to build their own stations.

If you are looking to learn about tower installations, head over to the HamRadio 24-7 YouTube channel. There, you will find videos ranging from new installs to emergency repairs. Thank you to Ray and his team for making the Remote Ham Radio Youth Program accessible to young hams.



## How's DX?

# HC8 — The Galápagos Islands

Most people who paid attention in school will remember learning about the Galápagos Islands. For me, it was probably in spring 1981 after I worked Ernest “Bud” Divine, Jr., HC8GI, on Santa Cruz Island during the SSB portion of the CQ WPX Contest. Bud was active as HC8GI for decades, starting in the mid-1950s.

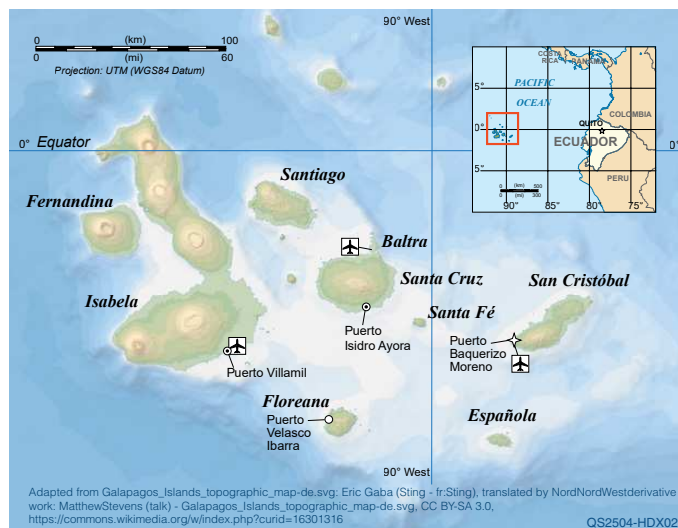
## DXCC History

The Galápagos Islands were on the original postwar DX Century Club (DXCC) list published in the February 1947 issue of *QST*. There was no set prefix for this DXCC entity at the time. In fact, one of the first — if not, the first — operations there was HDPP by Les Henson, W7MMX. HDPP was probably a commercial call sign that was also used on the amateur bands. At the end of 1959 and the beginning of 1960, HC1JU operated as HC8JU from a ship at the Galápagos Islands. As a reminder, shipboard operations do not count for DXCC. In January 1960, HCCC8 — another interesting call sign — was active from Shipwreck Bay on San Cristóbal Island. That same year, the famous Danny Weil, VP2VB, was ashore on the Galápagos Islands as HC8VB. WA2WUV was active as HC9CA in 1967, although the call sign was licensed to SM6CKU.

In the early 1970s, Lucio Saltos was active as HC8GS from Santa Cruz Island. Dr. Rick Dorsch, WB8ABN (now NE8Z and HC1MD), was active from Santa Cruz as both HC8EE and HD8EE in fall 1977. Using the call sign HD8CD (the “CD” was a reference to Charles Darwin), Rick made the first-ever OSCAR 7 contact from HC8. In 1979, Rick, his wife Maria, HC1MM, and their two kids were there again, operating as HC8EE and HC8MM.

Rick returned in November 1981 and stayed through December, operating as HC8MD and HC8VHF. That time, he made the first 6-meter contacts from HC8. He was on SSB and running 9 W and a 12 V dc boat battery into a two-element quad. Rick made more than 2,000 Magic Band contacts.

At the end of 1983, “Yasme Round the World DXpedition” husband-and-wife operators Lloyd Colvin, W6KG, and Iris Colvin, W6QL, spent about a month there as W6KG/HC8. During the SSB portion of the 1985 CQ World Wide (CQ WW) DX Contest, HC8X was a Multi/



A simplified map of the Galápagos Islands.

Multi contest effort with the following operators: KQ1F, KP2A, W6CDR, K8CV, AB8K, K8MA, KA8TKB, NE8Z, KA9RHK, K1XM, N2IC, WD8ATP, K8CW, W8KKF, W8PBO, WA8YST, K9AJ, and W0RLX. Pedro, HC1OT, went to the islands to operate as HC8DX in October 1986. In the SSB portion of the 1987 CQ WW DX Contest, members of the Southern California Contest Club and the Galápagos Radio Club operated as HC8DX in the Multi/Multi category. The team included HC2CQ, HC2RG, N6AA, N6VI, N6ZZ (SK), W6MKB, and W6NV. John, K2JF, conducted a DXpedition as HC8/K2JF in October 1988.

In the early 1990s, Trey Garlough, WN4KKN (now N5KO), started the HC8N contest station. It began as a single-operator station, and then it was expanded to multi operator until 2008. Also active during several CQ WW DX SSB Contests was Rich, N6KT, who operated as HC8A. In 1989 and 1990, WA6OTU (now N5OT) operated in the CW portion of the CQ WW DX Contest as HC8U. DL5XX operated as HC8KU in 1994, and in 1999, Paul, DL6FBK, was active as HC8/DL6FBK.

Throughout the first decade of the 21st century, the following stations were on the air from the islands: PA3GIO/HC8 (2000), G4IUF/HC8 (2002, 2003, and 2004), HC8L (2004), DL4CVG/HC8 (2004), HC8/XE1KK (2004), HC1MD/HC8 (2006), and HC8/DF8AN.

World traveler Vladimir Bykov, UA4WHX, made a stop on Isabela Island and was active as HC8ART in spring

2014. That same year, UA1ANA and RC5A operated respectively as HC2ANT/8 and HC2RCT/8.

The late EA5RM led the multi-operator HD8R DXpedition in early 2021. Rick, NE8Z, was back as HD8MD in April 2022 and March 2024. WB2REM, KE2D, and K4LT were active as HD8M in March 2023. During the CW portion of the 2024 CQ WW DX Contest, Edgar, K2IN (HC2AP), was on the islands as HD8CW, and he was on the digital modes as HC5CW/8. Shortly after, Gus, HC2FG, was active on 6 meters as HD8FG, and then again in early January 2025.

Many locals have also been active over the years, including Forest, HC8FN; Henri, HC8KU; Luis, HC8JG; Chela (YL), HC8FR; Guido, HC8GR; David, HC8DB; Rolf, HC8RS, and Milton, HC8MA (SK). Currently, HC8DH and HC8AV are the only resident hams on the Galápagos Islands.

Despite all of the previous activity, the Galápagos Islands rank number 138 worldwide on Club Log's DXCC Most Wanted List. For those who have not worked HC8, or those who need it on certain bands or modes, you will have the opportunity to do so in April 2025.

## April 2025 HD8G DXpedition

In June 2024, a large multi-national group of operators, primarily from Brazil, announced their plans for a DXpedition to the Galápagos as HD8G on April 18 – 26, 2025. As of press time, the team includes: E70A, N6JRL, YL1ZF, HC5F, HC5RF, HC5VF, K3NQ, N6PSE, PR7AB, PS8RV, PV8DX, PY2BS, PY2DV, PY2MC, PY2PT, PY2WAS, PY5EG, PY5HSD, PY5KD, PY6HD, PY6RT, R7KW, VU2RS, WD5COV, YL2KL, and YT1AD.

They will be operating eight stations from two locations on the southern end of Santa Cruz Island. This setup will include one station for satellites, one for Earth-moon-Earth, and one dedicated station for continuous operation on 6 meters. They plan to cover frequencies on 160 – 6 meters via SSB, CW, RTTY, FT8, and FT4. The team anticipates utilizing Club Log's livestream feature for real-time updates. Members of the Azuay Radio Club, HC5ARC, will sponsor the HD8G DXpedition. Fausto, HC5VF, and other club members intend to participate with a Field Day-style operation, including practice for emergency communication procedures.



HD8G QSL cards will be managed by Tim Beaumont, M0URX. Comprehensive QSL details are available at [www.hd8g.com](http://www.hd8g.com).

## DX News from Around the Globe

### 3B9 — Rodrigues Island

David, OK6DJ, and Milan, OK7GU, announced that their trip to Rodrigues Island as 3B9DJ will be from March 24 to April 5, 2025. They will be joined by OK1CRM and OK2ZA. The team will operate on 1.8 – 28 MHz CW, FT8, and SSB. QSL via OK6DJ and Logbook of The World®.

### 8Q — Maldives

Flavio, IW2NEF, will be operating from Filithoyo Island in the Maldives as 8Q7EF on April 3 – 10. QSL information is available via IK2DUW.

### C5 — The Gambia

F5RAV will be on the air as C5LT, and YT3PL will be C5R during their trip to Kololi on April 19 – May 2. They plan to be on HF, 6 meters, and satellites using FT8, SSB, and CW.

### FO — French Polynesia

Haru, JA1XGI, will operate as TX7XG from Fakarava Atoll (OC-066) on April 9 – 16. He will be on 40 – 6 meters via CW, SSB, FT8, and RTTY. For more information, visit <https://tx7xg.amebaownd.com>.

### P29 — Papua New Guinea

Xu Zhenglu, BG5DON, is in Hohola, a suburb of Port Moresby's National Capital District, from January 18 to May 30. He is using a low-power (10 W) Xiegu X6100 with a portable V antenna. He's operating as P29XZ on 20-, 17-, 15-, 10-, and 6-meter FT8. Xu plans to operate irregularly on weekends via FT8, with up to 10 W. More details are at [www.qrz.com/db/BG5DON](http://www.qrz.com/db/BG5DON).

### ZC4 — UK Sovereign Bases on Cyprus

Adrian, G0KOM, will return to Akrotiri in March. He intends to participate in the SSB portion of the 2025 CQ WPX Contest, and he will be active as ZC4MK on March 24 – 31. Adrian is planning another visit to ZC4 in July 2025.

## Wrap-Up

That's it for this month, with thanks to BG5DON, G0KOM, IZ2DPX, JA1XGI, KE3Q, NE8Z, OK6DJ, and *The Daily DX* ([www.dailydx.com](http://www.dailydx.com)) for helping to make this month's column possible. Please send your DX news, photos, and club newsletters to [bernie@dailydx.com](mailto:bernie@dailydx.com). Until next month, see you in the pileups! — *Bernie, W3UR*



## The World Above 50 MHz

# January 6-Meter F2, FT8 Harmonics, and Rare Grids On the Air

A widespread 6-meter F2 opening took place in the morning on January 6, 2025. *QST* “How’s DX?” columnist Bernie McClenney, W3UR (FM19), saw WO2T decode Dave, 9G1SD, on FT8 at 1442 UTC. At first, Bernie thought it might have been a “bogus spot.” His antenna was disconnected due to a winter storm, but he quickly hooked it up and found the signal from 9G1SD. Bernie worked him for his 6-meter DX Century Club #172! He also noted that 9G1SD worked stations in Michigan, Illinois, Ontario, Ohio, New Jersey (Nelson, KD2CYU, in grid FN20 at 1448 UTC), and Maryland. In the Midwest, KCØY, KFØM (EM17), WQØP (EM19), ABØS (EN11), and I, NØJK (EM28), noted strong stations from central and northern South America on 50.313 MHz FT8 at the same time. I copied TI2AA (EJ79) sending reports to GM4FVM and GØJHC at around 1501 UTC, and TI2FAF (EJ79) logged me at 1514 UTC, followed by K1HTV (FM18). KCØY and NT7C (EM29) worked TI2AA. HK4EI and HC2GRC also had strong signals. K1HTV noted Bob, ZL1RS, working XE1EE at 1738 UTC (very early in the morning for New Zealand to North America). At 1743 UTC, ZL1RS worked WA3QPX, who was running only 80 W, and then he worked K5VRX at 1744 UTC. K1HTV received ZL1RS for about 7 minutes. That was the last day of widespread 6-meter F2 from North America in January.

### Audio Harmonics on FT8

Tim, AE5TC, and others have observed audio harmonics from some strong South American stations on FT8. He noted one HC-region station on 50.313 MHz at 500 Hz, and another one at 800 Hz had spurious signals at 1200, 1700, and 2200 Hz. Is it a problem with the radio, or is it the amplifier? Lance Collister, W7GJ, has some insight into what is going on. He said:

Audio harmonics are caused by a new FT8 user trying to operate outside the 1500 – 2000 Hz offset range

without properly setting up *WSJT-X* to automatically offset the transmitter frequency. FT8 provides automatic transmitter control to avoid cluttering up the band pass with audio harmonics. Newcomers are urged to properly set up the software!

W9MDB discusses the importance of responsible *WSJT-X* setup at [www.dropbox.com/s/hlt50x44qs2ua1f/FT8Noise8.pdf?dl=0](http://www.dropbox.com/s/hlt50x44qs2ua1f/FT8Noise8.pdf?dl=0).

### N7PHY Portable on DN02/DN03 Grid Line

Ed Sershon, N7PHY, braved the cold weather and operated 6-meter portable from rare grids DN02 and DN03 during the 2025 ARRL January VHF Contest. Ed reported:

The site was located on a [Bureau of Land Management] land ridge about 78 miles southwest of Burns, Oregon. Horizon view was adequate, but I did have a big hill to the south. Weather was cold but clear. I had high hopes but not high expectations for propagation. I was not disappointed. I operated 1 full day and 2 partial days, logging exactly 75 6-meter contacts over FT8 and MSK144 in 41 grids. Thank you everyone who sat patiently by, hoping for that



Ed Sershon's, N7PHY, portable setup from the DN02/DN03 grid line during the 2025 ARRL January VHF Contest. [Ed Sershon, N7PHY, photo]





# Convention and Hamfest Calendar

A = AUCTION  
D = DEALERS / VENDORS  
F = FLEA MARKET  
H = HANDICAP ACCESS  
Q = FIELD CHECKING OF QSL CARDS  
R = REFRESHMENTS  
S = SEMINARS / PRESENTATIONS  
T = TAILGATING  
V = VE SESSIONS

## Abbreviations

Spr = Sponsor  
TI = Talk-in frequency  
Adm = Admission

### Alabama (Headland) — Apr. 26 FTV

8:30 AM. Spr: Wiregrass ARC. Headland Town Square, 100 Park St. TI: 145.43 (186.2 Hz). Adm: \$5. Email: [clwoodall2@gmail.com](mailto:clwoodall2@gmail.com)

### Arkansas (Paragould) — Apr. 19 FRT

8 AM – 2 PM. Spr: Crowley's Ridge ARC. Crowley's Ridge State Park, 2092 Hwy. 168 N. TI: 146.61 (107.2 Hz). Adm: Free. Email: [alfisher1950@gmail.com](mailto:alfisher1950@gmail.com)

### Arizona (Tucson) — Apr. 5 DFHQRT

7 AM – 11 AM. Spr: Radio Society of Tucson. Calvary Tucson Church, 8711 East Speedway Blvd. TI: 147.160 (141.3 Hz). Adm: Free. [www.k7rst.club](http://www.k7rst.club)

## ARRL ORANGE SECTION CONVENTION

### April 25 – 27, Big Bear Lake, California

DFHIRSTV

8 AM – 5 PM. Spr: Activate Big Bear, LLC. Holiday Inn Resort, 40650 Village Dr. TI: TBD. Adm: \$25. [www.bigbearhamescape.com](http://www.bigbearhamescape.com)

### California (Sonoma) pr. 26 DFHRTV

8 AM – noon. Spr: Valley of the Moon ARC. First Congregational Church of Sonoma, 252 W. Spain St. TI: 145.35 (88.5 Hz). Adm: Free. [www.vomarc.org](http://www.vomarc.org)

## INTERNATIONAL DX CONVENTION

### April 10 – 13, Visalia, California

DHQRS

8 AM – 5 PM. Spr: Northern California DX Club. Visalia Convention Center, 303 E. Acequia Ave. Adm: \$115 Advance; under 18 years old, free. [www.dxconvention.com](http://www.dxconvention.com)

### Connecticut (Gales Ferry) — Apr. 26 FT

8:30 AM – 2 PM. Spr: Southeastern Connecticut ARS. Our Lady of Lourdes Parish Hall, 1650 CT-12. TI: 146.73 (156.7 Hz). Adm: \$5. [www.secars.org](http://www.secars.org)

## ARRL DELAWARE STATE CONVENTION

### April 26, Georgetown, Delaware

DFHQIRSTV

8 AM – 3 PM. Spr: Sussex ARA. Cheer Center, 20520 Sand Hill Rd. TI: 147.09 (156.7 Hz). Adm: \$8. Email: [ashton@mchsi.com](mailto:ashton@mchsi.com)

### Florida (Tampa) — Apr. 12 FHQRTV

7 AM – 11 AM. Spr: Tampa ARC. 7801 N. 22nd St. TI: 147.105 (146.2 Hz). Adm: \$5. [www.hamclub.org](http://www.hamclub.org)

### Hawaii (Honolulu) — Apr. 12 FHQRTV

9 AM – 2:30 PM. Spr: Emergency Amateur Radio Club of Hawaii. National Guard Association, 891 Valkenburgh St. TI: 146.52. Adm: Free. Email: [wh6cph@gmail.com](mailto:wh6cph@gmail.com)

### Idaho (Kamiah) — Apr. 19 DFHRSV

8 AM – 3 PM. Spr: 3 Rivers ARC. Clearwater Valley ARC. American Legion Hall, 618 Main St. TI: 146.62 (88.5 Hz). Adm: \$5. [www.3riversarc.club/home](http://www.3riversarc.club/home)

### Illinois (Sandwich) — May 4 DFHRT

8 AM – 1 PM. Spr: Kishwaukee ARC. Sandwich Fairgrounds, 1099-1107 Suydam Rd. TI: 146.73 (100.0 Hz). Adm: \$8 Advance, \$10 door. [www.karc-club.org](http://www.karc-club.org)

### Illinois (Sullivan) — Apr. 26 DFHV

7 AM – 11 AM. Spr: Moultrie Amateur Radio Klub. Sullivan American Legion, E. Strain St. TI: 444.275 (103.5 Hz). Adm: \$5. [www.qsl.net/mark](http://www.qsl.net/mark)

### Indiana (Peru) — Apr. 26 DHRSTV

9 AM – 2 PM. Spr: Cass, Miami, Kokomo, Grant Co. ARCs. Miami Co. 4-H Fairgrounds, 1029 W. 200 N. TI: 147.345 (131.8 Hz). Adm: \$7. [www.ncihamfest.com](http://www.ncihamfest.com)

### Iowa (Des Moines) — Apr. 26 DFHV

8 AM – 3 PM. Spr: Des Moines Radio Amateurs Association. Iowa State Fairgrounds, Elwell Family Food Center, 3000 E. Grand Ave. TI: 146.94 (114.8 Hz). Adm: \$10; 12 and under, free. [www.dmraa.com/hamfest](http://www.dmraa.com/hamfest)

## ELLSWORTH HAM RADIO SYMPOSIUM 2025

### April 5, Ellsworth, Maine

HRS

Noon – 4 PM. Spr: Ellsworth Amateur Wireless Association. Meadow View Apartments Phase IV Dining Hall, 25 Tweedie Ln. TI: 146.91 (151.4 Hz). Adm: Donation. [www.w1tu.org](http://www.w1tu.org)

### Maryland (Maugansville) — May 3 DFHQIRSTV

7:30 AM – 12:30 PM. Spr: Antietam Radio Association. Maugansville Bible Brethren Church, 17904 Binkley Ave. TI: 147.09 (100.0 Hz). Adm: \$7.

[www.antietamradio.org/events/hamfest2025](http://www.antietamradio.org/events/hamfest2025)

### Maryland (Odenton) — Apr. 27 DFHRT

7:30 AM – noon. Spr: Maryland Mobileers ARC. Odenton Volunteer Fire Co., 1425 Annapolis Rd. TI: 146.805 (107.2 Hz). Adm: \$5. [www.sites.google.com/view/marylandmobileers/hamfest?authuser=0](http://www.sites.google.com/view/marylandmobileers/hamfest?authuser=0)

### Michigan (Burnips) — Apr. 12 FHQRTV

8 AM – 11:30 AM. Spr: Allegan Co. ARC. Salem Township Hall, 3003 142nd Ave. TI: 147.24 (94.8 Hz). Adm: \$5. Email: [ac8hz@arri.net](mailto:ac8hz@arri.net)

### Michigan (Cadillac) — May 3 DFHQRTV

8 AM – noon. Spr: Wexauke ARC. Mackinaw Trail Middle School, 8401 Mackinaw Trail. TI: 146.98. Adm: \$5. [www.wexaukearc.org](http://www.wexaukearc.org)

### Michigan (Centreville) — Apr. 19 FHRTV

8 AM – noon. Spr: St. Joseph Co. Michigan ARC. St. Joseph Co. Fairgrounds, 316 E. Charlotte St. TI: 145.31 (123.0 Hz). Adm: \$5. Email: [fuseboxr@hotmail.com](mailto:fuseboxr@hotmail.com)

### Minnesota (Brainerd) — Apr. 12 FHQRT

9 AM – 1 PM. Spr: Brainerd Area ARC. Brainerd National Guard Armory, 1115 Wright St. TI: 147.225. Adm: \$5. [www.brainerdham.org](http://www.brainerdham.org)

### Minnesota (East Grand Forks) — Apr. 26 FHRSTV

8 AM – 1 PM. Spr: Forx ARC. Heritage Village, 219 20th St. NE. TI: 146.940 (123.0 Hz). Adm: \$10. [www.wa0jxt.org](http://www.wa0jxt.org)

## OZARKCON

**April 4 – 5, Branson, Missouri**

**DF**

8 AM – 5 PM. *Spr:* Four State QRP Group. Stone Castle Hotel, 3050 Green Mountain Dr. *Adm:* \$20 Advance, \$25 door.

[www.ozarkcon.com](http://www.ozarkcon.com)

**Missouri (Perryville) – Apr. 12 DFHTV**

8 AM – noon. *Spr:* River Hills ARC. Fraternal Order of Eagles, 2746 W. St. Joseph St. *TI:* 147.00 (103.5 Hz). *Adm:* \$5. Email: [riverhillsarchamfest@gmail.com](mailto:riverhillsarchamfest@gmail.com)

## ARRL NEBRASKA STATE CONVENTION

**May 10, Lincoln, Nebraska**

**DFHQRSV**

8 AM – 3 PM. *Spr:* Lincoln ARC. Sandhills Global Event Center, 4100 N. 84th St. *TI:* 146.76. *Adm:* 16 years old and up, \$8; LARC members, \$5. [www.lincolnhamfest.org](http://www.lincolnhamfest.org)

**Nevada (Reno) – May 10 DFT**

8 AM – 1 PM. *Spr:* Sierra Nevada ARS. Cabela's Reno, 8650 Boomtown Garson Rd. *TI:* 147.21 (100.0 Hz). *Adm:* Free. <http://renohamswap.com>

**New Hampshire (Moultonborough) – Apr. 12 DFHRT**

8 AM – 1 PM. *Spr:* Lakes Region Repeater Association. Moultonborough Function Hall, 139 Old Rte. 109. *TI:* 147.03 (88.5 Hz), 444.70 (123.0 Hz). *Adm:* \$10. [www.w1bst.org](http://www.w1bst.org)

**New Jersey (Surf City) – May 3 DFHRTV**

8 AM – 1 PM. *Spr:* Old Barney ARC. Surf City Firehouse, 713 Long Beach Blvd. *TI:* 146.835 (127.3 Hz). *Adm:* \$5. [www.obarc.org](http://www.obarc.org)

**New Mexico (Roswell) – May 3 FRT**

8 AM – 1 PM. *Spr:* Pecos Valley ARC. Beginnings, 3908 SE. Main St. *TI:* 147.32 (146.2 Hz). *Adm:* Free. Email: [nm5gb@pecosvalleyarc.org](mailto:nm5gb@pecosvalleyarc.org)

**New York (Mountainville) – May 4 DFHRTV**

8 AM – 1 PM. *Spr:* Orange Co. ARC. Black Rock Fish & Game Club, 5 Pleasant Hill Rd. *TI:* 443.55 (156.7 Hz). *Adm:* \$6. [www.ocarcny.org](http://www.ocarcny.org)

**New York (Palmyra) – Apr. 19 DFHRT**

8 AM – 1 PM. *Spr:* Drumlins ARC. Palmyra VFW Post 6778, 4306 NY-31. *TI:* 148.745 (71.9 Hz). *Adm:* \$5. [www.drumlinsarc.us/hamfest-info](http://www.drumlinsarc.us/hamfest-info)

**New York (Queensbury) – Apr. 12 DFHV**

8 AM – 1 PM. *Spr:* Warren Co. Radio Club. Aviation Mall, 578 Aviation Rd. *TI:* 146.73 (100 Hz). *Adm:* Free. [www.w2wcr.org/events/swapmeet](http://www.w2wcr.org/events/swapmeet)

## ARRL NORTH CAROLINA STATE CONVENTION

**April 5, Raleigh, North Carolina**

**DFHQRSV**

8 AM – 2 PM. *Spr:* Raleigh ARS. Jim Graham Building, NC State Fairgrounds, 4285 Trinity Rd. *TI:* 146.88 (82.5 Hz). *Adm:* \$10 Advance, \$12 door. [www.rarsfest.org](http://www.rarsfest.org)

**Ohio (Athens) – Apr. 27 DFHRTV**

8 AM – noon. *Spr:* Athens Co. ARA. Athens Community Center, 701 E. State St. *TI:* 145.15. *Adm:* \$5. [www.ac-ara.org](http://www.ac-ara.org)

## RV RADIO NETWORK RALLY

**May 10 – 13, Navarre, Ohio**

**S**

All day, each day. *Spr:* RV Radio Network. Baylor Beach Park, 8777 Manchester Ave. SW. *TI:* 146.52. *Adm:* \$60. Email: [msack@verizon.net](mailto:msack@verizon.net)

## ARRL OKLAHOMA STATE CONVENTION

**April 11 – 12, Claremore, Oklahoma**

**DFHQRSV**

Fri. 4 PM – 9 PM, Sat. 8 AM – 3 PM. *Spr:* Green Country Hamfest, Inc. Claremore Expo Center, 400 Veterans Pkwy. *TI:* 147.09 (88.5 Hz). *Adm:* \$8 Advance; \$10 door; under 12, free. [www.greencountryhamfest.org](http://www.greencountryhamfest.org)

## ARRL EASTERN PENNSYLVANIA SECTION CONVENTION

**May 4, Bristol, Pennsylvania**

**DFHQRSV**

7 AM – noon. *Spr:* Warminster ARC. Bucks Co. Community College, Lower Bucks Campus, 1304 Veterans Hwy. (Rte. 413). *TI:* 147.09 (131.8 Hz). *Adm:* \$8. [www.wp.k3dn.org/hamfest](http://www.wp.k3dn.org/hamfest)

**South Carolina (Columbia) – Apr. 26 FHT**

8 AM – 1 PM. *Spr:* Columbia ARC. North Trenholm Baptist Church, 6515 N. Trenholm Rd. *TI:* 147.33 (256.7 Hz). *Adm:* Free. [www.w4cae.com](http://www.w4cae.com)

**Tennessee (Bartlett) – Apr. 12 DFHQRSV**

9 AM – 3 PM. *Spr:* Mid-South ARA. Bartlett Station Municipal Center Auditorium, 5868 Stage Rd. *TI:* 147.03 (107.2 Hz). *Adm:* Free. <http://maraonline.org/freefest>

## ARRL WASHINGTON STATE CONVENTION

**April 26, Spokane Valley, Washington**

**DFHQRSV**

9 AM – 4 PM. *Spr:* Kamiak Butte Amateur Repeater Association, Spokane DX Association, Inland Empire VHF Radio Amateurs, Washington Digital Radio Enthusiasts, Palouse Hills ARC, Northwest Tri-State Amateur Radio Org. Horizon Middle School, 3915 S. Pines Rd. *TI:* 147.38. *Adm:* \$5. <http://spokanehamfest.org>

**Washington (Union Gap) – Apr. 12 FHQRT**

9 AM – 3 PM. *Spr:* N7YRC Group. Yakima Office of Emergency Management, 2403 S. 18th St. *TI:* 147.06 (85.4 Hz). *Adm:* Free. [www.n7cfo.com](http://www.n7cfo.com)

**Wisconsin (Cedarbug) – Apr. 26 DFHR**

8 AM – noon. *Spr:* Ozaukee Radio Club. Ascension Columbia St. Mary's Center (Milwaukee Curling Club), W67N890 Washington Ave. *TI:* 146.97 (127.3 Hz). *Adm:* \$7. [www.ozaukeeradioclub.org](http://www.ozaukeeradioclub.org)

**Wisconsin (Stoughton) – Apr. 26 DFHRTV**

8 AM – noon. *Spr:* Madison Area Repeater Association. Mandt Community Center, 400 Mandt Pkwy. *TI:* 147.15 (123.0 Hz). *Adm:* \$8 Advance, \$10 door. [www.w9hsy.org](http://www.w9hsy.org)

**Wisconsin (Superior) – May 3 DFHQRSV**

8 AM – 1 PM. *Spr:* Arrowhead Radio Amateurs Club. Head of Lakes Fairground, 4700 Tower Ave. *TI:* 146.94 (103.5 Hz). *Adm:* \$10. [www.thearac.org](http://www.thearac.org)

## To All Event Sponsors

Before making a final decision on a date for your event, you are encouraged to check the Hamfest and Convention Database ([www.arrl.org/hamfests-and-conventions-calendar](http://www.arrl.org/hamfests-and-conventions-calendar)) for events that may already be scheduled in your area on that date. See [www.arrl.org/hamfest-convention-application](http://www.arrl.org/hamfest-convention-application) for an online registration form.



## Special Event Stations

**Working special event stations is an enjoyable way to help commemorate history. Many provide a special QSL card or certificate!**

**Mar. 18 – Mar. 20, 1218Z – 1218Z, W4LX**, Fort Myers, FL. Fort Myers Amateur Radio Club. **Honoring WWII Gunners at Buckingham Airfield.** 14.270 21.360 28.360 147.345. Certificate & QSL. FMARC Fort Myers Amateur Radio Club, P.O. Box 61183, Fort Myers, FL 33906. [www.fmarc.net](http://www.fmarc.net)

**Mar. 21 – Mar. 23, 1200Z – 1200Z, K5B**, Las Cruces, NM. Mesilla Valley Radio Club. **2025 Bataan Memorial Death March.** 146.55 146.58 147.750. Certificate. George Earl Drexler, Jr., 608 Hansen Ave., Las Cruces, NM 88005-1224. [earld7a@gmail.com](mailto:earld7a@gmail.com)

**Mar. 22, 1600Z – 2000Z, N4B**, New Bern, NC. New Bern Amateur Radio Club. **Battle of New Bern Adventure Day Special Event.** 7.065 14.330. QSL. John Riley, 980 Dry Monia Rd., New Bern, NC 28562. [www.qrz.com/db/n4b](http://www.qrz.com/db/n4b)

**Mar. 22 – Mar. 29, 0000Z – 0000Z, WØH**, Jackson, OH. White House Communications Agency Amateur Radio Club. **The White House Communications Agency 83rd Anniversary.** 3.875 7.275 14.250 28.550. Certificate. Lowell Yates, 6809 Four Mile Rd., Jackson, OH 45640. [www.whitehousecomms-arc.org](http://www.whitehousecomms-arc.org)

**Mar. 29 – Mar. 30, 0000Z – 2359Z, W7P**, Birmingham, AL. **70th Anniversary of the Birmingham Zoo.** 7.290 7.296 14.296. Certificate & QSL. Lloyd Palmer, N4GHP, 1325 Windsor Ct., Alabaster, AL 35007. [www.qrz.com/db/n4ghp](http://www.qrz.com/db/n4ghp)

**Apr. 1 – Apr. 6, 1300Z – 2200Z, W4S**, Lakeland, FL. Lakeland Amateur Radio Club. **Sun 'n Fun Aerospace Exposition.** 7.40 14.40 18.93 28.40. QSL. Lakeland Amateur Radio Club, P.O. Box 90853, Lakeland, FL 33804. [info@lakelandarc.org](mailto:info@lakelandarc.org)

**Apr. 6 – Apr. 13, 0001Z – 2359Z, N1KL/W1G**, Wheelwright, MA. GERATOL Net. **52nd Anniversary.** 3.668. Certificate. Kevin Lynch, P.O. Box 124, Wheelwright, MA 01094. [www.geratol.net](http://www.geratol.net)

**Apr. 10, 1500Z – 2000Z, KA4TAL**, Conway, SC. Horry Post 111, The American Legion Amateur Radio Club. **Honoring the 100th Anniversary of American Legion Horry Post 111.** 7.185 7.264 14.255 14.275. Certificate. The American Legion Amateur Radio Club, Horry Post 111, 3003 Highway 701 North, Conway, SC 29526. E-certificate; QSL card upon request. Send email to [talarcpst111sc@gmail.com](mailto:talarcpst111sc@gmail.com). [www.horrypost111.org/amateur-radio-club](http://www.horrypost111.org/amateur-radio-club)

**Apr. 11 – Apr. 13, 1600Z – 1600Z, K8L**, Youngstown, OH. The Public Library of Youngstown & Mahoning County. **National Library Week 2025.** 7.074 7.250 14.074 14.250; 20 and 40 meters; SSB and FT8. QSL. K8L — National

Library Week, 239 Elvira Ct., McDonald, OH 44437. [www.qrz.com/db/wf8u](http://www.qrz.com/db/wf8u)

**Apr. 12, 1600Z – 2300Z, N16IW**, San Diego, CA. USS Midway Museum Ship. **Operation Frequent Wind.** 7.250 14.320; 14.070 PSK31; D-STAR on PAPA System Repeaters. QSL. USS Midway Museum Ship COMEDTRA, 910 N. Harbor Dr., San Diego, CA 92101. [www.qrz.com/db/n16iw](http://www.qrz.com/db/n16iw)

**Apr. 12 – Apr. 13, 0800Z – 2000Z, K5LRK**, The Colony, TX. Lake Area Amateur Radio Klub. **Activation of State Parks in the State of TX Commemorating Tom King, WK5DX.** CW bottom of band +40 kHz; phone General segment +25 kHz and 28.350; VHF 50.200 144.200. QSL. Ken Rainy, AC3EZ, 529 Kenilworth Ave., Oak Point, TX 75068. [www.k5lrk.com](http://www.k5lrk.com)

**Apr. 18, 1300Z – 2000Z, W2JLD**, Rochester, NY. ROC-HAM Radio Network. **World Amateur Radio Day 2025.** AllStar: 2585, 47620, 531310; EchoLink: ROC-HAM CONFERENCE; DMR TGIF Talk Group 2585; 20 m, 14.316, 40 m, 7.266. Certificate & QSL. John Derycke, 85 Amherst St. #2, Rochester, NY 14607. [www.roc-ham.net/ward-2025](http://www.roc-ham.net/ward-2025)

**Apr. 19, 1400Z – 2300Z, W5NX**, Springdale, AR. Bella Vista Radio Club. **Ozark Highlands Nature Center 5th Anniversary.** 7.225 14.250 21.300 28.450. QSL. Don Banta, 3407 Diana St., Springdale, AR 72764. [www.qrz.com/db/w5nx](http://www.qrz.com/db/w5nx) or [www.bellavistaradioclub.org](http://www.bellavistaradioclub.org)

**Apr. 19 – Apr. 20, 1300Z – 2359Z, N6AJ**, Bakersfield, CA. Terry Godley. **World Amateur Radio Day.** 14.074, 28.425; 10 – 40 meters, FT8, SSTV. QSL. Terry Godley, 2701 Fordham St., Bakersfield, CA 93305. *Also participating, W6W, W6A, W6R, and W6D.*

**Apr. 25 – Apr. 27, 1900Z – 1900Z, WØZSW & WØEQO**, Minneapolis, MN. Handiham Radio Club & Handiham Radio Club of Minnesota. **Handiham Program 58th Anniversary QSO Party.** 7.050 14.050 21.050 28.050 CW; 7.200 14.250 21.350 28.350 SSB. QSL. Handiham Program, 3915 Golden Valley Rd., Mail Route 78446, Minneapolis, MN 55422. [www.handiham.net](http://www.handiham.net) or [www.handiham.org](http://www.handiham.org)

**Apr. 26, 1300Z – 2030Z, W2GSB**, Babylon, NY. Great South Bay Amateur Radio Club. **Marconi Day Event.** 7.245 14.246 21.250 28.340. Certificate. W2GSB GSBAC. P.O. Box 1356, Babylon, NY 11704. [www.gsbarc.org](http://www.gsbarc.org)

**Special Events Announcements:** For items to be listed in this column, use the ARRL Special Events Listing Form at [www.arrl.org/special-events-application](http://www.arrl.org/special-events-application), or email information to [events@arrl.org](mailto:events@arrl.org).

Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; a special event listing for **July** QST would have to be received by **May 1**. ARRL reserves the right to exclude events of a commercial or political nature.



# Certificate of Code Proficiency Recipients

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This month, ARRL recognizes merit and progress in Morse code proficiency on the part of the following individuals, who have achieved proficiency at the following rates, in words per minute.

## August 2024

|                         |    |
|-------------------------|----|
| Thomas H. Busch, WB8WOR | 10 |
| Jeanne Martin, KC1SPX   | 10 |
| Thomas S. Wright, ND9Z  | 10 |
| Richard McCleaf, K3EYJ  | 15 |
| Stephen C. Brandt, N7VS | 30 |
| George I. Levy, NC2M    | 30 |
| Stephen C. Brandt, N7VS | 35 |

## September 2024

|                              |    |
|------------------------------|----|
| Tony Levenson, W4FRV         | 10 |
| David E. McNeill, N7WMN      | 10 |
| David W. Risik, WA3HSC       | 10 |
| Sherrick A. Slattery, KA6NZB | 10 |
| Mark C. Guenther, WB7TLK     | 20 |

|                            |    |
|----------------------------|----|
| Robert Harrington, VE3OU   | 20 |
| <b>October 2024</b>        |    |
| Daniel L. Schaible, KD8UZS | 10 |
| John S. Hickman, WW3B      | 20 |
| David R. Koberstein, N9DK  | 25 |

## November 2024

|                         |    |
|-------------------------|----|
| Edward K. Metzler, KN9V | 10 |
| Paul B. Walp, WB6PIO    | 10 |

## December 2024

|                        |    |
|------------------------|----|
| Brian A. Bayani, KT3X  | 10 |
| Gary L. Carlson, KF5NV | 10 |
| Barry G. Fluxe, W4LSV  | 10 |
| Barry G. Fluxe, W4LSV  | 15 |

|                             |    |
|-----------------------------|----|
| Franz Willy Odenthal, DK5EQ | 15 |
| Kurt Hohler, HB9FMJ         | 20 |
| Jonathan Leung, VA7JC       | 20 |
| Lance Martin, VK6DU         | 20 |
| Gary W. Stephan, AE4GS      | 20 |
| Kurt Hohler, HB9FMJ         | 25 |

## January 2025

|                         |    |
|-------------------------|----|
| Ronald M. Bell, KG5CWH  | 10 |
| Freddie O. Cruz, AA2QL  | 15 |
| Forrest Phillips, AE0QH | 15 |
| Ron Kinney, KC0ZPS      | 30 |

## February 2025

|                       |    |
|-----------------------|----|
| James J. Werth, KD1AO | 15 |
|-----------------------|----|

Congratulations to all of the recipients.

## April 2025 W1AW Qualifying Runs

W1AW, the Hiram Percy Maxim Memorial Station at ARRL Headquarters in Newington, Connecticut, transmits Morse code Qualifying Runs to assist ham radio operators in increasing and perfecting their proficiency in Morse code. Amateur radio operators can earn a Certificate of Code Proficiency or endorsements by listening to W1AW Qualifying Runs.

April Qualifying Runs will be transmitted by W1AW in Newington, Connecticut, at the times shown on 1.8025, 3.5815, 7.0475, 14.0475, 18.0775, 21.0675, 28.0675, 50.350, and 147.555 MHz. The West Coast Qualifying Runs will be transmitted by K6KPH on Saturday, April 26, at 2 PM PDT (2100 UTC) on 3581.5, 7047.5, 14047.5, 18077.5, and 21067.5 kHz. Unless indicated otherwise, sending speeds are from 10 to 35 WPM.

Amateur radio operators who participate in Qualifying Runs may submit proof of 1 minute of the highest speed they have copied in the hope of qualifying for the Certificate of Code Proficiency, or an endorsement to their existing certificate.

Legibly copy at least 1 minute of text by hand, and mail the sheet to: W1AW Qualifying Runs, 225 Main St., Newington, CT USA 06111.

Include \$10 (check or money order) if this is a submission for your initial Code Proficiency certificate; \$7.50 if you are applying for an endorsement (available for speeds up to 40 WPM). Your text will be checked against the actual transmissions to determine if you have qualified.

Members of the North Fulton (Georgia) Amateur Radio League (<https://nfarl.org>) are offering to subsidize the total cost of a Code Proficiency certificate or endorsement submission for any

individual age 21 years and younger, and who reside in either the US or Canada. Participants who wish to make use of this offer should indicate on their Qualifying Run submissions they are age 21 or younger, and certify as such via their signature. Eligible participants are not required to send any fee with their Code Proficiency submissions.

For more information about Qualifying Runs, please visit [www.arrl.org/qualifying-run-schedule](http://www.arrl.org/qualifying-run-schedule).

For information about how to qualify for the Certificate of Code Proficiency, please visit [www.arrl.org/code-proficiency-certificate](http://www.arrl.org/code-proficiency-certificate).



## W1AW Qualifying Run Schedule – April 2025 (All times are in Eastern Daylight Time.)

| Monday                                               | Tuesday                                            | Wednesday                                            | Thursday                                           | Friday                              |
|------------------------------------------------------|----------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-------------------------------------|
|                                                      |                                                    | 4/2<br>4 PM – 2000Z<br>10 – 35 WPM                   | 4/3<br>10 PM – 0200Z<br>(4/4 – UTC)<br>10 – 40 WPM | 4/4<br>7 PM – 2300Z<br>35 – 10 WPM  |
|                                                      | 4/8<br>10 PM – 0200Z<br>(4/9 – UTC)<br>10 – 35 WPM | 4/9<br>7 PM – 2300Z<br>10 – 40 WPM                   |                                                    | 4/11<br>9 AM – 1300Z<br>35 – 10 WPM |
| 4/14<br>4 PM – 2000Z<br>10 – 40 WPM                  | 4/15<br>9 AM – 1300Z<br>10 – 35 WPM                | 4/16<br>10 PM – 0200Z<br>(4/17 – UTC)<br>35 – 10 WPM | 4/17<br>7 PM – 2300Z<br>10 – 35 WPM                |                                     |
| 4/28<br>10 PM – 0200Z<br>(4/29 – UTC)<br>10 – 40 WPM | 4/29<br>4 PM – 2000Z<br>35 – 10 WPM                | 4/30<br>7 PM – 2300Z<br>10 – 35 WPM                  |                                                    |                                     |



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# Volunteer Monitor Program Report

The Volunteer Monitor (VM) Program is a joint initiative between ARRL and the FCC to enhance compliance in the Amateur Radio Service. This is the January 2025 activity report of the VM Program.

◆ A commendation was issued to an operator in Indiana for exceptional CW operation, and to an operator in Michigan for exceptional courtesy in choosing a frequency for net operation during crowded band conditions. A commendation was issued to an operator in New Jersey for exceptional operation as net control of a net meeting daily on 7.255 MHz.

◆ A Technician-class operator in Texas received an advisory for FT8 operation on 20 meters. Technicians have no privileges on 20 meters. A Technician-class operator in New York received an advisory for FT8 operation on 15 meters, a band on which there are no Technician privileges. A Delaware Technician-class operator received an advisory for FT8 operation on 12 meters, which allows no Technician operation.

◆ An operator in California received a second advisory regarding operation with an expired license.

◆ An operator in Tennessee received an advisory for operation on 7.200 MHz with a signal that extended from 7.194 to 7.205 MHz. Section 97.307(a) of the

Commission's rules states, "No amateur station transmission shall occupy more bandwidth than necessary for the information rate and emission type being transmitted, in accordance with good amateur practice."

◆ Operators in Florida and New Jersey received advisories for lengthy periods of operation with no identification. Section 97.119(a) requires amateur stations to transmit the assigned call sign at the end of each communication and at least every 10 minutes during a communication.

◆ Operators in Louisiana and Arizona received advisories for operation with expired licenses.

◆ There was one FCC meeting and three case referrals from the FCC for monitoring.

The totals for December 2024 monitoring were 1,896 hours on HF frequencies, and 2,302 hours on VHF frequencies and above, for a total of 4,198 hours.

For the year 2024, Volunteer Monitors reported 21,331 hours of monitoring on HF frequencies, and 27,545 hours on VHF frequencies and above, for a total of 48,876 hours for the year. — *Thanks to Volunteer Monitor Program Administrator Riley Hollingsworth, K4ZDH*

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## This Month in

*QEX* magazine is a forum for the free exchange of ideas among communications experimenters. All ARRL members can access the digital edition of *QEX* as a member benefit ([www.arrl.org/magazines](http://www.arrl.org/magazines)). Print subscriptions are available and sold separately; see [www.arrl.org/qex](http://www.arrl.org/qex).

Coming up in the March/April 2025 issue of *QEX*:

■ John Stanley, K4ERO, gives examples of NVIS antennas with description and gain figures.

■ Anthony LeCren, F4GOH/KF4GOH, explains how Computer Science and Networks high school students programmed an HF SSTV transmitter to send images from a high-altitude balloon.

■ George R. Steber, WB9LVI, describes a new version of the classic RF preselector that improves the front-end selectivity of your shortwave receiver.

■ Mario Lechasseur, VE2KEC, presents an Arduino-based control unit that simplifies band and mode changes on the FT-891.

■ In his essay series, Eric Nichols, KL7AJ, discusses measuring components with a VNA.

Would you like to write for *QEX*? We pay \$50 per published page for full articles and *QEX* Technical Notes. Get more information and an Author Guide at [www.arrl.org/qex-author-guide](http://www.arrl.org/qex-author-guide).

# Congratulations

January 2025  
QST Cover Plaque Award Winner

## Les Chalfant KI5GTR

In his article, “275 Arkansas POTA Activations,” Les shares how he achieved his goal of activating 275 POTA parks in his home state of Arkansas, including experiences and lessons learned along the way.

QST Cover Plaque Awards are given to the author or authors of the most popular article in each issue. *You* choose the winners by casting your vote online at

[www.arrrl.org/cover-plaque-poll](http://www.arrrl.org/cover-plaque-poll)

Log in now and choose your favorite article in this issue!

## 275 Arkansas POTA Activations

New ham KI5GTR activated every POTA park in his state.

### Les Chalfant, KI5GTR

I started most of my Parks on the Air® (POTA®) activity in September 2022, when I tagged along to Mike Freeze Wattensaw Wildlife Management Area with some of my fellow Cabot Small Town Amateur Radio Service members. Ed Morris, K5KMY, and Loma Westmoreland, KU5J, handed me the microphone and asked if I wanted to activate the park; though initially hesitant as both a new ham and someone who had only ever hunted parks, I have been hooked on activating ever since.

I soon set a goal to activate all (at the time) 243 POTA parks in my home state of Arkansas. At first, I covered parks within a small radius of my house. But I realized that in order to activate the entire state, I would be traveling for multiple days at a time. So, I developed a planning strategy for parks more than 3 hours away. This involved setting up my logbooks beforehand, researching the routes, and more. Of course, not all would go as planned, but I finally met my goal in March 2023. As it turned out, more POTA parks were added to Arkansas after I met that goal, and I activated the rest of them by September 2024 for a total of 275.



The author's Icom IC-705 and laptop deployed during a park activation.

### Learning on the Fly

Early on, my friend and fellow POTA activator Bill Kattner, K5OGR, worked with me to achieve this goal. We took turns driving because — as you can imagine — the amount of money spent on gas started to add up as the parks got farther away from our homes. This and the sheer amount of time spent on the road were some of the reasons that I eventually went solo on this journey. I spent many nights in my truck or a tent in unfamiliar state parks. I recall one instance of trying to sleep in my truck during a hailstorm, as I became stranded after that day's park activation. Trial and error taught me the importance of sticking with a pre-written plan. I also became used to writing my activation routes in a notebook because lack of internet service would cause my GPS to fail in more remote areas.

I have done most of my POTA activities with an Icom IC-7300, a 30 Ah Bioenno battery, and a Chameleon MPAS 2.0 17-foot vertical with a 25-foot counterpoise. I also used a 20-meter Shark hamstick in areas that were harder to activate. I started out logging contacts by hand before realizing the process wasn't as efficient as it could be with a laptop and logging software.



The quaint rental cabin that the author stayed in while activating Lake Sylvia State Park (US-10236).

## Strays

### Celebrating an Antenna's Lifespan

In late 2001, Lynn Lamb, W4NL (SK), Sam Brown, WA4IUM (SK), and I had the idea to fund and install a tower and beam antenna on top of Neyland Stadium at the University of Tennessee (UT) for the University of Tennessee Amateur Radio Club, AA4UT. We felt that if the club had an improved antenna system, it would enhance interest in club membership.

Sam had important connections at UT that were needed to start the approval process, which turned out

to be a long and complex journey. Various UT officials and departments helped make this project happen.

The build began in April 2002 and concluded several months later. The tower consisted of four sections of Rohn 25. The beam antenna was a Force 12 model XR5 with five-band capability on 10 – 20 meters.

The tower and beam have stood on top of Neyland Stadium for more than 20 years now. It was a fun and challenging project for everyone involved. Hopefully, the antenna will last another 20 years. — *George Dominick, W4UW*

## New Products

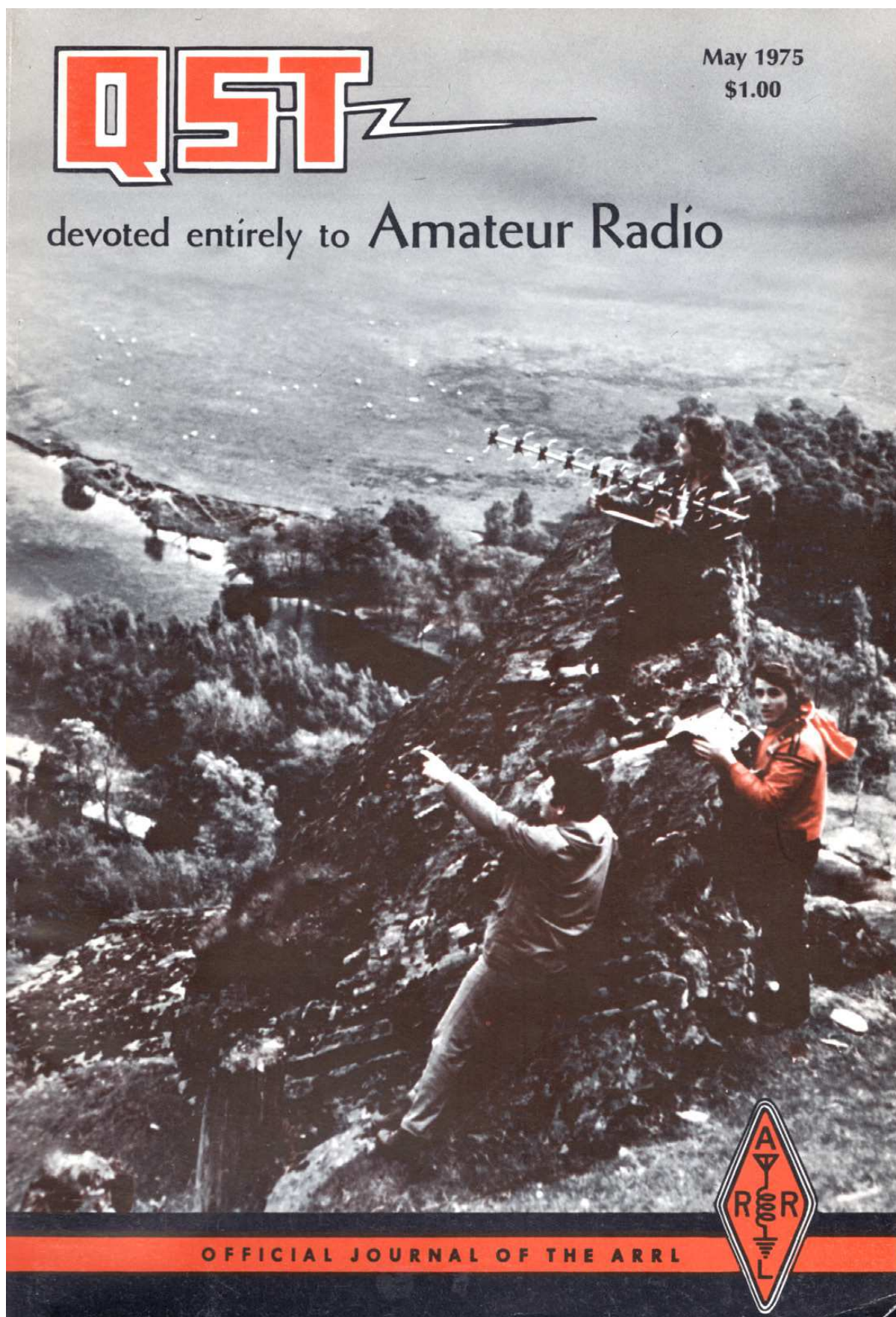
### Snappy Training Key

CW Corporation of America announces its latest CW training key. The key automatically monitors the user's sending technique. When the key senses a mistake, it automatically snaps into action, reminding the sender to improve their keying skill. — *Ellwood Brem, K3YV*





## A Look Back



# Celebrating Our Legacy

## Honoring My Mentor's Influence

When I was a boy, everyone my age had walkie-talkies. Because our little receivers were wide open, I would hear another fellow talking to folks from foreign countries. He seemed different from CB'ers in how he conducted himself on the air, and I gathered he was an amateur radio operator.

My mentor, Bert Thornhill, K3HT, set me straight about amateur radio. He set me up with a Lafayette receiver so I could listen to CW and SSB. I eventually became W3HIZ, and Bert and I are still friends to this day. He changed my life, and ham radio was where it all began.

**Wayne Francis, W3HIZ**  
Parkville, Maryland

## SSTV Through the Decades

Slow-scan television (SSTV) was used long before a computer was in nearly every shack. Sending pictures looked intriguing, so I decided to give it a try. I modified an old Eico oscilloscope kit and discarded everything but the case, the power supply, and the horizontal and vertical sweep circuits. I constructed a circuit board to convert the received demodulated audio tones into pictures. It controlled the sweep circuits that

caused the electron beam to scan, and it varied the beam's intensity to create a picture. I installed this board in the scope case. I bought a surplus 5-inch cathode ray tube (CRT) with a long 1802-P1 persistence phosphor. The received picture was scanned horizontally in less than a minute. Hams used modified TV cameras to send pictures. A friend made me a CQ SSTV cassette tape with his camera that I played on the air.

Years later, once hams added a computer to their shacks and people wrote SSTV software, we started sending and receiving color pictures. I spent hours every day sending and receiving pictures with friends. After spending several years on SSTV, I went on to other areas of the hobby.

In late 2021, the Amateur Radio on the International Space Station (ARISS) program transmitted SSTV pictures to hams worldwide on 145.800 MHz. I quickly downloaded and installed the free slow-scan software program *MMSSTV*. I went to <https://spotthestation.nasa.gov> and found out when the International Space Station would pass over my location. After I filled out an ARISS form and uploaded one of the space station pictures I received, in a few days, I got a certificate with my name and call sign on it.

Recently, I've been using SSTV more. If you want to try SSTV, it can be done easily. Connect a low-level audio signal from your transceiver to the sound card **LINE IN** jack on the back of your computer. Then, download and install the *MMSSTV* software, and tune to 14.230 MHz, USB. You will hear signals and see pictures from all over the world!

**Sumner Weisman, W1VIV**  
Framingham, Massachusetts

## Memorializing My Father's Legacy

My father, Marvin Wines, W7AE (SK), was an active amateur radio operator my entire life. He was first licensed in 1950 at age 21 while in the US Navy, where he ran phone patches through the Military Auxiliary Radio System and aboard two ships during the Vietnam War to help with crew morale.

While stationed in Guam, my father helped build the Naval Communications Station there. One of his most memorable moments was when he and some other men got together to enter the CQ World Wide Contest. They needed a bunch of new equipment to enter the contest, so he asked the base's captain for support in updating the ham equipment, and he was able to get new Collins radios and some new antennas. They did a pretty good job and finished in second place!

My father passed away on August 8, 2021. He was an Extra-class operator on the air until a few days before his death. He was an advocate for amateur radio, and helped many people become licensed operators. He was active in his local club, the Valley Radio Club of Oregon, W7PXL, for many years, and was a Volunteer Examiner. His legacy has passed to my nephew, who recently obtained my father's call sign.

**Kathy Moxley-South**  
La Pine, Oregon

Send reminiscences of your early days in radio to [celebrate@arrl.org](mailto:celebrate@arrl.org). Submissions selected for publication will be edited for space and clarity. Material published in "Celebrating Our Legacy" may also appear in other ARRL media. The publishers of *QST* assume no responsibility for statements made in this column.



One of Sumner Weisman's, W1VIV, early SSTV pictures.



## Classic Radio

# Heathkit GR-81 Shortwave Receiver: An Economy Radio

The 1960s were an exciting time for many kids, especially when we got our first shortwave radios. For the first time, we could hear the “dots” and “dashes” of Morse code and the Donald Duck-like sounds of single-sideband signals on the 80- and 40-meter bands. These sets were our first window into the world of amateur radio, and it was a marvelous time.

### An Economy Radio

The Heathkit GR-81 is a regenerative shortwave radio kit that surprisingly performs well, considering it's an entry-level radio using only three tubes. Those three tubes allowed us to hear stations around the world. While the tubes are modern, the regenerative radio circuit itself was the primary design used by most hams from the early days through the 1930s.

Heathkit introduced the GR-81 in 1961, and it remained in production until 1972, which is an impressively long time in the radio world, considering the technological advancements during that period. Advertised as an “Economy Radio,” the kit sold for \$29.95 in 1961, equivalent to \$314.21 in 2025. The GR-81 was available exclusively as a kit.

### 140 kHz to 18 MHz on Four Bands

The GR-81 covers a range from 140 kHz to 18 MHz on four selectable bands. Band A covers 140 to 560 kHz, where aircraft location beacons are heard. Band B covers 560 to 1730 kHz, which includes the AM

broadcast radio band. Band C covers 1.73 to 5.5 MHz, which includes the 160- and 80-meter ham bands, WWV, and international shortwave frequencies. Band D covers 5.5 to 18 MHz, which includes the 40-, 30-, and 20-meter ham bands, along with CHU (Canada), WWV, and a vast number of international shortwave frequencies.

The three-tube lineup includes a dual-section 12AT7, which operates as both the regenerative detector and the first audio amplifier. The 50C5 serves as the audio output amplifier, driving the speaker, while the 35W4 rectifier tube converts high-voltage ac to dc.

### GR-81 Styling

Heathkit did a marvelous job with the styling of the GR-81, incorporating bright colors, clean styling, and a look and feel of quality. The sturdy metal cabinet is painted beige, while the front panel features a blue-green color. The speaker is hidden behind a silver perforated metal grill. The knobs are the same ones used on many other Heathkit products. The GR-81 is quite small, measuring 10 inches wide, 7 inches tall, and 7 inches deep, with a weight of 9¾ pounds. It also has unique hard rubber feet that add to its styling, with some people even describing them as a “chicken foot.”



Heathkit GR-81 regenerative receiver.



Three simple tubes under the hood.



Rear view showing connections.



Bottom of the chassis.

## Simple Controls and Connections

The controls on the GR-81 are simple and straightforward. The main frequency tuning knob, with a plastic pointer, slides over a silk-screened frequency scale on the front panel. Below it is the fine-tuning knob. The bandswitch knob selects one of the four bands. The **REGENERATION** control is the heart of the regenerative receiver, adjusting the amount of positive feedback to affect sensitivity.

A volume control adjusts the speaker or headphone volume and turns the radio on and off. The headphone jack is located at the end, and the speaker can still be used even when headphones are plugged in. On the back of the chassis is the power cord and a terminal strip with screw connections for the ground, “long antenna,” and “short antenna.” While there is no safety fuse on the rear panel, one is located underneath the chassis.

Heathkit advertised the GR-81 as “shock proof” because it included a power transformer, which provided isolation from the ac power mains.



GR-81 uniquely styled hard rubber foot.

## How Well Does It Actually Work?

The GR-81 is a surprisingly good performer, especially considering it uses only three tubes and a handful of parts. It's impressive what those three tubes can do. I can copy plenty of CW and SSB signals on the ham bands, and the GR-81 acts like a magnet for radio stations on the shortwaves.

Operating the GR-81 can be a bit tricky, requiring more finesse than modern receivers. Many people say tuning a regenerative receiver is an art, and I agree. With some practice, though, an operator can easily master the art of tuning the GR-81. The key to this is the “regeneration” control. If there's too little regeneration, the radio's sensitivity is weak. If there's too much, the radio starts to oscillate, producing squeals and howls from the speaker. To achieve the highest sensitivity without oscillation, the operator increases regeneration until the radio begins to oscillate, then slowly reduces it until the oscillation stops. At this point, the radio is at maximum sensitivity. It's all about finding that regenerative sweet spot.

## The Last Shortwave in the Shack

Over the years, I've owned many little shortwave radios, including the GR-81, but I've sold all of them except for the '81. It's the last shortwave radio in my shack. Occasionally, I take it off the shelf, dust it off, hook it up, and enjoy several hours listening to 80-meter CW, 40-meter CW, WWV, CHU, airport location beacons, and some shortwave. While we can't turn back time, cruising the airwaves with the GR-81 brings back wonderful nostalgic memories from my youth.

All photos provided by the author.



# 100, 50, and 25 Years Ago

## April 1925

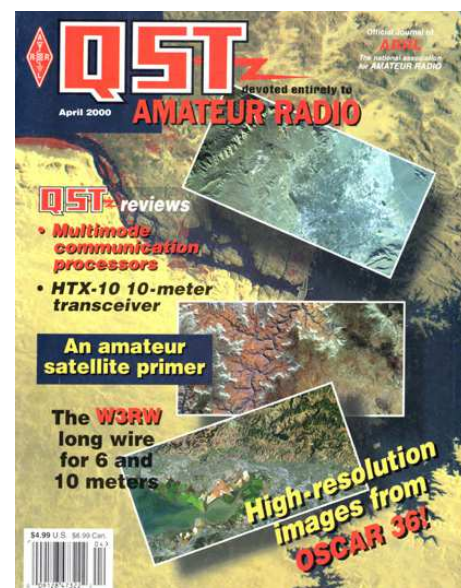
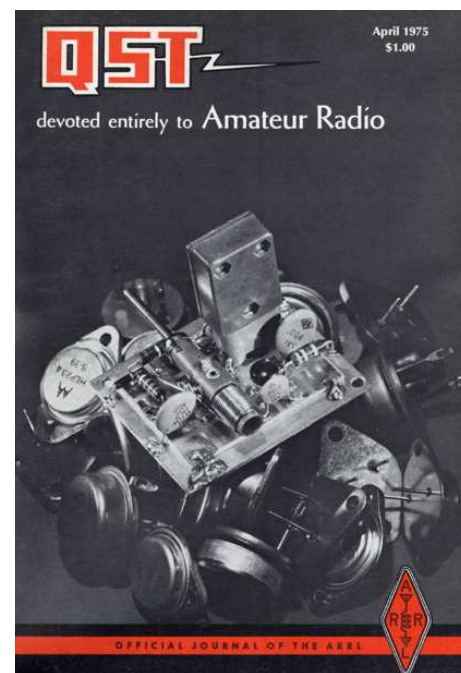
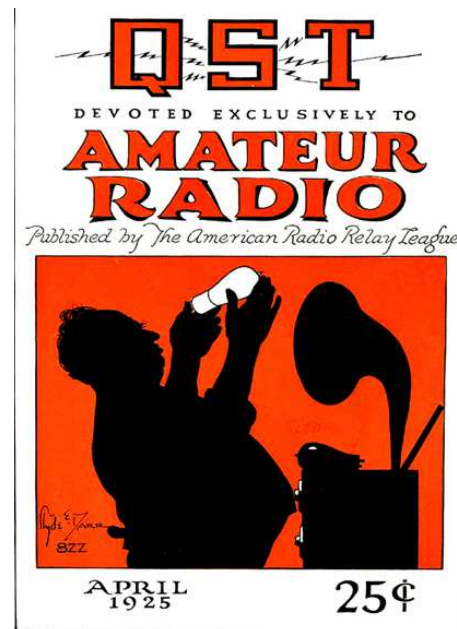
- The cover shows a ham holding a tube up to the light for a visual inspection.
- In "Editorials: This Interference Business," K.B. Warner, 1BHW, calls on members to take the initiative in reducing QRM caused by B.C.L. before the Commission takes action to instate quiet hours. See "Fair Warning!" in this issue.
- How reflection plays an important role in the use of shorter radio waves is explained by John L. Reinartz, 1XAM, in "The Reflection of Short Waves."
- F.H. Schnell, 1MO, accompanies a Navy fleet to Australasia to test short waves along the way. The details are in "Navy Picks Schnell for Tests" by K.B. Warner, 1BHW.
- At its annual meeting, the A.R.R.L. Board established "New Rules for A.R.R.L. Conventions" to make A.R.R.L. conventions more structured and to foster division spirit. K.B. Warner, 1BHW, explains.
- For those inclined toward experimentation, a separate table to test equipment is beneficial. L.W. Hatry, 1OX, shares ideas and layout suggestions in "The Amateurs' Test Table."

## April 1975

- The cover shows the completed oscillator stages for "Learning to Work with Semiconductors, Part 1 — Transmitter Design," by Doug DeMaw, W1CER, and Jay Rusgrove, WA1LNQ.
- In "It Seems to Us...IARU Fiftieth Anniversary," David Sumner, K1ZND, gives a short history of the International Amateur Radio Union.
- Jerry Sevic, W2FMI, shares instruments and methods for use with vertical antennas in "Simple RF Bridges."
- An antenna that can be built for less than \$12, excluding the rotator and cables, is described in "Beginner and Novice: A Ten-Meter Swiss Quad Missouri Style" by John V. Ellison, W0ERZ.
- A 40-meter CW transceiver that approaches the ultimate in portability, with present techniques, is shown in "The Ultramountaineer" by Howard F. Batie, W7BBX.
- Bill Mann, WA1FCM, reports on tornadoes that moved through Mississippi and Alabama in "Amateur Radio Public Service: Break Emergency — Tornadoes Again."
- Noel B. Eaton, VE3CJ, shares "A Message from the President of the IARU" on this significant anniversary in "IARU News."
- Louise Ramsey Moreau, W3WRE, reports on the growth of YL operators throughout Asia in "YL News and Views: The YL Story — Asia."

## April 2000

- The cover highlights images downloaded from OSCAR 36. The accompanying story "Step Up to the 38,400 Bps Digital Satellites," by Stacey E. Mills, W4SM, shares the technology and excitement.
- David Sumner, K1ZZ, marks the 75th anniversary of the founding of the International Radio Union in "It Seems to Us...International Amateur Radio."
- Frank W. King, KM4IE, constructs "A \$20 HF Mobile Antenna" in a few hours of fun with PVC and wire.
- Communicating with satellites isn't as hard as you think. "An Amateur Satellite Primer," by Steve Ford, WB8IMY, can get you started.
- Rick Lindquist, N1RL, chronicles the Dayton Hamvention, from history to logistics, in "How Hamvention Happens."
- This simple tool and winding approach will help you snake thin wires through tiny iron and ferrite cores. Details are in "A Tool for Winding Small Toroidal Cores" by Charlie Hansen, N0TT.
- "Some Tools and Tricks of the Hobby" are shared by Wayne Yoshida, KH6WZ, in "Technical Correspondence."
- "Amateur Radio Emergency Service and Schools" are becoming aware of the importance of good communication and working together. Jim Andera, K0NK, explains in this month's "Public Service" column.



# Silent Keys

It is with deep regret that we record the passing of these radio amateurs:

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| KB1AB<br>▼WA1BRN<br>K1DFD<br>•W1DIZ | <b>Glover</b> , John R., Weston, CT<br><b>Branciforte</b> , Emilio J., Cromwell, CT<br><b>Clark</b> , Gerald A., Danvers, MA<br><b>Wheeler</b> , Leland F.,<br>Shelburne Falls, MA<br><b>Zigun</b> , Sylvia M., Milford, CT<br><b>Gregoritsch</b> , Albert J., Jr.,<br>South Burlington, VT<br><b>Tenney</b> , Paul T., Woburn, MA<br><b>Kalagher</b> , Richard J., Hanover, PA<br><b>Marley</b> , W. T., Vernon, CT<br><b>Allen</b> , Frank W., Mars Hill, ME<br><b>Boyson</b> , Stephen P.,<br>South Dennis, MA<br><b>Killian</b> , John D., Acton, MA<br><b>Hayne</b> , Jack R., Old Bethpage, NY<br><b>Jackson</b> , Robert V., Syracuse, NY<br><b>Guerin</b> , Michael G., Sterling, NY<br><b>Geller</b> , George L., Long Beach, NY<br><b>Larrabee</b> , Stephen H.,<br>Woodstock, VA<br><b>Landry</b> , Ed, Bennington, VT<br><b>Randall</b> , John M., Webster, NY<br><b>Rogowski</b> , Gary J., Sr., Utica, NY<br><b>O'Hagan</b> , Kieran J., Carmel, NY<br><b>Weeman</b> , Kenneth G., Sr.,<br>Archdale, NC<br><b>Blackford</b> , Patricia, Georgetown, IN<br><b>Miles</b> , Ernest N., Apalachin, NY<br><b>Kirkpatrick</b> , George M.,<br>North Syracuse, NY<br><b>Godwin</b> , Thomas Griffin, Jr.,<br>Columbus, GA<br><b>Ballman</b> , Albert A., Toms River, NJ<br><b>Boler</b> , Stanley G., Muncy, PA<br><b>Bannan</b> , Clayton T., Lansdowne, PA<br><b>Brooks</b> , Eric L., Pleasant Gap, PA<br><b>Primavera</b> , Robert E., Berlin, MD<br><b>Dahrsnin</b> , Edwin A., Lancaster, PA<br><b>Dillard</b> , John "Jack" W.,<br>Germantown, MD<br><b>Smith</b> , William R., Elkridge, MD<br><b>Reed</b> , James, Dushore, PA<br><b>Holsopple</b> , Harry E., Scottdale, PA<br><b>Sherbondy</b> , Donald C.,<br>Greensburg, PA<br><b>Ploss</b> , Ronald D., Wattsburg, PA<br><b>Glunt</b> , Paul W., Tyrone, PA<br><b>Stewart</b> , James P., Milton, FL<br><b>Farler</b> , John W., Viper, KY<br><b>Garrett</b> , Royce R., Greensboro, NC<br><b>Ploeger</b> , Fred E., Jr.,<br>Elizabeth City, NC<br><b>Jordan</b> , James A., Dalton, GA<br><b>Kelley</b> , Milton "Russell," Beaufort, SC<br><b>Thomas</b> , Victor R., Rogersville, TN<br><b>Goodman</b> , Stanley F., Aiken, SC<br><b>Maphis</b> , Thomas P.,<br>Stephens City, VA<br><b>Edmisten</b> , Robert T., Vilas, NC<br><b>Wheeler</b> , Alan A., Fairfax, VA<br><b>Burroughs</b> , Aubrey C.,<br>Jamestown, NC<br><b>Peterson</b> , Richard Kent,<br>Louisville, KY<br><b>Adams</b> , James L., Marianna, FL<br><b>Johnson</b> , Sam W., Jr., Bartlett, TN | ▼W4LGJ<br>WA4LIJ<br>▼W4MRO<br><br>▼KI4OHG<br>N4QLX<br>N4QOR<br>KK4RQO<br>•WA4RRD<br>•KD4RZW<br>KI4UEQ<br>▼KI4UYM<br>▼W4B4VEJ<br>KX4WQ<br>KK4WYF<br>▼WB4ZTF<br>K5CMW<br>K5CPC<br>W5DGT<br>KE5EBF<br>WB5GCK<br>W5GEM<br>N5OEU<br>▼K5PWX<br><br>W5RRC<br>KC5UKC<br>W5VPX<br>▼N5WB<br>▼W6ARH<br>WB6EAK<br>▼WD6EQQ<br><br>▼NA6H<br>▼K6JWM<br><br>K6JYJ<br><br>▼W6LMJ<br>KA6MOK<br>▼WA6WTB<br>▼K7BV<br><br>•AD7EL<br>▼KJ7GG<br>W7LEA<br>K7TLV<br>KB7WQD<br>•WL7YM<br><br>KC7YQG<br>AK7YT<br>•N8AFE<br>▼KG8BC<br>KA8CAC<br>W8CVE<br>W8DMH<br>▼K8DMZ<br>▼W8DX<br>▼WD8DYO<br>•WD8LLT<br>▼N8MJA<br>K8NYM<br>▼W8UP<br>•WD8PDI<br><br>▼W8BVKL | <b>Bailey</b> , Gerald F., Corbin, KY<br><b>Woods</b> , Fred E., Jr., Knoxville, TN<br><b>Odum</b> , Melvin R.,<br>Fort Walton Beach, FL<br><b>Meacham</b> , Harold R., Salisbury, NC<br><b>Grubbs</b> , Ricky E., Kernersville, NC<br><b>Oppenheimer</b> , James, Miami, FL<br><b>Ridings</b> , Benjamin C., Cleveland, GA<br><b>Blair</b> , William L., Bowling Green, KY<br><b>Knotts</b> , D. D., Myrtle Beach, SC<br><b>Gish</b> , Barbara D., Beaufort, SC<br><b>Freer</b> , Don, Ocala, FL<br><b>Cuthrell</b> , Luther G., Wallburg, NC<br><b>McMahon</b> , Michael, Fort Pierce, FL<br><b>McCurrie</b> , Jesse E., Lakeland, FL<br><b>Grady</b> , Stanley M., Troy, NC<br><b>Papoutsas</b> , Alex, San Angelo, TX<br><b>Korgan</b> , Milton E., Happy Valley, OR<br><b>Taylor</b> , David G., Kingsland, TX<br><b>Gilbreath</b> , Joe P., Yukon, OK<br><b>Gauthier</b> , Ernest H., Mansura, LA<br><b>McCright</b> , Grady E., Grapeland, TX<br><b>Scanlon</b> , John M., Sulphur, LA<br><b>Hamrick</b> , William L.,<br>Mountain Home, TX<br><b>Lockerd</b> , Jimmy, Lawton, OK<br><b>Webber</b> , Michael T., McAlester, OK<br><b>Dickerson</b> , Willie D., Union, MS<br><b>Blair</b> , W. J., Jr., Plano, TX<br><b>Hill</b> , Alan R., Huntington Beach, CA<br><b>Gann</b> , Susan G., Sherwood, AR<br><b>Loose</b> , Walter M.,<br>North Highlands, CA<br><b>Crupi</b> , Robert L., Watertown, WI<br><b>Cunningham</b> , Kenneth D.,<br>Snelling, CA<br><b>Neely</b> , Thomas F., Jr.,<br>Palm Springs, CA<br><b>Redding</b> , Terrence R., Sr., Deland, FL<br><b>Pike</b> , Jon H., Irvine, CA<br><b>Mahorney</b> , Melvin C., Colusa, CA<br><b>Motschenbacher</b> , Dennis R.,<br>Turkey, NC<br><b>Tompkins</b> , Terry W., Arivaca, AZ<br><b>Zamora</b> , Matthew J., Tucson, AZ<br><b>Nielson</b> , Leigh, Moses Lake, WA<br><b>Webb</b> , George Alan, West Valley, UT<br><b>Stott</b> , Nyle W., Tooele, UT<br><b>Kimball</b> , Leonard R.,<br>Kansas City, MO<br><b>Stott</b> , Connie H., Tooele, UT<br><b>Blanke</b> , Glenn D., Stockton, CA<br><b>Graham</b> , Richard E., Centerville, OH<br><b>Curea</b> , John, Youngstown, OH<br><b>Prestel</b> , Liz, Laurel, MD<br><b>Wingfield</b> , Michael K., Danville, KY<br><b>Hunt</b> , Dennis M., Ottawa Hills, OH<br><b>Ventolo</b> , Joseph A., Jr., Enon, OH<br><b>Laidman</b> , Harvey S., Simi Valley, CA<br><b>Estok</b> , William E., Holland, OH<br><b>Campbell</b> , Mike, Highland, IL<br><b>Miller</b> , Larry, Greenville, OH<br><b>Ferrell</b> , Wesley A., Kent, OH<br><b>Mikula</b> , Phillip J., Howell, MI<br><b>Henkelmann</b> , Frederick W.,<br>Linton, ND<br><b>Wardwell</b> , Raymond H., Portland, MI | ▼♦♦♦WA9ABB<br>N9AU<br>▼WD9BCP<br>▼N9BMN<br>▼WD9FRF<br>KA9IOS<br>♦W9JL<br>KB9JXN<br>▼KD9KO<br>▼WA9KZF<br>W9LOA<br>▼WA9LYC<br>▼K9LZC<br><br>W9MCU<br>KB9MGA<br>KB9NBE<br>K9PLX<br>▼W9PPG<br><br>▼KA9QQD<br>▼KD9UIB<br>▼KC9VIS<br>▼KD9WHK<br>KA9WMI<br>KB9YKC<br>▼N0ALB<br>W0BBO<br><br>W0BEB<br>▼N0FJK<br>▼KB0GWY<br>♦♦KR0K<br>W0NHF<br>♦W0OGH<br>WA0PFV<br><br>▼♦K0QVF<br><br>▼N0SD<br>KB0SIO<br>▼AL0U<br>▼WA0UDD<br>▼KB0WDX<br>KE0ZIK<br><br>VE3RE<br><br>VE6WGW<br><br>♦ ARRL Life Member<br>♦ Current Diamond Club<br>♦ Maxim Society<br>▼ Veteran<br>• Former call sign<br><br>For information on how to list a Silent Key<br>in QST, please visit <a href="http://www.arrrl.org/silent-key-submission-guidelines">www.arrrl.org/silent-key-submission-guidelines</a> .<br><br><b>Note:</b> Silent Key reports must confirm the death by<br>one of the following means: a copy of a newspaper<br>obituary notice, a copy of the death certificate, or a<br>letter from the family lawyer or the executor. Please<br>be sure to include the amateur's name, address, and<br>call sign. Allow several months for the listing to<br>appear in this column. | <b>Sorrells</b> , Jimmy R., Findlay, OH<br><b>Gorski</b> , Ronald J., Milwaukee, WI<br><b>Roth</b> , Glen R., Waukesha, WI<br><b>Kennedy</b> , Carl P., Harvard, IL<br><b>Esser</b> , Jim R., Madison, WI<br><b>Winterberg</b> , Lois, Columbus, IN<br><b>Lauterbach</b> , James R., New Lenox, IL<br><b>Kuca</b> , Mieczyslaw L., Streamwood, IL<br><b>Plant</b> , Duane A., Batavia, IL<br><b>Bobzien</b> , Fred, Trevor, WI<br><b>Reier</b> , Doris E., Middleburg, FL<br><b>Davis</b> , James I., Lafayette, IN<br><b>Goodwin</b> , William E.,<br>North Manchester, IN<br><b>St. Onge</b> , Steven J., Milwaukee, WI<br><b>Pfaltzgraff</b> , Lorin R., Tunnel Hill, IL<br><b>Moore</b> , Bonnie L., Rockford, IL<br><b>Hopper</b> , Chuck, Warrenville, IL<br><b>Weinhardt</b> , William J.,<br>West Lafayette, IN<br><b>Lund</b> , Richard A., Wheaton, IL<br><b>Duffy</b> , Jim F., Black Creek, WI<br><b>Wiltse</b> , Robert J., Rudolph, WI<br><b>Huber</b> , William J., Sr., New Castle, IN<br><b>Arata</b> , David J., Moorpark, CA<br><b>Gebuhr</b> , Charles, Indianapolis, IN<br><b>Nulton</b> , Donald W., Wichita, KS<br><b>Eklund</b> , Charles A.,<br>Colorado Springs, CO<br><b>Baker</b> , Bruce E., Omaha, NE<br><b>Schulstad</b> , John C., Willmar, FL<br><b>Crihfield</b> , Arnold B., Carthage, MO<br><b>Larson</b> , Larry E., Faribault, MN<br><b>Fortune</b> , William F., Pueblo, CO<br><b>Godek</b> , Larry D., Cochise, AZ<br><b>McChesney</b> , James R., Jr.,<br>Roseville, MN<br><b>Tonneson</b> , Ronald J.,<br>Cedar Rapids, IA<br><b>Waltner</b> , John R., Sioux Falls, SD<br><b>Holt</b> , Catherine L., Hartford, WI<br><b>Morton</b> , Arthur S., Anchorage, AK<br><b>Wilkins</b> , Robert E., Des Moines, IA<br><b>Groves</b> , Parker Ross, Lawrence, KS<br><b>Pogachnik</b> , William J.,<br>Rochester, MN<br><b>Cassel</b> , Margaret Mary, New<br>Hamburg, Ontario, Canada<br><b>Ward</b> , Walter G., Sexsmith,<br>Alberta, Canada |
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• High Visible LCD with Backlight Function • Find Nearby Repeaters with the Built-In GPS • Easy D-STAR Settings for Beginners • Voice Recorder Function • Share Pictures in DV Mode



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## IC-7610 | HF/50 MHz All Mode Transceiver

• Large 7-inch color display with high resolution real-time spectrum scope and waterfall • Independent direct sampling receivers capable of receiving two bands/two modes simultaneously

## IC-V86 | VHF 7W HT

• 7W Output Power Plus New Antenna Provides 1.5 Times More Coverage • More Audio, 1500 mW Audio Output • IP54 & MIL-STD 810G-Rugged Design Against Dust & Water • 19 Hours of Long Lasting Battery Life • 200 Memory Channels, 1 Call Channel & 6 Scan Edges



**IC-2730B version available!**

## IC-2730A | VHF/UHF Dual Band Transceiver

• VHF/VHF, UHF/UHF simultaneous receive • 50 watts of output on VHF and UHF • Optional VS-3 Bluetooth® headset • Easy-to-See large white backlight LCD • Controller attachment to the main Unit



## IC-T10 | Rugged 144/430 MHz Dual Band

• Disaster Ready - Excellent Fit for Your Emergency Bag • Loud Audio - New Speaker Design • Long Battery Life - Up to 11 Hours • FM Broadcast & Weather Channels



## IC-R8600 | Wideband SDR Receiver

10 kHz to 3 GHz Super Wideband Coverage • Real-time Spectrum Scope w/Waterfall Function • Remote Control Function through IP Network or USB Cable • Decodes Digital Incl P25, NXDN™, D-STAR • SD Card Slot for Receiver Recorder



## ID-5100 AD | VHF/UHF Dual Band Digital Transceiver

• Analog FM/D-Star DV Mode • SD Card Slot for Voice & Data Storage • 50W Output on VHF/UHF Bands • Integrated GPS Receiver • AM Airband Dualwatch

## ID-52A | VHF/UHF D-STAR Portable

• Bluetooth® Communication • Simultaneous Reception in V/V, U/U, V/U and DV/DV • Enriched D-STAR® Features Including the Terminal Mode/Access Point Mode • UHF (225~374.995MHz) Air Band Reception

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## FTDX101MP | 200W HF/50MHz Transceiver

- Hybrid SDR Configuration • Unparalleled 70 dB Max. Attenuation VC-Tune • New Generation Scope Display 3DSS • ABI (Active Band Indicator) & MPVD (Multi-Purpose VFO Outer Dial) • PC Remote Control Software to Expand the Operating Range • Includes External Power With Matching Front Speaker



## FTDX10 | HF/50MHz 100 W SDR Transceiver

- Narrow Band and Direct Sampling SDR • Down Conversion, 9MHz IF Roofing Filters Produce Excellent Shape Factor • 5" Full-Color Touch Panel w/3D Spectrum Stream • High Speed Auto Antenna Tuner • Microphone Amplifier w/3-Stage Parametric Equalizer • Remote Operation w/optional LAN Unit (SCU-LAN10)



## FT-991A | HF/VHF/UHF All Mode Transceiver

- Real-time Spectrum Scope with Automatic Scope Control • Multi-color waterfall display • State of the art 32-bit Digital Signal Processing System • 3kHz Roofing Filter for enhanced performance • 3.5 Inch Full Color TFT USB Capable • Internal Automatic Antenna Tuner • High Accuracy TCXO



## FTDX101D | HF + 6M Transceiver

- Narrow Band SDR & Direct Sampling SDR • Crystal Roofing Filters Phenomenal Multi-Signal Receiving Characteristics • Unparalleled - 70dB Maximum Attenuation VC-Tune • 15 Separate (HAM 10 + GEN 5) Powerful Band Pass Filters • New Generation Scope Displays 3-Dimensional Spectrum Stream



**FT-710 Field version also available!**

## FT-710 Aess | HF/50MHz 100W SDR Transceiver

- Unmatched SDR Receiving Performance • Band Pass Filters Dedicated for the Amateur Bands • High Res 4.3-inch TFT Color Touch Display • AESS: Acoustic Enhanced Speaker System with SP-40 For High-Fidelity Audio • Built-in High Speed Auto Antenna Tuner



## FT-891 | HF+50 MHz All Mode Mobile Transceiver

- Stable 100 Watt Output • 32-Bit IF DSP • Large Dot Matrix LCD Display with Quick Spectrum Scope • USB Port Allows Connection to a PC with a Single Cable • CAT Control, PTT/RTTY Control



## FT-3185RASP | Heavy-Duty 85W 2M FM Transceiver

- Massive Heatsink Ensures Reliable 85W RF Power • Super-DX Function Increases Receiver Sensitivity & Weak Signal Reception • 221 Memory Channels • Large 6-Character Alpha-Numeric Display



## FTM-150RASP | 2M/430MHz FM True Dual Band Xcvr

- Dual Receivers Allowing (V+V, U+U, V+U, U+V) Operation • 55W VHF & 50W UHF • Heavy Duty Heat Sink w/Funnel Air Convection Conductor • Front & Main Body Speaker for 6W High Quality Audio



## FTM-510DRASP C4FM/FM 144/430MHz Dual Band Xcvr

- New Super-DX & ASP (Audio Digital Signal Processor Unit) • True Dual Bank Receive (V+V/U+U/V+U/U+V) • C4FM/C4FM Digital D-D Dual Receive • 2.4" High-Res Full-Color Touch-Panel Display • Wireless Operation Capability with Optional Bluetooth® Headset



## FT-60R | VHF/UHF Rugged Dual Band

- Over 1000 Memory Channels • Wide Bank Receiver Coverage • High Power Output: 5 Watts • Huge LCD Display • NOAA Severe Weather Alert with Alert Scan



## FT-70DR C4FM/FM 144/430MHz Xcvr

- System Fusion Compatible • Large Front Speaker delivers 700 mW of Loud Audio Output • Automatic Mode Select detects C4FM or Fm Analog and Switches Accordingly • Huge 1,105 Channel Memory Capacity • External DC Jack for DC Supply and Battery Charging



## FT-5DR C4FM/FM 144/430 MHz Dual Band

- High-Res Full-Color Touch Screen TFT LCD Display • Easy Hands-Free Operation w/Built-In Bluetooth® Unit • Built-In High Precision GPS Antenna • 1200/9600bps APRS Data Communications • Supports Simultaneous C4FM Digital • Micro SD Card Slot

## FT-65R | 144/430 MHz Transceiver

- Compact Commercial Grade Rugged Design • Large Front Speaker Delivers 1W of Powerful Clear Audio • 5 Watts of Reliable RF Power Within a compact Body • 3.5-Hour Rapid Charger Included • Large White LED Flashlight, Alarm and Quick Home Channel Access



## VX-6R | VHF/UHF Dual Band Hand-Held

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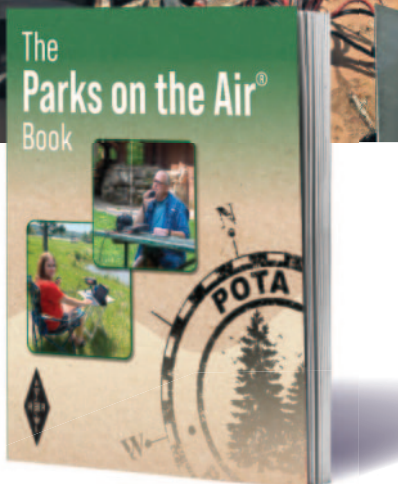
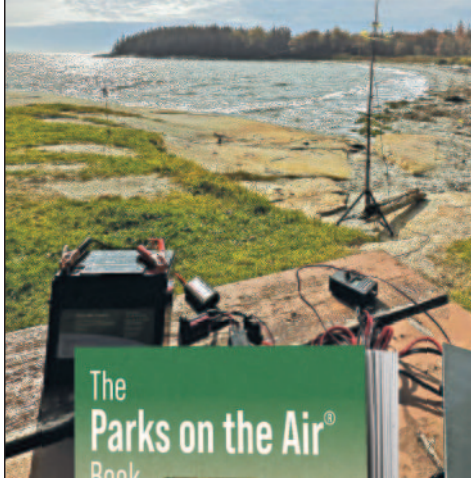
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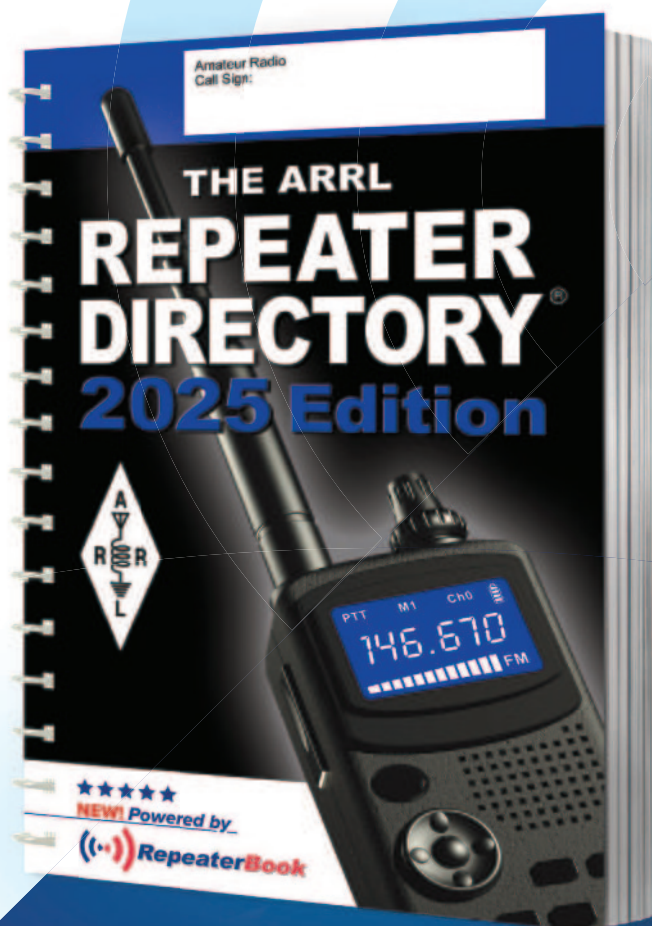
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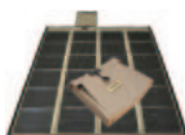
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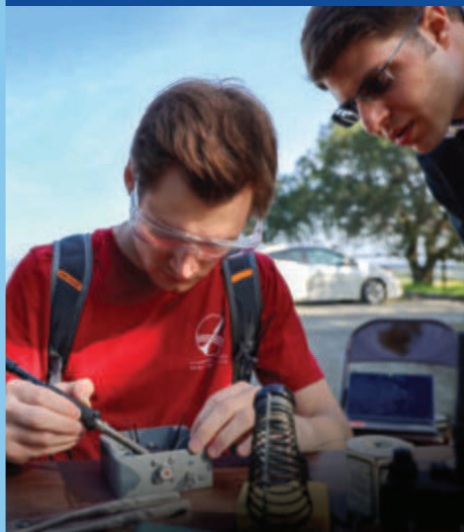
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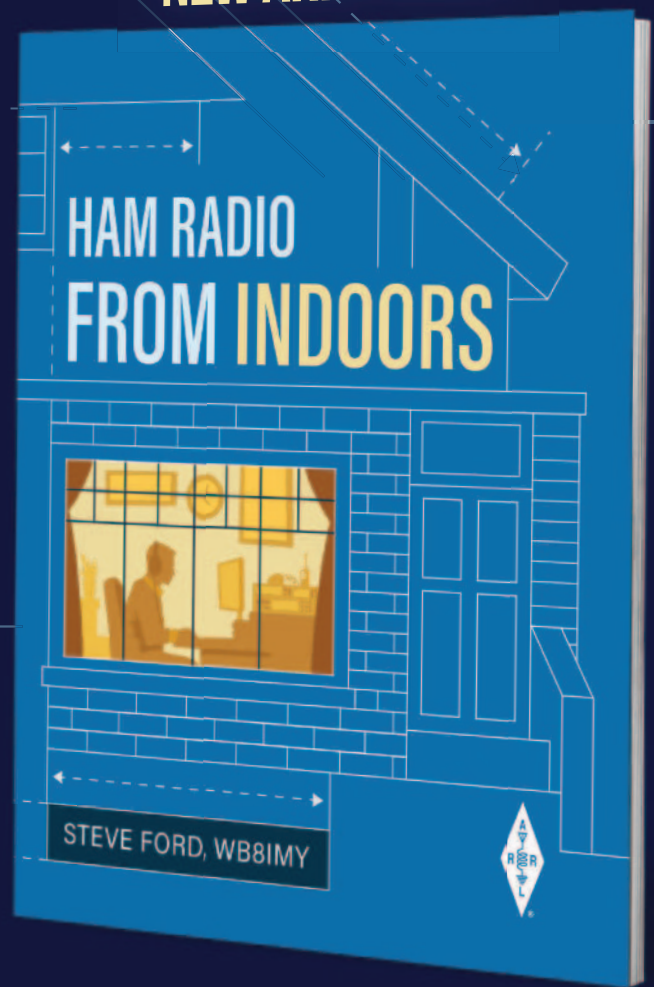
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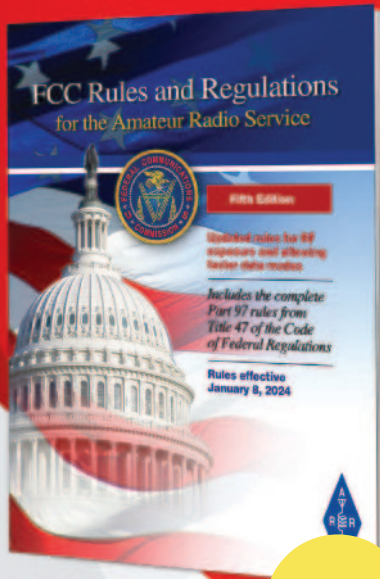
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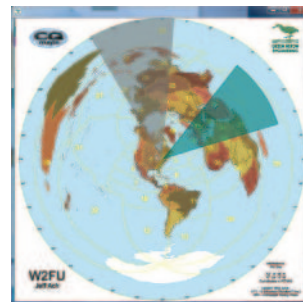
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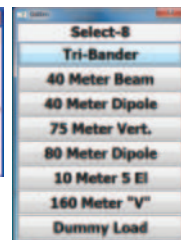
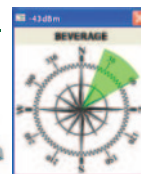
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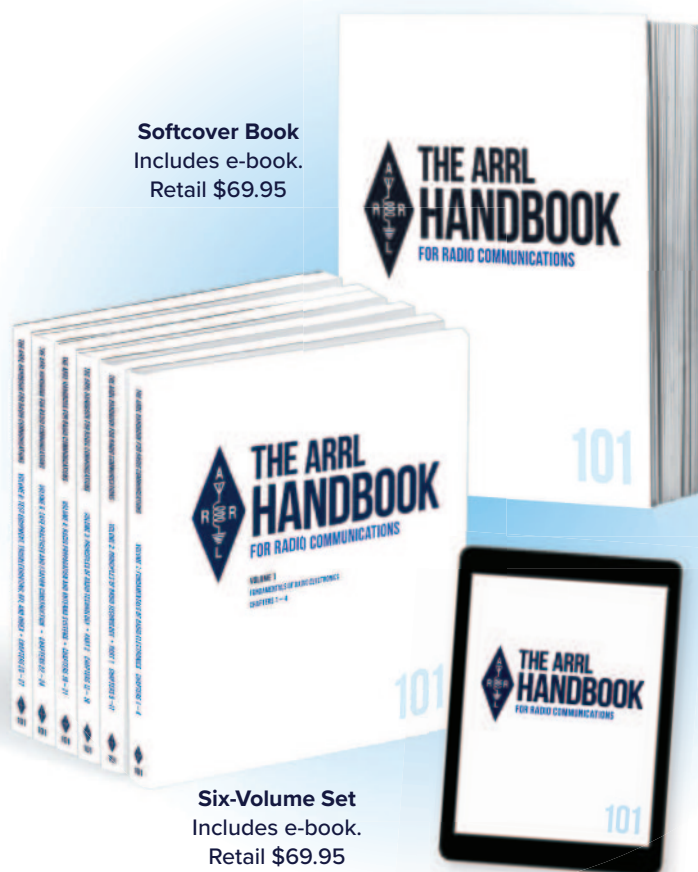




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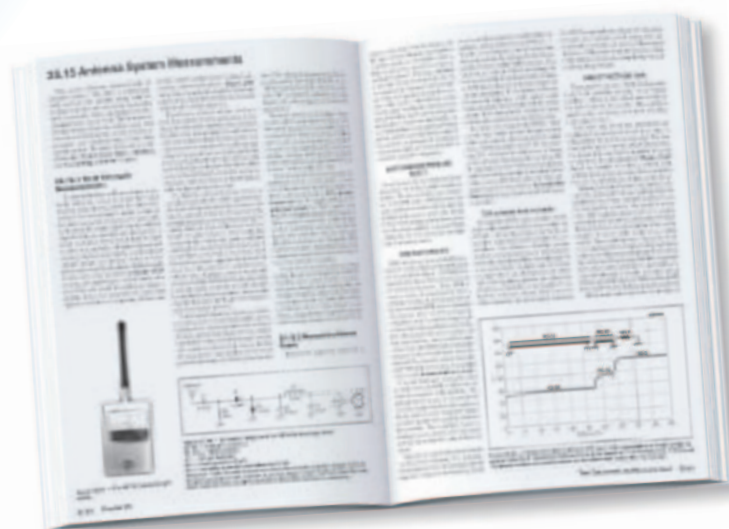
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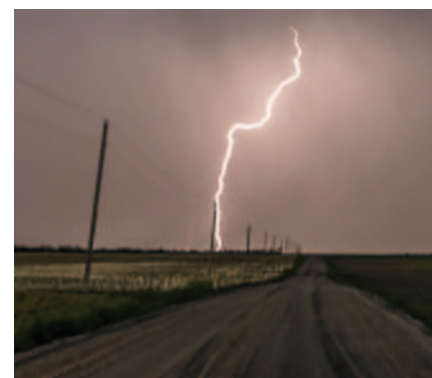
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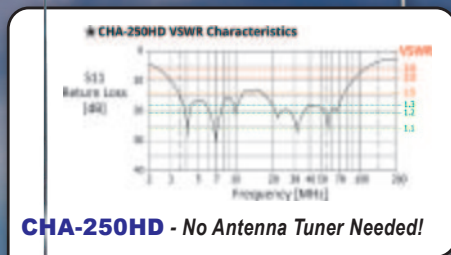
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### 06 **COMET, GP-15 TRI-BAND 52/146/446MHZ BASE REPEATER ANTENNA**

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