QST
DIGITAL EDITION

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All Eyes on the Sun:
The Peak of Cycle 25 is Here!

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*TX Phase Noise: 100W, CW mode

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- **3DSS**, real-time 3-Dimentional 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**

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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QST

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Our Cover
Here at the peak of Solar Cycle 25, hams are scrutinizing solar data ranging from daily sunspot numbers, to monthly averages and beyond. In his article "Looking at the Sun," John Keating, K7LY, digs into various types of data from this solar cycle and others, in an attempt to determine how reliably peaks in the data predict good propagation. [Sierra Harrop, W5DX, photo]

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F22A (2 Section)	2m	10.5	200	UHF
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MR77 Series	2m/70cm	20 in.	70	Mag Combo
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AZ504SP	2m/70cm	15.5 in.	50	UHF
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David A. Minster, NA2AA, ARRL Chief Executive Officer, na2aa@arrl.org

Second Century

Living at the Peak: Solar Cycle 25 in 2025

Back in 2020 when I joined ARRL as CEO, we had just begun a new sunspot solar cycle: Solar Cycle 25. Most predictions showed yet another lackluster forecast, much like Cycle 24. But one standout, with the science to back the claims, came from astrophysicist Dr. Scott McIntosh at the National Center for Atmospheric Research. His forecast for Cycle 25, in a word, was gangbusters*!*

In October 2024, NASA announced that we have reached the peak of Cycle 25. The bands are on fire, but it's all pretty much downhill from here. Across parts of North America, we knew that activity on the sun was extraordinary from our ability to clearly see the northern lights just after sunset on October 10. The huge solar storm that created this highly sought-after event gave hams the opportunity to make contacts on VHF using aurora for propagation.

What should you expect from these peak days of the solar cycle? Take 10 meters during October's CQ World Wide SSB contest. On Saturday around 1600Z, it was nearly impossible to find a clear frequency below 29 MHz! Contests, by the way, are a *great* way to test your station — just by setting a simple goal of making 100 contacts! You will get an indicator of how crazy 10 meters was during CQ WW if you look at the Multi/Multi stations. I looked at the station that appears to have won the category, CN3A in Morocco. This year they made an eye-popping 6,000+ contacts on 10 meters! Compare that to the low point of Cycle 24 in 2018, when they made only 470 contacts!

Or ask Fred Kemmerer, AB1OC. He and his wife Anita, AB1QB, have built a beautiful station in southern New Hampshire and have documented their experimentations on their blog. During the week of November 4, with a single seven-element LFA (loop-fed array) Yagi on 6 meters, Fred worked across Europe, into the Middle East, and on into India and Reunion Island. Also in November, the team at VK9CV on Cocos (Keeling) Islands reported openings to the other side of the globe into the Caribbean on 6 meters.

If you're a Technician, a ham with limited space, or someone who likes portable operating, this is extremely good news. One great antenna resource to look at is "Salty Walt" Hudson, K4OGO, whose YouTube channel "Coastal Waves & Wires" routinely features antennas that can be constructed with a push-up mast and light-gauge wire. ARRL is working with Walt to bring his antenna experiments to life in an antenna workbook. But there's no need to wait. Building a simple end-fed half-wave (EFHW) antenna is a quick and inexpensive way to get on the air. ARRL offers an EFHW kit to make it easy. We've also partnered with Momobeam to create a lightweight 10-meter Moxon and 6-meter Yagi on the same boom for home or portable use. It's quick and easy to get on the air with just the antenna and a mast.

The explosion in sunspots has also brought an explosion in DXpeditions. Using DX news sources, VOACAP, **dxwatch.com**, Reverse Beacon Network, and PSK Reporter can help you find and work entities to add to your DXCC Challenge count. Yes, there has been some static about expeditions becoming dependent on FT8 to drive up the number of contacts while also giving modest stations the opportunity to work them, but overall there's an excitement about working those all-time new ones now that they're finally on the air!

The next couple of years will continue to be strong performers, and you should take advantage. Experiment with new antennas or radios. Get familiar with the tools online and use them. Make sure you leverage Logbook of The World for confirmations as well as tracking your DXCC, WAS, and VUCC awards status. Be radio active. Enjoy these great conditions. Be a connector! Make sure that the hams you know, especially those with modest stations, are chasing the DXpeditions. Looking forward to seeing you at Orlando HamCation next month!

David A. Minster, NA2AA
Chief Executive Officer

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See review in October 2024 QST page 38

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Member Spotlight

Justin Hughes, KJ1H

Justin Hughes, KJ1H, has been an avid ham for most of his life. In 2021, he made the decision to live on the road full-time and hasn't looked back. Since then, he's managed to continue his operations and advocate for amateur radio.

Introduction to Ham Radio

Justin's father, Don, KA1MF, introduced him to ham radio. Justin was fascinated by his dad's ability to talk with people all over the world and even astronauts in orbit. So, Justin got licensed when he was 15 and began operating with his dad's old HF and VHF equipment. He now holds an Extra-class license.

Justin was driven to earn his Extra-class license so he could become a Volunteer Examiner for any license class. "I wanted to give something back to the amateur radio community. One of the most rewarding experiences I've ever had on the air was [my] first contact [with] someone I tested and passed at a recent exam," Justin recalled.

Justin has also given back to the amateur radio community by becoming one of the co-founders of the Northeast Rally Radio Club, W1RLY. Instead of partnering with local ham radio clubs to provide communications support for rally events, the responsibility is left to individual participants. Justin explained that a rally event is "where cars compete against each other against the clock on closed sections of roads rather than on racetracks. Many [participants] are car people first and don't know much about ham radio, so I created the W1RLY (W1 Rally) website [**https://w1rly.org**] as a repository of information about getting licensed, the right equipment to use," etc.

Justin understands the value of putting explanatory information online to educate an infinite number of people because he came across **#vanlife** in the same manner.

Introduction to #Vanlife

Justin initially imagined an American dream lifestyle for himself. However, he needed a change once he realized money went out as fast as it came in and that he was still unhappy after ultimately having it all. Justin discovered the **#vanlife** movement — living in a converted van or other motor vehicle for the ease of traveling — through videos online. After doing a lot of research and developing a plan, he converted a 2004 Ford E-250 van to live in full-time, with the goal of obtaining a simpler and less financially taxing way of life that provided the most freedom. He regularly provides updates on his life on the road at **https://smokeydavan.com**.

Justin put a Kenwood TM-V71A under the dashboard with a dual-band antenna on the fender to monitor 146.520 MHz and APRS so he can make contacts while driving. He operates HF while parked and runs SSB on the low bands with a Xiegu G90 and an Alpha Full Metal Jacket portable vertical antenna.

So far, Justin has visited 44 of the lower 48 states. When traveling, one of his cardinal rules is to trust the locals because they know more about where they live than he can ever learn online. This notion extends to local hams, too. They are happy to tell Justin about the general area, local nets and repeaters, and club meetings.

Of course, operating on the road full-time has its challenges. One of Justin's biggest obstacles is the difficulty of putting up an HF antenna. Campsites in forest areas often aren't big enough to put up a large antenna, and in the desert regions of Quartzsite, Arizona, where Justin spends his winters, there aren't any trees for stringing up a dipole.

The Road Ahead

Amid his adventures, Justin met a fellow traveler-turned-significant other. They plan to build an off-grid tiny home with a permanent ham shack, but they would still like to live on the road part-time.

Justin offered advice that applies to anyone looking to get into ham radio or live on the road full-time: "Just do it," he said. "Life is short, and you're never promised tomorrow. Whatever it is you want to try, go for it. It's better to try it and possibly realize it's not for you than to not try it at all and never know."

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QST Dec 2019 review *"easy-to-use device that improves the audio clarity of amateur signals"*

In-Line Module

In-Line Module connections

5W amplified DSP noise canceling In-Line module - 8 filter levels 8 to 40dB - Use in-line with a loudspeaker - Audio bypass feature - 3.5mm mono inputs and outputs - Headphone socket - Audio input overload feature - Use with an extension speaker - Supplied with a fused DC power lead, 3.5mm mono jack plug lead and user manual

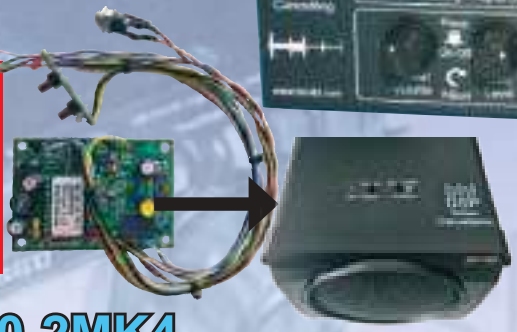
Dual In-Line

Fully featured flexible dual channel amplified DSP noise canceling unit
- 8 Filter levels 9 to 40dB
- 3.5mm mono or stereo inputs
- Line level input/output
- 7 watts mono speaker output
- Headphone socket
- Easy to use controls

Compact In-Line

- Portable DSP noise canceling unit
- Simple controls
- Use in-line with headphones or powered speakers
- Line/speaker level inputs
- Use with AA batteries or 12V DC supply

NEDSP1962-KBD 5W amplified DSP noise canceling extension speaker retrofit pcb module Easy to install!



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Up to 5 receive antenna sources

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Up Front

CQ New Orleans

While visiting New Orleans, Louisiana, Glenn Luzzi, WG3F, and his wife had the pleasure of experiencing a Mississippi River boat tour to view the city. As their boat passed a docked paddleboat, Glen noticed the paddleboat's tag — *CQ Creole Queen*. [Glenn Luzzi, WG3F, photo]

The $2 Book that Started It All

Robert Rayner, Jr., KB3ZIM, read the August 2024 *QST* editorial in which ARRL CEO David Minster, NA2AA, mentioned that he used "…the gray *Ameco Amateur Radio Theory Course* book to learn the material" to take his first amateur license exam. That reference inspired Robert to dig through his ham radio archives, where he found his copy, along with its purchase receipt. Robert says, "My father, who was not a ham, asked a friend of his who was a ham to obtain license study materials for me. The book was purchased (at a whopping $2.00 in 1982!), and Dad gifted it to me. Using audio cassettes, I learned Morse code, but life got in the way, and I didn't sit for a license exam until I was 59 years old. Happily, I've made up for lost time, but will never forget the thoughtful gift I received that started my quest to become a licensed amateur radio operator." [Robert Rayner, Jr., KB3ZIM, photo]

A Fellow Ham in Italy

On a recent walk through Anacapri, Italy, Ted Cohen, N4XX, and his then-fiancée, now wife, Pam Geiger, discovered a ham tower and antenna. They learned the owner was Oreste Gargiulo, IC8AJU, the proprietor of La Giara, one of the best restaurants in town, so they stopped in for an eyeball QSO — and a great meal. [Pam Geiger, photo]

Ted Cohen, N4XX, and Oreste Gargiulo, IC8AJU.

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Correspondence

Letters from Our Members

Hammarlund Memories

Comments about the Hammarlund HQ-100 receiver in the September 2024 "Classic Radio" column brought me back to 1956. I was a 12-year-old, new General-class licensee struggling with the Heathkit AR-2 receiver. After seeing my frustration, my father sprang for a Hammarlund HQ-100.

What a miracle! I worked the world with that radio, my Heathkit DX-35, and a 40-meter vertical antenna! It was a dream come true. In those days, you did not need a lot of features on a software-defined radio to sift out stations. The bands weren't that crowded, and the sunspots nourished plenty of DX. Background noise was S1, and static was limited to my mother's vacuum and the occasional car going by before they invented resistance spark plug wires. The Hammarlund HQ-100 never let me down.

Ron Masson, AI6IX
Topanga, California

First-Time Island Activation

I came across the US Islands Awards Program (USI) while searching the internet. To my surprise and delight, the USI website (**https://usislands.org**) showed an island in Lubbock, Texas (USI TX077L), on the pond at Leroy Elmore Park, that had never been qualified.

I found a great bargain on a Yaesu FTDX10 and quickly acquired it. I ordered an antenna, coax, and a battery and solicited help from my friends Brandon, K5BEK, and Don, KB5JNK.

We gathered at the lake on Sunday morning, July 28, 2024, and headed across to the island, where we managed to get the antenna across tree branches about 5 or 6 feet above the water. Once the antenna was up, we ran the cable across more branches and onto the island.

We hit the air and made contacts on the 17-, 20-, and 40-meter bands. For island qualification, we needed a minimum of 15 contacts, and we managed to make 23 with a couple of duplicates.

I am tremendously grateful to my team for working together to make this happen! This turned out to be a wonderful day to activate this island and have fun.

Patti Emerling, K9DWG
Lubbock, Texas

Terminology Mix-Up

In the early 1960s, my uncle, WA9GND (SK), became the repairman for our family's TV sets. He had some training and test equipment, including a tube tester, voltmeter, and oscilloscope. He often fixed the problem, saving us the cost of a repairman.

One time, our TV "went on the blink," so we gave him a call. My uncle came over to troubleshoot the TV and brought my cousin, who was about 5 years old. After taking measurements and adjusting the controls, my uncle said to himself, "I think there's a problem in the sync." My cousin ran to our kitchen, then returned and declared, "There's no problem in the sink; it's still there!" My uncle burst out laughing and explained what "sync" meant. We all had a good laugh!

Jim Kocsis, WA9PYH
South Bend, Indiana

Report RFI Issues

During the past few years, I have had issues with excessive radio frequency interference (RFI) making some of the ham frequencies nearly useless. Fortunately, our electric provider, Guadalupe Valley Electric Cooperative (GVEC) of south-central Texas, has been proactive and knowledgeable in this area.

Recently, I had RFI in the 18 to 50 MHz range that was worse than usual. It produced a broad range of spikes, separated roughly every 1 kHz, that masked almost all of the reception in those bands. These RFI transmissions were produced by an arrester located on a transformer at the top of a telephone pole. I emailed GVEC, and they responded within hours to replace the arrester. Notably, this was on a Friday afternoon. Upon the repair of the arrester, the bands were quiet once again.

It is important to understand that these reports benefit the ham radio operator and the utility by proactively addressing an issue prior to a significant failure. Don't be shy; report RFI issues as they occur.

I must thank GVEC for sharing the "Ham Radio RFI Find & Fix" (**www.youtube.com/watch?v=wEutG_IIxtQ**) and "18kV Rated VariGAP Porcelain Arrester Fail" (**www.youtube.com/watch?v=GnHw_KK_h4M**) videos that explain the source of RFI problems.

John Vause, KF5LZX
Seguin, Texas

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All the best to you in the Joyful Season

Peace in the world begins with peace in your heart,
may you find His peace this Holiday Season

testimonials

The SteppIR 4E/40 has fulfilled my expectations in providing a BIG signal anywhere in the world! The front-to-back performance is phenomenal 26DB with S9+ 20 reports commonplace.

Rich Barsky WA1GZY
4 Element Yagi w 40/30

Antenna performance: **5 Stars**
SteppIR assembly/support: **5 stars**
SteppIR fit and finish: **5 Stars**
This is a very nice, well designed antenna at KP3H.

Daniel Hernandez KP3H/KP4BD

love my SteppIR 4 element Yagi and se it every day I am home. It is one f my most prized possessions.

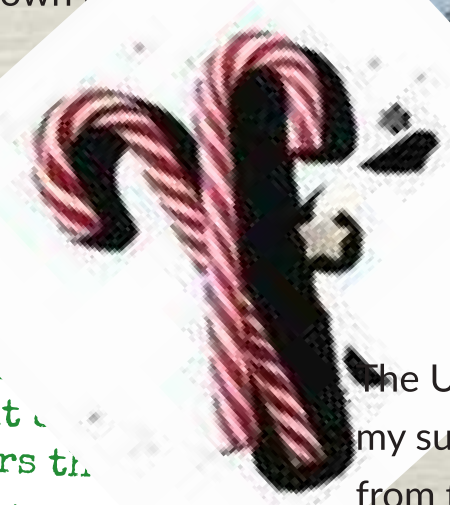
ohn Westerman W5ODJ **4 Element Yagi**

ve to hear about your SteppIR product experiences. ad all the reviews, check out our Testimonial Page on ebsite. **HAPPY HOLIDAYS FROM THE STEPPIR CREW!**

At SteppIR, we believe the best feedback you can get on a product, is from the people that own them – That's why we have a dedicated testimonials page on our website!

I have had the 2E for about 3 years now. The antenna has performed beyond what I ever imagined. The SteppIR 2E has been, and still is working like a dream! I have had bigger antennas prior, and SteppIR Yagi is the best I've owned. HOA i forced me to take this antenna down h in the field with great results!

Robert Coleman G0WYD
2 Element Yagi



From an RF performance pe
this is by far the best anten
ever used. My Yagi is at about
over average ground and hears th
gnats fart in the Middle East!

Greg Glenn NR6Q **DB36 Yagi**

The Urban beam is the perfect fit for my suburban QTH which is 1.8 miles from the Atlantic... This antenna has been up for three years and not one problem.

Steve Moore WB0AOD
UrbanBeam

The BigIR has performed flawlessly since it was installed about 2 1/2 years ago... I highly recommend The BigIR for those that enjoy working DX and are challenged with space or zoning constraints.

Howie Naugle K1TZQ **BigIR**

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steppIR
COMMUNICATION SYSTEMS

W1AW Schedule

PAC	MTN	CENT	EAST	UTC	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM	1400		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-12^{45} PM	8 AM-1^{45} PM	9 AM-2^{45} PM	10 AM-3^{45} PM	1500-2045	VISITING OPERATOR TIME				
1 PM	2 PM	3 PM	4 PM	2100	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	2200	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	2300	DIGITAL BULLETIN				
4 PM	5 PM	6 PM	7 PM	0000	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	0100	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	0200	DIGITAL BULLETIN				
6^{45} PM	7^{45} PM	8^{45} PM	9^{45} PM	0245	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	0300	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	0400	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

♦ 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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*1: APRS® (The Automatic Packet Reporting System) is a registered trademark of TAPR (Tucson Amateur Packet Radio Corp.)
*2: D-STAR is a digital radio protocol developed by JARL (Japan Amateur Radio League).

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ADS#31823

100+ W Low-Cost Dry Dummy Load

Build a medium- to high-power dummy load that's good for up to 225 or 450 MHz.

The completed 100+ W dry dummy load.

Phil Salas, AD5X

While looking for a heatsink on Amazon, I stumbled on a central processing unit (CPU) heatsink with a fan at an extremely attractive price. Almost simultaneously, I received a notification from AliExpress about some inexpensive 50 Ω high-power terminations. A little searching on AliExpress also uncovered some high-power attenuators. This led me to wonder if I could build a fan-cooled dry dummy load that could handle up to the full output of my Elecraft KPA500 amplifier — at least for a few seconds. My solution was to put a 3 dB 250 W attenuator in series with a 250 W 50 Ω termination. This way, half the power would be dissipated in each device, and I could spread the heat on the heatsink. The lead photo shows the completed dummy load, and Table 1 details the main parts used in this project. For a more complete table, with part numbers and minor hardware components, visit **www.arrl.org/qst-in-depth**. The total cost should be less than $40.

Heatsink Modifications

I wanted to mount the unit with ample space around the fan so that it can easily draw air through the heatsink fins. The fan is attached to a bracket using self-tapping machine screws (see Figure 1). The fan assembly is held to the heatsink with the interference fit of the screws and the heatsink fins. I removed the sheet metal screws from the heatsink side, and I replaced them with 4-40 × ½-inch machine screws. After that, I screwed 4-40 ½-inch threaded standoffs into the fan side. Because friction no longer held the fan assembly to the heatsink, I drilled ⅛-inch D holes in each side of the heatsink and attached the fan assembly via #6 self-tapping screws and washers (see Figure 2).

Next, I drilled and tapped holes for 4-40 screws in order to mount the UHF connector, the 3 dB attenuator, and the 50 Ω load on the heatsink. Figure 3 shows a top view of the final unit.

Table 1 — Dummy Load Major Components

Quantity	Part Description	Source
1	250 W 3 dB attenuator	AliExpress
1	250 W 50 Ω termination	AliExpress
1	StarTech 85 × 70 × 50-millimeter CPU cooler with heatsink	Amazon
4	4-40 × ½-inch aluminum standoffs	Mouser Electronics
1	UHF connector	Mouser Electronics
1	6.8 or 2.2 pF 1 kV capacitor	N/A

Figure 1 — The fan mounted with sheet metal screws.

Figure 2 — The standoffs and fan attached to the heatsink.

SWR Tests

So, how well does this work? First, I scanned the dummy load up to 500 MHz with an Array Solutions VNAuhf vector network analyzer. As you can see in Figure 4 (blue line), the standing wave ratio (SWR) is about 1.2:1 on 6 meters, 1.4:1 on 2 meters, and about 1.6:1 on 220 MHz. While this is not bad, especially on HF (6 meters), I thought there might be some room for improvement.

Because the VNAuhf indicated that the load was inductive, I felt that a capacitor connected from the RF input to ground could help compensate the inductive reactance. After a little analysis and some experiments, I determined that a 6.8 pF capacitor was a good compromise. Those results are shown in Figure 4 (red line). The SWR is now less than 1.1:1 on 2 meters and less than 1.2:1 on 220 MHz — a nice improvement. Of course, my main interest for this dummy load is 1.8 – 54 MHz, but it is good to know that it will also function well on 2 meters and 220 MHz.

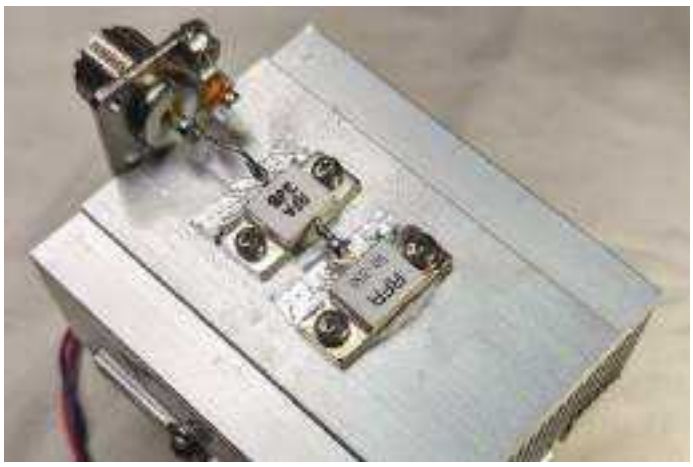


Figure 3 — A top view of the mounted UHF connector, compensating capacitor, attenuator, and load.

Thermal Tests

It was time to do some testing with an infrared thermal sensor. First, I applied 100 W on 14 MHz. After about 1 minute, the temperature of the heatsink between the two devices — the hottest place I could find — went from 68°F to 89°F, which is where it stabilized. After no change for 2 minutes, I terminated the test. Next, I

Lowest SWR Using Stripline Resistors

Loads used with stripline circuit boards typically have a broad tab that matches the width of the conductors on the board. An example of a stripline resistor can be viewed at **www.arrl.org/qst-in-depth**. The width is chosen to form a 50 Ω transmission line when working against its ground plane on the opposite side of the substrate. When directly connecting to a coaxial connector, it is difficult to get the impedance of the connecting strap working against ground down to 50 Ω. This means the connection represents either an inductor (see Figure A) or a short piece of higher *Z* line. The Z_{in} will go inductive as the frequency rises. In (b) of Figure A, adding capacity across the input connector can compensate for this inductance at a given frequency. An even better option is to add small capacitors at each end of the strap: one at the connector, and the other at the load. In (c) of Figure A, component values can be estimated with *SimNEC* after you measure the input *Z* for the uncompensated load. Phil, AD5X, discusses how to apply this method in the sidebar "Compensating for Added Inductance in Circuits" in his article in the September 2024 issue. — *John Stanley, K4ERO*

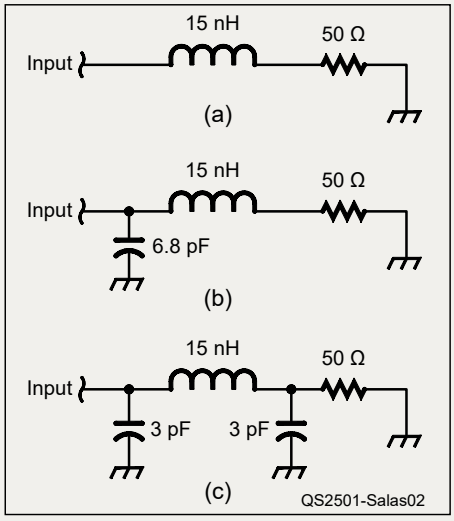


Figure A — A set of schematics showing that adding capacity across the input connector can compensate for this inductance at a given frequency, and that component values can be estimated with *SimNEC* after you measure the input *Z* for the uncompensated load.

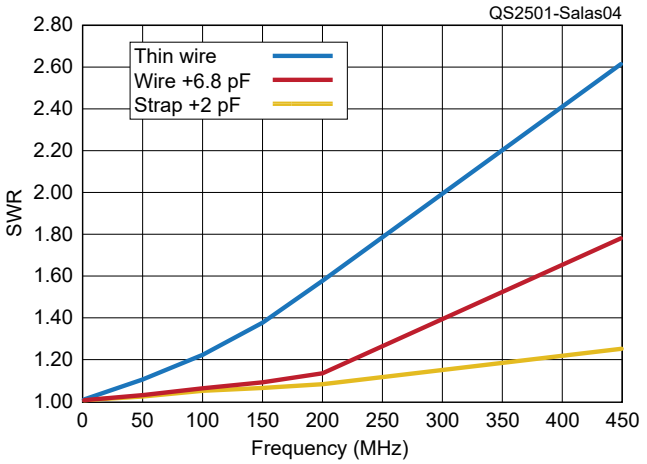


Figure 4 — The SWRs of the dummy load's three versions. The blue line represents the uncompensated dummy load, the red line represents the dummy load with a 6.8 pF capacitor added at input, and the yellow line represents the dummy load with an N connector, a short and wide strap, and a 2.2 pF capacitor at input.

applied 250 W from my Elecraft KPA500. The heatsink hot spot temperature went from 68°F to 120°F after 1 minute before stabilizing. Finally, I applied the full 500 W from the KPA500. The heatsink hot spot temperature rose to 130°F in 30 seconds. I terminated this test as the temperature was still climbing. But, this showed that I could use this dummy load at 500 W for at least 30 seconds. Incidentally, the case temperatures of both devices were about 10 degrees cooler than the heatsink hot spot temperature in both tests. I also saw no change in SWR during both tests, as measured by an in-line PowerMaster coupler.

Extending the Dummy Load to 450 MHz

John Stanley, K4ERO, suggested that this dummy load could be usable up to 450 MHz if I replaced the input wire with a wide copper strap, and changed the SO-239 input connector to a type N. I purchased a ¼-inch-wide copper strap, and I experimented with its placement with respect to the ground. I found that the best performance was when the strap was as short as possible. Positioning the strap close to the ground plane should theoretically result in a lower-impedance transmission line. However, I also had to add strap length to get to the connector pin, which added inductance. The SWR at 450 MHz was about 1.6:1. The input was slightly inductive. To compensate this inductance, I first tried a 1 pF shunt capacitor across the connector input. This undercompensated the inductance, though it improved the 450 MHz SWR to 1.4:1. I tried a 2.2 pF shunt capacitor next, which overcompensated the inductance, but it improved the 450 MHz SWR to 1.24:1 (see the yellow line in Figure 4). Additionally, the SWR from 1.8 to 220 MHz is less than 1.1:1 — excellent results overall!

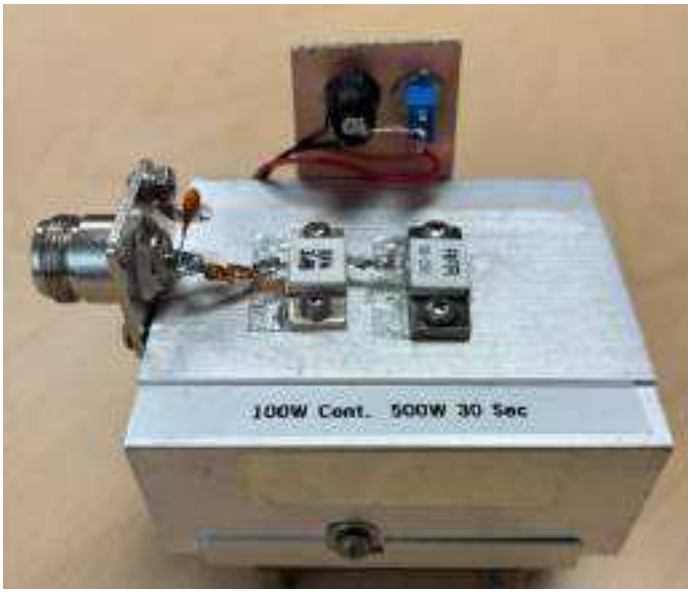


Figure 5 — The 450 MHz dummy load.

While I was working on the dummy load, I replaced the Powerpole connector with a 2.1 × 5.5-millimeter dc power jack mounted on a bracket, along with an on/off toggle switch. Figure 5 shows the final 450 MHz unit.

If you want only a 100 W dummy load, you can simply use the 50 Ω 250 W termination; that should give plenty of margin by itself, and it would reduce the cost of your dummy load to about $25.

See *QST* in Depth for More!

Visit www.arrl.org/qst-in-depth for the following supplementary materials and updates:

- ✓ A more detailed table of parts for this project
- ✓ More photographs of the dummy load
- ✓ Additional SWR, phase, and return loss plots
- ✓ An example of a stripline resistor

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. He held positions from design engineer to vice president of engineering. Now fully retired, Phil enjoys tinkering with ham radio projects. You can contact Phil at **ad5x@arrl.net**.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

The RAS3 Wi-Fi Project

This update to WA9FVP's RAS2 controller provides Wi-Fi interfacing and better internet security.

John Albert, WA9FVP

In the May 2024 issue of *QST*, I introduced "The RAS2 — A Remote Antenna Switch," which interfaced up to four transceivers with an amplifier and antenna. However, the RAS2 had its limitations. In order to connect to it via the internet, I needed to set up port forwarding to my PC and use third-party remote software, which could potentially expose vulnerabilities to my computer. It's important to read my article on the RAS2 prior to approaching this project.

The front panel of the RAS3 controller.

The ESP32-S3 DevKit

Bob Beckstrom, W9ZV, and I began working on the RAS3, which uses a microcontroller that connects directly to the internet via Wi-Fi. For this effort, we selected the ESP32-S3-DevKitC-1 (ESP32-S3) from Espressif (**www.espressif.com**), which is based on an Internet of Things (IoT) platform and includes the WROOM-1 module. This is a powerful, generic Wi-Fi and Bluetooth® low-energy microcontroller-unit module that's built around the ESP32-S3 series of system-on-a-chip devices. The WROOM-1 also includes an RF transceiver based on the Institute of Electrical and Electronics Engineers 802.11b protocol and has a built-in antenna. The original RAS2 software is compatible with the ESP32-S3 and is supported by *Arduino IDE*.

Software Migration

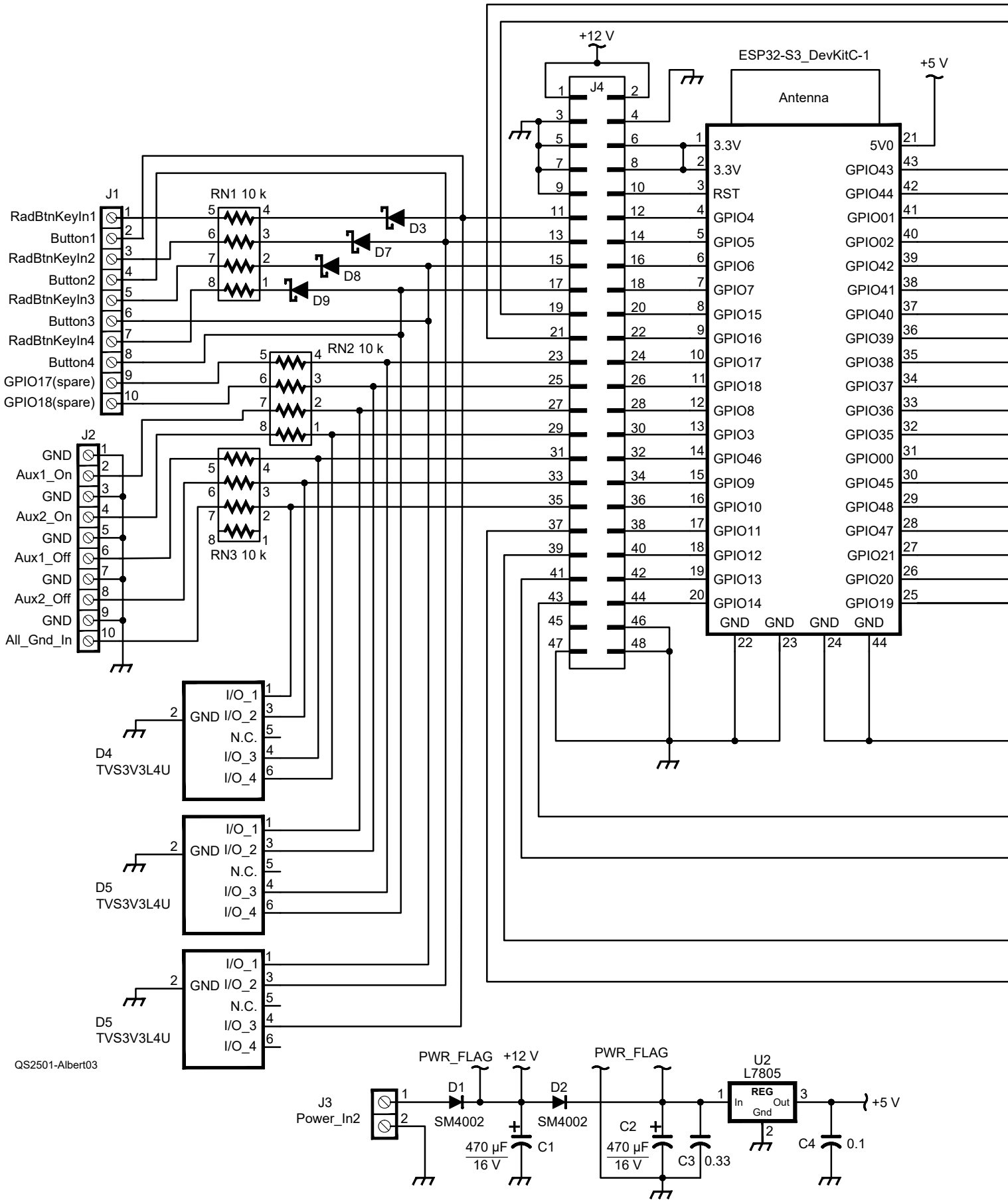
To utilize the existing RAS2 hardware, we renamed the GPIB ports and integrated the website software. Websites are built using a combination of HTML, CSS, and JavaScript. HTML provides the basic structure for web content, defining the elements and layout of a web page. JavaScript adds interactivity and functionality to the web pages, and allows developers to create dynamic features like form validation, animations, and responsive behavior. For more information, visit W3Schools at **www.w3schools.com**.

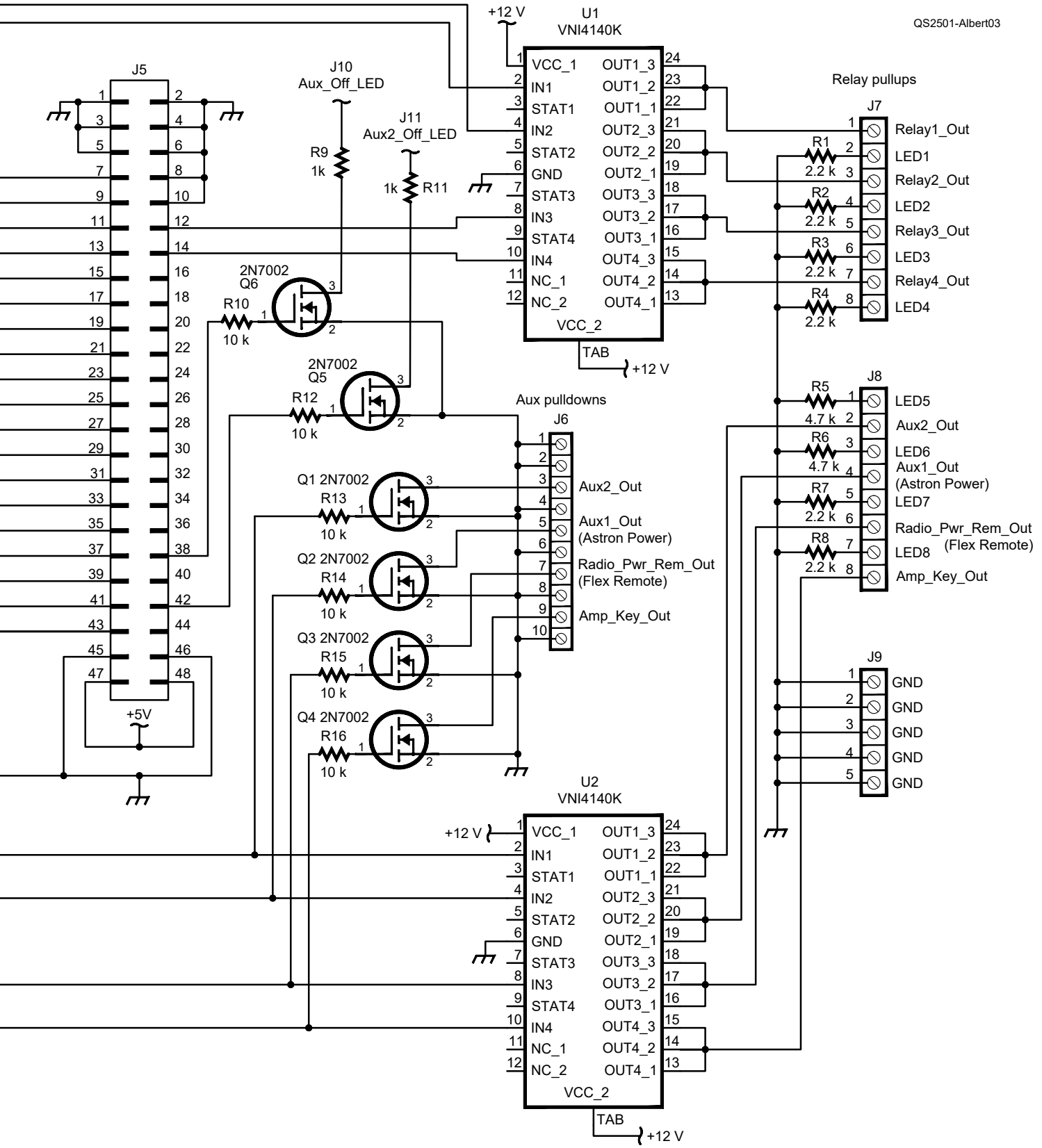
Page Layout and User Interface

Together, HTML and CSS handle the page layout. CSS is used for styling and formatting web content. JavaScript contributes to the user interface by enabling interactive elements and enhancing the user experience. I downloaded Kris Kasprzak's web page software from **https://github.com/KrisKasprzak/ESP32_WebPage**, and because it's license-free, I could legally modify it for my own application. I removed the original sliders and buttons, adjusted the text, and retained some elements like the real-time clock and colors. Additionally, I incorporated my own HTML radio buttons and a text box. My objective was to closely replicate the style of the original *Visual Studio* console. I named the modified version "RAS_web.h." With help from W9ZV, I focused on the hardware controller aspect and updated the original RAS2 software, renaming it "RAS_hw.ino." The original RAS2 software facilitated command exchanges between the *Visual Studio* console and your computer through a USB serial port. To enable communication between the ESP32 and the web interface, W9ZV created a second software module, called "main.ino." This module acts as a conduit, linking the website with the ESP32's hardware functionalities. Additionally, W9ZV refined a file from the RAS2 project, named "defs.h," which includes the definitions and enumerations utilized by *Arduino IDE* during the code compilation.

I translated the original programming language from Visual Basic into C#, which is Microsoft's iteration of C++. Despite the transition, the new console mirrors

The RAS3 schematic.




QS2501-Albert03
U1
VNI4140K
+12 V
VCC_1
IN1
STAT1
IN2
STAT2
GND
STAT3
IN3
STAT4
IN4
NC_1
NC_2
VCC_2
TAB
OUT1_3
OUT1_2
OUT1_1
OUT2_3
OUT2_2
OUT2_1
OUT3_3
OUT3_2
OUT3_1
OUT4_3
OUT4_2
OUT4_1
J5
J10
Aux_Off_LED
J11
Aux2_Off_LED
R9
1k
R11
2N7002
Q6
R10
10 k
Q5
R12
Q1 2N7002
R13
Q2 2N7002
R14
Q3 2N7002
R15
Q4 2N7002
R16
Aux pulldowns
J6
Aux2_Out
Aux1_Out
(Astron Power)
Radio_Pwr_Rem_Out
(Flex Remote)
Amp_Key_Out
+5V
Relay pullups
J7
Relay1_Out
LED1
Relay2_Out
LED2
Relay3_Out
LED3
Relay4_Out
LED4
R1
R2
R3
R4
2.2 k
J8
LED5
Aux2_Out
LED6
Aux1_Out
(Astron Power)
LED7
Radio_Pwr_Rem_Out
(Flex Remote)
LED8
Amp_Key_Out
R5
R6
R7
R8
4.7 k
2.2 k
J9
GND
U2
VNI4140K

The rear panel of the RAS3.

that of the RAS2 and communicates in tandem with the web console, sending similar messages to the text boxes.

The Flex Handler

The FlexRadio handler employs an algorithm designed to postpone the power-off sequence of my FLEX-6600. It's crucial that the FLEX-6600 enters sleep or hibernate mode prior to disconnecting the Astron ac mains. When the Astron **OFF** button is pressed, the FlexRadio remote is turned off, initiating the shutdown sequence. The FLEX-6600 power button flashes during the 40-second interval before changing to a steady amber color, indicating that the transceiver has entered the hibernate mode. After an additional 3 seconds, the ac mains are powered down. The timer is adjustable in the "RAS_hw.ino" software.

Login Credentials

W9ZV also created a third file, called "creds.h," which contains the necessary credentials for connecting to your local area network and logging in to the web page. Within this file, you can edit the service set identifier (SSID) and password as shown below:

```
#define AP_SSID "Your Router Name"
#define AP_PASS "Your Router Password"
#define WWW_USERNAME "Your Username"
#define WWW_PASSWORD "Your Password"
```

When all five files are placed in the project folder, *Arduino IDE* compiles them into a single binary file and uploads it via the USB port to the ESP32-S3 memory.

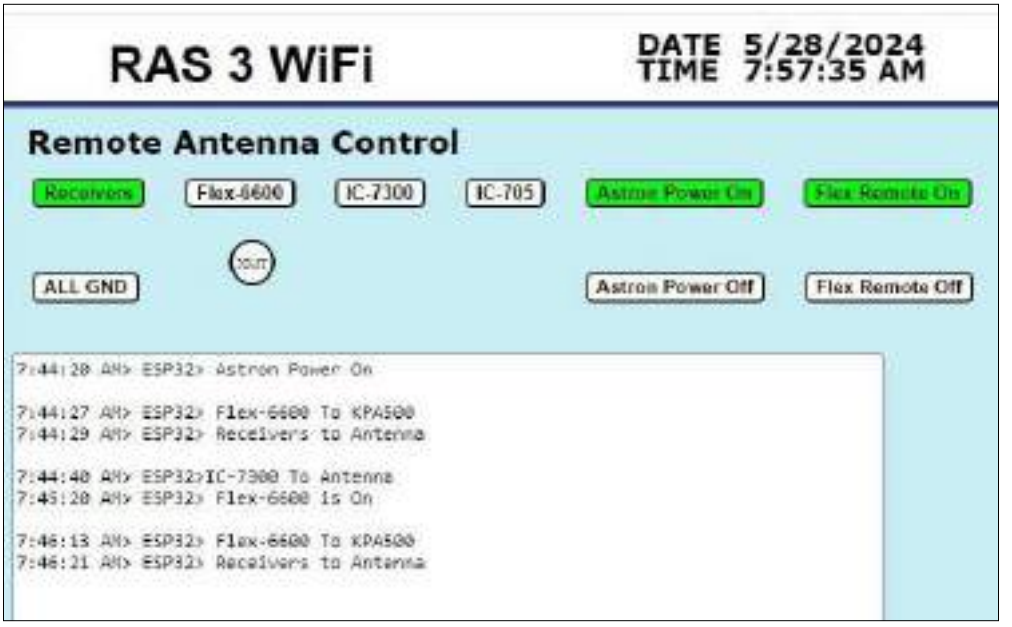
Hardware, Control Box, and PCB

Because the ESP32-S3 functions as a radio device, a metal box can obstruct its radio signal. I found a plastic project box on Amazon that closely matches the dimensions of the RAS2 box (**www.amazon.com/dp/B07ZRFMF82?ref=ppx_yo2ov_dt_b_fed_asin_title&th=1**). The slightly larger box featured a wider front and rear panel, providing additional space for rear-panel connectors.

Using *KiCad*, I designed a 3 × 5-inch printed circuit board (PCB). The ESP32-S3 is a development board, and it does not meet the Joint Electron Device Engineering Council standard. I was forced to create my own footprint, and, furthermore, I found that the ESP32-S3 comes in two sizes: 0.090- and 0.10-inch-wide footprints. Using the *KiCad* footprint editor, I created a dual footprint to accommodate the two sizes. I also added two dual-row header pins on both sides of the ESP32-S3 footprint. Berg jumpers across the dual-row header pins establish a connection between the ESP32-S3 ports and the board's input/output circuits. To enhance the versatility of the RAS3 Wi-Fi project, the header pins are well suited for future expansion. A picture of the PCB is shown on the *QST* in Depth web page (**www.arrl.org/qst-in-depth**).

Input/Output Circuit Protection

The RAS2 input/output circuitry was initially constructed using individual discrete components. Adopting a new design strategy, I selected the STMicroelectronics VNI4140K. This is a quad, high-side, smart-power, solid-state relay driver that boasts an integrated thermal shutdown feature for safeguarding against overheating and short-circuit conditions. The auxiliary control outputs are 2N7002



The RAS3 Wi-Fi web page.

pull-down transistors utilizing open-drain metal-oxide-semiconductor field-effect transistors (MOSFETs). Protection for the input circuits is ensured by three TVS3V3L4U transient voltage suppressor devices, offering a robust defense against voltage spikes.

Conclusion

Thanks to port forwarding on my Xfinity router, I can remotely control my shack from anywhere. Port forwarding basically opens a gateway on your network, making a specific device accessible from the internet. Luckily, setting it up through the Xfinity app on my computer was a breeze! To connect remotely, you need to know your router IP address and the RAS3 local address. Check with your internet provider for more information about port forwarding.

This project is not for the faint of heart. For me, there was a big learning curve with writing code in C#, HTML, CSS, and JavaScript. Fortunately, having worked in an electronic engineering environment for more than 20 years, PCB design and mechanical engineering is a discipline I'm familiar with.

See *QST* in Depth for More!

Visit www.arrl.org/qst-in-depth for the following supplementary materials and updates:

✓ An image of the RAS3 PCB

All photos provided by the author.

John Albert, WA9FVP, served in the US Army Signal Corps from 1967 to 1970. After his time in the service, he ran a small consumer electronics repair business from 1971 to 1979. Future employment included Rockwell Collins Telecom Division, Tellabs, and Argonne Laboratories. After leaving Argonne Laboratories, John was self-employed as DBA WILLCO Electronics from 2006 to 2020, where he primarily repaired amateur radio equipment. Since retiring in 2020, John has spent his time designing and homebrewing ham radio projects. He can be reached at **wa9fvp@arrl.net**.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

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 October 2024 activity report of the VM Program.

♦ An amateur radio operator in Wyoming received a commendation for relinquishing 3.927 MHz during a regularly scheduled net operation to allow emergency traffic related to the Asheville, North Carolina, floods and relief efforts on September 24, 2024.

♦ An amateur radio operator in Florida received a commendation for work on the Florida SARnet 444.325 MHz repeater, in cooperation with Florida's state emergency agency, during a hurricane and ensuing storm.

♦ An amateur radio operator in Illinois received a commendation for working with a local emergency management agency on the W9ANL 146.900 MHz repeater in an effort to clear downed trees and power lines after storms.

♦ Technician-class operators in Idaho and Washington received advisory notices about FT8 operation on 40 meters. Technicians have only CW privileges on 40 meters. Two Technician-class operators in California, and one in Oregon, received advisory notices concerning operation of FT8 on 20 meters. Technicians have no operating privileges on 20 meters.

♦ An operator in South Carolina received an advisory notice concerning interference on 3.933 MHz after refusing to leave a net operating on that frequency. An operator in New York received an advisory notice concerning interference on 7.200 MHz with digital signals such as EasyPal, Freenet, and SSTV, as well as general noises. An operator in Alabama received an advisory notice concerning operation on SARnet utilizing harassment and a false call sign. Each licensee was cautioned that such operation would be an issue during any license renewal proceedings.

♦ There were two Volunteer Monitor alerts issued in October to Monitors east of the Mississippi, to monitor for interference to hurricane and tropical storm emergency nets during the month. No instances of interference were detected.

The totals for September monitoring were 1,443 hours on HF frequencies, and 1,761 hours on VHF frequencies and above, for a total of 3,204 hours. — *Thanks to Volunteer Monitor Program Administrator Riley Hollingsworth, K4ZDH*

Looking at the Sun

K7LY discusses whether big peaks in daily sunspot numbers or the solar flux index are reliable indicators of good propagation

John Keating, K7LY

Recent solar activity triggered numerous powerful solar flares, generated high levels of solar flux, and elevated geomagnetic activity. Those events piqued my curiosity about the interrelationships between measurement parameters and band conditions. In particular, I wondered what propagation hints we might glean from near-real-time solar figures and whether big peaks in daily sunspot numbers (SSNs) or solar flux indices (SFIs) were reliable indicators of good propagation — and if we should pay closer attention to those rather than to their averages. I put my spreadsheet skills to the test and combined certain datasets to derive intuitively understandable graphical analyses.

First, I wanted to see how much of a difference there was between the individual daily maximum sunspot values (such as what you might see displayed on **www.hamqsl.com** by Paul Herrman, NØNBH) and the smoothed or monthly averages (such as what's displayed on NOAA's Space Weather Prediction Center website at **www.swpc.noaa.gov**). Hams get excited about high sunspot numbers. Careful observation of Figure 1 shows that on some days, the SSN (marked by the blue peaks) can be double that of the smoothed value (marked by the dark line), and, historically, has even reached a value of more than 500! As is also apparent from Figure 1, smoothing eliminates the random day-to-day fluctuations of solar activity with the aim of bringing out the long-term trends and the general progress of the solar cycle. Smoothing essentially applies a "low-pass filter" to the original data series. Smoothing over 13 months is the standard for analysis because it provides a common base for comparison of long-term evolution of the solar dynamo and processes with long response times such as global circulation in planetary atmospheres. Solar flux is closely related to the amount of ionization, hence the electron concentration in the F2 region. As a result, it gives a very good indication of conditions for long-distance communication, as reported by Ian Poole, G3YWX, in his September 2002 *QST* article, "Understanding Solar Indices," but it depends on what time periods are used for comparison, as will be addressed next.

Exploring the Data

With the daily peak sunspot data in hand, let us consider the following questions, which can be addressed by parsing and correlating data from several large historical datasets.

Does the SFI correlate with the daily SSN?

As is generally understood, and visually apparent from Figure 2, there is a moderately strong correlation between the maximum daily observed SFI (marked by the red line) and the maximum daily SSN (marked by

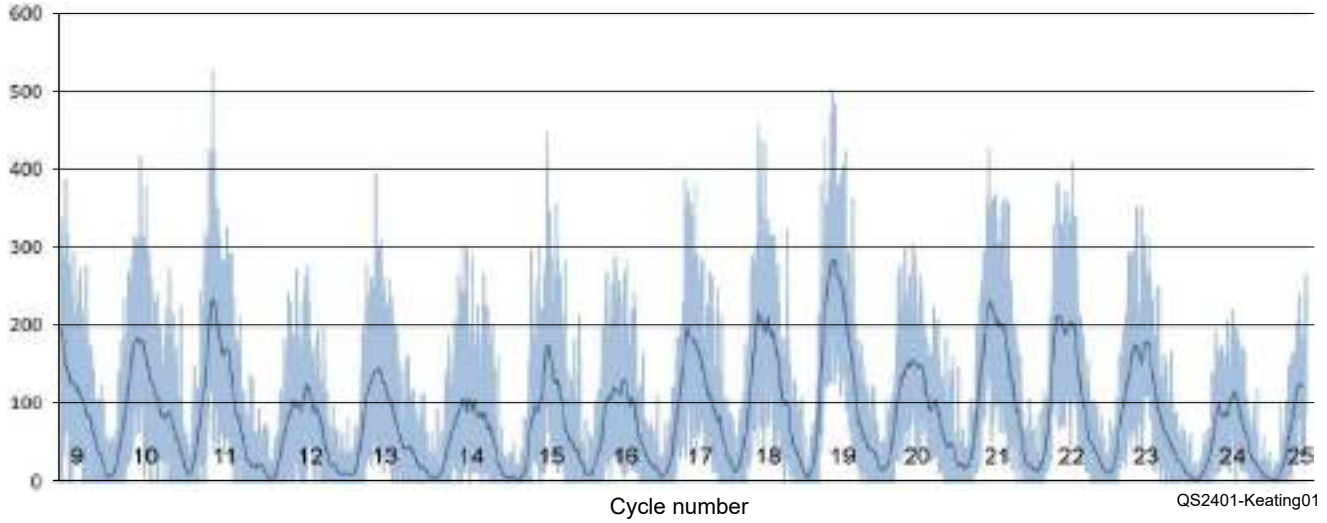


Figure 1 — The daily SSN (the blue peaks) and 13-month SSN (the dark line) for 1849 (Solar Cycle 9) through mid-2024 (Solar Cycle 25). [Source: **https://sidc.be/SILSO/datafiles**]

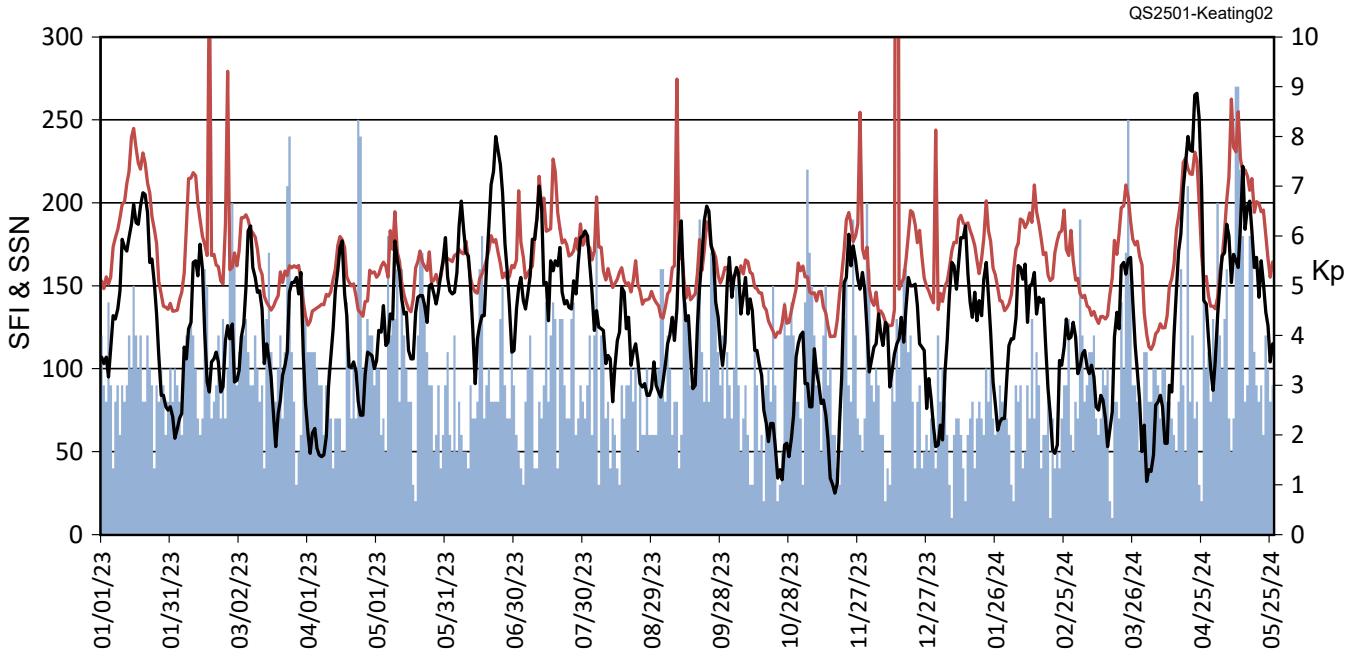


Figure 2 — Daily maximum solar flux (the red line), the SSN (the black line), and the Kp index (the blue peaks on the right axis) from January 2023 to May 2024. [Sources: **https://spaceweather.gc.ca**, **https://sidc.be/SILSO/datafiles**, and **https://kp.gfz-potsdam.de/en**]

the black line). Statistically, for the period of January 2023 to mid-May 2024, the correlation coefficient is $r = 0.62$.

Does a high SFI correlate with the daily high maximum usable frequency (MUF)?

As shown in Figure 3, from January 2022 to April 2024, there was a weak positive correlation ($r = 0.21$) for the daily maximum values, due in part to the high variability in daily peak MUF values and the large excursions, especially from May through August of those years. However, those data present a case for smoothing. Similarities in the timing and direction of the trends become apparent when overlaying 6th-order polynomial trend lines (which Excel conveniently calculates), as that technique provides a good fit for complex data with many local minima and maxima. One may therefore conclude that the longer-term timing and direction of the smoothed SFI and MUF peak data are consistent, whereas any particular day's peak SFI values should not create specific expectations regarding peak MUF on that day.

Is there a correlation between the SFI and the Kp index?

This relates to the possibility of geomagnetic disturbances correlating with high solar activity. Referring again to Figure 2, maximum daily Kp index data are marked by the blue peaks — those values vary extensively! The coefficient of correlation between the SFI (marked by the red line) and the Kp index is $r = 0.12$ (at most) for the Kp index values 3 days after the SFI data. Geomagnetic disturbances measured by Kp occur up to 5 days following a solar event, due to the time required for solar particles to travel to Earth's magnetosphere. When restricting the analysis to days in 2023 and 2024, during and after the occurrence of X-class flares, the correlation between the SFI and the Kp index is somewhat stronger (but still weak), at $r = 0.28$ for Kp index values, 3 days after the SFI data. Therefore, the daily peak SFI is a poor leading indicator of the daily peak Kp index. This can be explained by the fact that geomagnetic storms (measured by the Kp index) are produced almost exclusively by the Earth's passage of interplanetary disturbances driven by fast coronal mass ejections (CMEs), and about only 10% of CMEs spawned by flares reach Earth.

Is there a correlation between the Kp index and daily high MUF?

Not shown in the figures is a comparison of daily maxima of the Kp index and MUF for January 2022 through April 2024, which yields $r = -0.008$ — essentially no correlation. Correlation of those parameters is problematic because of the extremely spiky nature of the data. However, when the K index is high for a long time, the electron density in the F2 region of the ionosphere can be significantly depleted for days, not allowing higher frequencies to be propagated. That is somewhat apparent from the weak negative correlation ($r = -0.13$) between the 3-day moving average of the peak Kp index and the 3-day moving average of peak MUF, delayed 3 days from the Kp index average.

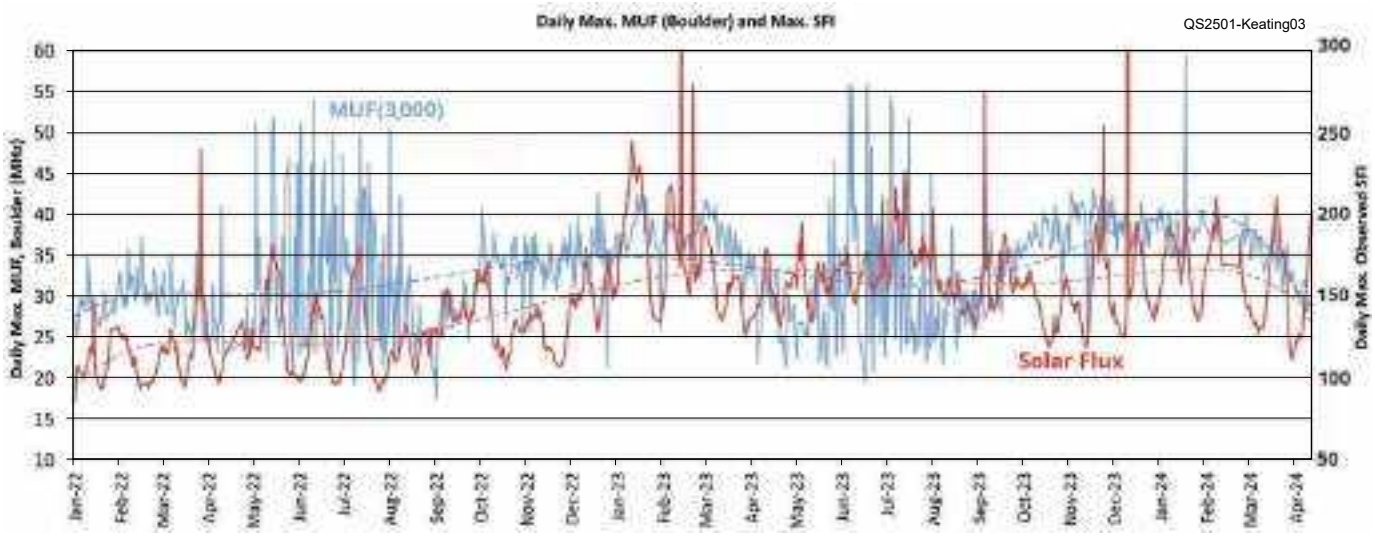


Figure 3 — Daily MUF (the blue line on the left axis) and maximum observed solar flux (the red line on the right axis) from January 2022 to April 2024, with 6th-order polynomial trend lines (the dashed lines). There are a few gaps in MUF data, which cause the SFI graph to differ slightly from Figure 2. [Sources: **https://spaceweather.gc.ca** and **https://giro.uml.edu/didbase/scaled.php**]

Conclusions

One can easily see the effect of the smoothing function on the daily peak sunspot values. Without the granular detail in Figure 1, one might have missed the 2 days where the maximum sunspot number exceeded 500 (August 29, 1870, and December 24, 1957), as well as other dates of interest. Similarly, wild swings in the SFI do not appear in the smoothed data. On the other hand, the peak SSN and peak SFI values do correlate pretty well, implying that one could reasonably serve as a proxy for the other. The key thing for hams to remember when looking at historical data is that the sun is a lot more variable than the smoothed data would imply.

As to the other points of analysis, peak daily SFI data in isolation doesn't imply anything about MUF. The similar directional trends of those parameters are apparent only when smoothed throughout relatively long periods. The peak SFI is weakly correlated with the Kp index, and, consequently, the SFI seems to have little relationship to geomagnetic disturbances. Finally, peak daily Kp index and MUF values are not correlated; therefore, any particular day's Kp index doesn't inform us of MUF, although longer-term samples, especially following periods of a high Kp index, may portend reduced MUF.

These analyses show that there isn't a good correlation among solar parameters and ionospheric conditions in the short term, which is why propagation predictions are statistical in nature and are based on smoothed solar indices and monthly medians.

Acknowledgments

I wish to express my appreciation and thanks to Frédéric Clette at the Royal Observatory of Belgium; Carl Luetzelschwab, K9LA, and Edward McCann, AG6CX, for their helpful suggestions and expert reviews.

See *QST* in Depth for More!

Visit www.arrl.org/qst-in-depth for the following supplementary materials and updates:

- ✓ Additional graphs
- ✓ Resources for further reading on the subject

John Keating, K7LY, recently retired after a career in the tech industry. He now has time to sort through mountains of data to produce charts, such as the ones in this article. When he needs a break from number crunching, he likes to operate SSB DX, build antennas, and restore vintage HF equipment. John can be reached at **k7ly@arrl.net**.

Product Review

Uniden SDS100 Handheld Communications Receiver

Reviewed by Steve Ford, WB8IMY
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Commanding one of the highest prices for a receiver of its type, the Uniden SDS100 seeks to justify the investment by packing almost every conceivable feature into a handheld package measuring 1.5 × 2.5 × 6.5 inches. The SDS100 weighs 10.6 ounces with the sizable 3.7 V 5400 mAh battery installed. For the radio specifications, see Table 1. For use in the field, Uniden includes a well-designed belt clip that easily attaches to the back panel.

Speaking of included accessories, the SDS100 comes with a USB cable, which you'll use for programming and battery charging, a wall wart-style charger, a flexible antenna, a BNC-to-SMA adapter (very handy for attaching other antenna systems), and an installed 8 GB memory card. The card is located within the battery compartment (Figure 1), and while you can swap in a card with up to 32 GB capacity, I found the 8 GB card to be more than adequate.

The 3.5-inch display screen is colorful and easy to read (Figure 2), which is a good thing because the display can often become quite crowded. Buttons on the side of the SDS100 allow access to settings, while a row of three so-called "soft keys" beneath the display select various functions. The knob at the top of the receiver scrolls through menu items, adjusts volume and squelch, and, with a downward press, acts somewhat like an **ENTER** key. Adjacent to the knob you'll find the obligatory headphone jack.

Figure 1 — The SDS100 memory card can be found inside the radio, directly beneath the battery. An 8 GB card is supplied, but you can install a larger card, up to 32 GB.

It was interesting to see that the SDS100 offers two USB ports. Both can be used for computer interfacing, but the larger of the two ports is labeled **CHARGE** for use with the supplied cable and charger. You can charge the battery from a computer or other device, but not all USB ports are created equal. When I attempted to charge from my desktop PC, the display warned that the voltage was "too low." The charger supplied with the radio is your best option.

Bottom Line

The Uniden SDS100 scanner/receiver is a remarkable piece of technology that you can hold in your hand. It is feature rich and offers a wide range of frequencies and mode reception.

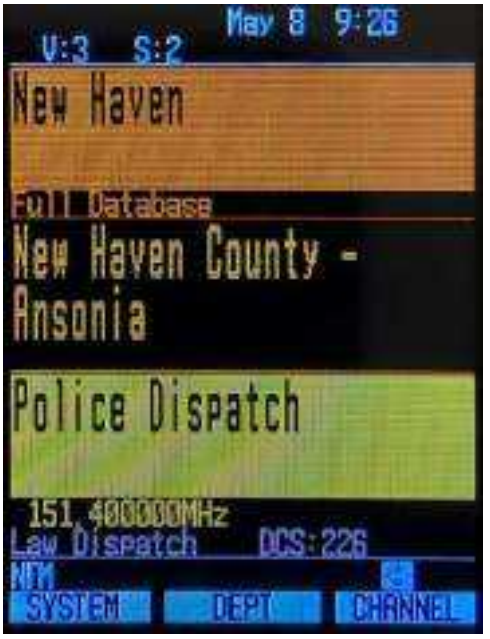

Figure 2 — The SDS100 display is detailed and colorful. It is also customizable.

When it comes to frequencies and modes, the SDS100 is impressive. Coverage spans 25 to 1300 MHz in several bands. Additionally, the SDS100 supports digital trunked radio systems in various formats, including APCO P25 Phase I and II, Enhanced Digital Access Communication System (EDACS), and Logic Trunked Radio (LTR). Of course, it also receives analog FM and AM.

The HomePatrol Approach to Reception

A number of years ago, Uniden released the first of its receivers to include its HomePatrol technology. Among other things, the HomePatrol design uses a massive frequency database contained within the radio itself.

The HomePatrol database is obtained from the Radio Reference website (**www.radioreference.com**), and it is the largest US and Canadian frequency database I've ever seen. When you switch on the radio, it spends the first 30 seconds or so loading this database from the memory card and storing it in RAM for quick access. According to the manual, Uniden obtains a new database from the Radio Reference site every 2 weeks. To keep your database up to date, you need to use Uniden's free *Sentinel* software for Windows (Figure 3). *Sentinel* will use the internet to grab the latest version from the Uniden site and load it to the SDS100 via the USB connection. *Sentinel* is a well-designed software package that makes it much easier to program and configure the SDS100 compared to doing it by wading through menus, twisting the knob, and pressing buttons.

If you program your location into the SDS100, it will limit its scans to those selected services that are within a maximum of 10 miles from your position (this range is expandable). Location programming is a matter of simply entering your zip code, though you can also choose to enter your latitude and longitude coordinates. The SDS100 does not include a Global Positioning System (GPS) receiver. However, if you happen to own a GPS receiver with a USB interface, it can be connected to the SDS100.

Once the SDS100 has your location information — added by whatever method you choose — it can bring another of its multitude of features into play: Close Call RF Capture Technology. Close Call automatically detects and tunes to transmissions from sources located within the maximum distance selected. For the Close Call feature to detect a signal, that signal

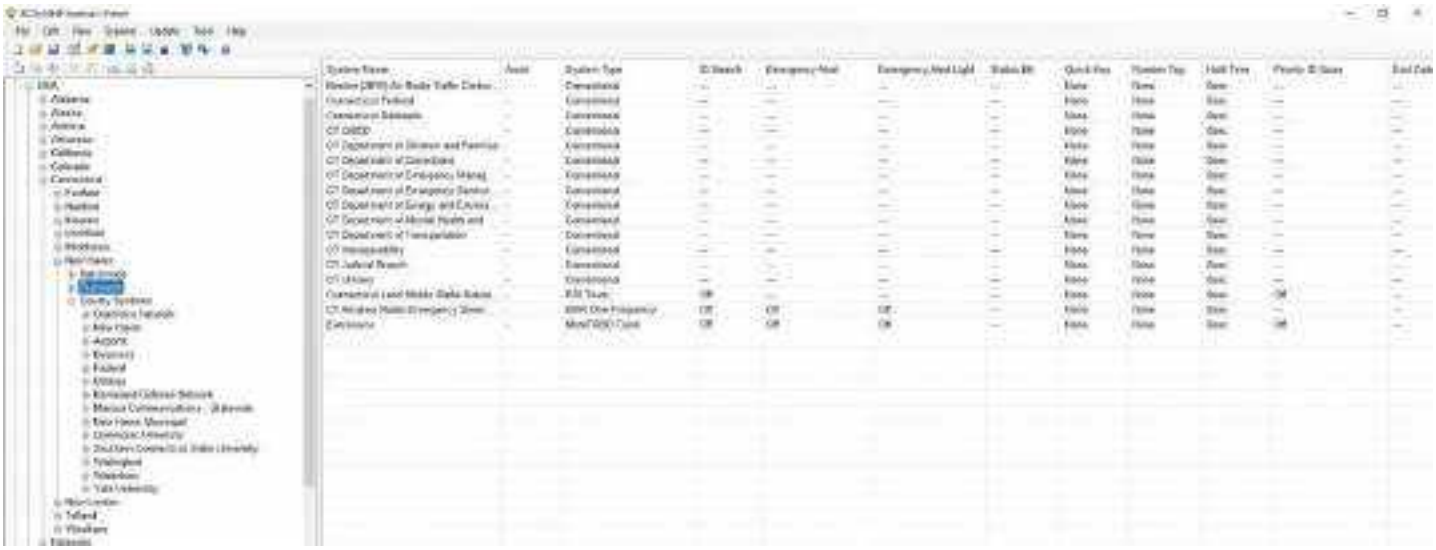

Figure 3 — The free Uniden *Sentinel* software makes it easy to manage the SDS100.

Table 1

Uniden SDS100, serial number 383Z48001439, FCC ID# AMWUB383, Firmware Version: Main: 1.23.07, Sub: 1.03.05

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Many services ranging from 24 through 1240 MHz.	As specified.[1]
Modes: FM, NFM, FMB, WFM, AM. Optional licenses for DMR, NXDN, and ProVoice (receive only).	As specified.
Power requirements, 5 V dc lithium-ion battery. At 161.985 MHz, manual, internal speaker; battery: squelch on, 720 mA; squelch off, 955 mA. USB power: squelch on, 800 mA; squelch off, 1190 mA.	Measured full battery at 4.175 V dc; current draw not tested.
Receiver	**Receiver Dynamic Testing**
Sensitivity: Not specified.	AM, 10 dB S+N/N, 1.5 µV (–104 dBm) 25 MHz; 0.93 µV (–108 dBm) 120 MHz. FM, 12 dB SINAD, 0.26 µV (–119 dBm) 40.9 MHz, 0.38 µV (–115 dBm) 146 MHz, 0.37 µV (–116 dBm) 162.4 MHz, 0.45 µV (–114 dBm) 222 MHz, 0.38 µV (–115 dBm) 440 MHz, 1.9 µV (–102 dBm) 800 MHz.
Audio output: At 8 Ω internal speaker/ 32 Ω phone jack: FM / NFM; 700 mW / 8 mW, FMB / WFM; 670 mW / 13 mW.	Internal speaker not tested. Phone jack: As specified at 2% THD.

Size (height, width, depth): 6.57 × 2.56 × 1.53 inches (excluding protrusions).
Antenna length: 5.75 inches.
Weight: 10.6 ounces (with battery and antenna).
[1] Excludes US cellular frequencies in 800 MHz band.

must be about 15 to 18 dB stronger than the RF noise floor in the band being checked. It may help to think of Close Call as a feature similar to the dual watch function found in many amateur transceivers. Close Call, however, is much more sophisticated. It can, for instance, monitor one band while you are listening to another. You can even designate some frequencies in your database as Do Not Disturb (DND). Whenever you are listening to those frequencies, Close Call won't interrupt.

As comprehensive as the frequency database may be, there is always the possibility that some services may be missing. You can find new signal sources with the SDS100's phenomenal "discovery" function in which the receiver sweeps through a given range of frequencies, recording "hits" in a separate database and even grabbing snippets of audio to go with them. The discovery function is an excellent way to explore a chunk of spectrum without having to park yourself by the radio for hours on end.

None of this is to say that you can't manually enter frequencies of interest on your own. In fact, the SDS100 allows you to create an extensive "favorites" list. You can also tune the radio by manually punching in a frequency using Quick Search (Figure 4). You simply press the right-hand soft key, enter the frequency in MHz, and then press the soft key again.

Figure 4 — The Quick Search function allows you to directly enter a frequency of interest.

DMR, NXDN, and ProVoice

Out of the box, the SDS100 does not receive digital mobile radio (DMR), Next Generation Digital Narrowband (NXDN), or ProVoice signals. These modes find uses in public service applications, depending on where you reside. In addition, DMR is popular among hams, and there are some amateurs who make use of NXDN as well.

To receive these modes with the SDS100, you're required to purchase individual alphanumeric "keys" and then enter the keys into the radio. To purchase a key, you must first register the radio by establishing a free account and entering the product serial number and electronic serial number at **https://my.uniden.com**. At the time of this writing, the key code to unlock DMR costs $60; the key to unlock NXDN costs $50.

The upgrade process was somewhat tedious, but once it was done, I could hear DMR activity throughout my area, including ham traffic. NXDN is not as common, but I managed to pick up one of the few amateur NXDN repeaters in my state.

ProVoice is a digital voice mode commonly used in EDACS trunked systems. However, it is active in only a few areas of the US (see **https://info.uniden.com/twiki/bin/view/UnidenMan4/ProVoice**). Because there is no ProVoice usage in my area, I chose not to purchase the $50 key that would have enabled reception.

Waterfall Upgrade

Most amateurs are familiar with waterfall displays, but this is a relatively uncommon feature for the scanner community. For those who may not be aware, a waterfall is a continuous display of transmissions and noise levels. The SDS100 implementation presents you with a scrolling 10-second window of activity. The most recent signal observation is at the top, and the oldest observation is at the bottom. Because the waterfall color-codes the strength of signals or noise received, and because observations move downward in time, the display resembles a waterfall — hence the name.

Signals appear as lines whose lengths reflect the lengths of the transmissions. Signal spikes also appear in the dynamic spectrum display above the waterfall. Signal strengths are represented by the colors of the lines. Each color represents a particular range of signal strength, and there are five signal ranges with five colors. The color choices are customizable.

With the SDS100's ample display area, the waterfall feature is easy to use. To listen to a signal, you need only twist the knob and move the green marker line to the spike in the display (Figure 5). You can also adjust the frequency span of the waterfall considerably.

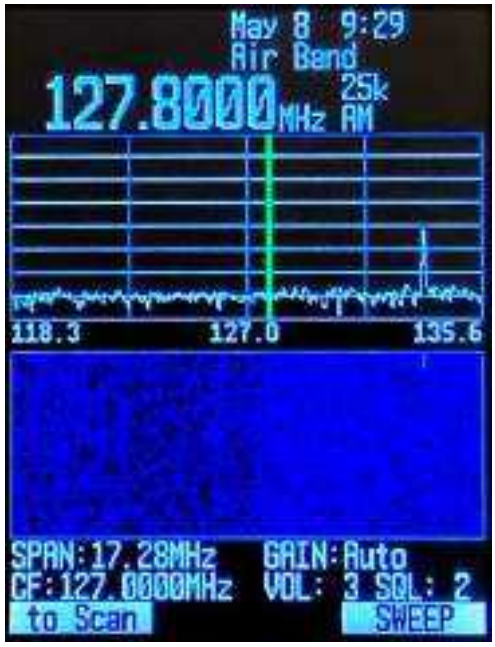

Figure 5 — The optional SDS100 waterfall display shown sweeping through the aviation band.

The catch, however, is that you must purchase a $20 key to activate the waterfall feature. Strictly speaking, the waterfall feature isn't a critical tool; it is more of an enhancement. I chose to buy the key for this review, and I was glad I did. There is something about visual representations of signal activity that I find fascinating, but it isn't for everyone, and I suspect many may choose to forego the upgrade and save $20. Besides, you can always add the waterfall upgrade at a later time.

Impressions

On page 1 of the SDS100 user manual, you'll find the following admonition: "Just as a car owner's manual does not teach you how to drive, this manual does not teach you about radio systems." Take this statement to heart if you are considering the SDS100.

The SDS100 is not a radio for beginners. While the manual is informative, it assumes a base level of knowledge. If you aren't familiar with trunking technology or digital radio systems, don't count on the user manual to teach you. You will also find unfamiliar terminology, including words that have different meanings than what you may be accustomed to in amateur radio. Most hams, for example, consider DMR to be a communication "mode." The SDS100 substitutes the word "system" instead. It also applies the term "conventional" to analog FM and AM modes. These

nomenclature differences can be baffling until you become accustomed to them.

The SDS100 is not a radio that you're likely to use intuitively straight out of the box. (I had to consult the manual to find the power on/off button!) The SDS100 learning curve is steep. Depending on your experience within the scanner universe, you will need to spend considerable time with the manual. Your patience will be rewarded, however, as you realize what a remarkable piece of technology you are holding in your hand.

Once I became comfortable with the SDS100, using the radio to explore all the signal activity in my area was a pleasure. Even within a 10-mile range, there were a remarkable number of signals to hear. I was eavesdropping on everything from aviation chatter, to local police, to shopping mall security, to railroads.

I used the adapter to connect the SDS100 to my HF dipole antenna, just for grins. The result was a flood of activity from low VHF to UHF.

I should note that an increasing number of public service agencies, such as police and fire, are switching to encrypted digital radio systems. I encountered a few of these, and the result was unlistenable gibberish. Encryption technology comes at a considerable cost, however, so this trend may evolve slowly. My guess is that only agencies in major metropolitan areas will choose to make the investment, at least initially.

Conclusion

Because the Uniden SDS100 uses software-defined radio architecture (or "true I/Q," as they call it), the radio can be upgraded easily by downloading and installing new firmware. In fact, before I began this review, I installed the *Sentinel* software and then used it to download and install the latest firmware version. The ability to perform firmware upgrades at a moment's notice goes a long way toward securing the usefulness of your investment for years to come.

For those looking for a scanner receiver for a stationary installation in the shack, Uniden offers a mobile/base station version (the SDS200) that is similar technically to the portable version.

Manufacturer: Uniden, 301 International Pkwy., Suite 460, Flower Mound, TX 75022, **www.uniden.com**. Price: main unit, $649.99; optional software activation: ProVoice, $49.99; DMR, $60.00; NXDN, $50.00; Waterfall, $20.00.

PowerFilm Solar Foldable Solar Panels

Reviewed by John Leonardelli, VE3IPS
ve3ips@gmail.com

Portable power has been a discussion point since the founding of ARRL in 1914. Modern technologies and improved quality over the past 2 decades have allowed operations outdoors not tied to commercial power to flourish. Radio, battery, and solar power manufacturers have responded with gear designed especially for portable operators.

Years ago at Hamvention, I learned about PowerFilm Solar solar panels by word of mouth from the Dayton ARES team. They told me that the panels were lightweight and strong, worked as advertised, and were made in Iowa. I bought a 15 W rollable panel to charge

NiCad packs and an SLA battery. It continues to serve me well after 10 years, with no degradation in performance and no breakage at the connector or internal wiring.

Now that I use a 20 Ah and 100 Ah LiFePO4 battery, the 15 W panel will not charge the battery fast enough for my use. I needed more power. I tried various mid-level

Bottom Line

You can rely on the PowerFilm foldable solar panels to provide reliable solar charging capability for your amateur radio and outdoor pursuits.

Table 2 — PowerFilm F16-3600 60 W Foldable Solar Panel Specifications

Manufacturer's Advertised Specifications (not tested in the ARRL Lab)

Power output:	3.6 A at 15.4 V dc (approx. 60 W peak)
Solar panel type:	Amorphous silicon
Dimensions:	Folded: 13.0 × 7.5 × 2.7 inches (330.2 × 190.5 × 68.6 millimeters) Unfolded: 47.0 × 51.5 inches (1,193.8 × 1,308.1 millimeters)
Weight:	2.6 pounds (1.2 kilograms)
Output socket:	Aptiv (formerly Delphi)

consumer brands, but they were too heavy, too large, and poorly made. I called PowerFilm and found out that they had a foldable solar panel line. I knew that Chris, W6HFP, really liked them, as did François Léger-Savard, a Montreal-based outdoor photographer/cinematographer, so I calculated my power requirements and obtained a 120 W (model F16-7200) and a 60 W (model F16-3600) foldable solar panel (see the lead photo). You will find the specifications of the 60 W panel in Table 2, and the 120 W panel in Table 3.

I like modularity, and following the "Two is one and one is none" philosophy, I knew the two panels would be the ideal solution for my needs.

Description

PowerFilm solar panels are monolithically integrated, which means they are manufactured in layers. This eliminates the need for damage-prone manual connections of individual solar cells. PowerFilm flexible solar panels are made using amorphous silicon and are naturally free from harmful heavy metals like cadmium, which are used in other technologies.

The foldable solar panels are lightweight, durable, and extremely portable. The solar panels are mounted to weather-resistant fabric that quickly folds for storage and unfolds for use. They are built with durability that allows for use in the harshest environments (compliant with MIL-STD-810G standard), and the panel works even after portions are damaged. This compact panel fits easily into most backpacks. The power connector is marine-grade and plug and play for easy use with different connector options.

Figure 6 — The PowerFilm foldable solar panel typical deployment.

Design and Build Quality

Construction is top notch and what is expected at this price point. PowerFilm also has a long-standing reputation for making high-quality products that are also used by military and public safety agencies. The panels are designed, engineered, and manufactured in the US. This shows in the high-quality materials used with solid stitching and a robust power connector assembly. The military rating is an important design standard that speaks to its usage in its intended environment — typically harsh conditions.

The MIL-STD-810 specifications address a broad range of environmental conditions that include: low pressure for altitude testing; exposure to high and low temperatures plus temperature shock (both operating and in storage); rain (including windblown and freezing rain); humidity, fungus, and salt fog for rust testing; sand and dust exposure; explosive atmosphere; leakage; acceleration; shock and transport shock; gunfire vibration, and random vibration.

It has a weather-resistant finish, and the fabric is easy to clean, though I am particular in making sure it's not tossed in mud or areas where foot traffic may damage it.

The outputs are provided at 15.4 V, which makes it easy to integrate with almost any battery and charging system. I added the optional adaptor for the Aptiv connector to the Anderson Powerpole®. They can also be daisy-chained to increase the output current.

Their light-sensitive technology absorbs more light even in cloudy and hazy conditions (see Figure 6), allowing more charging performance over other technologies. Because they use amorphous technology, they are less efficient than solid and rigid panels that use monocrystalline technology. PowerFilm compensates for the lower efficiency by increasing the size of the panels to produce an equivalent current.

Table 3 — PowerFilm F16-7200 120 W Foldable Solar Panel Specifications

Manufacturer's Advertised Specifications (not tested in the ARRL Lab)

Power output:	7.2 A at 15.4 V dc (approx. 120 W peak)
Solar panel type:	Amorphous silicon
Dimensions:	Folded: 14.5 × 14.0 × 3.0 inches (368.3 × 355.6 × 76.2 millimeters)
	Unfolded: 86.5 × 55.0 inches (2,197.1 × 1,397.0 millimeters)
Weight:	6.3 pounds (2.9 kilograms)
Output socket:	Aptiv (formerly Delphi)

The larger footprint proved to be a non-issue because the panels are lightweight and do not take up as much space as you would think with a 4-foot footprint (60 W) or 7-foot footprint for the larger one (120 W). That is better than one or three rigid panels that are 3 feet in length and weigh 8 pounds each. I do not want to carry three glass aluminum-framed panels and 24 pounds of weight in a backpack or in a vehicle.

The layered silicon approach they use in each sub-panel allows damaged sections to be bypassed so that power is still produced. They also resist point damage extremely well with minimal loss of output even after being punctured. This is what would be expected when operating away from commercial power to still be able to charge your batteries or devices if damaged. A video shows it being shot at with a Glock pistol (see **https://youtu.be/Nkx1837KJds**), and with nine bullet holes the solar panel lost less than 20% of its power. Some of the big, bulky, and low-efficiency panels I used in the past would just shatter and stop working.

The panels include extremely useful rugged corner grommets for tying the panels to tables, tents, and other structures. I added two rolls of paracord 550 to my kit.

I did confirm that a reverse blocking diode is part of the design. A reverse blocking diode is connected in series with a solar panel. Its purpose is to block the reverse current from the battery to the panel at night or when the panel is not producing enough power. As promised, it still produced output power during cloudy or shady conditions (not at full power but enough to keep the charger working).

I chose two panels in two different power wattages so I could support various battery sizes and use them independent of each other. I could use the 60 W on a 2-meter station on its own on a 20 Ah battery, while the 120 W panel would support the HF station with a 30 Ah battery. For faster charging, I can put both together for more than 10 A of current to charge bigger batteries or reduce charging time.

You do not want to connect the solar panels directly to your radio, as over-voltage damage will result. Solar panels convert sunshine to voltage, but some power management or a charger is still required.

You must use a LiFePO4-compliant solar charge controller. Use a controller that has multi-power point tracking charging technology, as they typically do not generate radio frequency interference (RFI). I prefer a power manager instead of a standalone solar charge controller to add additional functions by using a Buddipole POWERmini. Rick Palm, K1CE, reviewed the Buddipole POWERmini in the May 2019 issue of *QST*. I use Renogy standalone solar charge controllers as well.

The solar panels have a strong warranty — that is, 1-year defects and 3-year guaranteed 80% power output.

The PowerFilms are also useful for emergency power at your home during power outages or camping. This is an area where your investment goes beyond just ham radio.

Figure 7 — The PowerFilm foldable solar panel power output during very cloudy conditions.

Typical Scenario

If I spend a day at the park or operating from a campsite, I always charge the battery while operating. This allows me to use the 60 or 120 W panel and operate my Yaesu FT-891 all day. When the sun goes down, I have another 5 hours of usage before the battery needs to be charged. I can charge the battery in less than 5 hours with the 60 W panel and half that time with the larger panel. I fit all my solar load-outs in a Pelican box as an easy-to-grab solution.

As with any solar panel, it is important that it faces or is angled toward the sun to maximize current output. I found that just by deploying it on the ground, it delivered output power matching its specified performance power curve. Because the panel is foldable, draping it over a structure allowed sun capture at various angles to also generate maximum power output (see Figure 7). By having two panels, I can daisy-chain them for 180 W of solar power to decrease battery charging times or to offer more output on cloudy days.

During a POTA outing, I forgot my battery and used the car battery for the activation, and ended up depleting the weak battery beyond the ability to crank the engine. I laid the 120 W panel on the roof, attached it to the battery, and waited about 45 minutes to be able to supply enough current to bring the battery voltage to 12 V. No need to call my wife for a rescue mission — this alone was well worth the purchase cost.

Field Day Scenario

For ARRL Field Day I will use a 100 Ah battery to power a 100 W HF radio and, thus, need the 120 W panel. Extra points are given out as a reward to operators using emergency power sources to develop operating readiness with alternate power sources. Daisy-chaining the panels to offer as much as 10 A of current in full sunshine will charge the batteries 30% faster. I can also use the panels separately and use the smaller one to power a GOTA station easily. To me, ARRL Field Day is about operating using quiet solar power, and not a gas-powered generator, as an emergency power source.

Backpack/QRP Scenario

The 60 W panel would be ideal for 20 W radios, but many will use a 5 or 10 W radio. The 60 W panel is still ideal for this. I had no problems with it fitting in a backpack, or it can even be shock-corded to the pack body. The panels fold up almost to the size of a three-ring binder. My backpack battery is usually an 8 Ah version, so a lighter and smaller-footprint 20 or 30 W panel may be my next purchase.

Electronic Devices Scenario

The battery solution leads to charging drones, cameras, smartphones, and CPAP machines. There are USB converters that can be added to take the 15.4 V down to 5 V and be used to charge your electronic gadgets, or you could use a pure sine wave inverter to allow for charging a 19 V laptop. I have a couple that are rated at 100 W and work fine for their intended purpose. They do generate RFI, and squelching it with ferrite cores helps. Many power stations, like a Goal Zero, offer solar panel inputs and USB charger outputs, adding additional interoperability for your investment. Check your power station solar panel input wattage specifications, as they may have a wattage limit.

Maintenance

These panels are not designed to be used in the rain for long periods of time, but they are water-resistant. If they do get wet, you must allow time to air-dry them before packing them away for storage. Also, the actual panel itself should be kept clean, especially if deployed near bird's nests. The water sprinkler quality control method proved that it will survive after a short-duration rainfall. I have had no issues with the power connector and its power connector base attached to the fabric. This is a common failure point, and using marine-grade connectors increases the panel's reliability substantially.

Conclusion

The solar panels manufactured by PowerFilm are a top-tier choice for portable radio operators. They are premium products, and it shows in the use of the highest-quality materials and panel chemistry for efficient output. The durability and water-resistant fabric ensure that they can take rainfall and tossing around in the trunk of your vehicle. I am incredibly happy with them fitting in various backpacks that I use. They pack up to a small size for storage and offer consistent charging output as specified. The investment goes beyond the hobby because of their universal use for any outdoor, non-radio activities, and they are an essential component of an emergency power solution, making these solar panels a worthwhile investment.

Manufacturer: PowerFilm Solar, Inc., 1287 XE Pl., Ames, IA 50014, **www.powerfilmsolar.com**. Price: F16-3600 60 W version, $899.95; F16-7200 120 W version, $1,649.95; optional Aptiv-to-Anderson Powerpole adapter, $16.99.

Radioddity HF-008 HF Mobile Antenna

Reviewed by Richard Lawn, W2JAZ
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I am always looking for a new, easy-to-deploy antenna for portable operations, especially when we venture to the Pocono Mountains area of Pennsylvania or the New Jersey shore. My criteria for such antennas are quite simple and well defined: small, lightweight, easy to set up, inexpensive, and multi-band possibilities. This new HF-008 offered by Radioddity seemed to fit the bill and attracted my attention.

Description

The HF-008 is designed to perform on nine amateur bands including 80, 40, 30, 20, 17, 15, 12, 10, and 6 meters. The manufacturer also claims resonance on 11 meters (CB band). The HF-008 is not self-supporting, nor is it an antenna I would feel comfortable traveling with down a highway at the speed limit, but more on that later. It seems sturdy though and solidly constructed of good materials. The antenna is rated at 200 W PEP on SSB and 100 W on CW. In short, the package contains everything you need to get on the air with a portable installation quickly, except some sort of base mounting setup, which could be a magnetic mount for mobile rooftop mounting or some sort of post or mast if you aren't near your vehicle. Overall antenna length depends on the tuning whip adjustment, but in no instance will it exceed 69 inches, and in most cases it will be shorter. For the manufacturer's specifications, see Table 4.

Bottom Line

The Radioddity HF-008 nine-band antenna provides lots of band coverage for an attractive price.

The antenna comes with a base section with the band tuning ports (26.4 inches), the intermediate threaded extension (12.5 inches), two tuning whips (22.4 and 30.7 inches), an Allen wrench for tuning the whips, a band-selection jumper wand, and a one-page manual.

Figure 8 — The Radioddity HF-008 mobile installation with a magnetic mount.

Table 4 — Radioddity HF-008 Mobile Antenna

Manufacturer's Specifications (not tested in the ARRL Lab)	
Operating band:	80, 40, 30, 20, 17, 15, 12, 10, and 6 meters
Center frequency:	3.56, 7.05, 10.1, 14, 18, 21.1, 24.9, 27, 29, and 50 MHz
Connector:	PL-259/SL16-K
Impedance:	50 Ω
Whip length:	Adjustable (2-millimeter Allen key for grub screws included)
Material:	Copper, stainless steel
Power:	200 W (SSB), 100 W (CW)
SWR:	1.0 – 1.5
Weight:	22.9 ounces (0.7 kilogram)

Assembly, Setup, and Resonance Check

I initially elected to check the resonance on each band using a magnetic mount on the roof of my wife's Honda Fit (see Figure 8). I used the Quick Guide provided by the manufacturer for starting measurements. SWR readings on my RigExpert AA-650 were occasionally slightly erratic due to capacitance and ground proximity, as well as other aspects of the mobile installations. But it is safe to report that the antenna is very broad-branded on the higher bands and easily tuned with an auto tuner. I was actually more impressed with the results than I expected to be, as shown in my measurements in Table 5. Unsurprisingly, for such a small antenna, the bandwidth on 40 and 80 meters is rather narrow. Of course, your mileage may vary based on the installation.

The measurements provided in the one-page early-production copy of the Quick Guide I received were misleading. My measurements included in this review are based on the length of the whip insert, not including the intermediate metal extension that screws into the long black base coil section. The whip is adjusted by using the provided Allen wrench to tighten the whip in a collet that screws onto the intermediate threaded extension. The Radioddity website now offers a revised Quick Guide that clarifies the various whip measurements, and they confirmed to us that the latest packaging will come with the revised version. My own measurements of the whip (short or long), from the collet to the tip of the whip, don't always agree with those found in the old or revised Quick Guide.

I found that a shorter whip might enable higher band coverage on 80 meters, but it's doubtful such a short antenna will perform well on the lower bands.

The manual also describes which whip to use and the port to plug the jumper cable into for desired band resonance. It would be more convenient if the band was labeled on the coil covering so there is no mistaking which band has been selected. I made that mistake more than once! The uppermost jumper port at the very top of the coil is for 6 meters, followed by the 10-meter port, then 12 meters, and so forth moving down the black coil section. No jumper is used for 80 meters. The antenna design has been around for years, and similar products are available from different companies.

I also set up the antenna on a fence post and added three 32-foot radials to see how the antenna would perform in such a temporary installation. The bottom coil section of the antenna, which includes a built-in PL-259 for connection to a mobile mount, can be removed, exposing the standard threaded stub to make use of other styles of portable mounts. The antenna performed better with the radials about 3 feet or so above the ground. As expected with this radial length, the antenna resonated well on 40 and 20 meters and demonstrated band coverage and SWR characteristics similar to the mobile mount situation, with a few adjustments to the whip length. I have no reason to doubt that the antenna would perform well on other bands if proper-length radials were added.

On the Air

As they say, the proof is in the pudding, and in this case I must say I was impressed. On the afternoon of April 23, 2024, in southern New Jersey (in case anyone wants to check propagation and solar flux index), I mounted the antenna on the car roof with the magnetic mount and set my FT-710 on a tray table. Using my previous whip measurement, I tuned to the 20-meter

Table 5 — Radioddity HF-008 Mobile Antenna — W2JAZ's SWR Measurements*

Frequency Range	Corresponding SWR Measurements
50.000 – 51.490 MHz	1.38:1 – 2.0:1
28.000 – 29.050 MHz	1.04:1 – 2.0:1
24.890 – 24.970 MHz	1.36:1 – 1.28:1
21.000 – 21.450 MHz	1.6:1 – 1.8:1
18.068 – 18.168 MHz	1.48:1 – 1.20:1
14.000 – 14.350 MHz	1.6:1 – 2.1:1
10.100 – 10.150 MHz	1.7:1 – 1.9:1
7.075 – 7.175 MHz	2.0:1 – 3.0:1 (7.125 was 1.02:1)
3.55 MHz	1.5:1 (shorter whip needed for best resonance)

** W2JAZ's SWR measurements with the RigExpert AA-650 of the antenna mounted on a vehicle using a magnetic mount (see Figure 8).*

SSB segment of the band and heard quite a few signals. I heard a small pileup on S51DX, who quickly returned my call and gave me a fine signal report. I was running 100 W and was amazed thinking I was probably just lucky! I then found a station from Serbia and immediately worked him with a 57 report. This QSO was immediately followed by another station in Madrid who gave me an honest 59 report. Without adjusting the whip, I tuned down to the CW portion of the band and used the radio's built-in tuner to make any necessary adjustments. I quickly achieved a 1:1 match, and in no time I worked a station in Germany and another in Slovenia. At this point I became convinced that this antenna would be a keeper and function very well for POTA and other portable operations. It might work well in a moving mobile situation, but I would not trust the rooftop magnetic mount at highway speeds. For driving around town, or with a bumper or hatch mount, it would likely be fine.

Conclusion

If you are looking for an inexpensive, multi-band antenna that offers fairly broadband performance that can easily be tweaked with modern radio auto tuners, this might be a good option. But remember, you must retune the antenna whip and relocate the band jumper each time you change bands. You will need a mobile or stationary mount and band-specific radials if you intend to mount this as a portable antenna without the benefit of the counterpoise provided by a vehicle. The antenna also seems to be well made to last for some time.

Manufacturer: Radioddity, **www.radioddity.com**. Price: $99.

SOTABEAMS Carbon-6 Ultra-Light Telescopic Mast

Reviewed by John Leonardelli, VE3IPS
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One of the most useful items for a portable radio operator is a telescopic antenna mast. These masts come in materials such as fiberglass, carbon fiber, and aluminum, with varying lengths (keep the number of ends to a minimum). I've used several types, but they all collapse to more than 28 inches, making them inconvenient for travel. Additionally, many inexpensive fishing poles aren't durable enough for amateur radio use — they often crack or snap in the field, which can be frustrating.

I wanted something that was tested outdoors, specifically designed for ham radio, and compact enough to fit into my Icom LC-192 backpack side pocket. It had to be strong and supported by a brand that offers spare parts in case of damage.

Bottom Line

The SOTABEAMS Carbon-6 mast's portability and ease of use make it a popular choice for operators who prefer to travel light and engage in all forms of portable operation.

Table 6 — SOTABEAMS Carbon-6 Ultra-Light Telescopic Mast

Manufacturer's Advertised Specifications (not tested in the ARRL Lab)

Extended length:	19.6 feet (6 meters)
Packed length:	17 inches (43 centimeters)
Number of sections:	18
Wall thickness:	0.04 inch (1 millimeter)
Weight:	11.1 ounces (315 grams)
Mast material:	Carbon fiber
Tube diameter:	Base: 1.2 inches (31 millimeters); top: 3⁄32 inch (2.4 millimeters)
Base cap diameter:	1.25 inches (32 millimeters)

Description

The SOTABEAMS Carbon-6 Ultra-Light Telescopic Mast extends to just over 19 feet and collapses to 17 inches, making it ideal for portable operators. It's built from carbon fiber, designed for ham radio, and is perfect for lightweight antenna setups made with #26 Stealth wire. The compact size and portability make it a key tool in my portable operations, and the carrying bag is included. For the manufacturer's specifications, see Table 6.

Out in the Field

The SOTABEAMS mast is lightweight and easily fits well into my Icom 705 go bag. I use it primarily for supporting an antenna in an inverted-**V** configuration, but it also works with sloper, inverted-**L**, or half-square setups. It's easy to set up, and with a custom mount I simply deploy the ground spike, mount the mast, and clip on the wire. Each section locks with a slight twist, and I've tested it in light rain without issue, ensuring to dry it thoroughly afterward. Although I can't speak about long-term durability, many SOTA operators use it in harsh conditions like snowy mountain summits. SOTABEAMS states, "Since the Carbon-6 is quite flexible near the top, anything except a vertical antenna is best attached a couple of sections down rather than at the very tip." I found this to be true.

During a trip to Jamaica, I realized how useful a portable mast would have been when I was struggling to find suitable natural supports for my dipole antenna. Its compact size allows it to fit in my carry-on luggage and pair with my lightweight antennas, so next time I will be active on 40, 20, 15, and 10 meters, without needing a tuner, directly from the beach.

Please note that carbon fiber is slightly conductive, so make sure to not contact power lines.

Improvements

The smallest top sections of the mast lack strength and are very flexible. To fix this, I collapsed the top two sections into the next larger one and secured them with glue. I also added a wire loop at the top to attach a carabiner, reducing the height but keeping a functional length of 16 feet. Additionally, I built a custom ground spike mount and mast holder with a 3⁄8-24 stud for a sturdy setup.

Conclusion

I've used the SOTABEAMS Carbon-6 on every activation, and it has exceeded my expectations. It's a simple, well-made telescopic mast, perfect for portable ham radio operations.

Manufacturer: SOTABEAMS, Unit 1 The Green, Green St., Macclesfield, SK10 1JH, UK, **www.sotabeams.co.uk**. Price: $57.99.

Dave Casler, KEØOG, askdave@gmail.com

Ask Dave

Get more information from the "*QST:* Ask Dave" YouTube playlist at **https://bit.ly/3z2MBMI**.

An Antenna for 80, Tuning Up, and SignaLink Setup

Loop Skywire Antenna

Q Rodney Cobb, NØNXG, asks: I have a Yaesu FT-991A with an Ameritron AL-811 amplifier that puts out 600 W. I put up a 1-wavelength 80-meter horizontal antenna loop at 272 feet. The problem is that the standing wave ratio (SWR) shown on my RigExpert is high and varies across the 80-meter band. What am I doing wrong?

A The loop you describe is called a Loop Skywire antenna on pages 10 and 11 in the 23rd edition of *The ARRL Antenna Book* (see Figure 1). I made one of these some years back. It worked fairly well, though I could not get it up to 40 feet. This antenna should be fed with ladder line or open-wire line because the high SWR on the line could cause undue resistive losses. A wide-range antenna tuner, such as the MFJ-993B automatic tuner, is mandatory. This antenna will also work on other HF bands. The radiation pattern changes with each band, and there are multiple lobes on the higher bands.

Bringing the window line into my shack created radio frequency interference (RFI) problems. I took down the ladder line, put a 4:1 voltage balun at the feed point, and ran coax to my radio. It worked about as well as the ladder line but without the RFI problems. Again, the high-range tuner was mandatory. As Figure 1 demonstrates, the higher, the better, or 40 feet if possible. I can't get anything that high, but my antenna did work well for near vertical incidence skywave (NVIS) on 40 and 80 meters.

I ended up replacing the Loop Skywire with a refurbished multi-band vertical. The vertical worked so well that I took down the loop and cut it up for additional radials. Overall, I would rate the Loop Skywire as a compromise multi-band DX antenna because its height is not a full half wavelength (about 132 feet) on 80 meters, where it is more of an NVIS antenna.

Tuning Up on the Air

Q Greg Grierson, KE8QAS, asks: When I'm on the HF bands with my Yaesu FT-991A, I find a signal on the variable-frequency oscillator, dial slightly off of it onto an apparently quiet frequency nearby, and press my internal auto tuner button to tune the antenna. I

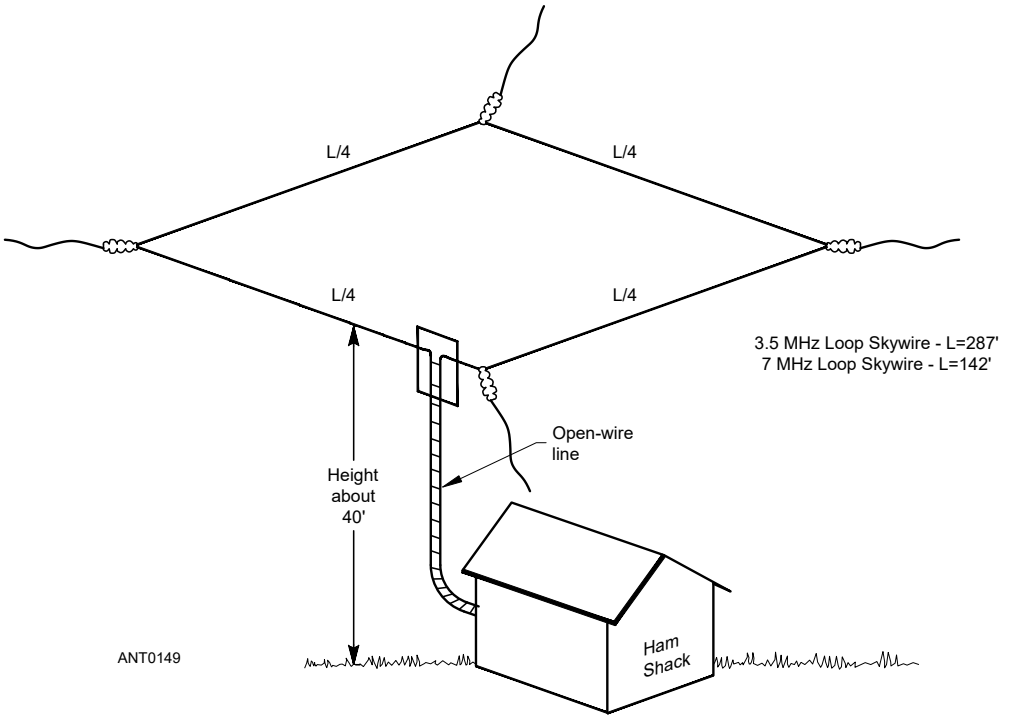


Figure 1 — Figure 10.18 of the Loop Skywire antenna from *The ARRL Antenna Book*. It's a full wavelength around, but it can also operate on higher HF bands using a wide-range antenna tuner and will cover all of 80 meters. Each side is a quarter wavelength at the antenna's lowest frequency. For 80 meters, that's 272 feet. For 40 meters, that's 142 feet. The antenna's radiation pattern is much like a single-band dipole. On higher frequencies, the radiation pattern develops multiple lobes.

asked another ham how far off the given frequency he tunes during a contact. He said I should not tune up on the air and use only a dummy load because I am still causing interference where I tune even though I don't hear anyone. Is this true? What's the right way?

A We should indeed use dummy loads when testing our transceiver. If we transmit on the air, some hams may be trying to receive a station you cannot hear. However, tuning your station into a dummy load does not tune your station into the antenna system. The antenna tuner built into your FT-991A will tune your transmitter into your feed line and antenna. It uses fairly low power to do this and is usually quick.

If the frequency you last tuned to is not too far from where you want to operate, you can do so without retuning the radio. If you use a dipole for any band from 6 to 40 meters, and you tune just once prior to operating on each band, the tuning will likely be close enough for the entire band that you don't have to retune. The transmitter will be happy with any SWR less than about 1.6 to 1.

It is bad practice to tune your antenna right on the frequency of the station you want to answer. The station you want to talk to cannot hear other people calling, which is considered poor amateur practice. Always tune up slightly off frequency (at least 3 kHz for SSB and 500 Hz for CW). Sometimes, highly sought-after stations will listen to frequencies other than the one they're transmitting on. They may say something like "Listening up 5 to 10." This causes calling stations to spread out a little bit so the DX station can pick out one that is readable. In such a case, if the DX station says they're listening up, then you should go down about 5 kHz to do a quick tune-up. The intent is to get your transmitter and antenna system working their best with each other while avoiding interfering with other stations.

Using the SignaLink Integrated USB Sound Card

Q Steve Hailstone, KB9CNN, asks: I just purchased a SignaLink USB Digital Information Interface (see Figure 2) and watched your "Soundcards and the SignaLink USB" video (**https://youtu.be/_As1xTP-M04**) that talked about its digital setup. Which cable plugs into each jack? I'm trying to set it up for FT8. The six-pin cable for the FT-891 connects the radio to the SignaLink. What does the USB connect to? It seems the SignaLink needs power from the computer, so is that how the USB cable is used? When I connect it to the computer via the USB cable, the correct communication ports don't show up in *WSJT-X*, but they do show up when I connect the USB from the computer to the radio. But then *WSJT-X* tells me I don't have the computer-aided transceiver control set up correctly.

Figure 2 — The SignaLink USB showing the jumpers inside. The jumpers get ground, transmit, and receive audio to the right pins on the cable connected to the radio. Nowadays, most HF radios contain a built-in sound card, so a separate sound card interface is not required.

A It sounds like you already have the cable that goes from the SignaLink to the radio. It likely plugs into the RTTY/PSK jack at the back of the radio. You may need to set some jumpers inside the SignaLink — this step cannot be skipped! Follow the instructions carefully. The USB cable does connect to your computer. First, open the **DEVICE MANAGER** within your computer's settings. Next, select **PORTS**. Then, insert the USB cable. A new communication port should appear on your screen (make a note of it). You can now close the **DEVICE MANAGER** and open *WSJT-X*. Select **FILE**, **SETTINGS**, and then **RADIO**. Choose your radio. The communication port's setting will be the one you discovered via the **DEVICE MANAGER**.

Note that the SignaLink determines when to transmit by the presence of audio from the computer. The delay setting helps keep the device from constantly switching from transmit to receive, so your experience adjusting it will help you determine what to use.

You will want to separate your window sounds, which go through your normal speaker, from the sounds created by *WSJT-X*. That way, any odd computer sound won't throw the rig in transmit and send some broadband audio out via your radio. Similarly, you don't want your computer's microphone sending information while using *WSJT-X*.

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

Hints & Hacks

A Stealth Antenna for 6 Meters; An Alternate Use for Lids

Soup Cans for 6 Meters

I needed a new antenna for 6 meters, and the cover of the August 2021 issue of *QST* inspired me to make one. It featured a vertical antenna constructed from coffee cans by Hiroki Kato, AH6CY. Based on Hiroki's work, I decided to design a vertical dipole for 6 meters — one that I could hang in a tall tree as an effective, yet stealthy, radiator. But instead of coffee cans, I chose standard-size soup cans.

I calculated the length and determined that the antenna needed to be slightly shorter than 12 4.25-inch cans per leg. My design called for the top half of the dipole to use cans in an upside-down configuration so that they wouldn't collect water. Soldering the cans together would further waterproof the top half. The bottom half of the dipole would have cans in a right-side-up configuration. One leg is shown in Figure 1.

Figure 1 — One leg of the soup can vertical dipole, soldered and ready for use. [Tom Inman, KC8T, photo]

I ruined four cans while learning the best technique for applying solder. Steadiness is key, and a furniture clamp worked well for balancing up to 10 cans. For the last two, I recruited my wife to hold the stack steady. I used a propane torch and 60/40 rosin core solder.

I installed an SO-239 connector into the top can of the bottom half of the antenna (see Figure 2) and used a length of #12 AWG insulated wire to connect the center of the connector to the top half of the antenna. I determined that Schedule 40 PVC pipe would work as an insulator and structural member to hold the two halves together, which were spaced about an inch apart. I planned to use Flex Seal® tape to wrap the open area between the top and bottom halves and keep the whole assembly waterproof.

Figure 2 — Installing the SO-239. [Tom Inman, KC8T, photo]

Before completing the assembly, however, I laid out the cans on my deck (see Figure 3) and measured the resonant frequency. I was quite disappointed to see 39 MHz on the NanoVNA analyzer. The ham radio operator's rule of thumb is to make an antenna long and then trim it to tune. This rule works great with wire, but not so well with soup cans.

Figure 3 — I made my initial tests with the antenna too close to the house and other objects. As a result, I thought the dipole was too long, and I shortened it accordingly. That was a big mistake, but a valuable learning experience. [Tom Inman, KC8T, photo]

Figure 4 — The antenna in place, with a coat of camouflage paint. To a casual observer, it looks like it is part of the tree. [Tom Inman, KC8T, photo]

Using a hacksaw, I sawed one and then two soup cans off of each end. I added the center section and tape before hanging it in the tree to check the frequency. I discovered that my first test was conducted too close to the house, the legs were too far apart, and the entire antenna was too close to metal objects; all of these factors influenced the resonant frequency. With too short of an antenna, I was forced to make a design change. I soldered 12 inches of solid #12 AWG wire to each end. This made it longer than the original 24 soup cans.

I applied a coat of camouflage paint and then hauled the antenna into its final location (see Figure 4). I trimmed the extension wires and conducted more measurements until the voltage standing wave ratio (VSWR) was at a minimum of 1.16:1 at 52.76 MHz. The low-SWR bandwidth spans the entire band thanks to the diameter of the cans, so I enjoy an SWR of no greater than 1.7:1 at any frequency.

A 6-meter-band opening occurred soon after I installed the antenna, and I was pleased to contact Martin Moens, PJ4MM, in Bonaire via FT8. I quickly followed up with an FT8 contact with Bruce Campbell, W8HW, in Port St. Lucie, Florida. Since then, I've enjoyed many contacts with stations in the Midwest, Southwest, and even the Canary Islands on CW, SSB, and FT8. — *73, Tom Inman, KC8T,* **kc8tom@comcast.net**

Figure 5 — The lid on the left serves as a temporary parts holder, while the one on the right contains glue. [Scott McCann, W3MEO, photo]

Save those Lids

Before you toss a used jar or other container in the trash, consider keeping the lid. It can become a temporary repository for screws or other small parts as you work on projects (see Figure 5). A lid can also serve as a handy dish for glue or paint. When you're done, the lid simply joins the rest of its container in the garbage. — *73, Scott McCann, W3MEO,* **achess@juno.com**

"Hints and Hacks" items have not been tested by *QST* or ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to **hh@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number, and email address on all correspondence. Whether you are praising or criticizing an item, please send the author(s) a copy of your comments.

Strays

Ham Radio-Inspired Song

While poking around on Bandcamp for some new artists and music, I stumbled upon an artist called The Duke of Surl. What caught my eye was the title of one of his albums: *Ham Radio*. The first track is a short collection of CW and digital mode signals. You can listen to the album at **https://thedukeofsurl.bandcamp.com/album/ham-radio**. — *Bob Curran, NW3M*

Paul Wade, W1GHZ, w1ghz@arrl.org

Microwavelengths

Microwave Activity Days

Microwavers in the Northeast have informal Microwave Activity Days (MADs) on the first Saturday morning of each month. They have become more popular in the Lake Ontario, western New York, and Toronto areas with intrepid rovers out even during the winter months and operators ranging to the Midwest and Texas. This is a great way to maintain interest between contests. In New England, good rover spots are accessible only for 3 or 4 months per year, so some operators have built microwave home stations to operate most of the year.

78 GHz Rain Scatter

During the MAD on September 7, 2024, Peter Prabucki, VA3ELE, and Kevin Hobbs, VE3KH, completed the first 78 GHz rain-scatter contact in region 2 (there might have been a previous one in Europe). The distance was 36 kilometers from Maidenhead grid square FN03fn to FN03cg. Elevating the dish about 7 degrees was necessary. Conditions were windy, and they had to chase fast-moving rain cells by peaking signals on 24 GHz in azimuth and elevation, then switching to 78 GHz. Video of the contact is at **www.youtube.com/watch?v=NF0FRtZGtbI**.

On the same day, Andy Flowers, KØSM, was operating 24 GHz rain scatter and worked Kevin at 190 kilometers. They found that the signals on the higher bands peak at a higher antenna elevation. Finding good scatter requires a 2D search in azimuth and elevation because only shorter distances are usually possible due to attenuation by water vapor. So the higher rain cells are closer and require aiming upward. Hugh Duff, VA3TO, suggests low-altitude nimbostratus clouds are the best for higher frequencies. At 10 GHz, the interesting rain scatter is from distant thunderstorms, so the tops of the storms are on the horizon.

As a result, Andy has augmented his software at **https://rainscatter.com** to show suggested elevation angles of storm tops and azimuth, for rain-scatter paths.

Be Ready for Foul-Weather Contacts

Some microwavers without home stations have found sites that can be reached fairly quickly, so they can take advantage of promising conditions, like rain-scatter possibilities.

On July 16, 2024, Andy, who was near Rochester, New York, alerted me to a large thunderstorm over Lake Ontario. We were preparing to attempt a 10 GHz contact when we heard a rain-scatter signal on frequency. It was Tony Emanuele, K8ZR, who often operates from a convenient spot along Lake Erie in EN91kt. I called, and Tony came back to me, making a rain-scatter contact of 773 kilometers from FN34uj. Then Andy worked Tony and me.

Peter Prabucki, VA3ELE, trying to stay dry while operating rain scatter on 10, 24, 47, and 78 GHz. [Hugh Duff, VA3TO, photo]

The following day, the same storms were approaching Vermont. I saw an opportunity and called John Swiniarski, K1OR, in FN42ir. The path from my location to his home station is obstructed by a large hill, so we took advantage of a storm cell in the opposite direction to act as a reflector for both of us and made the 202-kilometer contact.

I used my backup system for these 10 GHz rain-scatter contacts with an 18-inch dish and about 2.5 W output because my 10 GHz transverter needed repair. Many 10 GHz operators have similar systems. Higher power and big dishes are not necessary for good rain scatter or for most contacts. Even smaller systems can work. Drew Arnett, N7DA, reported making a 379-kilometer rain-scatter contact in 2020 with a 10 mW output and a 2-foot dish.

Jeff Atto, VE4GA, and Rick Banack, VE4AQU, making their first 10 GHz contact from the roof of a 23-story office building in Winnipeg, Canada. [Shawn Peters, VE4SA, photo]

Until recently, the range limit for rain scatter was thought to be about 600 kilometers for thunderhead heights of about 40,000 feet. However, larger storms approaching 60,000 feet are becoming more common, enabling longer rain-scatter contacts. Unfortunately, these large storms are also more destructive.

A screenshot showing the 189-kilometer 24 GHz rain-scatter contact between Andy Flowers, KØSM, and Kevin Hobbs, VE3KH.

Southern Microwaves

Microwave activity in the North peaks in the summer, but high temperatures may discourage it in the South. Southern microwavers have been meeting at the Huntsville Hamfest in Alabama, which happens to be on the same Saturday in August as the ARRL 10 GHz and Up Contest. After the hamfest, hams get together for dinner, then devote Sunday to microwave contacts, bouncing signals off nearby tall TV towers at increasing distances. The result has been a good increase in the number of active microwavers in the South, and more activity for the rest of the year, and some of them are planning MADs.

Microwave activity can continue all year long. Stay alert for the weather, but put safety before microwaves. Preparedness for emergency communications is an important aspect of ham radio as well.

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.

The author's Icom IC-705 and laptop deployed during a park activation.

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 quaint rental cabin that the author stayed in while activating Lake Sylvia State Park (US-10236).

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.

My Top Five Arkansas POTA Entities

It's safe to say that out of the nearly 300 parks that I visited on this POTA journey, each one had unique traits that stood out to make the activation memorable. Although there isn't enough space to cover them all in this article, five noteworthy activations included:

1. Lake Sylvia State Park (US-10236). When I activated this park, I rented a small, furnished cabin with my wife, Lori. The location boasted nice views of the lake, hiking trails, and lots of trees from which to hang antennas. I made more than 904 SSB and CW contacts there across six activations. I was also the first to activate this entity for POTA, and our club, Cabot Small Town Amateur Radio Service, operated there for ARRL Field Day. I highly recommend this park to fellow activators.
2. White Rock Mountain Recreation Area (US-11155). Seated along a mountaintop overlooking the state, this park was an awesome place to activate. I was able to walk the trails and find a great overlook where I made CW contacts.
3. Buffalo National Wild and Scenic River (US-0646). As an activator, I prefer parks that offer great scenery and a low noise floor for ease of operating. This park has spectacular views of the bluffs surrounding the Buffalo National River that runs through Arkansas. Tent camping is offered at this spot — first come, first served. If you plan to activate this park, be sure to set time aside for activities like rafting and canoeing.
4. Rohwer Relocation Center Memorial Cemetery National Historic Landmark (US-11233). My father was in the military, so I enjoy visiting sites pertaining to veteran history. Rohwer Relocation Center was a World War II-era Japanese American confinement site. Now, it's a cemetery with monuments honoring Japanese American soldiers who died fighting for the US. This quiet site was a calm place to both activate and reflect on an important piece of history.
5. Civil War Trail State Trail (US-7435), Butterfield State Trail (US-9161), and Trail of Tears National Historic Trail (US-3791). This was a single, three-park activation on a trail that went through all three parks. Many similar spots exist in the POTA program, allowing activators to get the most out of their operations. Jason Maguran, KN4AL, joined me for this activation.

Now, I mostly use *HAMRS* when activating on SSB, and I run *WSJT-X* when using digital modes.

The biggest challenge was having to re-charge my electronic devices, especially my laptop and radio battery. Solar was not an option because I would sometimes activate more than 15 parks a day (earning me the Rover Cheetah Award), and I didn't have an inverter. There was one instance where I was in a rush to pack up all my equipment at one park and head to the next one. I remember arriving at the park and going to retrieve my laptop, only to discover it was nowhere to be found — I had left it charging on a bench at the previous park. Luckily, it was still there when I returned to get it. Lesson learned — sometimes, being in a hurry can slow you down.

The author (left) and fellow ham Jason Maguran, KN4AL, at the three-park activation trail, which counted for Civil War Trail State Trail (US-7435), Butterfield State Trail (US-9161), and Trail of Tears National Historic Trail (US-3791).

New Faces and New Places

While my Arkansas POTA journey took some getting used to, it was an extremely rewarding experience from start to finish. The process of activating all 275 designated POTA parks within Arkansas led me to fully realize how much history is in my home state,

The author on SSB amid a park activation.

A view of the author's equipment during his quest to activate all of the POTA parks in Arkansas.

The author making CW contacts on a bluff with a view at White Rock Mountain Recreation Area (US-11155).

despite living here for most of my life. I encountered many local landmarks having to do with events like the Civil War and the Trail of Tears, in addition to family home markers dating back to the 1800s. I also had the chance to meet Eddie Daniel, W5LST, the POTA US mapping representative for Arkansas. He informed me of a five-for-one park activation at the Historic Washington State Park (US-1106). That is where I met Gary Martin, N5HOG, another fellow ham who showed me the town and its historical significance.

In fact, I'm now on a first-name basis with many hams after talking with them via POTA, and I've enjoyed every single contact. Several park hunters followed my spots around the state to help me achieve my goal, which, in turn, helped them achieve their hunter awards.

One of my most memorable activations was Mount Magazine State Park (US-1104). It boasts the highest peak in Arkansas, and I found myself operating at an altitude of 2,300 feet above sea level, cold and surrounded by thick fog. It says a lot about how much you love activating for POTA hunters when your face and body are frozen.

The Takeaway

Having been a General-class operator for 2 years, I feel that activating every park in my state has been a huge accomplishment. I thank all who have come along for the ride, and all of the others who have helped me locate parks off the beaten path.

For me, POTA has made getting out of the house and on the air more exciting than ever. I still enjoy hunting, but leaving my comfort zone back in September 2022 has shown me that activating is my cup of tea. Finding parks that have seldom or never been activated is my current priority for hunters who need them in their logs.

So far, I have activated 564 parks in total and hunted 5,895. My future plans are to work toward DX park hunting, earn my Amateur Extra-class license, and activate every park in Mississippi (which I'm in no hurry to complete). I encourage anyone interested in POTA to begin activating their local parks at their own pace, especially to meet other hams and learn what their state has to offer.

All photos provided by the author.

Les Chalfant, KI5GTR, is a General-class licensee studying for his Amateur Extra-class test. He has been licensed since March 2022, and he enjoys talking locally on the air using the General Mobile Radio Service, VHF/UHF, and HF. Les is currently the Vice President of Arkansas' Cabot Small Town Amateur Radio Service. He feels that amateur radio did not enter his life early enough, but he's enjoying making up for lost time with activities like Parks on the Air. When Les is not operating, he works at his job in the building automation/energy management industry. Les can be reached at **les_chalfant@yahoo.com**.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

These hams summited Cinnamon Butte for a YL-only SOTA activation on July 23, 2023: (back row, from left to right) Amy Haptonstall, AG7GP; Renee Dolphin, KF7TED; Kim Flannagan, K7IMA; Kathy Lew-Eells, K2THY; (front row, from left to right) Aliah Eells, KK7NRS; Randi Johannsen, N7OLE; Amy Boyle, KC7JNU, and Katherine Maack, KK7IUD. Mount Thielsen can be seen in the background.

Building a Sisterhood through SOTA

An annual Summits on the Air campout in Oregon's Cascade Range provided an opportunity for a women's activation.

Amy Haptonstall, AG7GP

Mount Thielsen emerges from the High Cascades in Oregon like a jagged tooth piercing the checkered plains of the deep-green and charred-gray forest. Amidst the massive expanse of volcanic terrain, this peak (at 9,184 feet) became the focal point from sunrise to sundown for hams activating the summit as part of the Second Annual W7O (Oregon) Pacific Northwest (PNW) Summits on the Air (SOTA) Campout in July 2023.

The first PNW SOTA Campout occurred in 2022, and invited operators from across the US to gather at a campground in Oregon and activate numerous summits for SOTA all weekend. The 2023 event was special because we were joined by 10 female operators (YLs), some of whom had just earned their license prior to the event.

The impressive turnout of YL operators at the PNW SOTA Campout was a rarity for a SOTA

SOTA Operators Chase the Queens

Following the Cinnamon Butte activation in 2023, Paula Uscian, K9IR, and I developed the YL-only special event, Annual Queens of the Mountains. Queens of the Mountains was created with the intention of bringing YLs together to foster camaraderie, inspire women to try SOTA, and shine light on how supportive and welcoming ham radio, particularly SOTA, is to women.

During the inaugural event in June 2024, 1×1 special event calls (W#Q) were used in each US region, and the hashtags **#QOM** and **#YLSOTA** were used on social media. Several women made their first SOTA activation, and some were using a 1×1 call for the first time. We incorporated an achievement award in memoriam of Liz Burns, K1LIZ (SK) — a blind ham who was an avid SOTA activator and chaser — for any YL who accomplished a joint YL activation and YL-to-YL summit-to-summit contacts, among other achievements. Lorene Samoska, W6LOR, was the 2024 winner. Despite some challenges (near-radio-blackout conditions, heavy rain in some areas, some vehicular breakdowns, hiking challenges, and more), everyone had a lot of fun.

Due to the success of the first event (which spread as far as South Africa), we plan to make this an annual occurrence. The Second Annual Queens of the Mountains will take place June 7 0000Z to June 8 2359Z. More information is to come on the SOTA reflector at **https://reflector.sota.org.uk**.

event, or any radio event. I took advantage of this opportunity and arranged a YL-only SOTA activation for the third evening, after we returned from our daytime climbs. I chose Cinnamon Butte, an easier drive-up summit with a fire lookout tower. We announced the plan on our campout whiteboard and on 146.58 MHz, inviting interested YLs to join. At about 6:00 PM, eight YLs headed to the summit. Although it was a short drive, it provided an opportunity for people to meet one another prior to the activation.

A YL-Only Activation

Once we arrived on Cinnamon Butte, we were greeted by Angela, who was staffing the summit's fire lookout tower. "I've been waiting all day for you!" she said. "The men have been telling me for 2 days that a group of women were going to be coming my way." Angela gave us a tour of the tower, offered a summary of her job (with an update on the current wildfires), and introduced us to her dog.

Angela "wo-manning" the lookout was quite fitting, making our evening that much more special. From the top of the lookout tower, we took in the amazing view of this volcanic region where the great Mount Mazama once stood at approximately 12,000 feet before its eruption 7,700 years ago, formerly dwarfing the existing mountains. Now, the beautiful Crater Lake partially fills its craggy-rimmed *caldera* (a volcanic crater with a diameter many times the size of the central part of a volcano, often caused by volcanic explosions). This unique wonderland of timber- and rock-covered mountains and cliffs, rolling pumice plains, and, of course, the deepest

Randi Johannsen, N7OLE, sat with Kim Flannagan, K7IMA, as she took her turn activating Cinnamon Butte.

Aliah Eells, KK7NRS (on the left), and her mom Kathy Lew-Eells, K2THY (on the right), were chased by family members Jarod Eells, NE7ET, and Byron Eells, K7HY, from Garwood Butte.

Renee Dolphin, KF7TED, successfully made her four SOTA contacts required to activate Cinnamon Butte.

and bluest lake in the US provided us with lots of opportunities for SOTA activations.

After Angela left, we prepared for our activation using our handheld transceivers. We needed to figure out how eight YLs could harmonize a SOTA activation while they were all on the same mountain — without causing confusion and interference with each other. We decided to take turns making four contacts (the minimum required for a SOTA activation). The men back at camp were our main chasers, most of whom were socializing and resting after a long day of activations (as were we, which was one reason that we chose a summit we could drive to).

Typically, making 2-meter contacts in this area would be very challenging, but with such a large crowd back at the campground, the real challenge was organizing airtime. One family coordinated their evening to make summit-to-summit contacts. Jarod Eells, NE7ET, waited on Garwood Butte with his son, Byron Eells, K7HY, to contact his wife, Kathy Lew-Eells, K2THY, and daughter, Aliah Eells, KK7NRS (who earned her license that week). Amy Boyle, KC7JNU, proudly called CQ using what once was her grandmother's call sign. We took turns until everyone "got their four" and successfully activated Cinnamon Butte (W7O/CS-055) together.

As we wrapped up, we had a small huddle, reflecting on how special this short and sweet event was. We joked that this was a YL SOTA world record — eight YLs on one mountain! Many of us had never met prior to the event, and one of us had just gotten licensed, but we traveled to an unknown mountain together and drove back to camp with newfound friendships. I was inspired by every one of these ladies at Cinnamon Butte.

Katherine Maack, KK7IUD, operated her handheld transceiver from the base of Cinnamon Butte's fire lookout tower.

Amy Haptonstall, AG7GP, helped new ham Aliah Eells, KK7NRS, make SOTA contacts while the others patiently awaited their turn.

Ham radio is a team sport, and this is especially apparent with SOTA. Sometimes you need a coach, sometimes you are a coach, sometimes you're a cheerleader, sometimes you need a little cheering on (or even a physical boost!) to finish that last ascent, or you might be the one driving the team bus — all of which are valuable roles. If you've offered your help and support, kudos to you! Your assistance is extremely valuable, no matter how small it may be.

Success Beyond Measure

The 2023 PNW SOTA Campout was an amazingly successful and welcoming event with close to 60 operators participating, and it was full of diversity. Many got to meet for the first time in person, some heard team members' voices for the first time (even though their calls were heard in Morse code dozens of times), and some finally got to meet the person(s) who had mentored or inspired them from afar. It felt like a family reunion (or "hamily" reunion, as I like to call it).

I don't know how many mountains or activations were made (maybe more than 300?), contacts made (possibly several thousand?), feet climbed, miles hiked, or summit-to-summit contacts made, but I can tell you that we all had a lot of fun with such a diverse group of operators.

All photos provided by the author.

Amy Haptonstall, AG7GP, earned her license in 2017 with her husband Robin Haptonstall, N7HAP, seeking better off-grid communications. Soon after, she fell in love with HF portable operations. SOTA quickly became Amy's passion, and she achieved Mountain Goat status in 2022 (making her the first YL in Oregon to achieve that status) and Double Goat in 2024. Amy continues to activate mountaintops on a regular basis, enjoying every view and taking lots of pictures. She also enjoys expedition contesting, organizing and attending W7O campouts, and being part of her local clubs. Amy can be reached at **ag7gp.amy@gmail.com**.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

View a photo slideshow of the 2024 PNW SOTA Campout and the inaugural Queens of the Mountains event in the digital edition of *QST* (**www.arrl.org/qst**).

Building a Radio Go-Box

A simple radio build you can take anywhere.

Brad Robertson, N3OFI

I joined a local club called the South Mountain Radio Amateurs, N3TWT, which has an Amateur Radio Emergency Service® (ARES®) communications group. As I started to complete the various qualifications in the ARES task book, the thought of a radio go-box became an obsession. My goal was to create something that covered multiple frequencies and was easy to carry and move by myself with minimal assembly.

I recently retired from the construction field and had a few toolboxes, so I figured I could use them to keep the cost down. These boxes have a rubber strip that creates a nice seal when closed. A triple-level stackable toolbox seemed big enough, and more importantly, it had wheels. I attached an aluminum plate with a piano hinge in the bottom level of the toolbox so I could raise it for storage and access. This worked well and allowed me to put it in a flat position to store it or in an inverted position for easy viewing with plenty of airflow.

The radio go-box with the aluminum plate in the flat position.

The radio go-box with the aluminum plate in the inverted position.

Mounting the Components

Once the plate was in, I placed the radio heads, speakers, and mics in different positions to see what worked and looked the best. Then I drilled holes and made cuts for permanent mounting. All the holes had grommets, and I used automotive door guard strips for the bigger cutouts because they had adhesive and were flat and flexible.

I mounted the main radio units inside the box on the sides to allow extra storage space. I also mounted an automotive fuse block with a hinge for easier access. Each radio had an 18-inch extension cable, so I did not have to attach the antenna to a tough-to-reach area behind the radio.

I cut and placed some heavy foam padding in the leftover space to protect the radios. I put my Astron power supply inside with a

The radio go-box with cutouts in the foam padding to easily store handheld radios and their accessories while maintaining organization.

long power cable lead and two extended antenna cables, making connections quick and easy.

The middle level of the toolbox (not pictured) will hold supplies, such as hand tools, crimpers, a soldering iron, meters for measurements, and anything needed for quick repairs on the road.

The top level of the toolbox became my handheld radio box. I cut out a piece of foam to carry my FRS, GMRS, and dual-band handheld radios with their chargers, extra batteries, and miscellaneous cables.

That concludes my rolling radio go-box. Hopefully my idea will inspire others. I like to think I'm working smarter, not harder!

All photos by the author.

Brad Robertson, N3OFI, has been a ham since 1992 and holds a General-class license. He retired from his career in construction in 2022. Brad is a member of the South Mountain Radio Amateurs club, N3TWT, and is active in ARES/emergency communications and auxiliary communications. He has been happily married for 39 years and has two children and grandchildren. When Brad's not operating, he also enjoys oil and acrylic painting in his free time. You can check out some of his paintings on the Brad Robertson-Studio Facebook page. Brad can be reached at **artistbrad@comcast.net**.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

Field Organization Reports — October 2024

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**.

760
AD8CM

531
KT5SR

475
N9VC

460
KR4PI

451
KE8BYC

420
NØJAR

415
WM5N
KCØDE

409
K1CJV

395
W2PAX

390
W6WHS

352
KK4AGX

338
KO4KUS

315
W4PXE

310
NK4AA

292
KB9PGY

281
W9FE

267
AA4JS

265
NW3X

264
KN4WX

262
KT4WX

260
AC8NP

255
KF8ATJ

250
N2LC
WO2H
KV2J

245
KT2D

235
W4DNA

220
K5OB
K4SJC

215
WØPZD

204
KE8DON

201
W9RY

200
KC9FXE
KD2NMG

198
KC8YVF

196
KM4WXX

190
ND8W

181
WD8USA

174
W1LEM

170
ACØKQ
NI2W
W1RVY
N1ILZ

169
W5WMC

168
WA9FTA

165
W4CMH
N8SY
KD8ZCM

161
W9EEU

160
W8GSR

153
KE8ANW

150
WB9WKO
W9GRG
K3JL
W8MAL
KV8Z

145
WB8YYS
WM2C

144
KC1OIP

140
WA3QLW
AD3J
KE4RS
KK3F

139
K3EAM

138
KE8HKA

135
W3YVQ

130
AG9G
WK4WC
K8MDA
KY2MMM
WDØBFO
N2JBA
KW1U
N1UMJ
WZØC

128
KT5EM

127
WB9QPM

126
W8DJG
WV5Q

125
K9LGU
N8MRS
KB8GUN
N3GE

124
K8RDN
KC8T

122
KD2LPM

120
WA4VGZ
WC4FSU
AD4DO

NX9K
KB3YRU
KY2D
KA9QWC
AB9ZA

115
K7OED
W2OOD

110
KM4WHO
KO4OL
W4NHO
AI9F
N4CNX
KD8UUB
WB8TQZ
KB2QO
N1IQI
KD0HHN

108
N2DW
N3RPB
N2TSO

105
KA9IKK
W1TCD

103
W8IM
WA3EZN

100
KZ8Q
WB4RJW
WB9EDL
W4EDN
KA8BJA

WB8SIQ
WX2DX
K2MTG
K3YAK
W1KX
N1LAH
KC1KVY
N1CVO

98
W4TTO
NJ5R

97
N8RWF
KC1HHO

96
N3KRX
KB8RCR
KA2HZP

95
KD2YYK

94
WB8R
AE5MI

93
ND3L
WW3S
WB2VUF

90
KB9GO
KC9UC
KN4AAG
W4KX
K8KRA
KL7RF

K8ED
KB8PGW
W2QMI
K2MJR

88
WB8RGE
K1STM
WA3QPX

87
N8OD

85
W2ARP

84
N4NOA

82
KF7GC

81
KB4OLY

80
AE2EY
KG5AOP
KR4ST

79
W7MIN
KB1NAL

77
KB3MXK
K4DH
KAØDBK

76
KE8CYC
W9BGJ

75
NT1N

74
W3ZR

73
W5XX

72
W2AH

70
K2PHD

The following stations qualified for PSHR in these previous months, but have not been recognized in this column yet: (Sep. 2024) W7PAT 324, W7EES 295, W9EEU 177, KA9QWC 120, W9BGJ 117, AB9ZA 90.

Section Traffic Manager Reports

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

KY2D 1,840, W2AH 1,787, NX9K 1,778, KW1U 1,486, WB9WKO 1,118, WA3QLW 684, KK3F 584, K8ED 545.

ARRL Teachers Institute: Looking Back, Moving Forward

In 2025, the evolving professional-development program is restructuring to provide educators with more course availability and resources.

Steve Goodgame, K5ATA
ARRL Education and Learning Manager

To support ARRL's new advocacy of inspiring and educating youth, the Education and Learning Department has taken the growth of our programs to a new level. The ARRL Teachers Institute on Wireless Technology (TI; **www.arrl.org/teachers-institute-on-wireless-technology**) is a donor-funded program in which teachers from across the country are brought to ARRL HQ in Newington, Connecticut, for 1 week of professional development. TI has grown from three sessions in 2021 to seven sessions in 2024 — and 16 sessions are scheduled for 2025.

Program Curricula

Teachers attending TI-1 (the introductory course) learn basic electronics, how to program microcontrollers, the fundamentals of radio direction finding, how to make contacts via satellites, and more. Teachers who complete TI-1 become eligible to apply to attend TI-2, which focuses much more heavily on microcontrollers, the Automatic Packet Reporting System (APRS), and remote sensor data gathering. Participants learn how to program using *Arduino IDE*, how to build a sensor buoy that can be deployed in nature, and how to use APRS to receive the data remotely.

In 2024, we introduced TI-3, which entailed 1 week of an in-depth focus on amateur radio ballooning and space communications. During this time, teachers built and launched a pico balloon payload. Educators learned about radio astronomy and visited the Haystack Observatory at the Massachusetts Institute of Technology. The week wrapped up with teachers building and deploying a Radio JOVE (**https://radiojove.gsfc.nasa.gov**) receiving station.

Equipment Donations

TI allows teachers to take equipment back to their schools and immediately engage students in amateur radio. The list of equipment they take with them is impressive and wouldn't be possible without the generosity of the manufacturers.

Thanks to Yaesu and ZUM Radio, ARRL can give a Yaesu FT-70DR digital handheld transceiver and a ZUMspot Elite digital hotspot to each attendee. The goal of including these two items specifically is to provide teachers with the tools needed to build a network of classroom stations with which students across the country and around the world can connect through a Yaesu System Fusion reflector. This reflector has already begun to get traffic, thanks to teachers assisting their students with making their first contact, not only by getting them on the air, but doing so in a comfortable setting where they can talk with their peers. I'm incredibly thankful to ZUM Radio and Yaesu for their support of engaging young people in amateur radio! Programming the FT-70DR is a simple process,

Everton Henriques, KD2ZZT, tests his sensors during the 2024 TI-2 Remote Sensors and Data Gathering course. Everton teaches at Staten Island Technical High School, an ARRL model school. To date, he has helped more than 100 students get licensed.

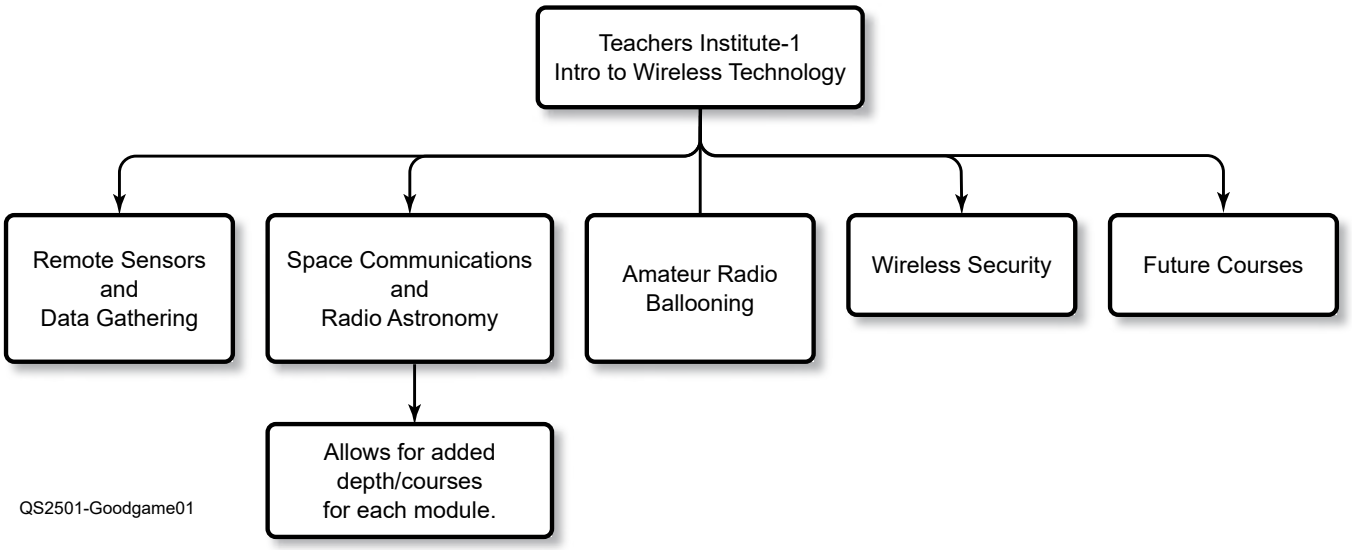


Figure 1 — Beginning in 2025, after a teacher completes TI-1, they'll be able to choose which course they would like to take next.

thanks to RT Systems offering programming cables and software at a steep discount. It's exciting to watch teachers program their local repeaters into the software, anxious to get home and on the air.

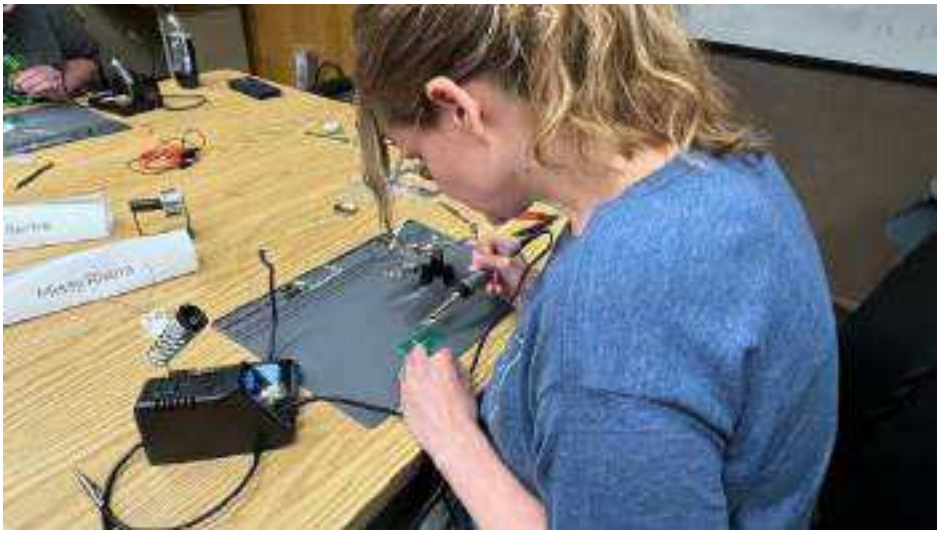
Teachers also receive a Byonics MicroFox transmitter and an antenna from Arrow Antennas. These two tools let them immediately engage students with amateur radio and introduce them to how much fun it can be. Kids love foxhunting, so tools like these are critical to getting that immediate motivation. The TI program also includes an attenuator kit, provided by 3rd Planet Solar/KC9ON at a significant discount, so teachers can gain experience building kits with something they can use during foxhunts — it's a win-win!

Looking Ahead

As we move into 2025, Teachers Institute continues to evolve. There are some structural changes taking place that will adjust the way educators apply for these professional-development courses. Rather than teachers being required to complete each TI course in numerical order, they'll have a choice of what to pursue after completing TI-1. As we continue to build courses on specific topics, each one will be added to the selection of post-TI-1 courses shown in Figure 1.

This change will allow teachers to select coursework that they're interested in implementing in the classroom, rather than being required to attend courses that don't appeal to them before they can attend the one(s) they want. This, in turn, provides a cost savings for administering the program, allowing us to focus each session's resources on teachers who are most likely to engage and inspire students using what they learn.

TI-3 Space Communications and Balloons was first introduced in 2024 as a beta test with select teachers in attendance. This test proved invaluable, as we quickly learned that there was far too much content to cover in a week. As a result, we'll be splitting it into two sessions: one on balloons and one on space.



Missy Rivera, KF8BRN, learns to solder during TI-1. Missy earned her Technician license during Teachers Institute.

A group of teachers build a Radio JOVE receiving antenna during TI-3.

The Teachers Institute lineup for 2025 is as follows:

- Introduction to Wireless Technology (all teachers are required to complete this session prior to applying for others)
- Remote Sensors and Data Gathering
- Space Communications and Radio Astronomy
- Amateur Radio Ballooning
- Wireless Security (currently in development for beta testing)

Every educator who attends any Teachers Institute session completes a formal lesson plan aligned with educational standards. These are available for everyone on the ARRL Learning Center web page (**https://learn.arrl.org**) and have proven to be extremely popular with teachers seeking ways to meaningfully integrate radio into their classrooms. Additionally, these plans can be easily modified for use as activities for Scouts, 4-H Ham Radio, church groups, etc.

ARRL is also developing a formal curriculum for teachers that will correlate with national and applicable state education standards and have the ability to be used with any learning management system. The curriculum will be initially intended for middle school teachers and students, with plans for expanding into high school-specific subject areas. Consisting of video lessons, hands-on projects, interactive online lessons, and independent-study activities, it'll be easy to integrate into classrooms across the nation. One important thing to note is that while the curriculum will involve amateur radio, it will be a STEM (not an amateur radio) curriculum that uses radio as a platform for learning. Students will be introduced to amateur radio while learning about coding, electronics, math, science, etc.

Thank You for Your Support

As TI scales up to reach more young people, so do the costs. Teachers Institute would not be possible without the generosity of our donors, who are stepping up to help fund this new advocacy. They're endowing seats in the program, sponsoring teachers for several years. Others are increasing their giving, helping to fund TI sessions. Members of the YouTube community have consistently supported our efforts, from hosting impromptu fundraisers on their channels to having in-person fundraisers at hamfests. Mike Dahlhofer, K8MRD, of Ham Radio Tube and Josh Nass, KI6NAZ, of Ham Radio Crash Course have hosted Teachers Institute telethons on their YouTube channels to raise significant resources for ARRL's Education and Technology Program.

Whether you give financially or volunteer your time, thank you! The program is a success because of your support.

IARU Celebrates 100 Years

The International Amateur Radio Union (IARU) is the worldwide federation of national amateur radio organizations. IARU membership consists of more than 160 member-societies in as many countries and separate territories.

IARU President Tim Ellam, VE6SH, and ARRL Radiosport and Regulatory Information Manager Bart Jahnke, W9JJ

The IARU (**www.iaru.org**) is comprised of an Administrative Council (president, vice president, and secretary) and three regional executive committees (R1, R2, and R3) — all of which are made up of volunteers. On behalf of the growing list of IARU member-societies, these officers and committee members have (for the past century) worked to maintain and expand the frequency allocations enjoyed worldwide.

Countries with IARU member-societies are shown in yellow.

The IARU was founded as the international representative of the amateur radio movement at a meeting in Paris in 1925. At the time, the short waves were just beginning to be understood, as well as be exploited for global communication via power levels and antennas within reach of private individuals operating from their homes. These radio amateurs needed an organization to coordinate their activities and be their voice at international conferences.

A Centennial Celebration

April 2025 marks the 100th anniversary of this worldwide federation. To commemorate this milestone, a ceremony will be held in Paris on April 25 – 26, where delegates from IARU member-societies will hold a formal reception. On-air celebrations include:

• IARU 100th Anniversary Centennial QSO Party (IARU CQP)

The IARU CQP will be held for 9 days, beginning at 0000 UTC on Saturday, April 12, and ending at 2359 UTC on Sunday, April 20. This event will celebrate 100 years of the IARU promoting the interests of amateur radio worldwide, seeking to protect and enhance our spectrum privileges. Amateur radio operators worldwide are encouraged to be active on the air. A website will track participants' accumulated contact points and provide participation certificates for download. The CQP also encompasses World Amateur Radio Day on Friday, April 18, 2025.

• IARU HF World Championship

The 24-hour IARU HF World Championship starts at 1200 UTC on Saturday, July 12, and ends at 1159 UTC on Sunday, July 13. This annual contest supports amateur self-training in radiocommunications, including improving operating skills, conducting technical investigations, and intercommunicating with other amateurs around the world using the 160-, 80-, 40-, 20-, 15-, and 10-meter bands.

Visit **www.iaru.org** for updates on IARU activities planned for 2025.

Sierra Harrop, W5DX, sharrop@arrl.org

NCVEC Question Pool Committee Removes Two Pool Questions from Use

The National Conference of Volunteer Examiner Coordinators (NCVEC) Question Pool Committee has removed one Extra-class and one General-class pool question from use. Extra-class pool question E2A13 and General-class pool question G8C01 have been deleted from exams, as they each have more than one correct answer. The deleted questions must be removed from exams as soon as possible.

Updated question pool files, including the errata and new information, have been posted on the NCVEC Extra-class question pool web page at **www.ncvec.org/index.php/2024-2028-extra-class-question-pool-release**. The current Element 4 Extra-class question pool became effective July 1, 2024, and it is valid through June 30, 2028.

Updated General-class question pool files, also including the errata and new information, have been posted at **www.ncvec.org/index.php/2023-2027-general-question-pool-release**. The current Element 3 General-class question pool became effective July 1, 2023, and it is valid through June 30, 2027.

The ARRL VEC advises the community to regularly check the NCVEC website at **www.ncvec.org** for updates to the question pools, which may include errata and withdrawn questions.

Results of the 2024 ARRL US/IARU Region 2 Radio Orienteering Championships

The 23rd ARRL US and 12th International Amateur Radio Union (IARU) Region 2 Radio Orienteering Championships, held October 5 – 13, 2024, brought together more than 50 competitors from 13 US states, as well as participants from Canada, Australia, Uganda, and China.

Set in the scenic parks and forests near Chelsea, Dexter, Pinckney, and Brighton, Michigan, the event was organized by the Southern Michigan Orienteering Club, with communications and logistics help from the Chelsea Amateur Radio Club. Event Director Joseph Burkhead, KE8MKR, of Pinckney, was praised for his outstanding leadership in managing the event. Joseph's wife, Becca Burkhead, filled multiple roles to ensure the event's smooth operation.

2024 ARRL US/IARU Region 2 Radio Orienteering Championships participant William Wright, WB6CMD, won first place in four events for the M60 category. [Ken Harker, WM5R, photo]

Radio orienteering, or Amateur Radio Direction Finding (ARDF), blends map and compass navigation with radio transmitter hunting. This sport not only provides a challenging competition, but it also has practical applications in search and rescue, wildlife tracking, and defense communications. Competitors faced difficult terrain, signal reflections, and elite-level navigation challenges, while beginners were welcomed with coaching and a 2-day training camp held before the championships.

The event included the Sprint at Hudson Mills Metropark, Foxoring race in the forests of the Waterloo Recreation Area, 2-meter Classic at Eddy Discovery Center, and 80-meter Classic at Brighton Recreation Area.

Medals were awarded across various categories, with standout performances in both women's and men's divisions. In the women's W35 category, Erin Hammer and Sandra Quinn Giovannini of North Carolina's Backwoods Orienteering Klub (BOK) split gold medals in the Sprint and Foxoring events, while Lori Huberman of New York secured first place in both Classic races.

In the Elite men's category, Gheorghe Fala of BOK took gold in

both the Sprint and Foxoring races, while Eduard Nasybulin from Massachusetts swept the Classic events.

The Masters classes saw impressive performances as well. In the W55 division, Nadia Scharlau, KO4ADV, of BOK won three gold medals across four races and finished second in the Sprint, just behind Natalia Leoni. In the M60 category, William Wright, WB6CMD, from California's Bay Area Orienteering Club, swept all four events to take home the gold.

In the youth divisions, Alex Lefgren took top honors in the M12 category, while James Harker earned recognition in the M14 class. Anastasia Afonkin shined in the W14 category, and in the W19 category, both Adalia Schafrath-Craig and Yitong Qin had notable performances. Adalia competed in all four events, finishing with times that would have been competitive even in more elite categories. In the M19 class, Dax Welborn turned in a strong showing, further highlighting the rising talent in youth radio orienteering.

Three first-time competitors who participated in the training camp earned medals. Roland "Carey" Woodward, KC9YQT, from Wisconsin, secured bronze in the M60 Sprint and Foxoring races, outperforming several experienced racers. In their respective classes, Rose B. Ganim, W1RBG, received medals in all four events, and Vincent J. Melling, N1VJM, earned two medals.

These results will factor into the selection of Team USA for the next World ARDF Championships. For complete results, photos, and further details, visit **www.radioorienteeringchamps.us**.

Pacificon 2024 Inspires Next Generation of Radio Amateurs

The Mount Diablo Amateur Radio Club held Pacificon 2024 in San Ramon, California, on October 18 – 20. The convention drew radio amateurs from throughout the populous Bay Area, and it annually hosts the ARRL Pacific Division Convention.

The organizing committee works all year to pull together an impressive program. This year included an exceptional lineup of forums, seminars, hands-on activities, and exhibits, but what stood out was the tremendous effort to include and engage young and prospective hams.

Pacificon 2024 coincided with the largest digital/on-air Scouting event in the world: Jamboree on the Air-Jamboree on the Internet. As radio amateurs and radio clubs around the world got Scouts on the air to promote friendship and global citizenship, Pacificon partnered with the Boy Scouts of America Golden Gate Area Council to get dozens of Scouts to attend the convention. They were led by their troop leaders in small groups to meet with ARRL Education and Learning Manager Steve Goodgame, K5ATA, and his wife Cyndi Goodgame, K5CYN. The duo provided them with a short introduction to radio and wireless technology, ham radio, and ARRL. The Scouts eventually got on the air using the most recognized call sign in the world, W1AW. Special Event Station W1AW/6 was sponsored by the Palo Alto Amateur Radio Association.

Section Manager of the ARRL Minnesota Section Bill Mitchell, AEØEE (left); 2024 Hiram Percy Maxim Memorial Award recipient Kees Van Oosbree, WØAAE (middle), and Director of the ARRL Dakota Division Bill Lippert, ACØW (right). [Charles Stroud, KA8HDE, and Bill Lippert, ACØW, photo]

Many young hams also attended, including those accompanying parents and grandparents. Among them was Section Youth Coordinator of the ARRL East Bay Section Alexia Snethen, KM6LGG, a 17-year-old from Alameda County, and San Joaquin Valley Section Youth Coordinator Shane Lewis, K5SML. Both Youth Coordinators are General-class licensees and are involved in a variety of activities to attract and engage young hams. For instance, Snethen runs a youth net on a local repeater and helps students in her Section connect with each other — even online — to discuss ham radio.

ARRL member Brian Zoraster, KA6ZED, of Livermore, California, helped organize a foxhunt for Pacificon. Before the activity, Zoraster quickly briefed participants on techniques for using handhelds, S-meters, and directional antennas to find the transmitters he had hidden on the San Ramon Marriott hotel property. A short video is available on the ARRL Facebook page at

www.facebook.com/ARRL.org/videos/1732721217554145/?rdid=UB5yXS1eGLIplfiW.

ARRL National Instructor Gordon West, WB6NOA, was on hand to greet attendees and congratulate new licensees and those who have recently upgraded. West led an Instructors Academy during the convention, sharing ideas for instructional demonstrations and highlighting ARRL resources for teaching amateur radio classes.

A Pacificon 2024 photo album on the ARRL Facebook page (**www.facebook.com/media/set/?set=a.955393939956254**) captures more of the convention highlights. Pacificon will return October 10 – 12, 2025.

2024 Hiram Percy Maxim Memorial Award Recipient: Kees Van Oosbree, WØAAE

Kees Van Oosbree, WØAAE, received the 2024 Hiram Percy Maxim Memorial Award at the North Star Radio Convention/ARRL Minnesota State Convention held in Brooklyn Park, Minnesota, on October 5, 2024.

Van Oosbree is an active member of the radio community in Minnesota and at Iowa State University, where he is treasurer of the Campus Amateur Radio Club. He is active in the Minnesota Wireless Association, and is regularly on SSB, CW, RTTY, and other digital modes. In 2020, Van Oosbree was part of the Remote Ham Radio team that put NU1AW on the air for the International Amateur Radio Union HF World Championship. In January 2024, he operated in the SSB portion of the ARRL North American QSO Party in the single-operator low-power assisted category. Van Oosbree made more than 1,000 contacts in less than 9 hours.

The Hiram Percy Maxim Memorial Award consists of a $1,500 cash award and an engraved plaque. It is given annually to a licensed ARRL member under the age of 21. The nominee's accomplishments and contributions to both the amateur radio and local communities should be of the most exemplary nature.

Section Manager Nomination Notice

To all ARRL members in Maryland/DC, Nevada, New Hampshire, Northern New Jersey, Rhode Island, San Joaquin Valley, Utah, and West Texas. 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**. 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 March 7, 2025. If more than one member is nominated in a single Section, ballots will be mailed from Headquarters no later than April 1, 2025, to full members of record as of March 7, 2025, which is the closing date for nominations. Returns will be counted May 20, 2025. Section Managers elected as a result of the above procedure will take office July 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 July 1, 2025. If no petitions are received from a Section by the specified closing date, such Section will be resolicited in the July 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*

Rick Palm, K1CE, k1ce@arrl.net

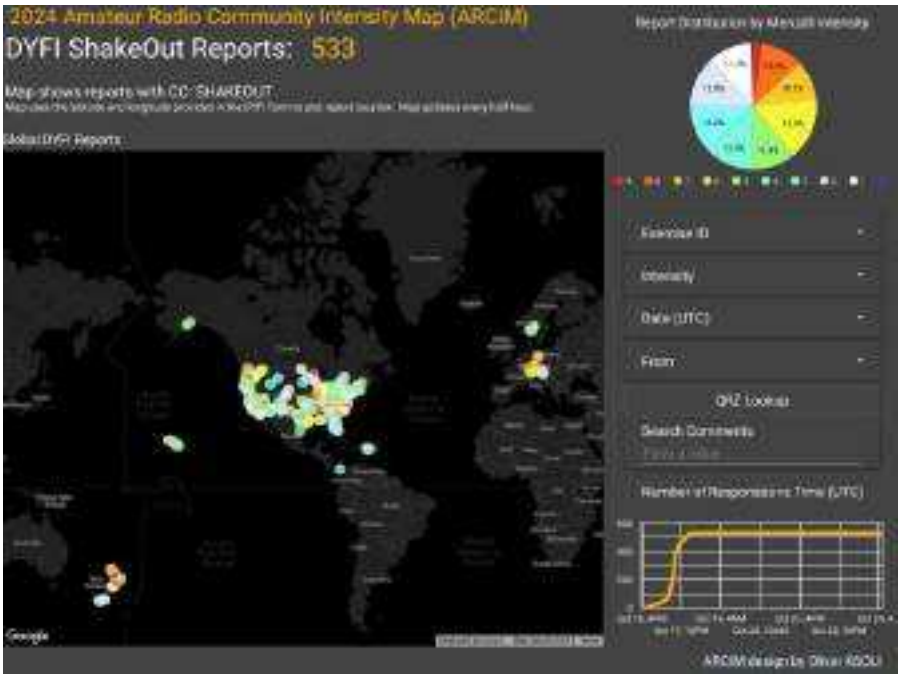
Public Service

The 2024 Great ShakeOut ARCIM: A Map for Hams, by Hams

The 2024 Great ShakeOut — a popular worldwide annual earthquake drill (**www.shakeout.org**) — was held on October 17, 2024, at 10:17 AM local time. Millions of people around the world participated in the drill to practice earthquake safety. The ShakeOut Amateur Radio Community Intensity Map (ARCIM) project — a collaboration of Amateur Radio Emergency Service® (ARES®) LAX Northeast, Ventura County Auxiliary Communications Service (ACS)/ARES, San Diego ARES, the ARRL San Joaquin Valley Section, and the Institute of Electrical and Electronics Engineers (IEEE) MOVE Radio Club, W4MOV — offered the whole community of radio operators the chance to submit Winlink "Did you feel it?" (DYFI) reports as part of their ShakeOut drill experience. Radio amateurs who copied "SHAKEOUT" in their DYFI message were able to view their report and location on the ARCIM (**www.laxnortheast.org/dashboards/shakeout**), which was updated hourly for the drill.

Oliver Dully, K6OLI, initiated and coordinated the Winlink DYFI project, an amateur radio community collaboration with the United States Geological Survey (USGS) that allows hams to submit ground truths to USGS during real events, contributing to earthquake intensity assessments and event response products. During his 2 years as Forms Manager for the Winlink Development Team, Dully coordinated the creation and management of Winlink forms. He worked closely with amateur radio and agency stakeholders to build mission-centric forms. In 2023, he began exploring dashboards for mapping and displaying amateur radio-generated data. Now, he builds and maintains dashboards for VARA FM Chat, Winlink mappable data, and the regional DYFI reports submitted by amateur radio operators.

I had fun filing my report and viewing it along with my location on the ARCIM during the 2024 ShakeOut. It worked great for me, and Dully said it was a smashing success. "Participation was higher and more international than we anticipated," he said, reporting that as of October 18, there were 533 reports from the US, New Zealand, Puerto Rico, Norway, Germany, Canada, Austria, Switzerland, Philippines, Mexico, US Virgin Islands, Singapore, and Panama.



Amateur Radio Community Intensity Map dashboard.

"While the ARCIM's original concept had focused on 'earthquake country' — i.e., the earthquake-prone states of California, Nevada, Oregon, Washington, and Hawaii — we quickly realized that it was scalable," he reported. "We were incredibly pleased by the many operators throughout the United States who opted in for ShakeOut. We also appreciated the efforts the EmComm Training Organization went through to clarify the parallel exercises and encourage people to participate in both."

The ARCIM project also fostered international goodwill, as groups from New Zealand, Germany, Austria, Norway, and other countries around the world worked together with their US counterparts to spread the word about ShakeOut, train operators in sending

DYFI reports that cc'd "SHAKEOUT," and have fun with fostering emergency preparedness. "While the Amateur Radio Community Intensity Map project for ShakeOut started as a collaboration of the aforementioned groups, we provided the ARCIM for the whole amateur radio community and all were welcome to participate," Dully said. "The ARCIM — a map for hams by hams — embodies the spirit of amateur radio collaboration in the truest sense of the word."

Rick Palm, K1CE, can quickly and easily move his station components to the floor in case of an earthquake.

Preliminary Mandatory Testing

Dully stressed the importance of the thorough testing of the ARCIM in the weeks leading up to the Great ShakeOut drill. ARES LAX Northeast operators, as well as San Diego ARES and Hawaii ARES operators, provided bulk testing showing that large amounts of data can be handled by the setup and proved the scalability of the system. Winlink Treff, a German amateur radio group affiliated with Deutscher Amateur Radio Club (DARC), helped with international testing and was joined by hams from New Zealand.

Patrick Langer, OE1LHP, and the World-Link Communications Austria group amplified the SHAKEOUT messaging and provided German translations of much of the documentation and exercise instructions. "All of that allowed us to work out the kinks any new system invariably encounters," Dully said. "We have also received very positive feedback regarding the ARCIM from Dr. David Wald, seismologist at the USGS in Golden, Colorado, and Executive Director of the Earthquake Country Alliance Mark Benthien," he added. "The Earthquake Country Alliance spread the word, as did ARRL's *The ARES Letter*."

The ARCIM report for the 2024 Great ShakeOut is available at **https://drive.google.com/file/d/1q2s_dwaFpeCE4EIegUMrhz90uon9nC0B/view**, and live results can be viewed at the project website (**www.laxnortheast.org/dashboards/shakeout**).

Station and Earthquake Safety Tips

Participation in the Great ShakeOut drill can help prepare hams for operating during a real earthquake, and this preparation includes figuring out the best way to set up their station. I've experimented with numerous station-component layouts throughout the course of 5 decades as an amateur radio operator. My favored scheme has been to mount the components (transceiver, tuner, etc.) on steel shelves that are placed on steel miniature scaffolding. The shelves, with the mounted components, can easily be removed from the scaffolding and placed in the back of my car for deployments. They can also easily be placed on the floor of my shack in a matter of seconds for the security of the gear and operator during an earthquake.

When it comes to earthquake safety, it's important to follow the widely accepted protocol: drop, cover, hold on. Wherever you are, drop down to your hands and knees, and hold onto something sturdy. If you're using a wheelchair or walker with a seat, make sure the wheels are locked, and remain seated until the shaking stops. Cover your head and neck with your arms. If a sturdy table or desk is nearby, crawl underneath it for shelter. If no shelter is nearby, crawl next to an interior wall (away from windows). Crawl only if you can reach a better covering without going through an area with more debris. Stay on your knees or bent over to protect vital organs. If you are under a table or desk, hold on with one hand and be ready to move with the desk if it moves. If seated and unable to drop to the floor, bend forward, cover your head with your arms, and hold onto your neck with both hands.

All photos provided by the author.

Contest Corral

January 2025

Check for updates and a downloadable PDF version online at **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					
1	0000	1	0100	3.5	AGB New Year Snowball Contest	CW Ph Dig	RST, serial, mbr (if any)	www.qsl.net/eu1eu/agb_nysb.htm
1	0800	1	1100	3.5,7	SARTG New Year RTTY Contest	Dig	RST, serial, name, happy new year (native language)	www.sartg.com
1	0900	1	1200	3.5-14	AGCW Happy New Year Contest	CW	RST, serial, mbr (if any)	www.agcw.de
1	1400	1	1800	144,432	AGCW VHF/UHF Contest	CW	RST, serial, pwr class, 6-char grid square	www.agcw.de
1	2000	1	2100	3.5	UKEICC 80m Contest	Ph	6-char grid square	www.ukeicc.com/80m-rules.php
2	0000	3	0300	7	Walk for the Bacon QRP Contest	CW	Max 13 WPM; RST, SPC, name, mbr or pwr	qrpcontest.com/pigwalk40
2	1800	2	2200	28	NRAU 10m Activity Contest	CW Ph Dig	RS(T), 6-char grid square	nrau.net/nrau-contests-in-general
2	2000	2	2200	1.8-28,50	SKCC Sprint Europe	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
3	0100	3	0130	See rules	NCCC FT4 Sprint	Dig	4-char grid square	www.ncccsprint.com
3	0230	3	0300	See rules	NCCC Sprint	CW	serial, name, QTH	www.ncccsprint.com
4	0000	4	2359	3.5-28	PODXS 070 Club PSKFest	Dig	RST, SPC	www.podxs070.com
4	0700	4	2100	3.5-14	Marconi Club ARI Loano QSO Party Day	CW	RST, serial, "MC" (if mbr)	www.ariloano.it
4	1200	5	1200	1.8-28	WW PMC Contest	CW Ph	RS(T), PMC abbrev or CQ zone	www.s59dcd.si
4	1300	4	1700	3.5,7	RSGB AFS Contest, CW	CW	RST, serial	www.rsgbcc.org
4	1800	4	2359	3.5-14,18,21,24,28,2-m rptrs	ARRL Kids Day	Ph	Name, age, QTH, favorite color	www.arrl.org/kids-day
4	1800	5	2359	3.5-28	ARRL RTTY Roundup	Dig	W/VE: RST, SP; non-W/VE: RST, serial	www.arrl.org/rtty-roundup
4	2000	5	0700	1.8	EUCW 160m Contest	CW	RST, name, mbr or "NM"	www.uft.net
7	0100	7	0300	3.5-28	ARS Spartan Sprint	CW	RST, SPC, pwr	ars-qrp.com
11	0000	11	2359	3.5-28	YB DX Contest	Ph	RS, serial	ybdxcontest.com
11	1200	12	1200	3.5-28	UBA PSK63 Prefix Contest	Dig	ON: RSQ, UBA section or serial (starting with 001)	www.uba.be
11	1200	12	2359	1.8-28,50	SKCC Weekend Sprintathon	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
11	1800	12	0559	1.8-28	North American QSO Party, CW	CW	Name, SPC	www.ncjweb.com/NAQP-Rules.pdf
12	0630	12	0830	3.5,7	NRAU-Baltic Contest, SSB	Ph	RS, serial, 2-letter fylke/län/province/region	www.nraubaltic.eu
12	0900	12	1059	28	DARC 10m Contest	CW Ph	RS(T), serial, DOK (if any)	www.darc.de
12	0900	12	1100	3.5,7	NRAU-Baltic Contest, CW	CW	RST, serial, 2-letter fylke/län/province/region	www.nraubaltic.eu
12	1300	12	1700	3.5,7	RSGB AFS Contest, Data	Dig	RST, serial	www.rsgbcc.org
13	0100	13	0300	1.8-28	4 States QRP Group Second Sunday Sprint	CW Ph	RS(T), SPC, mbr or pwr	www.4sqrp.com
14	1800	14	1929	3.5,7	DARC RTTY Sprint	Dig	RST, serial, DOK (if any)	www.darc.de
15	2300	19	2300	1.8-14	AWA Linc Cundall Memorial CW Contest	CW	RST, eqpt year, input power (see rules for format)	www.antiquewireless.org
16	0000	17	0300	14	Walk for the Bacon QRP Contest	CW	Max 13 WPM; RST, SPC, name, mbr or pwr	qrpcontest.com/pigwalk20
16	0130	16	0330	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or pwr	naqcc.info/sprint_rules.html
16	1900	16	2000	3.5-14	NTC QSO Party	CW	Max 25 WPM; RST, mbr or "NM"	pi4ntc.nl/ntcqp
18	1200	19	1159	1.8-28	Hungarian DX Contest	CW Ph	RS(T), serial, 2-letter county (if HA)	ha-dx.com/en/contest-rules
18	1200	19	1159	3.5-28	PRO Digi Contest	Dig	RST, serial, "ME" (if mbr)	proradiocontestclub.com
18	1300	18	1700	3.5,7	RSGB AFS Contest, SSB	Ph	RS, serial	www.rsgbcc.org
18	1800	19	0559	1.8-28	North American QSO Party, SSB	Ph	Name, SPC	www.ncjweb.com/NAQP-Rules.pdf
18	1800	19	0559	1.8-28	NA Collegiate Championship, SSB	Ph	Name, SPC if NA	www.w9smc.com/nacc
18	1900	20	0359	50 and up	ARRL January VHF Contest	CW Ph Dig	4-char grid square	www.arrl.org/january-vhf
18	2000	19	0559	1.8-7	Feld Hell Sprint	Dig	See rules	sites.google.com/site/feldhellclub
19	2300	20	0100	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or pwr	qrpcontest.com/pigrun
22	0000	22	0200	1.8-28,50	SKCC Sprint	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
23	0130	23	0330	1.8	NAQCC CW Sprint	CW	RST, SPC, name, mbr or "none"	naqcc.info/sprint_rules.html
24	2200	26	2200	1.8	CQ 160m Contest, CW	CW	RST, SP or CQ zone	www.cq160.com
25	0600	26	1800	3.5-28	REF Contest, CW	CW	RST, French dept or serial	concours.r-e-f.org
25	1200	26	1200	3.5-28	BARTG RTTY Sprint	Dig	Serial (no signal report)	bartg.org.uk
25	1300	26	1300	3.5-28	UBA DX Contest, SSB	Ph	RST, serial, ON section (if ON)	www.uba.be
25	1600	26	2159	No WARC	Winter Field Day	CW Ph Dig	Category, ARRL section, MX or DX	www.winterfieldday.com
25	2200	26	1000	1.8-28	Australia Day Contest	CW Ph Dig	RST, 4-char grid square	www.wia.org.au
29	2000	29	2100	3.5	UKEICC 80m Contest	CW	6-char grid square	www.ukeicc.com

There are a number of weekly contests not included in the table above. For more info, visit: **www.qrpfoxhunt.org**, **www.ncccsprint.com**, and **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** *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.*

Maria Somma, AB1FM, ab1fm@arrl.org

Exam Info

The ARRL VEC Program's Future

The role and importance of the Volunteer Examiner Coordinator (VEC) system have not diminished over the years; most hams today never had the experience of sitting for an exam in front of an FCC official at an FCC field office. The VEC exam sessions provided are far more convenient and more plentiful than any FCC-commissioned examinations. VE teams can administer exams online at any time or in person at any location according to local needs.

The 2025 ARRL VEC Exam Fee Remains $15 for Adults and $5 for Youth

Visit **www.arrl.org/arrl-vec-exam-fees** for more information.

Today, our VEC program is about more than just amateur radio exams; it is also about serving the FCC and supporting the amateur radio community in many ways. VECs are special event call sign coordinators, club call sign administrators, question pool writers, and a knowledgeable information source for a wide range of licensing matters.

Last year was the ARRL VEC's 40th anniversary, and it marked the last year that the ARRL VEC would create, print, and ship new exam booklets for the ever-changing question pools. VE teams using ARRL VEC exam booklets will need to transition to the ExamTools online exam platform by the end of 2025. Shifting teams to this web-based system will reduce VEC printing, storage, shredding, and shipping (both to and from the teams). This will move us one step closer to our complete digital transformation.

We hope our VEs are willing to take on this endeavor with us as we continue to move toward electronic testing, as it is vital to the amateur radio community. We will be here every step of the way to help with and ensure a smooth transition, as we remain committed to offering quality programs and services. This includes providing a superior overall experience for our customers and potential customers, and demonstrating our capabilities and value in serving the public.

These strategies will help the VEC program remain strong and active in the amateur radio community. Our commitment to delivering a fast, easy, and affordable solution allows teams to speed up FCC license grants for customers. Hopefully, it will give us traction to grow the amateur radio community more than ever.

ExamTools Online Exam System

Since June 2020, our VE teams have been shifting to the ExamTools platform (**www.exam.tools**), which works well for online and printed exams. The platform manages almost everything needed to conduct an in-person or remote video test session. As we shift teams to the online exam system, teams will be required to electronically file session documents from the field via our session upload web page.

The ExamTools Platform Offers Four Options for Exam Sessions:

1. Remote video-supervised test sessions with online exams.

2. In-person test sessions with online exams.

3. In-person hybrid test sessions with some online exams and some paper exams.

4. In-person test sessions with all ExamTools-generated paper exams (with automated grading).

Regardless of the type of exam session that is managed through the system, the program offers registering and tracking candidates throughout the session, automated grading, online signing of Certificate of Successful Completion of Examination (CSCE) forms and 605 forms by the candidate and examiners,

Question Pools Schedule

No question pools will be updated or released in 2025.

The question pools review is part of a regular process.

Each question pool is reviewed and updated on a 4-year rotation.

The Technician-class (Element 2) pool became effective July 1, 2022, and is valid until June 30, 2026.

The General-class (Element 3) pool became effective July 1, 2023, and is valid until June 30, 2027.

The Amateur Extra-class (Element 4) pool became effective July 1, 2024, and is valid until June 30, 2028.

ARRL VEC Program Services

Online Amateur Radio Exams

ARRL VE teams can go completely electronic by using a web-based exam system to administer online exams for in-person or remote video-supervised sessions.

Remote Video-Supervised Sessions

Remote sessions are conducted using an online video conferencing platform with on-screen tests.

Electronically File Exam Sessions to the VEC

Upload exam session documents or files for quicker service! New and upgraded licenses are transmitted to the FCC within 1 – 2 business days for weekend sessions, and they are usually transmitted on the same day for weekday sessions.

ARRL Member Licensing Support

Ongoing FCC licensing guidance and support for our ARRL members, including license renewal help, is an important part of our program services.

Please contact the VEC department at **vec@arrl.org** for information about our services.

logging and compiling session statistics and VE participation lists (test report summaries), and output files for upload to the coordinating VEC. Additionally, our blue overlay grading template designs are loaded in the program and can be used with the ExamTools printed exams. The easy-to-use program helps VEs conduct a session whether the team is using online or printed exams. ExamTools provides a comprehensive solution for managing and tracking all types of exam sessions.

Looking Ahead

By moving VE teams to the online testing platform and to electronic session filing, there will be quicker service to candidates. The average wait time for a license has drastically decreased to a few days instead of a few weeks (or months, when conducted by the FCC) for candidates who test with VE teams using these services.

Stronger results will be attained by meeting our VE teams' and examinees' expectations, being less dependent on the US Postal Service and paper filings, and achieving higher customer satisfaction due to the shorter wait times for license issuance. The COVID-19 pandemic served as a catalyst to accelerate changes that were already happening. We know that we must look to our future and to new technology, and we must be poised to thrive in the electronic testing world.

We recognize the need to create a better digital experience for our customers and members, and we are committed to providing an honest, reliable exam system. The ARRL VEC team is proud to serve the community. We have accomplished so much in the past 40 years, and continuing to move forward will protect amateur radio for future generations.

We would like to thank our VEs for playing an important role in the success of the ARRL VEC and amateur radio, as we believe their contributions are rewarding, and our impact is significant. The VEC system has truly made a positive difference in our community's growth and future. We look forward to continuing to serve you wherever your examining takes you, and we hope we can continue together for the good of amateur radio.

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@arrl.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.arrl.org/qst-author-guide**.

Paul Bourque, N1SFE, n1sfe@arrl.org

2024 ARRL International Digital Contest Results

The ARRL International Digital Contest was held June 1 – 2, 2024.

With the ARRL International Digital Contest (IDC) in its third year, we have more data to analyze. Let's look at the overall activity first. In the initial running of the event in 2022, 1,452 logs were submitted, which is a healthy number for a new contest! Nine hundred sixty-three logs were submitted in the second year, and 937 logs were submitted in the third year, showing the activity has leveled out. In 2024, 505 logs were received from stations in the continental US and Canada, with 432 DX stations participating.

Contacts by Band

Meters	Contacts
160	3
80	208
40	10,050
20	68,542
15	65,324
10	15,093
6	260

Twenty and 15 meters remained the most popular bands in 2024. Twenty meters had 68,542 contacts, while 15 meters had 65,324 contacts. These comprise almost 84% of all the reported contacts in the contest. The third most popular band was 10 meters with 15,093 contacts (9.46%), which makes sense as we approach the peak of Solar Cycle 25. Because the IDC occurred during the peak of the 6-meter E-skip season, it's surprising that so few contacts were reported on that band. As many modern radios now include HF plus 6-meter capabilities, switching between bands is relatively easy, making it surprising that more operators do not take advantage of the propagation enhancements that summer conditions present.

The Single Operator, One Radio categories remain the most popular entry categories, comprising 92.6% of the total entries. The Single Operator, Two Radios categories comprised 3.6% of all the entries, with the Multioperator categories totaling 1.8%. One hundred eighty-five single-operator participants took advantage of the All-Enclosed Antennas overlay. The overlay is available for single-operator stations that are unable to erect towers or install antennas outside a structure.

The 2025 ARRL International Digital Contest will be held June 7 – 8, 2025.

Top Ten — US and Canada

Single Operator, One Radio, Low Power

N3QE	12,967
K6SEA (KA6BIM, op)	10,495
WA2BOT	10,092
K6OK	9,994
K3DNE	6,304
KA2MGE	6,201
K6RO	6,187
KC3PIB	5,814
N4VZ	5,418
W0ZA	5,373

Single Operator, One Radio, Low Power, 8 Hours

K6LL	5,440
WU8T	3,615
W2LPL	3,294
W9ET (WB9SBD, op)	3,181
W7PP	2,846
AF6SA	2,677
AB1J	2,366
K6TQ	2,253
W1IZZ	2,107
WA7BNM	2,091

Single Operator, One Radio, QRP

N4FUR	4,709
N5ER	3,391
WA3LXD	2,654
K7FR	2,450
K2IW	2,097
KG7CW	1,828
WB0WAO	1,479
N3TTT	973
W5UHQ	842
N6WZQ	705

Single Operator, One Radio, QRP, 8 Hours

WQ5L	1,536
AA3R	1,419
N0UR	1,034
N4NM	976
W4RZ	940
KO1H	847
W0ADL	580
NZ1I	467
KE6K	367
N8CJ	340

Single Operator, Two Radios, Low Power

K3MM	20,803
N8HRZ	17,188
WV4P	12,547
NN1SS	10,767
NF3R	9,044
K9YY (KG9OV, op)	7,490
N7UVH	6,214
N4IQ	5,084
K9KLD	4,969
W9AV	4,444

Single Operator, Two Radios, Low Power, 8 Hours

VE3WUE	7,199
W1UE	5,505
K9CT	4,701
AI9T	4,527
KI6DY	3,639
KW1X	2,301
N9LQ	2,114
VE3MGY	1,402
AA3B	1,194
WY3A	1,071

Single Operator, Two Radios, QRP

KN6OKY	212

Single Operator, Two Radios, QRP, 8 Hours

N5YT	1,685

Multioperator, Single Transmitter, Low Power

N4SVC	9,316
W2ZQ	5,751
W0AAE	4,119
N1SOH	3,543
K1UHF	2,603
N1KT	1,980
K3AJ	1,751
AK4NF	1,688

Logs Received by Category

Category	Logs Received
Single Operator, One Radio, Low Power	543
Single Operator, One Radio, Low Power, 8 Hours	241
Single Operator, One Radio, QRP	45
Single Operator, One Radio, QRP, 8 Hours	39
Single Operator, Two Radios, Low Power	20
Single Operator, Two Radios, Low Power, 8 Hours	11
Single Operator, Two Radios, QRP	1
Single Operator, Two Radios, QRP, 8 Hours	2
Multioperator, Single Transmitter, Low Power	16
Multioperator, Single Transmitter, QRP	1

Continental Winners

Africa		
Single Operator, One Radio, Low Power	ZS6JBZ	3,017
Asia		
Single Operator, One Radio, Low Power	5B4AMM	13,625
Single Operator, One Radio, Low Power, 8 Hours	TA4RC	1,281
Single Operator, One Radio, QRP	JA1KPF	1,272
Single Operator, One Radio, QRP, 8 Hours	BD4VGZ	963
Multioperator, Single Transmitter, Low Power	JL3ZHU	2,804
Europe		
Single Operator, One Radio, Low Power	CQ7F (CT2FEY, op)	10,347
Single Operator, One Radio, Low Power, 8 Hours	ON6NL	4,786
Single Operator, One Radio, QRP	EC7KW	6,786
Single Operator, One Radio, QRP, 8 Hours	SP4LO	1,522
Single Operator, Two Radios, Low Power	PA4O	8,005
Single Operator, Two Radios, QRP, 8 Hours	UT3N (UT3NK, op)	686
Multioperator, Single Transmitter, Low Power	PI4COM	10,362
North America		
Single Operator, One Radio, Low Power	HI8RD	5,089
Single Operator, One Radio, Low Power, 8 Hours	FG4NO	2,366
Single Operator, One Radio, QRP	KP2B (WP3A, op)	4,404
Single Operator, Two Radios, Low Power	NP4TX	11,031
Multioperator, Single Transmitter, Low Power	6Y5PW	15,233
Oceania		
Single Operator, One Radio, Low Power	ZL3IO	24,121
Single Operator, One Radio, Low Power, 8 Hours	VL2Y (VK2EZF, op)	3,813
Single Operator, One Radio, QRP, 8 Hours	YC4SIZ	1,853
South America		
Single Operator, One Radio, Low Power	PY5ZHP	11,855
Single Operator, One Radio, Low Power, 8 Hours	PP5GTA	4,620
Single Operator, One Radio, QRP	PY2PLL	2,944
Single Operator, One Radio, QRP, 8 Hours	PY2SFA	573
Single Operator, Two Radios, Low Power	PY1ZV	9,131
Multioperator, Single Transmitter, Low Power	LT5D	7,117

Top Ten — DX

Single Operator, One Radio, Low Power

ZL3IO	24,121
KH6WI	17,432
YE9BJM	15,671
5B4AMM	13,625
KH6AQ	12,534
PY5ZHP	11,855
CQ7F (CT2FEY, op)	10,347
DJ2KP	10,065
PY1KV	9,981
HS0ZOY	9,894

Single Operator, One Radio, Low Power, 8 Hours

ON6NL	4,786
PP5GTA	4,620
VL2Y (VK2EZF, op)	3,813
G4NBS	3,556
ER4KAA	3,273
LU7JMS	3,162
DB9SH	2,760
DL5DTG	2,721
YF3AJJ	2,534
YL2LW	2,416

Single Operator, One Radio, QRP

EC7KW	6,786
PA3EOU	6,361
EU4E	5,029
KP2B (WP3A, op)	4,404
EA4HWT	3,825
PY2PLL	2,944
LU2PWY	2,412
PP5IP	1,990
PE2K	1,426
JA1KPF	1,272

Single Operator, One Radio, QRP, 8 Hours

YC4SIZ	1,853
SP4LO	1,522
UT1IC	1,236
BD4VGZ	963
SP9DTE	872
DH9DX/P	849
PY2SFA	573
DU7OK	441
DB7YI	417
JJ1SSY	389

Single Operator, Two Radios, Low Power

NP4TX	11,031
PY1ZV	9,131
PA4O	8,005
GI7NKK	3,341

Single Operator, Two Radios, QRP, 8 Hours

UT3N (UT3NK, op)	686

Multioperator, Single Transmitter, Low Power

6Y5PW	15,233
PI4COM	10,362
OI5AY	7,813
LT5D	7,117
G4R	6,975
GB9DAT	3,784
JL3ZHU	2,804
9A2EU	2,387

Affiliated Club Competition

Club	Score	Entries
Medium		
Potomac Valley Radio Club	81,038	31
Society of Midwest Contesters	69,382	26
Yankee Clipper Contest Club	56,504	17
Northern California Contest Club	54,322	18
Frankford Radio Club	34,727	22
Swamp Fox Contest Group	27,720	10
Florida Contest Group	26,582	15
Tennessee Contest Group	19,969	6
Arizona Outlaws Contest Club	15,255	5
Southern California Contest Club	15,238	7
Minnesota Wireless Assn.	13,999	12
Contest Club Ontario	10,806	6
Spokane DX Assn.	7,138	3
Alabama Contest Group	6,906	5
North Coast Contesters	6,039	3
Hudson Valley Contesters and DXers	4,577	4
Carolina DX Assn.	4,112	4
Silver Comet Amateur Radio Soc.	3,617	4

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 ARRL February School Club Roundup

This event begins on Monday, February 10, 2025, at 1300 UTC and runs through Friday, February 14, 2025, at 2359 UTC.

♦ Stations may operate for up to 24 hours during the entire contest and may operate for only 6 hours during any single 24-hour period. Any mode — SSB, CW, or digital — is allowed.

♦ There are five participation categories: Elementary/Primary, Middle/Intermediate/Junior High School, Senior High School, College/University, and Non-School. There's also a category for individuals (individual participation is vital, as the schools need and want to contact as many stations as possible).

♦ School Club Roundup (SCR) is co-sponsored by ARRL and the Long Island Mobile Amateur Radio Club (LIMARC). Results will appear in *QST* and online at **https://contests.arrl.org**. Printable certificates will be available for download at **https://contests.arrl.org/certificates.php**.

♦ Share your team's photos and stories, and be sure to include a photo release (**www.arrl.org/photo-video-release-form**) for participants under 18 years of age. One of the best parts of SCR is showing off your team members and station! Upload your photos and stories when you submit your score at **https://contests.arrl.org/arrlscrscoresubmission.php**.

Ian Alkema, KI8AN, operated during the 2024 October School Club Roundup from his family's home station in Michigan. Ian made 464 contacts during the event. He stated, "[I] had a great time talking to all the schools and helping to promote youth in amateur radio." [Timothy Alkema, K8LK, photo]

For complete rules, logging sheets, and other resources, visit www.arrl.org/school-club-roundup.

New Products

NCH-W Wireless Noise-Canceling Headphones

Bhi has released wireless over-ear, noise-canceling headphones designed to reduce background noise. The headphones block up to 25 dB of sound, and feature Bluetooth compatibility and easy-to-reach controls to adjust the volume, skip tracks, answer calls, and turn noise cancellation on and off for ease of operation. The adjustable headband and high-quality ear pads provide comfortable wear for the 8 hours of battery life. For more information or to purchase the headphones for about $52, visit **https://bhi-ltd.com**.

Certificate of Code Proficiency Recipients

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.

May 2024

Tom J. Zajdel, AA3TZ	10
Tom J. Zajdel, AA3TZ	15
John H. Orkney, KA1LHJ	20
Tom J. Zajdel, AA3TZ	20
Daryl I. Hammond, WØBZ	25

June 2024

Robin L. Zinsmaster, N6PHP	25

July 2024

Theodore J. Jacobson, N6ZO	10
Jerry K. Nobles, N5MES	10
Charlene K. Lewis, K8XCO	15
David R. Koberstein, N9DK	20

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

October 2024

Daniel L. Schaible, KD8UZS	10
John S. Hickman, WW3B	20
David R. Koberstein, N9DK	25

Congratulations to all of the recipients.

January 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.

January 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 K9JM on Wednesday, January 29, at 9 PM PST (0500 UTC on January 30) on 3590 kHz. Unless indicated otherwise, sending speeds are from 40 to 10 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**.

For information about how to qualify for the Certificate of Code Proficiency, please visit **www.arrl.org/code-proficiency-certificate.**

W1AW Qualifying Runs — January 2025
(All times are in Eastern Standard Time.)

Monday	Tuesday	Wednesday	Thursday	Friday
		1/8 7 PM – 0000Z **(1/9 – UTC)** 35 – 10 WPM	**1/9** 10 PM – 0300Z **(1/10 – UTC)** 10 – 40 WPM	**1/10** 9 AM – 1400Z 10 – 35 WPM
	1/14 4 PM – 2100Z 10 – 35 WPM	**1/15** 7 PM – 0000Z **(1/16 – UTC)** 10 – 40 WPM	**1/16** 9 AM – 1400Z 35 – 10 WPM	**1/17** 10 PM – 0300Z **(1/18 – UTC)** 10 – 35 WPM
	1/21 9 AM – 1400Z 10 – 35 WPM	**1/22** 10 PM – 0300Z **(1/23 – UTC)** 35 – 10 WPM	**1/23** 7 PM – 0000Z **(1/24 – UTC)** 10 – 35 WPM	
1/27 10 PM – 0300Z **(1/28 – UTC)** 10 – 40 WPM	**1/28** 9 AM – 1400Z 35 – 10 WPM		**1/30** 4 PM – 2100Z 35 – 10 WPM	

Mike Walters, W8ZY, w8zy@arrl.org

Club Station

Behind the Scenes of Starting a Ham Club

Dale County, Alabama, was lacking an amateur radio club, so local hams worked together to start the Daleville Area Amateur Radio Service (DAARS), K2DAL. In this month's column, DAARS Trustee Kevin Turley, K9ADE, shares how starting a ham club could be easier than one might think.

There is strength in numbers. This is true on local, state, regional, and national levels. It helps to have a unified voice when it comes to troubleshooting issues, sharing knowledge, providing license exams, responding to event communication needs, and delivering emergency communications services — all great reasons to have an amateur radio club.

Where to Begin

Those of us interested in creating the club chose its name and discussed that its focus would be on community involvement, education, mentorship, and the Amateur Radio Emergency Service® (ARES®). From there, we drafted our constitution (using the sample at **www.arrl.org/affiliated-club-resources**), bylaws, and articles of incorporation as a nonprofit. (Each Secretary of State may have a unique online process to become incorporated and file documents.)

After agreeing upon our organizational documents, we elected our club officers. In addition to amateur radio knowledge, they have combined backgrounds of military and public service and are all humble enough to know they don't have all the answers. It's important that tasks are shared so that no one gets overwhelmed or burned out. Having members willing to serve in elected office may be the hardest part of starting a ham radio club, so it's important to support them.

You don't need a building or shack owned by the club to get started. This can be a goal, but when you're just starting out you can meet at a local college, American Red Cross, emergency management agency (EMA), or library. The key is consistency — choose a regular time and place for meetings. This will help the organization grow.

DAARS's ARRL Field Day setup was at Culpepper Park in Daleville, Alabama, to help spread the word about amateur radio and ARES.

Making It Legal

Next, we obtained our employer identification number (EIN) from the IRS (**www.irs.gov/businesses/small-businesses-self-employed/apply-for-an-employer-identification-number-ein-online**). Because a club will likely be handling money, it's best to have an account at a financial institution. They're going to require an EIN and a copy of your organizational paperwork. Some financial institutions may also require a copy of meeting minutes when opening the account.

If you want to go above and beyond, you can submit an online application for tax-exempt status. You can learn more about this and apply for it at **www.irs.gov/charities-non-profits/applying-for-tax-exempt-status**. If you receive tax-exempt status, you'll need to annually file a Form 990. Be advised there are additional steps you'll need to take to obtain tax-exempt status on the state level, and they vary by state. Consider consulting with a tax professional.

Our next step was to obtain our FCC Registration Number (FRN) and club call sign/license from the FCC. In following our constitution and bylaws, this was completed by the appointed trustee.

Getting the Word Out

Reach out to local media outlets to promote your new club. Draft a press release outlining that your amateur radio club has formed, defining its purpose, expanding on what amateur radio is about, and sharing how people can get in touch with the club. You'll also want to keep your local media informed of any activities your club becomes involved in, such as giving presenta-

tions at local schools, engagements with a local Boys and Girls Club, participating in activities with the local Scouts, providing radio communication for a local bike race, and holding licensure classes and testing sessions.

In addition to distributing regular press releases to local media outlets, we've also created a welcoming presence on social media and on our website (**www.daleville.us**). This allows us to keep our community informed of DAARS happenings and to create a means for fellow amateur radio operators to join.

Our club also opted to join the Daleville Area Chamber of Commerce, which assists us with marketing, getting involved in the community, and having a means to reach newcomers of Daleville as well as our neighbors at Fort Novosel, a local US Army post.

DAARS Activities

One of DAARS's goals was to become an ARRL Affiliated Club. The requirements, benefits, and application process can be found on the ARRL website at **www.arrl.org/affiliated-club-resources**. ARRL affiliation is perpetual, but you must update your club record annually to remain in good standing. This process takes about 3 minutes. We've found that being an ARRL Affiliated Club has helped us have strength with sharing knowledge, networking, receiving referrals, and more.

Our club is also very active with ARES. We serve our local National Weather Service and rescue squad, and we're beginning a working relationship with our local EMA (the ARRL Alabama Section has a great working relationship with the state EMA).

DAARS's first hamfest was held at the Daleville Cultural and Convention Center and drew approximately 200 to 250 attendees from Alabama, Florida, and Georgia. DAARS set up the registration table where attendees could obtain tickets to win door prizes.

Speaking of working with others, if you have other clubs nearby, work with them! We regularly work with other amateur radio clubs in neighboring counties. We have agreements to use one another's repeaters, we've partnered for events, and many DAARS members are members of these clubs as well. We ensure that our meetings and nets are not scheduled at the same time as neighboring club activities.

Inaugural Costs

The initial costs to start a ham radio club can add up, but it's worth it. Filling out organizational paperwork to become a legal organization in Alabama cost us $208, obtaining an EIN and becoming an ARRL Affiliated Club were free, the recurring web hosting fee is being covered by a member, and the local chamber of commerce membership is $55 per year. Despite the expenditures, we've opted not to have annual membership dues — DAARS members pull together when the time comes to help cover costs.

If you have any questions about forming an amateur radio club, please feel free to email me (**kevinturley334@gmail.com**) or contact ARRL for resources.

All photos provided by the author.

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.arrl.org/ssc-application** for more information about this program. Below is a list of new and renewing SSCs as of October 30, 2024.

Renewing SSCs

South West Idaho ARC, K7SWI	Nampa, ID
Central Ohio Radio Club, Inc., W8AIC	Sunbury, OH
Stanwood Camano ARC, W7PIG	Stanwood, WA
Spartanburg ARC, K4II	Spartanburg, SC
Tulsa ARC, W5IAS	Tulsa, OK

Sign Up for ARRL Club News

Read the monthly *ARRL Club News* e-newsletter to find out more about what clubs are doing to advance amateur radio in their communities and within the hobby. To opt in to monthly email delivery of *ARRL Club News*, log in to **www.arrl.org** and select "E-Newsletters and Notifications" on your account web page.

Steve Goodgame, K5ATA, sgoodgame@arrl.org

Ham Media Playlist

Digital Rancher — Making Amateur Radio Satellite Contacts

I talk to a lot of people about what interests them most about amateur radio. One thing that hams young and old have in common is the love for communicating via satellites. Admit it, you know it is a different level of cool to be able to aim a handheld antenna at the sky, key up, and communicate using an object in space. Robert Theiss's, W5ITR, YouTube channel focuses heavily on chasing satellites and making contacts. Viewers know him as his YouTube channel name, "Digital Rancher" (**https://youtube.com/@digital.rancher**).

I have known Robert for some time, having met in YouTube livestreams. We met in person at a hamfest with a small crowd gathered around him as he made satellite contacts. I was impressed right away, not by his operating technique (although that was spot on), but by his willingness to talk to people and answer their questions. He takes his time, making sure people get the answers they need.

A "YouTube Ham"

Robert initially found amateur radio because of his interest in the Raspberry Pi computer. Back when the model 3B was released, he got his hands on one and started searching YouTube for different ways to utilize the miniature computer. He stumbled upon a familiar name, Jason Oleham, KM4ACK, who was "sending messages using the Pi and a radio through the ether." Robert was immediately hooked, calling what Jason was doing "magic."

Robert, like many hams today, did not have a traditional mentor when he started out. He is a self-proclaimed "YouTube ham," meaning that he gained the bulk of his knowledge about amateur radio by watching YouTube content creators such as Ham Radio Crash Course, Ham Radio 2.0, and KM4ACK, among others.

Like many HamTubers, Robert did not initially plan on creating a YouTube channel with full-length videos. He created YouTube Shorts in which he shared tidbits about his operating and experience. It wasn't until viewers started reaching out to him with specific questions that he started to consider using the platform to give back to amateur radio, eventually becoming Digital Rancher.

Satellite Operations

Digital Rancher delivers his YouTube content in the same calm manner with which he carries himself in person. His video titled "My Satellite Rig!" (**https://tinyurl.com/Rancher-Sat**), in which he showcases his portable amateur radio FM satellite rig, is a direct response to people reaching out to him with questions

In his video "My Satellite Rig!" Robert, W5ITR, explains the purpose of each item in his satellite pack.

about what gear they needed to be successful with portable satellite operations. This video explains what bag he uses, why he chose this bag, modifications he made to it, and the contents and placement of the gear in the bag. In true Digital Rancher style, Robert not only explains the *what* but goes into detail explaining *why* he chose certain equipment and placement. This is a critical step when people are learning, and Robert nails it.

Robert, W5ITR, works satellites.

Robert loves to see the excitement when someone makes their first satellite contact. Most hams can remember the moment that created the spark — the contact or revelation that ignited the fire within them to delve more deeply into amateur radio — and Robert loves helping to create those moments for others. In his video titled "New Ham, attempts #ISS contact!" (**https://tinyurl.com/Rancher-ISS**), Robert helps his wife Trina, KI5YYL, make not only her first satellite contacts, but her first contacts ever on amateur radio. Taking it one step further, Trina wanted to talk to an astronaut. In this video, Robert takes the time to explain some of the equipment, including a homebrew monopod built out of PVC pipe, which allows Trina to manage the weight of the Elk antenna through the entire 10-minute pass. Robert coaches Trina through the process, gently reminding her what to say and when. The excitement is palpable when Trina hears astronaut Woody Hoburg, KB3HTZ, calling as NA1SS. Minutes later, when Trina makes a contact with Woody, her excitement is evident on her face.

Robert, W5ITR, coached Trina, KI5YYL, through making a contact with astronaut Woody Hoburg on the International Space Station.

Making satellite contacts is one thing, but understanding how amateur radio satellites work is another. In his video titled "Understanding the Magic of CubeSats!" (**https://tinyurl.com/Rancher-Cubesat**), Robert meets with Radio Amateur Satellite Corporation (AMSAT) representatives at Dayton Hamvention to learn what is inside a CubeSat and how they work. From learning how the antenna system deploys using fishing line, to showing his viewers a CubeSat simulator, this video is full of great information for those who wish to dive a little deeper into satellite communications.

Experimenting with Meshtastic

Digital Rancher does a lot with satellites, but he also does a lot with something that young people are really interested in experimenting with: Meshtastic. With so many device options available, it can prove a challenge to choose a first device. Robert has several videos in which he discusses the devices he uses for various tasks, going into detail about battery life, reliability, and ease of use. These videos can be found in a playlist all about Meshtastic at **https://tinyurl.com/Rancher-Playlist**.

If you are considering getting into amateur radio satellites, check out the Digital Rancher YouTube channel.

Bernie McClenny, W3UR, w3ur@arrl.org

How's DX?

The 2024 CY9C DXpedition to St. Paul Island

In this month's column, Patrick Dolan, N2IEN, provides a colorful retelling of the CY9C team's time on St. Paul Island — an experience they won't soon forget.

CY9C team members Adrian Ciuperca, KO8SCA (left); Glenn Johnson, WØGJ (middle), and Craig Thompson, K9CT (right), working pileups in their main operating tent. [Patrick Dolan, N2IEN, photo]

From August 24 to September 5, 2024, 11 members of the CY9C team huddled on St. Paul Island, a windswept, 3-mile-long island located about 15 miles northeast of Nova Scotia's Cape Breton Island and about 44 miles southwest of Newfoundland's Cape Ray. It took about a year to secure permission from Fisheries and Oceans Canada (DFO) to operate on the island, but it was a straightforward process thanks to some friendly help from DFO's Colleen MacDonald.

Our camp was located on St. Paul Island's North Point, a separate piece of barren rock that is only about several hundred yards wide and separated from the main island by a narrow channel. North Point is crowned by cliffs that are more than 100 feet high and deliver a thrilling view of the bright blue waters of the Gulf of St. Lawrence. It's home to an abandoned lighthouse and a scattering of wrecked buildings. At the time of the operation, CY9C team leader Murray Adams, WA4DAN, said, "We have a high elevation here — we're about 108 feet above the water — so we have wonderful takeoff angles in all directions. You couldn't ask for a better spot."

Despite good operating conditions, North Point is a challenging place for a DXpedition. It's subject to quirky and sometimes violent North Atlantic weather, and its steep coastline is rimmed with jagged rock. Over the centuries, countless seafarers have lost their lives there in shipwrecks, earning St. Paul Island the name "The Graveyard of the Gulf."

Preparations

The team prepared six radios loaned by FlexRadio, with Maestro control units, associated amplifiers, and tuners to cover the HF bands. Antennas included assorted Yagis for 10 – 20 meters, verticals for 30 and 40 meters, and two dipoles secured to the lighthouse tower for 80 and 160 meters. A triplexer on the Cushcraft A3 tribander would allow us to have three full-power stations with one antenna. DX Engineering also donated a valuable cache of coax, connectors, and filters.

The CY9C team hired local veteran mariner Greg Lawrence and his crew to land a heavy stash of water bottles on the island before our arrival. Local charter operator Breton Air later hauled in passengers, equipment, and tents via a cargo net. The team also used

an Airbus H120 five-seat helicopter (owned and piloted by me) for supply runs during the DXpedition. At one point, we used it to ferry a few lucky operators to a coveted shower at The Markland Coastal Beach Cottages in Dingwall, Nova Scotia. We fondly remember the hotel staff adopting the scraggly CY9C crowd, and even cooking a phenomenal chicken dinner for us, which was airlifted back to St. Paul.

Our Final Stats

Prior to the DXpedition, CY9 was ranked number 50 on Club Log's DXCC Most Wanted List. But our team undoubtedly made a dent in that number by making approximately 115,000 contacts on all HF bands and 6 meters. Many of those contacts were made via Earth-moon-Earth and low Earth orbit satellites. The tally far surpassed the results of our team's 2019 and 2016 DXpeditions combined. "We exceeded expectations," said Murray.

Our positive results were partially thanks to the peak of the sunspot cycle. Propagation was a little off during the middle of our stay, and it was worsened by a couple of solar flares. But conditions heated up for the second half of the trip, resulting in explosive, continuous pileups. The 10- and 12-meter bands were frantic well into the evenings. "One for the history books," said CY9C team member Adrian Ciuperca, KO8SCA, a veteran of 34 DXpeditions. He added, "We got an opening so strong on all bands that SSB was possible, even from unusual places such as 10 and 12 meters. [We] ended the DXpedition doing SSB pileups on 80 meters. It's something I've never encountered." Team member Craig Thompson, K9CT, said, "We made 8,000 contacts a day."

CY9C operators ran up the score on all HF bands via CW, SSB, RTTY, and FT8. FT8 operations relied heavily on the brand-new Super Fox mode, which accommodates nine streams without dividing the power. "It's amazing, you can do incredible throughput with it. At one time, I was working [1,600] stations per hour at peak rate," said co-leader Glenn Johnson, WØGJ. The downside of Super Fox is that it can be difficult to decode in marginal conditions, so the team switched back to regular Fox and Hound after a solar storm disrupted propagation.

Meanwhile, Lee Imber, WW2DX, had the VHF/UHF crowd well covered. Immediately after connecting the 6-meter Yagi and powering up, he worked 20 – 25 European stations, which he said was "not at all expected this late in the season." He added more European contacts by jumping on RS-44 satellite passes. But the biggest thrill happened when he aimed

The five-seat turbine helicopter piloted by Patrick Dolan, N2IEN, over a helipad on North Point. [Patrick Dolan, N2IEN, photo]

his array at the moon. Lee said, "432 MHz was never activated from CY9, so I wanted to give it out as an all-time new one. There are probably 15 or 20 first-time contacts between CY9 and those 15 countries."

Reflecting on the Experience

We didn't get our final contact tally without some close calls. For example, a sudden squall shook our small tent, lashing it with horizontal sheets of rain. Water found its way onto the power supply for the 6-meter and VHF/UHF gear that Lee was using. He recalled, "I quickly dove under the table, ripped it out, and threw it outside while it was smoking and popping and burning. That'll get your heart rate racing!"

Despite the downpours, thrashing winds, and chilly temperatures, there were days with mild, beautiful weather — clear enough to see the coast of Newfoundland, dozens of miles away. One night, a blazing aurora lit up the sky. Passing showers yielded brilliant horizon-to-horizon rainbows that seemed to plunge like molten metal into the sea. At one point, a pod of whales cruised by, and seals were a regular presence on the rocky shore. Coyotes could be heard from the main part of the island across the channel.

Mix some natural beauty, an exotic location, and a little adventure into ham radio, and you get some bragging rights and good memories. What were the best memories? In addition to the Asian pileups, it was "probably the time in the mess tent with the rest of the team. Just sitting around chatting, telling stories, and eating some questionable food," said Dan Sullivan, W4DKS. For Craig, it was "10-meter sideband and getting a lot of guys in the log, [and] the excitement in their voices when we worked them. That was priceless."

Jon Jones, NØJK, n0jk@arrl.org

The World Above 50 MHz

October 6-Meter F2

"Looks like the [fall] 6-meter F2 season has started," said Rich Zwirko, K1HTV (FM18), on October 8, 2024. Strong signals from South America and the Caribbean suddenly appeared that morning, taking many hams in North America by surprise. I received an email from Greg Cerny, WQØP, with a screenshot of a 6-meter contact he had made with CX4AAJ at 1415 UTC. I headed out the door so fast that I nearly dropped my coffee, and I set up a portable station at 1430 UTC. There were many strong signals on 50.313 MHz, such as LU8EKC from Argentina. I quickly put half a dozen Argentinian stations in the log, as well as YV1GIY. K1HTV started with an FT4 contact with LU1WI at 1430 UTC, followed by PXØFF. Rich logged VP8NO at 1520 and worked FY5FY, FY5KE, and HK6J on CW. However, the operating got tougher as more people got on the air, and heavy QRM developed.

I copied CT3MD via backscatter at 1554 UTC. WQØP and Fred, NO5Z, worked CT3MD. Greg also found PXØFF. NO5Z worked FY5KE on CW, and he worked CT1IUA and CN8LL on FT8. Lance, W7GJ, operating as ZD9GJ, worked W9RM (DM58) on 50.323 MHz. Dan, K7SMA, picked up signals from Argentina, Chile, Costa Rica, Honduras, and Uruguay. The opening lasted until around 1730 UTC and ended with signals from Ecuador and Colombia. Mike, KMØT (EN13), decoded ZL1RS and E51BQ. Frank Donovan, W3LPL, commented the following in a message to K1HTV:

Ed Sershon's, N7PHY, roving station on October 13, 2024. This image was taken near Umatilla National Forest while Ed was activating grid DN16. To the lower left of his antenna, comet A3 can be seen whizzing across the sky. [Ed Sershon, N7PHY, photo]

> Your 1430Z contact with LU1WI was much too early in the day for [transequatorial propagation (TEP)]. It was classic multi-hop F2, as were all of [the] other contacts you mentioned. TEP starts to [Argentina] at about 2:00 PM in the northern ionization crest over Haiti. The 1530Z – 1600Z opening to PXØFF could not possibly have been TEP. Why? The southern TEP ionization crest is directly over PXØFF. Our PXØFF contacts were classic 4,000+ mile double-hop F2 from mid-latitudes all across the US to PXØFF.

More limited F2 took place on October 9. Don, N3MK (FM27), noted contacts with PXØFF and VP8NO. K1HTV worked several stations in Brazil and Chile.

An October Geomagnetic Storm

A major geomagnetic storm with aurora took place on October 10, followed by a widespread F2 opening the next day. On October 8, sunspot AR3848 launched a powerful X1.8-class solar flare with an Earth-directed coronal mass ejection. It struck Earth at 1515 UTC on October 10. A large crack opened in Earth's geomagnetic field before the storm. Ken, WB2AMU, observed "decent aurora on 6 meters." He made 20 aurora CW contacts on the band. WA2GFN (FN20) worked KA2OMQ (FN13) on SSB. Sam Whitley, K5SW (EM25), made 2-meter CW aurora contacts with NØLL (EM09) and WØVB (DN74). Scott Armstrong, AA5AM (EM13), worked stations to the east, including K4LAZ (FM09) on 2 meters. Scott also worked NØLL on 222 MHz. Rich, NØHJZ (EN34), made 41 aurora contacts on 2 meters. Bob, W9EWZ (EN52), worked K1TEO (FN31), K1WHS (FN43), and KD2LGX (FN13) via aurora on 432 MHz!

As the aurora faded that evening, 6 meters opened to South America. I worked PY2XB (GG66) at 0220 UTC on October 11. Jim, AAØMZ (EM29), worked several Brazilian stations in rare grids, including PT9FD (GG27). AA5AM in Texas noted that the band was open until after local midnight. He worked CE3SOC at 1:28 AM and LU5VV at 2:08 AM. Scott said, "In my 45 years on 6 meters, I have never seen the band open to South America at this time of day. CE3SOC's signal peaked at +16 on FT8!"

Before going to work, I worked LU1WFU the next morning at 1515 UTC. About an hour later, 6 meters broke wide open, and 50.313 MHz became a mad-

house! WB2AMU worked FY5FY and several stations in Argentina and Brazil on CW. Fred, NO5Z (DM62), logged VP8LP, TI9/TI2JJP, and PXØFF on FT8; N7KA logged them, too, in addition to ZL7DX. K1HTV worked TI9/TI2JJP at 1815 UTC. At 1820 UTC, ZL1RS appeared and was copied by stations from coast to coast. On my work break, I put a quarter-wave whip on my car and copied TI9/TI2JJP, PXØFF, ZL1RS, and many others. I logged KH6AQ (BK29) at 1744 UTC. There was tremendous QRM on 50.313 MHz. Later that evening, when the band quieted down, Trey, N5KO, found and worked TI9/TI2JJP.

DXpeditions Cover 6 Meters

Some rare DX entities were active on 6 meters in October, including previously mentioned PXØFF and TI9/TI2JJP. Also on the band were C21MM, ZD9GJ, XT2MD, and others. However, on October 11, it was heartbreaking to see some of the DX stations struggle to complete contacts through the high levels of QRM. In the ON4KST chat, W9GA posted, "The problem with this mode (FT8) is that having a big amplifier doesn't necessarily help. You are a red bar on their screen among dozens of others." Please consider 50.323 MHz with Fox and Hound or *MSHV* for FT8, or 50.318 MHz for FT4, CW, and SSB.

Halloween 6-Meter F2 between North America and Europe

On October 31, the solar flux was 270. WQØP said European stations appeared for him at 1415 UTC. Greg worked Italy, Germany, Austria, England, and 4O3A in Montenegro. Nelson, KD2CYU, also noted many European stations, and the opening extended deep into eastern Europe and beyond. K1TOL (FN44) worked Z21ML (KG49) at 1345 UTC. At 1453 UTC, Roger, W4MW (EM96), found VU2MSA (MJ89)! VU2MSA confirmed the contact in Logbook of The World®. WQØP logged Z21ML at 1709 UTC. Gene, N9TF (EM66), worked Mike, SV9CVY, "with a big signal" at 1607 UTC. Gene runs 100 W to a three-element Yagi elevated 15 feet. Halloween concluded with a 6-meter F2 opening from continental North America to Alaska, starting at around 2000 UTC and followed by a strong opening to Japan. Jeremy, NØAW (DN70), made his first contact with Japan on 6 meters.

On the Bands

50 MHz. Bernie, ZS4TX/6, worked Phil, TI5/N5BEK, on October 1. On October 13, Trey Garlough, N5KO (CM97), made 14 contacts via long path to call sign regions BY, BV, VR, and JA. On October 16, Phil, NØPB (EM39), found VK4KEE, VK4MA, VK4HJ, VK4QG, and VK4WTN with strong signals. These led

Jim Kennard's, W2EKE, homebrew 13-element Yagi. He used this antenna to make his first 2-meter Earth-moon-Earth contact on September 20, 2024. [Jim Kennard, W2EKE, photo]

to Phil's DX Century Club #100 for 6 meters, which may have happened thanks to an E_s link to Arizona, and then a TEP opening. E_s was spotted by KØGU (DN70). Otherwise, there was very little E_s reported in October. Ed, N7PHY, activated DN16 on October 13 – 16. He worked ZL1RS and LU8EX. On October 17, NØLL and K7BG (DN94) worked FR8TZ. NØPB worked FR8TZ and 3B8FA. KD2CYU logged ZD9GJ, and NKØS (FM14) worked VP8NO. K7BG logged PXØFF on October 19. ZD9GJ was into the St. Louis, Missouri, area for "nearly an hour" on October 20, and he was worked by Joe, WØFY; KMØA; K2DP, and NØPB. On October 30, NØPB worked Z21ML at 1420 UTC. On November 1, KMØT (EN13) decoded DU6/PE1NSQ at 0121 UTC. At 1601 UTC, K1HTV worked VU3WEW. KFØM (EM17) copied TA1BM. That afternoon, there was a strong F2 opening to Alaska from the lower 48 states. KL7HBK, AL7JX, NL7WK, KL4JP, KL2T, and others were on FT8. KL7SB was active on 50.150 MHz SSB. Several stations completed their Worked All States Awards on 6 meters, including David, WA9DU, and Tom, N4TL.

144 MHz. Jim, W2EKE, made his first 2-meter Earth-moon-Earth contact on September 20, and he was running only 100 W to a homebrew 13-element Yagi. On September 28, he logged I2FAK.

Here and There

The Quadrantid meteor shower is predicted to peak on January 3, 2025, at 1725 UTC. This shower has a narrow 6-hour peak. It will be a good time frame for morning/late-morning meteor scatter. The best paths and times, based on radiant location, are northeast – southwest (1300 – 1500 local time mid-path) and southeast – northwest (0500 – 0700 local time).

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

Arizona (Glendale) — Jan. 11 H Q R S T V
7 AM – noon. *Spr:* Amateur Radio Council of Arizona. Haven Church, 5902 W. Cactus Rd. *TI:* 446.15 (100.0 Hz), 147.040 (162.2 Hz). *Adm:* $5. **www.tbirdfest.org**

QUARTZFEST
January 19 – 25, Quartzsite, Arizona
F H S V
All day, each day. *Spr:* Quartzfest Committee. Roadrunner short-term BLM camping, US-95 and La Paz Valley Rd. *TI:* 146.55. *Adm:* Free. **www.quartzfest.org**

Colorado (Loveland) — Jan. 18 D F H R S V
8 AM. *Spr:* Northern Colorado ARC. Thomas M. McKee 4-H Youth & Community Building, 5280 Arena Cir. *TI:* 447.275. *Adm:* $7. Email: **jhawley2@msn.com**

Florida (DeFuniak Springs) — Jan. 11 F H R T V
8 AM – noon. *Spr*: Walton Co. ARC. Life Enrichment Senior Center, 312 College Ave. *TI*: 147.285 (100.0 Hz). *Adm*: Free. **https://wf4x.wordpress.com**

ARRL SOUTHERN FLORIDA SECTION CONVENTION
January 10 – 11, Fort Myers, Florida
D H Q R S T V
Fri. noon – 5 PM, Sat. 8 AM – 3 PM. *Spr:* Fort Myers ARC. Florida SouthWestern State College, 8099 College Pkwy. Building "U." *TI:* 147.17 (136.5 Hz). *Adm:* $10. **www.swflhamfest.com**

ARRL SOUTHEASTERN DIVISION CONVENTION
February 7 – 9, Orlando, Florida
D F H Q R S T V
Fri. & Sat. 9 AM – 5 PM, Sun. 9 AM – 1 PM. *Spr:* Orlando ARC. Central Florida Fairgrounds, 4603 W. Colonial Dr. *TI:* 146.76 (103.5 Hz). *Adm:* $25. **www.hamcation.com**

Florida (Tampa) — Jan. 18 F H Q R T V
7 AM – 1 PM. *Spr:* Tampa ARC. Tampa ARC Club House, 7801 N. 22nd St. *TI*: 147.105 (146.2 Hz). *Adm*: $5. **www.hamclub.org**

Georgia (Lawrenceville) — Jan. 11 H R S V
8:30 AM – 3:15 PM. *Spr*: Gwinnett ARS. Gwinnett Fairgrounds Expo, 2405 Sugarloaf Pkwy. *Adm*: Free. **www.techfest.info**

Illinois (Collinsville) — Jan. 18 D F H Q R S V
8 AM – 1 PM. *Spr:* St. Louis and Suburban Radio Club. Gateway Convention Center, 1 Gateway Dr. *TI:* 146.97. *Adm:* $12 Advance, $15 door. **https://winterfest.slsrc.org**

ARRL INDIANA SECTION CONVENTION
February 8, Danville, Indiana
D F H Q R S V
9 AM – 1:30 PM. *Spr:* Hendricks Co. ARS. Hendricks Co. 4-H Fairgrounds & Conference Center, 1900 E. Main St. *TI:* 147.015 (88.5 Hz). *Adm:* $7. **www.n9hc.org**

Kansas (Mound City) — Feb. 1 D F H R
9 AM – 1 PM. *Spr:* Mine Creek ARC. Linn Co. Fair 4H Building, 8510 KS-7 Hwy. *TI:* 147.285 (91.5 Hz). *Adm:* Free. Email: **kb0dti@arrl.net**

Louisiana (Ponchatoula) — Jan. 18 D F H Q R S T V
8 AM – 4 PM. *Spr:* Southeast Louisiana ARC. Ponchatoula Community Center, 300 N. 5th St. *TI:* 147.00 (107.2 Hz). *Adm:* $5. **www.selarc.org**

ARRL MISSISSIPPI SECTION CONVENTION
January 31 – February 1, Jackson, Mississippi
D F H Q R S T V
Fri. 4 PM – 7 PM, Sat. 8 AM – 3 PM. *Spr:* Jackson ARC. Mississippi Trade Mart, 1200 Mississippi St. *TI:* 146.76 (77 Hz). *Adm:* $10. **www.msham.org**

New Mexico (Albuquerque) — Jan. 25 D F T V
Sunrise to 11 AM. *Spr:* 146.580 Simplex Group. Stone Face Tavern parking lot, 8201 San Pedro Dr. NE. *TI:* 145.330 (100 Hz), 444.000 (100 Hz). *Adm:* Free. Email: **k5tee@arrl.net**

New York (Almond) — Feb. 1 F H V
8 AM. *Spr:* Keuka Lake ARA. Almond Municipal Building, 1 Marvin Ln. *TI:* 147.045 (110.9 Hz). *Adm:* Free. **www.klara.us**

New York (Marathon) — Jan. 11 F H R T V
7 AM – noon. *Spr:* Skyline ARC. Marathon Civic Center, 16 Brink St. *TI:* 147.180 (71.9 Hz). *Adm:* $6. **https://skylinehamradioclub.org**

New York (Virtual) — Jan. 26 S
9 AM – noon. *Spr*: Long Island Mobile ARC. *Adm*: Free. **www.limarc.org**

Ohio (Shade) — Jan. 19 D F H V
8 AM. *Spr:* Sunday Creek Amateur Radio Federation. Shade Community Center, 2380 Old US-33. *Adm:* $6. Email: **jeramy_duncan30@yahoo.com**

Pennsylvania (Harrisburg) — Jan. 11 D F H Q R V
7 AM – 11 AM. *Spr:* Harrisburg Radio Amateurs Club. Vietnam Veterans Association Building, 8000 Derry St. *TI:* 147.075 (123 Hz). *Adm:* $5. Email: **wb3bknjunk@gmail.com**

South Carolina (Greenwood) — Jan. 11 D F H R S V
9 AM – 2 PM. *Spr:* Greenwood ARS. St. Mark United Methodist Church, Rivers Street Campus, 1633 Rivers St. *TI:* 147.165 (107.2 Hz), 443.900 (107.2 Hz). *Adm:* $7 Advance, $10 door; free admission for up to five children ages 5 – 13. **www.w4gwd.org**

ARRL NORTH TEXAS SECTION CONVENTION
January 17 – 18, Forest Hill, Texas
D F H R S T V
Fri. 3 PM – 8 PM, Sat. 7 AM – 3 PM. *Spr*: Cowtown ARC. Forest Hill Civic & Convention Center, 6901 Wichita St. *TI*: 146.94 (110.9 Hz). *Adm*: $10 Advance, $12 door. **www.cowtownhamfest.com**

Texas (Harlingen) — Feb. 8 D F H R V
7:30 AM – noon. *Spr:* Rio ARC. Sunshine RV Resort, 1900 Grace Ave. *TI:* 147.14 (114.8 Hz). *Adm:* Free. **www.rioarc.arc**

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**) for events that may already be scheduled in your area on that date. You are also encouraged to register your event with HQ as far in advance as your planning permits. See **www.arrl.org/hamfest-convention-application** for an online registration form. Dates may be recorded up to 2 years in advance.

Events that are sanctioned by ARRL receive special benefits, including an announcement in these listings and online. Sanctioned conventions are also listed in *The ARRL Letter.* In addition, events receive donated ARRL prize certificates. Once the form has been submitted, your ARRL Director will decide whether to approve the date and provide ARRL sanction.

The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **February 1** to be listed in the **April** issue. Information in this column is accurate as of our deadline; contact the sponsor or check the sponsor's website for possible late changes, driving directions, and other event details. Please note that postal regulations prohibit mention in *QST* of games of chance, such as raffles or bingo.

Promoting your event is guaranteed to increase attendance. As an approved event sponsor, you are entitled to special discounted rates on *QST* display advertising and ARRL web banner advertising. Call ARRL's toll-free number at 1-800-243-7768, or email **ads@arrl.org.**

Congratulations

October 2024
QST Cover Plaque Award Winner

Frank Donovan
W3LPL

What to Expect from the Solar Cycle 25 Surge

The highest sunspot activity since 2002, combined with revolutionary advances in digital communications technology, make this the most productive solar maximum ever for HF operators of every license class, especially for those using low power in challenging environments.

Frank Donovan, W3LPL

This article provides insight into how the solar maximum greatly enhances HF and 6-meter propagation and provides practical advice about capitalizing on solar maximum propagation over the next 2 years and maybe more. Written from a North American operator's perspective, its general principles apply globally.

HF operators during the Solar Cycle 25 solar maximum often focus on the dramatically improved 12- and 10-meter daytime global propagation that began in January 2023. However, solar maximum also greatly enhances 40- through 10-meter nighttime propagation. Enhanced day and night solar maximum propagation is expected to continue for all license classes through 2026. Figure 1 shows NASA's sunspot number forecast through 2032.

HF operators benefit from the increased sunspot activity and the revolutionary advances in digital communications technologies such as FT4 and FT8 that provide good communications under weak-signal conditions. The new technologies opened global HF DXing to operators with even the most basic HF stations, especially when operating under challenging conditions.

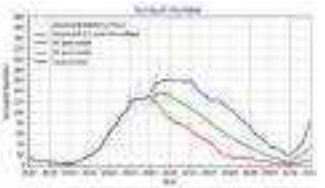


Figure 1 — This graph shows NASA's sunspot number forecasts from August 8, 2024. This graph is updated monthly through 2032. The unexpected July and August surge in sunspot activity is likely to produce future sunspot activity corresponding to the blue curve or perhaps much higher. Visit **www.nasa.gov/solar-cycle-progression-and-forecast** for more information and updates before the 10th of every month. [Photo courtesy of NASA]

Fully automated DX spotting networks such as PSK Reporter and DX Maps capitalize on very high levels of global FT4 and FT8 activity to provide all HF and 6-meter operators — regardless of mode preference — with unprecedented real-time knowledge of global propagation. The Reverse Beacon Network provides similar capabilities for digital and CW operators. Spotting networks can also provide real-time reports of how well an operator's transmissions are being received globally.

Activity alerting services such as HamAlert provide automated real-time notifications when specified stations are active, making tedious manual searches for call signs, DXCC entities, CQ zones, etc., no longer necessary.

10- and 12-Meter Propagation

Ten- and 12-meter global propagation improved suddenly and dramatically beginning in January 2023. Both bands provide reliable global propagation from dawn through at least early evening most of the year, except during the annual 3-month summer decline of the F2 region maximum usable frequencies (MUFs).

Reduced F2 region MUFs that significantly degrade 10- and 12-meter propagation every summer are unrelated to the solar maximum. Instead, reduced summer MUFs are caused by seasonal high-altitude hemispheric winds blowing atoms and molecules from the dayside to the nightside F2 region. Strong winds in the northern hemisphere from mid-June to mid-October significantly deplete the volume of essential oxygen atoms, which are one of the most important sources of atoms and molecules needed for ionizing the F2 region, and the resulting elevated MUFs.

Ten- and 12-meter horizontally polarized antennas only 20 feet high produce adequate low-angle radiation

Special Event Stations

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

Dec. 1 – Jan. 31, 0000Z – 2359Z, K7S, West Jordan, UT. The Utah DX Association. **60th Anniversary of the Amateur Radio Stamp and the 110th Anniversary of ARRL**. All bands, all modes; 7.260 14.260 21.300 28.470. QSL. Wesley Wilkinson, 7363 S. Galaxy Hill Rd., West Jordan, UT 84081-3961. **w7wes@yahoo.com**, **www.udxa.org**, or **www.qrz.com/db/w7wes**

Dec. 21 – Dec. 24, 1500Z – 2359Z, KC5OUR, Peralta, NM. Valencia County Amateur Radio Association. **Christmas in Bethlehem, New Mexico**. 7.183 14.283 21.283 28.383. QSL. VCARA, P.O. Box 268, Peralta, NM 87042. **www.kc5our.com**

Dec. 26 – Jan. 2, 0059Z – 0059Z, W2T, Trenton, NJ. Delaware Valley Radio Association. **Battle of Trenton**. 7.220 14.280 21.280 28.430. Certificate & QSL. Delaware Valley Radio Association, P.O. Box 7024, Trenton, NJ 08628. **www.w2zq.com**

Jan. 1 – Jan. 12, 1500Z – 2359Z, W5B, Waco, TX. Heart of Texas DX Society. **155th Anniversary of the Waco Suspension Bridge**. 28.437 SSB. Certificate. Larry Merritt, W5DXS, 3200 Colcord Ave., Waco, TX 76707-1814. **www.w5dxs.tripod.com**

Jan. 2 – Jan. 4, 1600Z – 2300Z, WØJH, Stillwater, MN. Stillwater Amateur Radio Association. **WØJH — Remembering Father Metcalf at Belwin Conservancy**. 3.860 7.260 14.260 21.360. eCertificate. Send QSO information to: **w0jhrequest@gmail.com**. **www.radioham.org** or **www.qrz.com/db/w0jh**

Jan. 2 – Jan. 31, 0000Z – 2359Z, K3Y*, Ellicott City, MO. Straight Key Century Club. **19th Annual Straight Key Month**. 3.550 7.055 14.050 21.050. Certificate & QSL. SKCC c/o Ted Rachwal, K8AQM, 6237 Twin Lakes Dr., Kimball, MI 48074. **K3Y/0 thru 9, plus KH6, KL7, KP4, and DX member stations in six WAC areas operating straight key, bug, and cootie keys. QSL card confirms one QSO per area, up to 19 for all-area sweep. See URL for operator schedule/map, stats, etc.* **www.skccgroup.com/k3y**

Jan. 3 – Jan. 12, 0059Z – 0059Z, W2P, Trenton, NJ. Delaware Valley Radio Association. **Battle of Princeton**. 7.220 14.280 21.280 28.430. Certificate & QSL. Delaware Valley Radio Association, P.O. Box 7024, Trenton, NJ 08628. **www.w2zq.com**

Jan. 11, 0400Z – 1100Z, W5RIN, Beaumont, TX. Beaumont Amateur Radio Club. **Beaumont Amateur Radio Club 66th Anniversary**. 10.136 14.025 14.258. Certificate. Beaumont Amateur Radio Club, P.O. Box 7073, Beaumont, TX 77726. **www.qrz.com/db/w5rin** or **www.w5rin.com**

Jan 11, 1700Z – 2359Z, NI6IW, San Diego, CA. USS *Midway* Museum Ship. **Commemorating USS *Midway*'s arrival at San Diego for Museum Ship Conversion 1/10/04**. 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/ni6iw**

Jan. 17 – Jan. 31, 0001Z – 2359Z, W9R, Salem, WI. W9AFB. **REFORGER 85 40th Anniversary**. 7.250. Certificate & QSL. Scott Grams, General Delivery, Salem, WI 53168. **www.qrz.com/db/w9r**

Jan. 25, 1400Z – 2100Z, W9RH, Milwaukee, WI. Milwaukee Radio Amateurs' Club. **MRAC 108th Anniversary**. 7.250 14.250 21.350 145.390. Certificate. MRAC, P.O. Box 26938, Milwaukee, WI 53226. **www.w9rh.org**

Jan. 25 – Jan. 26, 1900Z – 1859Z, W2GSB, West Babylon, NY. Great South Bay Amateur Radio Club. **Winter Field Day**. 7.245 14.246 21.250 28.340. Certificate. W2GSB, P.O. Box 1356, West Babylon, NY 11704. **www.gsbarc.org**

Jan. 25 – Jan. 27, 1700Z – 0100Z, AG6AU, Coloma, CA. El Dorado County Amateur Radio Club. **Discovery of Gold in California**. 7.248 14.248 21.348 28.348. QSL. El Dorado County ARC, P.O. Box 451, Placerville, CA 95667. **www.edcarc.net**

Certificates and QSL cards: To obtain a certificate from any of the special event stations offering them, send your QSO information along with a 9 × 12-inch self-addressed, stamped envelope (3 units of postage) to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

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**, or email information to **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 **April** *QST* would have to be received by **February 1**. In addition to being listed in *QST*, your event will be listed on the ARRL Web Special Event page. Note: All received events are acknowledged. If you do not receive an acknowledgment within a few days, please contact us. ARRL reserves the right to exclude events of a commercial or political nature.

You can view all received Special Events at **www.arrl.org/special-event-stations**.

Christina Lessard, KC1TDM, clessard@arrl.org

At the Foundation

ARRL Foundation Scholarship Overview

The ARRL Foundation successfully wrapped up the 2024 Scholarship Program by awarding 135 scholarships totaling more than $715,000. Young hams throughout the country benefitted from scholarships ranging from $500 to $25,000 to assist them with college or university expenses. A complete list of the 2024 scholarships and student recipients can be found in the September 2024 issue of *QST*.

Funded entirely through the generous contributions of individuals, clubs, and friends, the Scholarship Program is one of two focus areas (the other being grants) for the ARRL Foundation, which is a separate organization that works closely in partnership with ARRL.

The ARRL Foundation gratefully acknowledges the following volunteers for serving on the Scholarship Committee under the leadership of Kermit Carlson, W9XA: Jim Fenstermaker, K9JF; Bill Lippert, AC0W; Josh Long, W9HT; Carl Luetzelschwab, K9LA; Bill Morine, N2COP; David Norris, K5UZ; Gayle Olson, K6GO; Mike Ritz, W7VO; Ed Snyder, W1YSM; Mark Tharp, KB7HDX; Craig Thompson, K9CT; Scott Yonally, N8SY, and Art Zygielbaum, KØAIZ. The ARRL Foundation Scholarship Committee reviews applications and terms of reference for the scholarships, interviews students, and matches qualifying students to applicable scholarships.

The 2025 Scholarship Program began accepting applications on October 30, 2024, and will close on January 6, 2025.

New Scholarships

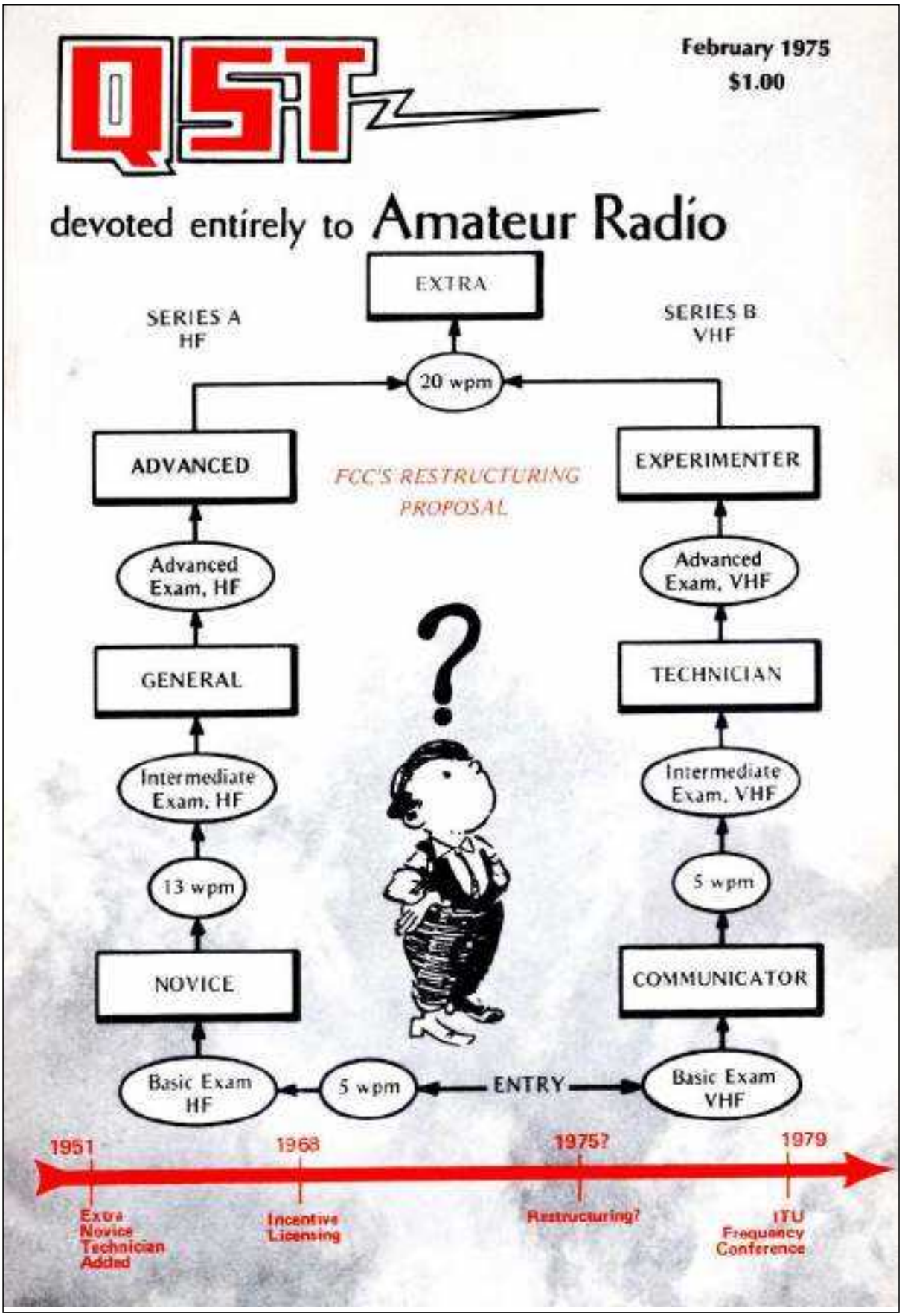
The Foundation is pleased to announce two new scholarships.

The Steve Marks, W5CIA, Legacy Scholarship was created by Steve's family shortly after he passed away to memorialize him and his love for amateur radio. This scholarship will award $1,000 to a licensed amateur radio operator attending a 2- or 4-year college, university, or trade school.

The Craig, K9CT, and Ilean Thompson Scholarship is an endowed fund providing $1,000 annually to a licensed amateur radio operator attending a 4-year undergraduate college or university in the United States. Craig's strong beliefs in outreach and engaging new and young hams led him to create this scholarship.

Full eligibility requirements for all scholarships can be found at **www.arrl.org/scholarship-descriptions**. To learn more about the ARRL Foundation Scholarship Program, visit **www.arrl.org/scholarship-program**.

A Look Back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SERIES B
VHF
20 wpm
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EXPERIMENTER
FCC'S RESTRUCTURING PROPOSAL
Advanced Exam, HF
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GENERAL
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1951
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Extra Novice Technician Added
Incentive Licensing
Restructuring?
ITU Frequency Conference

Celebrating Our Legacy

A Wire Across the Garden

I became interested in radio in the 1950s, when World War II radios were available in abundance. I persuaded my grandfather to let me put one in his garden shed and run copper wire through his garden. My grandfather's next-door neighbor, who had been a signals man in the Royal Air Force, noticed what I was doing and allowed me to extend the copper wire across his garden as well.

One Saturday morning, my grandfather's neighbor and I got the radio's receiving side operating. From that day on, I was hooked! I progressed in radio and took the first part of the UK ham radio exam. Later, I took the second part and became a licensed ham radio operator. I was only allowed to use 144 MHz and above. I purchased a Pye Cambridge commercial transceiver. Last year at an Arizona hamfest, I purchased the same model radio.

Gary Austin, G6NYH
Northampton, England

Bonding Over Beginner CW

My time as a ham radio operator began in 1983. There I was, timidly tapping my CW key, likely managing 2 WPM. For my sixth CW contact, I received a one-of-a-kind, hand-drawn QSL card from KB4FAI. It was so unique that I had it tacked to my desk for years. Eventually, I sidelined my radios to focus on my family and a budding career.

With the arrival of the pandemic in 2020, I dusted off my gear, connected the coax, and found that it all still worked. I've remained on the air since, learning about all the new and exciting changes that have occurred since I left the hobby.

One night, I was reading my old paper logbook and QSL cards. There at the top of the stack was my all-time-favorite hand-drawn card. I wondered if KB4FAI was still around and active on the air. Thanks to online databases, I found Allan (now KV4T), still active! We corresponded by email, and he said he had been a ham for only 1 day when our contact took place! As it turned out, we were well matched in our CW speed. I am pleased I reached out to him because we both shared how much that contact meant to us, and it reminded me of the sense of community that amateur radio provides.

Michael Guerin, W6MVT
Simi Valley, California

From an Average Listener to a Ham

When I was in high school in the 1950s, my dad had an old Atwater Kent battery-operated radio from the early 1900s. One day, I took it apart to see how it worked, but I completely destroyed it.

One night, I was listening to our old Crosley AM radio and heard someone using call letters I didn't understand. That increased my interest in radio even more. I asked my dad to find out who or what the call letters were. We met up with the only local ham in our small rural community, and he gave me information on how to get a license and use a radio.

Then my next-door neighbor and I learned Morse code together. My musical background in piano and trumpet gave me the proper rhythm to easily send and receive Morse code.

After studying, I went to Chicago, Illinois, and passed my Novice license test. There I met two other high school-aged kids who also passed their test. We became close friends over the radio, and we all passed our General license test.

At 85 years old, and after 71 years of being licensed, I still enjoy the hobby. I am still active on HF, mostly SSB, and enjoy making new contacts and having a good ragchew.

John A. Orner, W9BQK
Dousman, Wisconsin

Send reminiscences of your early days in radio to **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.

Scott Freeberg, WA9WFA, wa9wfa@gmail.com

Classic Radio

Building a 1965 Heathkit SSB Transceiver Kit in the 21st Century

In 1965, at just 12 years old, I dreamed about building a radio featured in Heathkit's catalog. But I didn't have the money or the technical ability, so I had to wait — it turned out to be a 57-year wait. Once I was ready to build one, Heathkit's radio kits were long gone from the market. However, I recently discovered a process called *re-kitting*, where hams disassemble a previously built Heathkit radio, turning it back into an unbuilt kit (Mike Waldrop, W5RKL, documents this process in great detail on his website at **https://w5rkl.com**).

I decided to re-kit the HW-12 (affectionately known as the Hot Water 12) — a 14-tube, single-band, 75-meter, 200 W peak-envelope-power, SSB transceiver. A long-time radio friend, Dave VanDenburg, WA8DOF, had one in good condition and was willing to give it to me for this project.

Radio Deconstruction

When re-kitting, you can deconstruct the radio to whatever level you want, from partially to fully disassembled. I decided to turn the HW-12 back into a completely unassembled kit, so it looked like I opened the box in 1965. I removed every nut, screw, washer, and wire, as well as all the parts from the printed circuit board (PCB) and chassis.

To take the radio apart in an organized manner, I started at the end of the assembly manual and followed the steps in reverse. As I removed the parts, I cleaned them, removed excess solder from the terminals, and straightened pins before placing them in labeled bags. I replaced the 57-year-old fixed resistors and capacitors with new ones that were in tolerance and had unclipped, unsoldered, and unbent leads. I sorted these new parts and placed them in yellow paper envelopes, just like Heathkit did. I did a major cleanup of the aluminum chassis, knobs, cabinet, and front panel so they looked close to what the original builder would see when opening the box in 1965.

Building the "Kit"

The PCB was the first item that needed to be assembled. I followed the manual step by step, checking off each task as I went along. The manual did a great job identifying the components and where they were placed on the PCB.

Once I placed all the parts on the PCB, my next steps were to assemble the chassis hardware, install the PCB onto the chassis, and attach the extensive prebuilt wiring harness. Eventually, I soldered the last connection and was ready for the testing phase, which included making extensive resistance measurements at various points of the circuit to locate errors before applying voltages. I didn't find any issues, so I applied ac power.

The HW-12 used a separate HP-23 power supply. Because I was building a 1965-era HW-12, I wanted to use the matching 1965-era HP-23 ac supply — and build it from a kit (see the sidebar "Re-Kitting an HP-23 Power Supply" for more details on this project).

The HW-12 75-meter SSB station and HP-23 power supply built by re-kitting.

The HW-12 PCB and cleaned-up chassis.

The HW-12 PCB and wiring harness.

After building the HP-23, I plugged the Hot Water 12 into it, holding my breath as I turned on the transceiver. After several seconds, the receiver came to life! I performed the transceiver alignment per the assembly manual instructions and was rewarded with a partially functional radio. The receiver worked, but the transmitter output power was less than 4 W due to a missing or poorly soldered connection in the final plate tuning capacitor. Once I resolved that, the transceiver tuned up properly. I finished assembling the cabinet hardware, slipped the chassis into the cabinet, and closed it — it looked just like it did in the 1965 catalog!

Operating Performance

It was time to take the Hot Water 12 for a cruise on 75 meters and make some contacts. I checked in to several Minnesota area nets and a vintage SSB net, where I received good audio reports and a lot of interest. Many hams who I talked with either remembered the Hot Water transceiver series, currently owned one, or built one in the distant past and were sharing fond memories of it.

The HW-12 performed well and was a delight to use. The receiver was sensitive, and I could hear most everything that my modern transceiver hears. My only negative observation was that the frequency tuning was fast and touchy, so I wasn't always exactly on frequency, more in the vicinity, which was just fine.

A Dream Come True

I never thought I'd get the chance to build a Heathkit transceiver, but here I am with a spiffy new 1965-era HW-12 and HP-23 station that I built from kits in the 21st century! I highly recommend re-kitting if you're looking to experience what it's like to build a Heathkit radio; it let me experience a little bit of 1965 again, while achieving a long-awaited dream of building a Heathkit radio myself.

All photos provided by the author.

Re-Kitting an HP-23 Power Supply

I wanted to re-kit a matching 1965-era HP-23 ac power supply to power my HW-12, so I created my own kit (as I did with my HW-12) by disassembling a previously built HP-23 and turning it back into a kit.

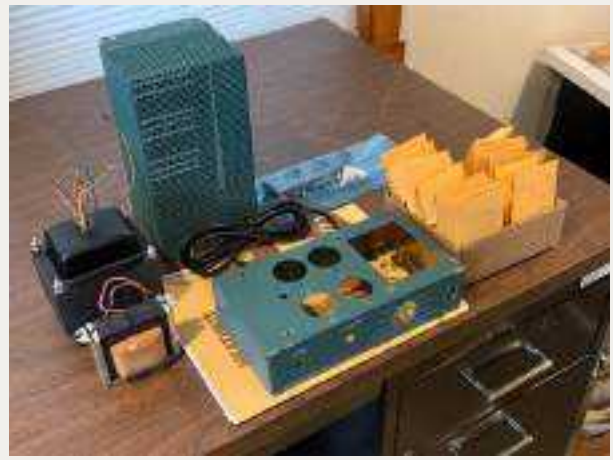
After removing every single part, I was left with the bare chassis. I reused all the mechanical parts, hardware, transformer, and choke, but replaced the 57-year-old resistors, capacitors, and diodes with new parts.

I removed some transformer wires by heating the connection and pulling the wire, but others needed to be clipped off due to potential damage to themselves or nearby components. All but two were long enough to make the new connections, so I added extension wires and covered them with heat-shrink tubing.

The power supply had large capacitors with big terminals secured to insulated mounting wafers that had deteriorated and fallen apart. The new capacitors were small, with tiny terminals intended for a PCB. Chuck Milton, W4MIL, sent me a set of wafers and suggested gluing the capacitor to the mounting wafer first, then crimping and soldering standard ring terminals to the tiny capacitor terminals — this technique worked well.

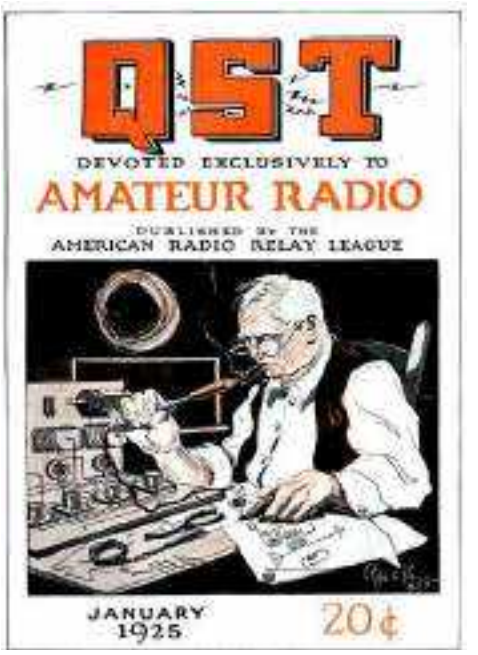
Next, I replaced the old fused ac cord with a modern three-wire grounded cord and added a low-profile fuse holder and fuse in an empty hole on the rear panel. I repainted the cover and touched up the chassis.

I quickly assembled this kit without difficulty, and when I turned it on, it came to life smoothly. It operates well and looks nearly as good as it did 57 years ago!



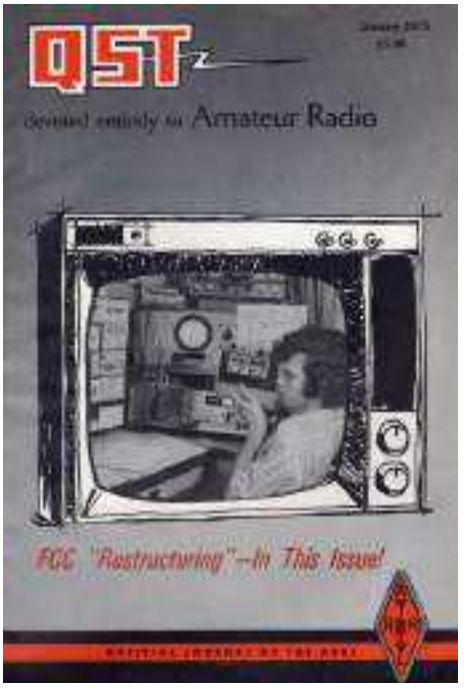
Scott Freeberg, WA9WFA, fully disassembled the 1965 HP-23 so he could re-kit it.

100, 50, and 25 Years Ago



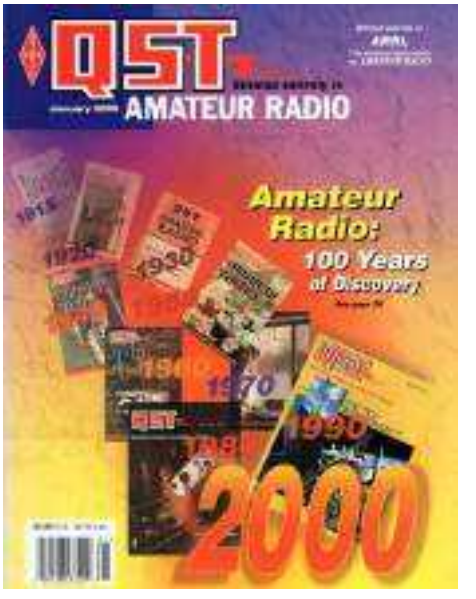
January 1925

- The cover shows an OM lighting his cigar with his soldering iron as he builds the latest transmitter circuit.
- Readers are reminded of A.R.R.L.'s story, from its beginning through its accomplishments of the last ten years, in "Editorials: This League of Ours."
- John M. Clayton, 1DQ, shares his method of winding "Some Cylindrical Self-Supporting Coils."
- European, Australasian, South American, and North American amateurs are now all working each other nightly, reports K.B. Warner, 1BHW, in "Super DX."
- According to C.A. Service, Jr., 1ID, amateurs are offered an opportunity to serve science during the January eclipse in "A Nationwide Fading Test."
- A method to measure the antenna current generated by an oscillating receiver is explained in "Measuring Very Small R.F. Currents" by J.H. Turnbull.
- L.W. Hatry explains differences in coils in "The Amateur Builder: About Coils."
- A semi-automatic sending machine is explained in "Making Your Own Bug" by Ralph E. Kepler, 8OT.



January 1975

- WB6MEU appears on the cover, toying with ATV. In the accompanying article, "Practical Ideas for the ATV Enthusiast, Part 1," Thomas R. O'Hara, W6ORG, shares short cuts that will speed the newcomer on his way to achieving maximum coverage and sharp, snow-free pictures at minimum cost.
- The editorial shares some amateur radio milestones recorded throughout 1974 in "It Seems to Us…Caravan Tracks — 1974."
- An inconspicuous antenna with gain and directivity is shared in "A Simple Fixed-Direction Quad" by Rudolph J. Bacher, WA3JYI.
- Arlo R. Eggensperger, W2TJZ, describes his approach to building a frequency counter in steps by using plug-in circuit cards in "Frequency Counter – A Modular Approach, Part 1."
- A broadband amplifier with the safety, simplicity, and efficiency of solid-state equipment at power levels suitable for home stations is described in "100 Watts PEP Output with Power Transistors" by Aksel H. Mathiesen, OZ1AM.
- In "Hints and Kinks for the Experimenter," Mike Greenway, K4TBN, gives construction details for a "Ham Shack Table."
- Some advance details on upcoming restructuring proposals are reported in "FCC Issues Restructuring Proposals."



January 2000

- This month's cover celebrates 85 years of *QST.*
- *QST* Managing Editor Steve Ford, WB8IMY, highlights some changes to *QST*'s appearance, including new columns, in "It Seems to Us…A New Year and a 'New' *QST*."
- Take a short walk through amateur radio history with Jim Maxwell, W6CF, in "Amateur Radio: 100 Years of Discovery."
- A group of amateurs set out to discover the effects of a solar eclipse on the ionosphere and propagation in "The 1999 Solar Eclipse and Amateur Radio" by John Devoldere, ON4UN.
- Thanks to years of preparation and a system of linked, wide-coverage repeaters, hams in Oklahoma were able to help save many lives. Keli Tarp tells the story in "The Oklahoma Tornado Outbreak."
- Murray Greenman, ZL1BPU, explains the technology behind Hellschreiber in "Let's *See* You in *Hellschreiber!*"
- A few simple and often-overlooked precautions are presented in this new column "Radios To Go: Hello, and welcome to 'Radios To Go.'"
- Rich Arland, K7SZ, gives a rundown on low-power operation topics that can be expected in this new column, "QRP Power: Welcome!"

Silent Keys

It is with deep regret that we record the passing of these radio amateurs:

K1AAS **Gordes**, Neil G., Rocky Hill, CT
vW1BNW **Roell**, Paul, Marstons Mills, MA
K1CXX **Huntress**, Richard C., Auburn, ME
WE1G **Thibault**, Ernie, Merrimack, NH
N1KRC **McNulty**, Paul R., Westborough, MA
vNM1O **Cassidy**, Joe A., Sr., Trumbull, CT
v•N1OEF **O'Keeffe**, John F., Norwood, MA
vK1PZS **Broverman**, Harvey A., Granby, CT
WA1QGU **Cleveland**, George S., Milford, MA
vAI2A **Clark**, David M., Greenwood, IN
NA2AN **Halladay**, Merton F., Little Falls, NY
K2CZT **Schultze**, Donald B., Sebastian, FL
WA2IHE **Swindell**, George T., Deptford, NJ
vW2ILE **Cattron**, Edward P., Rochester, NY
♦W2LE **Franson**, Paul D., Pennington, NJ
v•WA2MGF **Damato**, Lorrie, Wayne, NJ
vW2PQC **Murillo**, George, Jr., Mountainside, NJ
♦KC2RCU **Nicholls**, Grant T., Bryan, OH
K2SDD **Meltzer**, Michael R., Syracuse, NY
vK2SST **Parham**, Ronald W., Hendersonville, NC
vKC2SXH **Moulin**, Donald R., Jr., Martinsville, VA
WB2ZFY **Lessnick**, Ronald, Matawan, NJ
WB3EMH **Yerger**, Louis M., III, Linden, PA
v♦WA3GQU **Barr**, Charles F., DuBois, PA
♦W3HCF **Mills**, David L., Newark, DE
vKB3ITJ **Graves**, Jerold L., East Springfield, PA
♦•W3PJM **Phillips**, David H., Accokeek, MD
vKB3RFX **Manley**, Paul W., Brooklyn, MD
v•W3TWV **Hopkins**, Roy A., Clarks Summit, PA
KB4AUL **Robinson**, Frank M., Jr., Christiansburg, VA
KG4BHH **Pitkin**, William, Jr., Knoxville, TN
WA4BSF **True**, Cathy J., Somerset, KY
KQ4D **Rinaca**, Phillip L., Shenandoah, VA
•WA4FOA **Holt**, Michael H., Smyrna, GA
vWD4FRC **Coker**, Raymond J., Jr., Dallas, TX
•KD4IDO **Barker**, Charles W., Talladega, AL
WA4IZG **Miller**, David B., Butner, NC
vW4JAU **Mottley**, Larmin D., Kennesaw, GA
♦K4JTL **Lowe**, James Tracy, Pikeville, KY
N4JTO **Tozier**, John E., Greensburg, PA
♦K4JYS **Stewart**, William A., Smithfield, NC
KA4KUS **Brand**, Clarence C., Harrisonburg, VA
vWB4LJP **McQueen**, James E., Jr., Eufaula, AL
vKM4LJT **Stearns**, David A., Jacksonville, FL
KE4LYG **Meade**, Jeffrey L., Ruther Glen, VA
W4MMS **Smith**, Mark M., Ethel, GA
♦WB4OSD **Barrow**, Kay M., Suwanee, GA
KM4SQS **Botto**, Joseph J., Spring Hill, FL
vW4TO **Prater**, Donald G., Farragut, TN
K4VIF **Jackson**, Stewart, Foley, AL
vWA4VJK **Strout**, Richard E., Bowling Green, KY
KF4WZG **Gatling**, Judith H., Suffolk, VA
N5ARM **Oehmichen**, Robert A., Gulfport, MS
♦WD5BJT **Otnott**, Charles H., III, Clermont Harbor, MS
•WD5ICC **Ferris**, Woodrow D., Providence, RI
W5ICF **Marcum**, Timothy P., Houston, TX
N5IDO **Hawk**, Thomas E., Harrison, AR
WB5JJA **Richardson**, Ray E., Broken Arrow, OK
N5KEV **Smith**, Kevin L., May, TX
KD5MDA **Reichert**, Janet, Lansing, KS
•W5NUP **Sims**, Lorraine H., Shelby, NC
KA5QDG **Wright**, Wayne, Houston, TX
N5RHF **Feuerbacher**, Robert H., Abilene, TX
vKB5RZM **Present**, Blake A., Missouri City, TX
v•N5TWC **Snyder**, Ken, Edmond, OK
KE5TXX **Sherrill**, Mike N., Bluffton, AR
KY5U **Young**, Charles L., Milton, FL
vN5YLJ **Lebow**, David W., Spavinaw, OK
K5YPV **Ridge**, Benjamin W., Ripley, MS
W5ZQR **Bean**, David L., Pearland, TX
N5ZXZ **Wood**, Michael D., Albuquerque, NM
vKJ6BHX **Harryman**, Michael G., El Cerrito, CA
K6CHU **Chu**, William B., Frazier Park, CA
W6DEN **Polito**, Dennis A., Auburn, CA
WB6OOA **Davis**, Romona, Merced, CA
K6PLR **Shorten**, Grant, Carlsbad, CA
KG7COG **Lee**, Russell F., Mountain Home, UT
WB7CXA **Johnston**, Norman H., Anacortes, WA
W7DXX **Lamonica**, Keith E., Las Cruces, NM
♦K7EQ **St. Aubin**, Joseph Earl, Seattle, WA
v•N7GME **Carr**, George A., Jr., Port Orchard, WA
vN7GTW **Anderson**, Vern L., Spokane, WA
AG7GY **Fitch**, Timothy C., Mayer, AZ
vKG7SYW **White**, William S., Helena, MT
vK7SZ **Arland**, Richard H., Dacula, GA
•W7TVA **Felten**, Jere T., Keyport, WA
vKF7UTH **Roberts**, Dennis P., Spokane, WA
vN8BQV **Lyon**, R. L., Owosso, MI
vAJ8C **Tolles**, Vernard W., Saginaw, MI
vWA8CAG **Hepner**, Julius J., Russell, PA
vK8EXK **Plummer**, James P., Medina, OH
K8GIM **Nemecek**, Edward J., Lorain, OH
W8HDS **Cunkelman**, Jack P., Milford, OH
KC8KFY **Hansen**, William C., Leesburg, FL
vWA8MSU **Dennis**, Wallace E., Bowling Green, OH
♦K8NA **Pauck**, Theodore, Jr., Troy, MI
v•WA8OKR **Hunt**, William W., Medina, OH
vW8OMS **Betz**, Michael E., Galion, OH
vKB8OVA **Rabbitts**, Lyle M., West Farmington, OH
KD8PWD **Bolen**, John P., Otsego, MI
vKA8RPB **Seeley**, Lowell D., Gladstone, MI
•W8RQE **Dworkin**, Marvin Edward, Cincinnati, OH
KB8SIO **Ranck**, Carol M., Westerville, OH
•N8SMT **Butz**, Jeffrey L., Sunbury, OH
KA8YTS **Orndorff**, John A., Hubbard, OH
vKD8ZWS **Thiele**, Gary A., Green Valley, AZ
KB9DGM **Duel**, Karen E., Woodstock, IL
vWX9DX **Cary**, James M., Haines City, FL
♦W9EET **Bauer**, Laura L., Centralia, IL
WA9GLN **Isaacson**, Todd A., Waterloo, IA
•K9JIG **Christopherson**, Denis, De Pere, WI
N9KQ **Evans**, Arthur A., Baraboo, WI
vWA9LTI **Mills**, Hewitt C., Martinsville, IN
v•N9LYT **Lester**, Dannie J., Macomb, IL
KB9LZJ **Dancy**, Robert L., Alton, IL
♦KA9U **La Due**, Rolland D., Aurora, IL
•K9YDO **Akin**, William T., Jr., Noblesville, IN
N9ZGE **Wilson**, Donald D., Springfield, IL
WDØAEH **Fiedler**, Dennis J., Beatrice, NE
vKØBQ **Ohnhaus**, Ronald R., Bremerton, WA
v♦NØCKC **Boatman**, Buster B., Jr., Loveland, CO
v♦♦KØGNW **Erickson**, Keith R., Wayzata, MN
KBØHJH **Garner**, Tommy J., Sullivan, MO
KAØIRF **Cochrane**, Bill, Loveland, CO
NSØL **Potter**, Deuel W., Owatonna, MN
♦WØMJN **Finkstein**, Joseph F., Marion, IA
vWBØMNE **Bolster**, Richard D., Fairmont, MN
vNØMTU **Miller**, Duane V., Denver, CO
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•NØVRA **Westerfield**, Jerry L., Encampment, WY
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NØWGC **Cowley**, William George, Dardenne Prairie, MO
KAØYJE **Widener**, Larry D., Kansas City, MO
VE3LB **Varinsky**, Cyril, Dundas, ON, Canada

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♦ Current Diamond Club
v Veteran
• Former call sign

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Note: Silent Key reports must confirm the death by one of the following means: a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address, and call sign. Allow several months for the listing to appear in this column.

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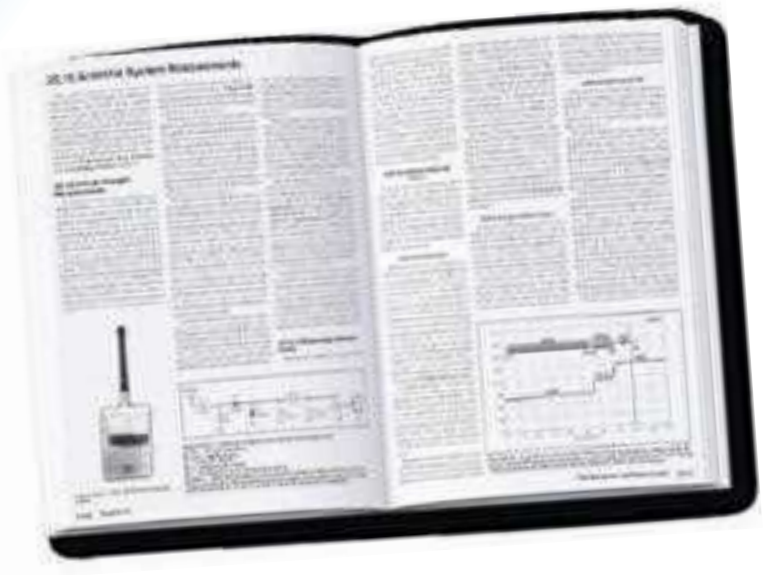

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Power Rating	1.5KW (1.8~60MHz) 1KW (144MHz)	2KW (1.8~60MHz) 1KW (144MHz)	200W (140~525MHz)
Tolerance	±10% at Full Scale	±10% at Full Scale	±10% at Full Scale
SWR Measurement	1:1~1:∞	1:1~1:∞	1:1~1:∞
SWR Detection Sensitivity	4W MIN	4W MIN	4W MIN
Input/Output Impedance	50 ohms	50 ohms	50 ohms
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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

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Frequency Range (up to): 600MHz
Power Rating: 2.5 kW PEP1 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 1:1.3 at 1.3 GHz
Insertion Loss: Less than 1.2 dB at 1.2 GHz
Isolation: 50 dB 1 GHz
Connector: Gold Plated N-Type
Output Port: 2

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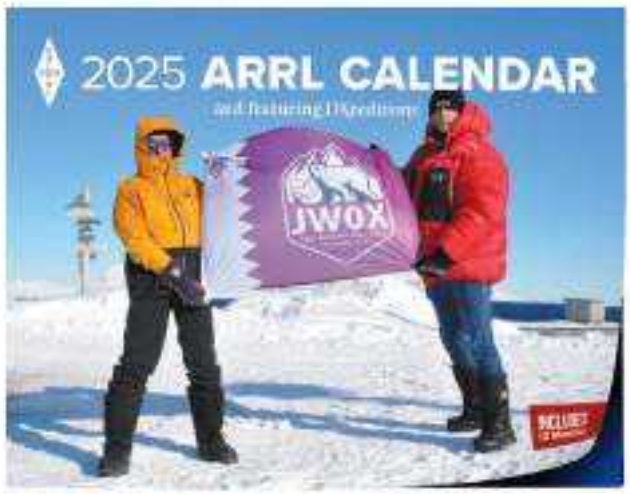

Month by month, the 2025 ARRL Calendar will take you on a trip around the world, celebrating recent ham radio DXpeditions and their teams who gave us those sought-after contacts and rare ones. Display in your home, office, or ham radio workshop all year long.

Includes:

- ARRL contests and other major ham radio contests
- National event dates: ARRL Field Day, Kids Day, JOTA, and more
- Phases of the moon and meteor showers
- Holidays and other important dates
- Bonus month — January 2026
- 2026 monthly planner

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ARES volunteers provide communications for:

- Government agencies
- Disaster relief organizations
- Public service events
- Emergencies or disasters
- Training exercises

ARES radio operators receive training in:

- Message handling
- Communication technology
- Administrative procedures
- Disaster preparedness

ARRL's volunteer amateur radio operators help their communities in good times and bad through community events, disaster response, and various programs.

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- Ask local hams about involvement
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- Join local radio clubs, **www.arrl.org/clubs**
- Be "radio active" — Get on the air as often as possible
- Attend SKYWARN® training, **weather.gov/SKYWARN**
- Learn more about ARES, **www.arrl.org/ares**
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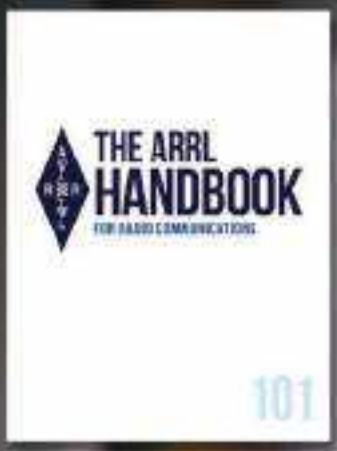

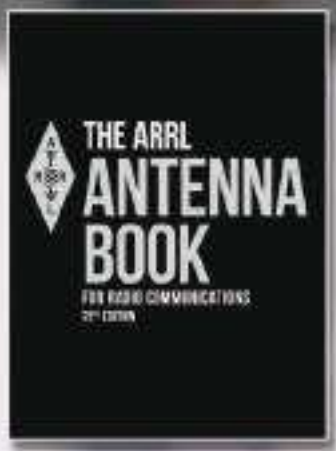

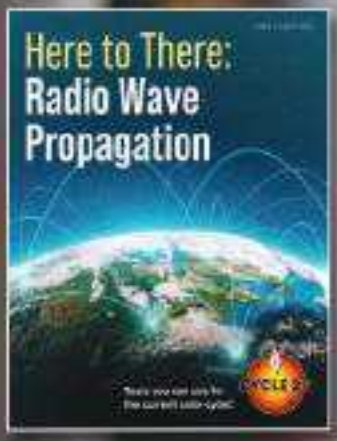

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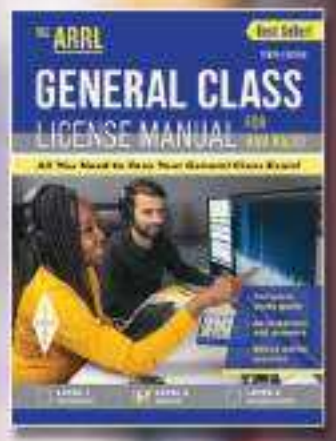

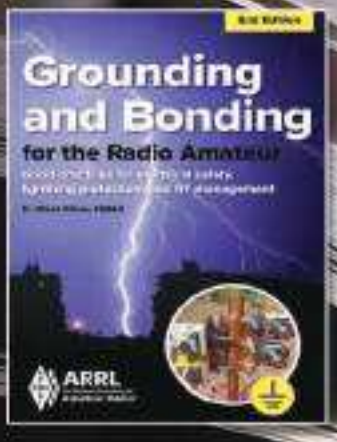

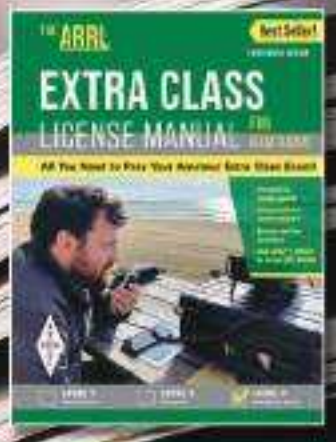

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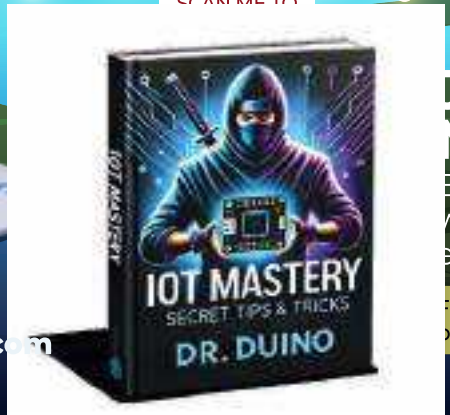

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Our Washington, D.C. regulatory affairs team filed a technical report against an effort from stock traders that would obliterate our HF bands. The fight to safeguard our spectrum requires ARRL's 24/7 vigilance.

To keep 60-meters usable for radio amateurs, ARRL is working with the FCC to keep the 100 W power limit and the existing five channel allocation. ARRL is protecting the rights of all Amateur Radio Operators and the advancement of American expertise in wireless technology.

A delegation from ARRL and the International Amateur Radio Union represented our interests at the ITU World Radio-communication Conference 2023 (WRC-23) in Dubai, United Arab Emirates, in November and December. This huge effort at a significance expense needs your support.

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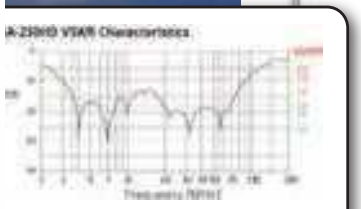
COMET®

Life is a JOURNEY. Enjoy the ride!



CHA-250HD - *No Antenna Tuner Needed!*

Steel Whip - More Flexibility, Less Wind Load!

Aluminum Base - Strong, Light Weight!

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CTC-50M *Window Gap Jumper*
No more drilling or open windows!

❼

Base Antennas

❶❶ COMET® **CHA-250HD BROADBAND 80M THROUGH 6M VERTICAL ANTENNA**

A newly designed broadband vertical with NO GROUND RADIALS. EXTREMELY easy to assemble, requires no tuning or adjustments and VSWR is under 1.5:1 from 3.5-57MHz! • TX: 3.5MHz – 57MHz • RX: 2.0– 90MHz • VSWR is 1.5:1 or less, continuous • Max Power: 250W SSB/125W FM• Impedance: 50 Ohm • Length: 23' 5" • Weight: 7 lbs. 1 oz. • Conn: SO-239 • Mast Req'd: 1" – 2" dia. • Max wind speed: 67MPH

❷❷ COMET® **GP-3 DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA**

Wavelength: 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Max Pwr: 200W • Length: 5'11"• Weight: 2lbs. 9ozs. • Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

❸❸ COMET® **GP-6 DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA**

Wavelength: 146MHz 5/8 wave x 2 • 446MHz 5/8 wave x 5 • Max Pwr: 200W • Length: 10'2"• Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

❹❹ COMET® **GP-9 / GP-9N DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA**

BEST SELLER! • Wavelength: 146MHz 5/8 wave x 3 • 446MHz 5/8 wave x 8 • Max Pwr: 200W• Length: 16' 9"" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated SO-239 • GP-9N Gold-plated N-type female • Construction: Fiberglass, 3 Sections

❺❺ COMET® **CX-333 TRI-BAND 146/220/446MHZ BASE REPEATER ANTENNA**

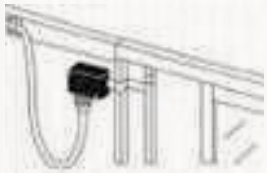
Wavelength: 146MHz 5/8 wave x 2 • 220MHz 5/8 wave x 3• 446MHz 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz.• Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

❻❻ COMET® **GP-15 TRI-BAND 52/146/446MHZ BASE REPEATER ANTENNA**

Wavelength: 52MHz 5/8 wave • 146MHz 5/8 wave x 2 • 446MHz 5/8 wave x 4 • Max Pwr: 150W • Length: 7'11" • Weight: 3lbs. 10oz. • Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

❼❼ COMET® **CTC-50M WINDOW GAP JUMPER**

Avoid drilling holes or leaving windows open/unlocked. Flat coax easily forms to window frame. Low loss SO-239 on each end, 15 inch length.
• Max Pwr: **HF** 100W PEP / **VHF** 60W FM / **UHF** 40W FM / **900-1300 MHz** 10W FM



CAA-500MarkII
1.8-500MHz Antenna analyzer

The CAA-500MarkII combines the simplicity and accuracy of an analog instrument, PLUS...a full color LCD graphic display • Resistive (R) and Reactive (X) components of impedance graphed and displayed numerically • SWR readings in both graphic and numerical results.

Operates on 8-16VDC external power, 6 AA Alkaline or NiMH rechargeable cells • Trickle charger built in (only when using NiMH batteries) • Typical battery life: 9 hours of continuous operation • Battery level indicator • Selectable auto power-off time limit preserves battery capacity • SO-239 connector for 1.8-300MHz range • N-female connector for 300-500MHz range

The perfect combination of analog and graphic information, designed in particular for antenna diagnostics and adjustments while on the roof, tower or in the field!

CAA-5SC

Protect your CAA-500MarkII from moisture, shock, dents and dings!

Shoulder strap included.

Call or visit your local dealer today!

www.natcommgroup.com | 800-962-2611

COMET®

The EVENT HORIZON OF DX

TS-990S

Dual TFT Display & Dual Receiver HF/50 MHz Transceiver

The main receiver has an IP3 in the +40 dB class, and the sub-receiver is the already famous TS-590S receiver. Capable of receiving two signals at once, on different bands. 7-inch and 3.5-inch color TFT displays allow displaying of independent contents. Simplification of complex operations at a glance. Make no mistake, this is not a toy. Finally a serious tool is available for getting the very most from your hobby - of course it's a Kenwood.

- Covers the HF and 50 MHz bands.
- High-speed automatic antenna tuner.
- USB, Serial and LAN ports.
- Various PC applications (free software): ARCP-990 enabling PC control, ARHP-990 enabling remote control, and ARUA-10 USB audio driver.
- Clean 5 to 200 W transmit power through the 50 V FET final unit.
- Built-in RTTY and PSK.
- Three Analog Devices 32-bit floating-point arithmetic DSPs.
- DVI output for display by an external monitor (main screen display only).

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