The *QST* Antenna Design Competition Is Back! | 64

QST

DIGITAL EDITION

ARRL The National Association for Amateur Radio

September 2024 www.arrl.org

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QST Reviews

Kenwood TH-D75A Tri-Band FM/ Digital Transceiver

DX Engineering NOISELOOP Portable Flag Antenna Kit and Portable Receive Preamplifier-Attenuator

Elk Antennas 2M/440L5 Dual-Band Portable Log-Periodic Antenna

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  - TX Phase Noise : −143dBc/Hz
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- **Built-in High-speed Automatic antenna tuner**
- **Effective QRM rejection by Dual-core DSP**

*Multi-signal receiving characteristic: 14MHz band/2kHz separation
*TX Phase Noise: 100W, CW mode

- **AESS (Acoustic Enhanced Speaker System) with SP-40 speaker to create High-fidelity audio output**
- **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

Contents

September 2024 ♦ Volume 108 ♦ Number 9

An icon next to an article means there's bonus content in the digital edition at **www.arrl.org/qst**.

Columns

Departments

Our Cover
Matthew, K2EAG, and Angela, N3ARB, Brown, and their friend Dennis Schultz, N2DJS, participated in the US Islands Awards Program's 2023 W/VE Island QSO Party as an Island Rover team, activating five islands in one of the largest lakes in Pennsylvania. The islands in question are accessible only by water, so the team mapped a water route, made camping reservations, packed their gear, and embarked on an activation adventure. Read "W/VE Island QSO Party: A Kayak Rove," by Matthew Brown, K2EAG, to learn how it all turned out. [Matthew Brown, K2EAG, and Angela Brown, N3ARB, photo]

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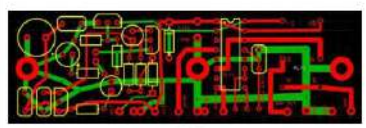

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QST (ISSN:0033-4812) is published monthly as its official journal by the American Radio Relay League, Inc., 225 Main St., Newington, CT 06111-1400, USA. Volume 108, Number 9. Periodicals postage paid at Hartford, CT, USA and at additional mailing offices.

POSTMASTER: Send address changes to: *QST*, 225 Main St., Newington, CT 06111-1400, USA. Canada Post: Publications Mail Agreement #90-0901437. Canada returns to be sent to The Mail Group, 1501 Morse Ave., Elk Grove Village, IL 60007.

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Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421.

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X200A (2 Section)	2m/70cm	8.3	200	UHF
X50A (1 Section)	2m/70cm	5.6	200	UHF or N
X30A (1 Section)	2m/70cm	4.5	150	UHF
Monoband Base Station/Repeater Antennas				
F23H (3 Section)	144-174 MHz (W/ Cut Chart)	15	350	UHF
F22A (2 Section)	2m	10.5	200	UHF
CP22E (Aluminum)	2m	8.9	200	UHF
F718A (Coax Element)	70cm	15	250	N
Dualband Mobile Antennas				
SG7900A	2m/70cm	62.2 in.	150	UHF or NMO
SG7500A	2m/70cm	40.6 in.	150	UHF or NMO
NR770H Series	2m/70cm	38.2 in.	200	UHF or NMO
MR77 Series	2m/70cm	20 in.	70	Mag Combo
AZ504FXH	2m/70cm	15.5 in.	50	UHF
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David A. Minster, NA2AA, ARRL Chief Executive Officer, na2aa@arrl.org

Second Century

Dewey Defeats Truman!

"LoTW is dead and all the data is gone forever!" Who doesn't love a sensational, but completely false, headline? Did you read the posts from the systems gurus and armchair insiders? We did — in emails from panicked members. Alas, the real headlines read more like, "LoTW is back on, and I uploaded my logs!" And, "The LoTW queue of 60,000 logs is now completely caught up in less than 4 days!"

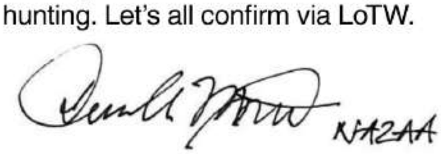
The real hero of this story is Jon Bloom, a former ARRL IT Manager who wrote most of our Logbook of The World. We've been working with Jon for months now, on improvements to LoTW with an eye to the next generation of the system. When we suffered our network attack, Jon jumped into action, taking a full backup of the database off-site. He even has a version of LoTW running on an off-site server with the latest version of Linux, and on a completely different database system. The question of LoTW being safe and sound was never an issue. Despite the headlines. It was more about how we were going to bring it back online with the dependencies it has on other systems in the enterprise, while working to contain and remedy the attack on our network. This took longer than we would have liked, but we were being conservative and deliberate about bringing it back into reliable service.

We take very seriously the responsibility of keeping LoTW up and running. After all, we're administering amateur radio's worldwide logbook and confirmation system! It is one of our most popular and important member benefits. For a long time LoTW has had monthly uptimes of 99% or higher. We've made investments in the platform, servers, and processors. Keeping the hardware current has been important as LoTW users have radically changed the way they use the system. Long gone are the days of occasional large uploads replacing trips to the post office. Today, most of the traffic on LoTW is a single contact — but the envelope that one contact sits within must be processed just as a thousand contacts would.

If you are an LoTW user, or a fanatic like I am, you might find it interesting that most LoTW users are not ARRL members. The service is popular with international users, including top contesters, DXers, and rare DXpeditions. Of course, the personal accomplishment reflected in your log makes LoTW valuable to every user. There are many opinions on how LoTW should be structured to help fund its full operating costs, but being a member is the easiest way to start. President Rick Roderick, K5UR, and I recently sent out more than 30,000 emails to non-members in Europe who have used LoTW within the past year, asking them to consider supporting LoTW by joining ARRL. How many users stepped up and became members? 74. So, clearly, asking for support from the people who use it is inadequate. A similar issue exists on the support side: Nearly 60% of the support emails we receive on LoTW come from non-members. Should there be a charge to support non-members? You're a member! What are your thoughts? So far this year, I have personally spent nearly $100 so that DXpeditions will send me confirmations via LoTW. This notion of "pay to play" is the one thing I hear the most feedback on from members. If a DXpedition is collecting money to QSL via LoTW, should they be paying to do so? I already know some of your thoughts!

The future of LoTW looks very bright. ARRL awards, including DXCC, remain very popular. The integrity of the submissions is strictly adhered to. The current version of the system runs very well for the load that is placed on it. We plan on moving LoTW into the cloud so that greater horsepower and storage would be available on demand. Calls for changing the look of the user interface and mobile optimization are few and far between. But the next generation of LoTW can look and feel different.

If you're a new member, or a member who has not yet set up your LoTW account — do it! LoTW is fun because thousands of hams use it. The system is storing nearly 2 billion QSO records! So be the connector who uploads all your contacts to LoTW. Surprise a new ham by uploading the contact you've made with them on the same day, so they will begin earning QSL records and can get started with award hunting. Let's all confirm via LoTW.



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Steve Ford, WB8IMY, wb8imy@arrl.net

Member Spotlight
Geoff Mendenhall, W8GNM

Geoff Mendenhall, W8GNM, spent decades in the broadcast transmission equipment industry holding prominent positions at well-known companies such as Broadcast Electronics and Harris Broadcast. He officially retired from Harris Broadcast in 2013. A year later, Geoff and his wife, Nike Mendenhall, W8MNM, built their retirement home on Catawba Island, Ohio.

After retirement, Geoff acted as a Federal Communications Commission consultant concerning issues surrounding the digital TV spectrum repack. He continues to do other consulting work today.

Starting Young

Geoff began tinkering with electronics at the age of 8. What lit the spark was his father's gift of an Olson seven-in-one radio kit. Six years later, Geoff and some of his friends earned their Novice-class licenses.

His first transmitter as a Novice was entirely homebrewed: a CW rig built around an 807 tetrode vacuum tube with a power supply whose components were scavenged from an old television set. Later, with the assistance of the late Bill Orr, W6SAI, Geoff designed and built a linear amplifier for 6 meters using an Eimac 4-400A tetrode. This amplifier was a high school science fair project that ultimately appeared at the national Junior Engineering Technical Society science fair in New York City.

Before graduating high school, Geoff earned his Advanced-class license, not to mention a First Class Radiotelephone license so he could work for local radio and TV stations. Later, he upgraded to the Amateur Extra-class license. Throughout the many years that followed, Geoff's passion for electronics in general, and amateur radio in particular, never waned.

Like many amateurs, Geoff credits the hobby with having a strong influence on his life. According to Geoff, "My ham radio background played a key role in my pursuit of an electrical engineering education at the Georgia Institute of Technology and my subsequent career choice in RF transmission technology."

While attending Georgia Tech, Geoff worked for WAGA-TV in Atlanta as a camera operator and technician. His first job after graduation was with the COMCO division of EF Johnson in Coral Gables, Florida.

"But I really wanted to get back into broadcast-related design work," Geoff said. "So, I moved to Quincy, Illinois, in 1973 to work for the Gates Radio division of Harris Corporation. Later, I worked at Broadcast Electronics from 1978 to 1993 and then returned to Harris Broadcast and stayed until retirement in 2013."

Geoff is a Harris Corp (now L3Harris) Technology Fellow and holds nine US patents involving broadcast equipment. In 1999, he received the National Association of Broadcasters Radio Engineering Achievement Award for his contributions to FM broadcast technology. Geoff was also a member of the FCC Technology Advisory Committee.

Still Enjoying Amateur Radio and More

Geoff still enjoys homebrewing his own gear, including modeling, building, and evaluating his own antennas. Among his favorite on-air activities are joining friends in various nets and chasing rare DX.

"I'm also on the board of the Port Clinton Lighthouse Conservancy, and I am a docent in the summertime. With several other ham friends, we will be activating the Port Clinton Lighthouse on August 17 during International Lighthouse/Lightship Weekend, which coincides with the Port Clinton Lighthouse Festival," he added.

In addition to his amateur radio activities, Geoff is an active sailor and enjoys sailing around the Lake Erie Islands. And yes, he occasionally operates amateur radio from a sailboat using an Icom IC-706MKII transceiver with hamstick antennas for 20 meters and up and an inverted-**V** antenna that hangs from the top of the mast.

Looking Ahead

Geoff takes a generally positive view of the future of amateur radio. "I am encouraged by the large number of licensed amateur radio operators in the US and around the world at the present time," he stated, "but I worry about whether there will be enough next-generation hams coming into this wonderful hobby. I think the new digital transmission modes are important to stimulate interest in young people and attract them to amateur radio."

Geoff believes that science, technology, engineering, and mathematics education opportunities in our school systems, and activities promoted by groups such as Ham Radio Science Citizen Investigation, can be attractive entry points for new amateurs.

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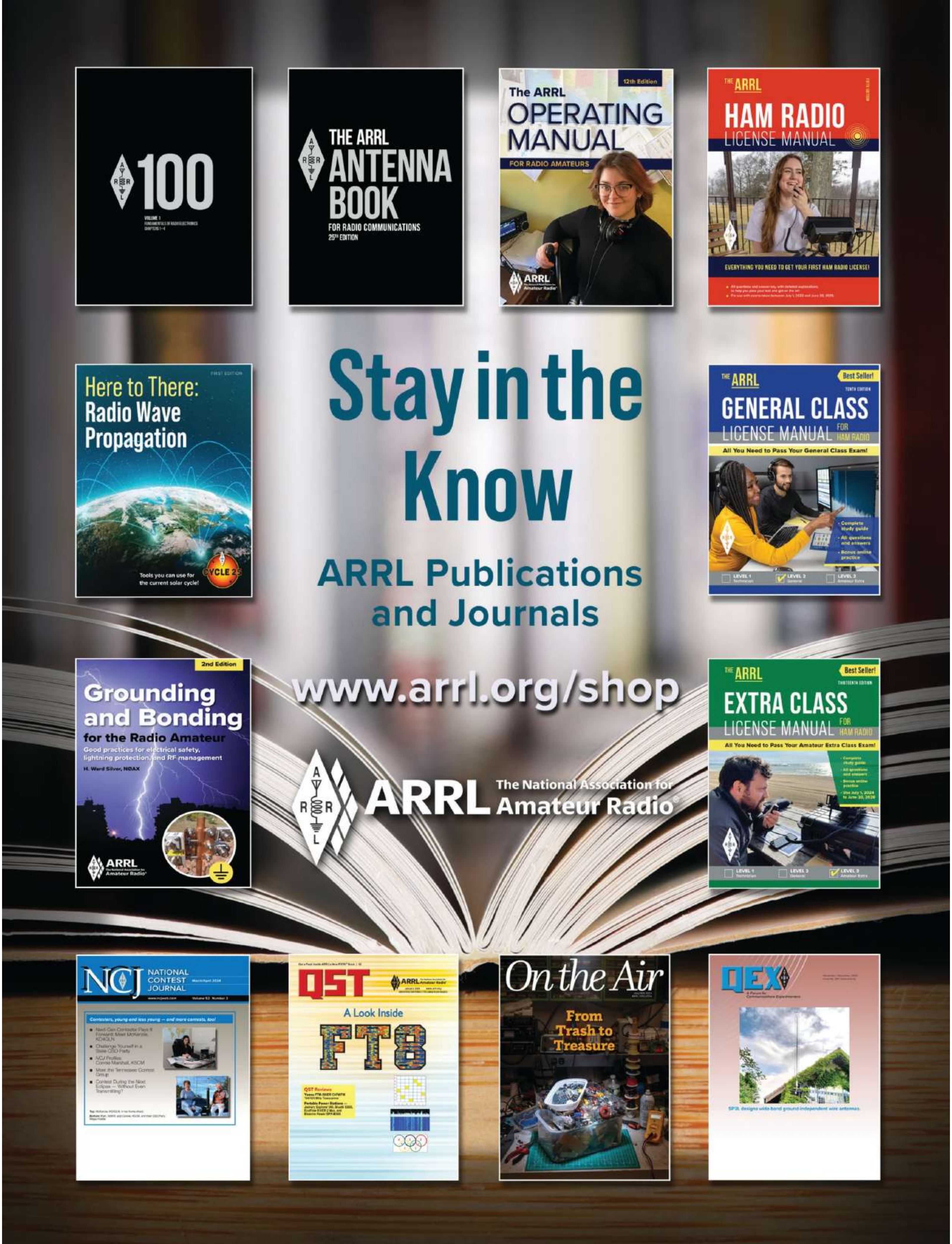
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Up Front

Building Memories

Bob Davet, W8RID, was finally able to finish the project he and his dad started several years ago. They wanted to make two of these 3-500Z tube lamps (damaged tubes provided by RF Parts), one for each shack. Unfortunately, his dad, Robert E. Davet, W8JFQ (SK), passed away before the project was completed.

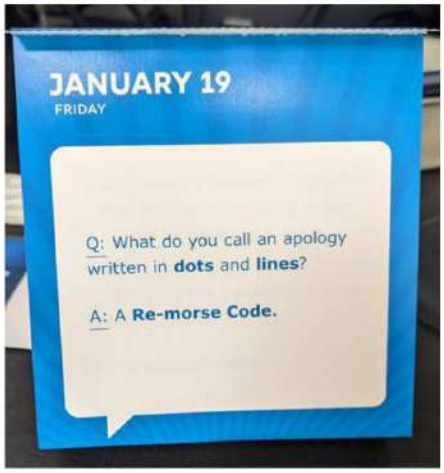
While sorting through some of his dad's old radio boxes, Bob came across the tubes along with all the parts. He pulled them out and rekindled the project.

Bob says, "Now every time I turn on my radio equipment, the tube lamp turns on and reminds me of who got me into this hobby."

[Bob Davet, W8RID, photo]

Everyone Loves a Joke

Art Balourdas, AI6KK, shares this joke from the daily "Dad Joke" calendar his son Michael gifted him for Christmas.



[Art Balourdas, AI6KK, photo]

IOTA Beverages

A new drink for Islands on the Air participants? Not exactly. Adrian Stimpson, VE7NZ, shared this photo. This pilsner is part of a line of iOTA non-alcoholic craft beers manufactured by Phillips Brewing and Malting Company in Victoria, British Columbia, Canada. The name comes from the Greek letter iota, meaning an extremely small amount. But sure, you may be able to get some for your next IOTA event.

[Adrian Stimpson, VE7NZ, photo]

Where Elmers Hang Out

Trent Dowler, KG5DTI, found a place for elmers while traveling Highway 86 across Texas, between Nazareth and Tulsa. Trent may be right when he says, "I don't think it has anything to do with ham radio — but it does have an old radio tower out front with large letters that spell ELMER'S." Elmer's, in Tulia, Texas, is a local watering hole.

[Trent Dowler, KG5DTI, photo]

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Letters from Our Members

Hands-On Resources to Get Started

My interest in ham radio waned a bit as the main theme seemed to be making contacts or helping during emergencies. No emergencies have occurred in my rural area for the past century, and I don't find contesting very thrilling. Many would-be amateurs might look at our current high-tech hobby and wonder how to get started if they share similar feelings. I believe the way to begin is to build a very simple transmitter, a radio kit, and a separate receiver and learn by doing, as I did.

This approach gently leads prospective hams into electronics. Videos on the internet help a lot, too. They taught me how to design a variable-frequency oscillator. The analog-style projects and wire dipoles in *Experimental Methods in RF Design* by Wes Hayward, W7ZOI; Rick Campbell, KK7B, and Bob Larkin, W7PUA, are helpful, as opposed to complex digital circuitry that presumes a prior knowledge of many electronic subsets.

Charles Hooker, VE3CQH
Ontario, Canada
Life Member

Work DX with FT8

I enjoyed the article "Work DX with FT8" by Gregory P. Widin, KØGW, in the May 2024 issue of *QST*. The author made excellent points for maximizing the chances of making DX contacts with FT8 using *WSJT-X*. I want to add a couple of suggestions.

First, achieving DX when FT8 frequencies are crowded can be difficult, but switching to the often-overlooked FT4 mode can make a difference because it is less crowded. FT4 is sometimes mistakenly considered only a contest mode, but anyone can use it anytime for faster contacts.

Second, as wonderful as FT8 is, adding the *GridTracker* software connected to *WSJT-X* can create a whole new dimension to the enjoyment of it! It adds grid maps, automatic PSK Reporter spotting, call sign lookups, real-time gray lines, logging confirmation status, alerts, and much more.

Albert Hearn, WA4GKQ
Woodstock, Georgia

You Don't Need a Large Antenna to Succeed

I hope new operators do not think large antennas are required to have fun and succeed in our hobby.

My city has a 35-foot maximum antenna height restriction, and I have a basic three-element SteppIR 20- through 6-meter antenna at that height. I've been a ham for more than 60 years, and during that time, I have experienced some frustration with low-noise loops and phased antennas that can hear really weak signals. You can hear other hams, but they have a hard time hearing you or are working the strong stations they have propagation for. However, I have done very well in numerous contests, worked all US counties and 160-meter DXCC, and have a mixed DXCC total of 347, most of them achieved before FT8. With the advent of FT8, more people can work DX with minimal resources.

Having dual receive on a radio and understanding the concept of "up" will get you a lot of DX stations. I cannot count the number of times I've worked a DXpedition and continued to hear a superstation still calling 20 minutes later.

Just try, do the best you can, and make the most of what you have.

Rick Darwicki, N6PE
Yorba Linda, California
Life Member

Celebrating *QST*

Every issue of *QST* is a treasure, but the April 2024 issue was outstanding. The "Ask Dave" column featured a great question about antenna tuners, which reminded me of my mentor, Jim Trutko, W8EXI (SK), who helped many hams put up antennas.

The crossword puzzle was a nice touch! Of course, there were the Straight Key Night results, which were outstanding. Additionally, the simple construction projects and Arduino sketches were nice. Thanks for *QST*!

Jim Hebert, W8FDV
Mesa, Arizona

Teaching Kids Morse Code

I built two keys with piezoelectric audio buzzers and two AA batteries.

Young children love secret messages, so I gave the keys to two kids. They practiced using the keys in front of each other to learn the letters. Then they moved to separate rooms and practiced by using their cell phones on speaker mode to hear the audio tones and send and receive what they thought were secret messages over longer distances.

This technique works like a charm. In 1976, I got my two sons on the air, and they earned their General- and Extra-class licenses. Now it's my grandkids' turn. I just delivered these special keys to them.

Jim Garrett, K5BTV
Cumming, Georgia

Send your letters to **letters@arrl.org**. We read every letter received, but we can only publish a few each month. We reserve the right to edit your letter for clarity, and to fit the available page space. Letters published in "Correspondence" may also appear in other ARRL media. The publishers of *QST* assume no responsibility for statements made by correspondents.

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

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

♦ Morse code transmissions: Frequencies are 1.8025, 3.5815, 7.0475, 14.0475, 18.0975, 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 2024, Headquarters and W1AW are closed on New Year's Day (January 1), Presidents Day (February 19), Memorial Day (May 27), Independence Day (July 4), Labor Day (September 2), Veterans Day (November 11), Thanksgiving and the following day (November 28 and 29), and Christmas Day (December 25).

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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

External QSK T/R Switch for HF Amplifiers Using an Inexpensive Power Relay

AD5X describes a low-cost external QSK switch that will work with any amplifier.

The author's new inexpensive relay-based QSK switch.

Phil Salas, AD5X

CW is my favorite mode. It occupies probably 98% of my operating time. I enjoy full break-in operation, especially when chasing DX. In the February 2008 issue of *QST*, I described an external legal-limit, full break-in QSK switch for HF amplifiers. While that design worked well, it was expensive because it used the popular Jennings RJ1A 26 V dc vacuum relay. Also, an internal 50 V dc power supply was needed to power the RJ1A and the 12 V transceiver-switching relay. Recently, fast-switching, high-current relays have become available at very reasonable prices. A relay that I found to be of great interest is the inexpensive Panasonic DK1a1b power relay. Besides carrying legal-limit power, this relay has no contact bounce. Table 1 illustrates the comparison between the Jennings RJ1A vacuum relay and the Panasonic DK1a1b relay.

Table 1 — Jennings RJ1A Vacuum Relay vs. Panasonic DK1a1b Mechanical Relay

Relay	Switching Speed Max	Current Carrying	Lifetime	Cost
RJ1A	8 ms/8 ms operate/release	7 A at 32 MHz; higher current at lower frequencies	2 million operations	$100+
DK1a1b	10 ms/8 ms operate/release	8 A	50 million operations	$8

Table 2 — Parts List for External QSK Switch (Prices as of 7/2024)

Qty.	Description	Mouser Part Number	Price (each)
1	DK1a1b relay (RLY2)	769-DK1A1B-12V	$7.65
1	DK2A-PS socket	769-DK2A-PS	$4.29
1	DPDT signal relay (RLY1)	653-G6A-274P-DC12	$5.32
1	16-pin IC socket	653-XR2A-1611-N	$2.57
1	SPST switch	118-1MS9T1B1M1QES	$5.34
6	4.7K Ω 1/4 W resistors	660-MF1/4LCT52R472G	$0.11
2	22 pF 2 kV ceramic capacitors	810-CC45SL3DD220JYNA	$0.35
1	15 pF 2 kV ceramic capacitor	810-CC45SL3DD150JYGN	$0.37
1	10 pF 2 kV ceramic capacitor	810-CC45SL3DD100JYNA	$0.37
3	0.1 µF 100 V capacitors	581-SR211C104KAR	$0.32
2	0.01 µF 1 kV capacitors	810-CK45-E3AD103ZYGN	$0.50
1	10 µF 25 V elec. capacitor	80-ESK106M025AC3AA	$0.22
1	0.33 µF capacitor	594-K334K20X7RF5TH5	$0.86
1	78L08 regulator	863-MC78L08ACPG	$0.60
1	2N3906 PNP transistor (TO92)	512-2N3906TA	$0.31
1	2N3904 NPN transistor (TO92)	637-2N3904	$0.10
1	Two-pin header	538-90120-0122	$0.49
1	Jumper	538-15-29-1024	$0.48
1	2.1 × 5.5 mm dc jack	163-1060-EX	$0.75
4	SO-239 connectors	601-25-7350	$2.65
1	Phono jack	502-BPJF02X	$1.68
2	1N4001 diodes	583-1N4001-B	$0.21
1	Red LED	941-C503BRBNCY0Z0AA2	$0.21
1	Green LED	941-C5SMFGJFCX14Q7T2	$0.30
1	1/8-inch stereo jack	523-ACJS-MV35-3S	$1.13
3	0.25-inch-long #4 Al. standoffs	534-8714	$0.47
4	#4 solder lugs	534-7325	$0.20
1	2.3 × 3.2 × 4.8-inch aluminum box	563-CU-472	$12.30
Misc.	4-40 screws, nuts, and split lock washers		

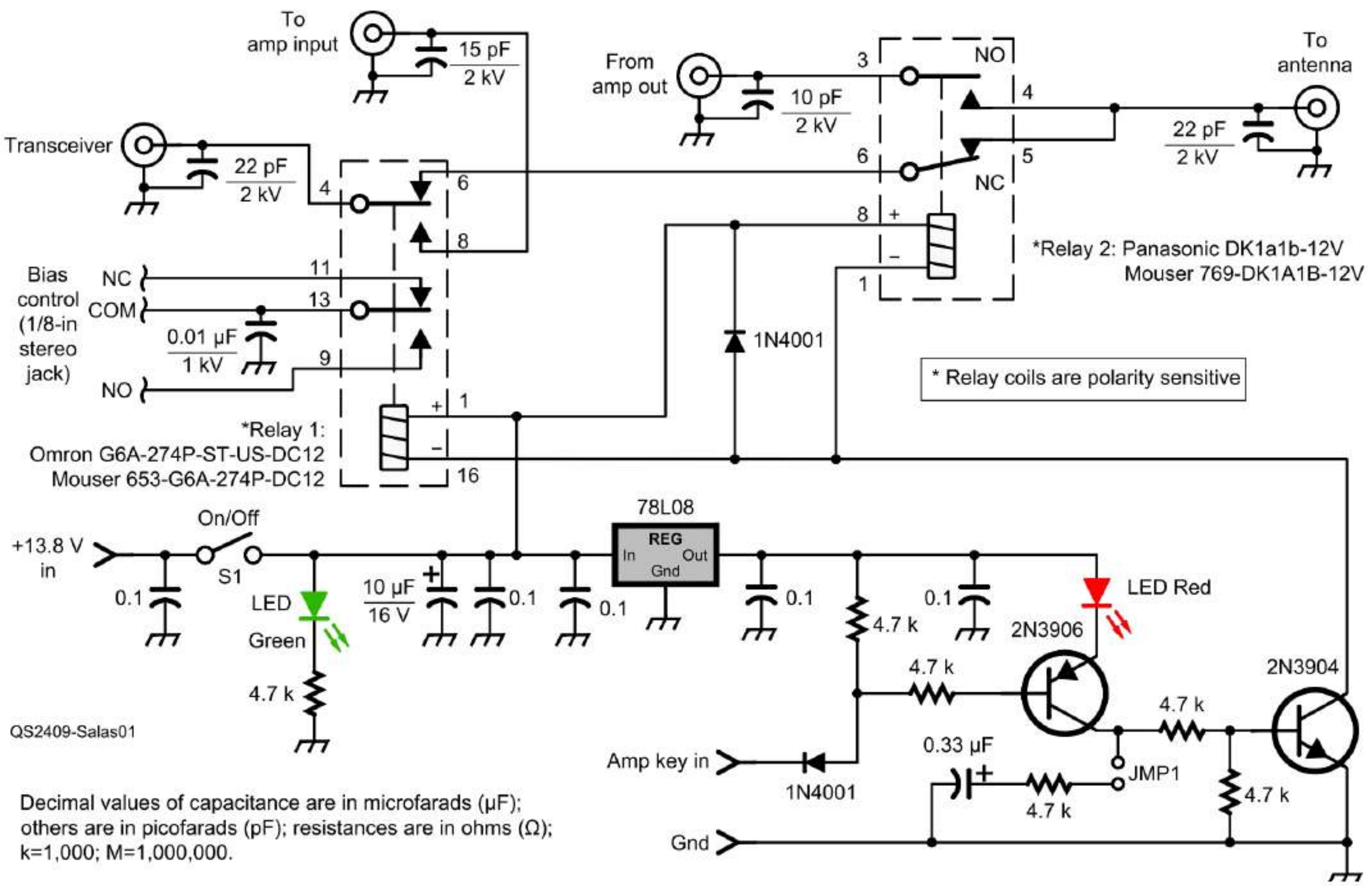

Figure 1 — The QSK switch schematic.

As you can see, the maximum switching times are almost identical. The DK1a1b also has 25 times the operating lifetime compared to a *new* RJ1A (many hams purchase "pulls" — or used relays — as the new cost is quite high). Finally, the DK1a1b is significantly less expensive than the RJ1A. It is interesting to note that the RJ1A vacuum relay is often quoted to have a switching speed of less than 5 milliseconds. While this may be a typical switching speed, we should always plan around the maximum specification to ensure that no damage to the transceiver or amplifier can occur due to hot switching. Timing information will be provided later in this article.

The schematic of the QSK switch is shown in Figure 1, and the components are listed in Table 2. Recommended Mouser part numbers are given. However, you can probably do better on pricing with a little shopping around.

This unit operates directly from your +13.8 V dc station power supply. RLY1, the transceiver-switching relay, is an Omron G6A-274P-ST-US-DC12. It has a current-carrying capability of 3 A and a maximum switching speed of 5 milliseconds. While the total current required by both relays is just 32 mA, I incorporated a lower-current driver circuit that will interface to any transceiver with an amp-key output. This also interfaces with Icom IC-706 series transceivers, and Xiegu G90, X5105, and G106 transceivers, all of which have keying outputs that go to +8 V dc on receive and 0 V on transmit. The circuit also includes a keying LED, and you can jumper in extra delay to the output switch time in case your transceiver outputs RF after the amp-enable line goes high. I discussed this issue in my November 2011 *QST* article titled "Internal Full Break-in Keying Interface for the ALS-600 Amplifier."

Construction Notes

Figure 2 shows my PC board layout (contact me for boards and/or the ExpressPCB layout). I used sockets for the relays in case they ever have to be replaced.

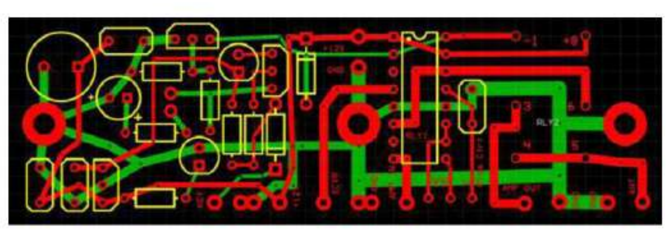

Figure 2 — The layout for the QSK relay-based switch.

Figure 3 — QSK switch internal view.

Figure 4 — Rear panel connector configuration.

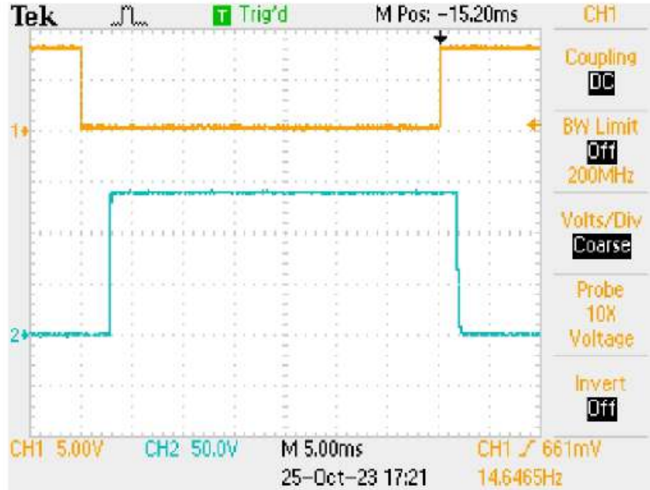

Figure 5 — Input relay with no turn-off delay.

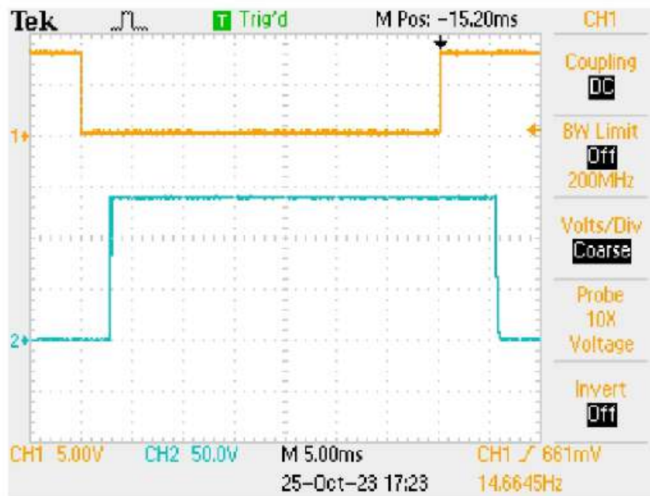

Figure 6 — Input relay with turn-off delay.

However, based on both of the relays' expected lifetimes, this will rarely — if ever — occur.

I built the unit into an existing aluminum box, but the smaller box listed in Table 1 would be an excellent substitute as the complete PC board assembly is quite compact. Figure 3 shows the internal view of my QSK unit, and Figure 4 shows the back panel. I used 18 AWG solid buss wire for the RF and ground connections. Note that the capacitors that compensate for wiring inductance are soldered directly to the RF connectors. All labeling was done using a Casio labeler with black-on-clear labeling tape.

Some Timing Measurements

So, how fast is the switching? The plots in Figures 5 – 8 show the actual timing while sending dits at the rate of about 35 WPM.

Figure 5 shows the input Omron relay timing with no added turn-off delay. The upper (orange) trace is the keying signal, and the lower (blue) trace is the relay operation. The relay keys in 3 milliseconds and unkeys in 2 milliseconds. Figure 6 shows the same relay with the added turn-off delay strapped in. In this case, the keying is still 3 milliseconds, but the unkey is 6 milliseconds.

Figure 7 shows the timing of the high-current Panasonic DK1a1b amplifier relay with no additional turn-off delay. This relay keys in 5 milliseconds and unkeys in 5 milliseconds. These are also the total QSK unit key/unkey switching times, as this is determined by the slowest relay. Figure 8 shows the same relay with the additional strapped-in turn-off delay, which extends the unkey delay to 9 milliseconds.

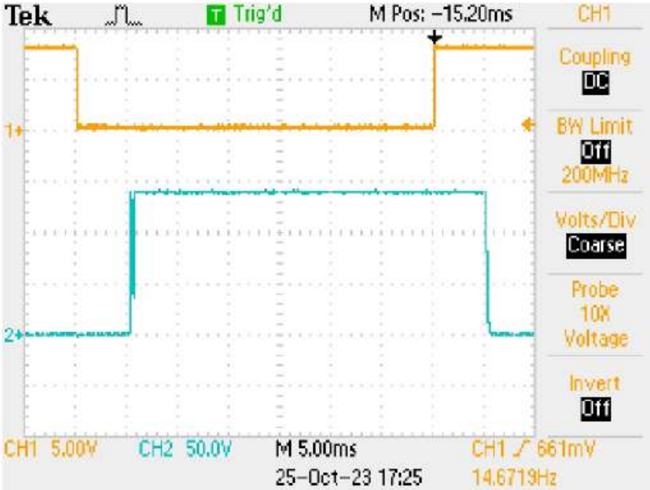

Figure 7 — Output relay with no turn-off delay.

Figure 8 — Output relay with turn-off delay.

Some SWR Checks

As you can see in Figure 3, there is about an inch of wiring between the PC board and the RF connectors. Also, the relays aren't perfect 50 Ω paths either. In general, you add inductance to your circuit with the wiring. This can be compensated for with shunt capacitors (see the sidebar, "Compensating for Added Inductance in Circuits"). A little analysis with a vector network analyzer (VNA) permitted me to choose the capacitors shown in the schematic. With the capacitors shown, the standing wave ratio (SWR) from transceiver to antenna, transceiver to amplifier, and amplifier to antenna is no higher than 1.1:1 from 1.8 to 54 MHz.

Isolation

Because the amplifier is continuously enabled, it is important that the isolation from the amplifier output to its input be high enough that there is no possibility of oscillation. This isolation would be between pins 4 and 5 of the DK1a1b relay. The isolation between contacts is shown in the data sheet only as dielectric strength in root-mean-square V, so I decided it was prudent to measure the isolation. First, I measured the actual capacitance between the open contacts; this was 0.5 pF, which would imply 42 dB isolation at 50 MHz. However, my capacitance measurement was a dc measurement, so I measured the isolation with a VNA. Table 3 shows my VNA-measured isolation.

Table 3 — DK1a1b Contact Isolation

Frequency	Isolation
1.8 MHz	–68 dB
3.5 MHz	–62 dB
7 MHz	–56 dB
14 MHz	–50 dB
28 MHz	–44 dB
50 MHz	–38 dB

Because ham radio power amplifiers are limited to 15 dB gain by the FCC, there is plenty of margin with regard to the relay isolation.

Using the QSK Switch

It is important that the amp-key-to-RF output of your transceiver exceeds the switching time of this QSK unit to ensure that no hot switching occurs. As this unit switches in 5 milliseconds, this shouldn't be a problem — I don't know of any transceiver that outputs RF any sooner than this after the amp-key line is enabled. But most transceivers have this parameter as a menu option so they can interface with non-QSK amplifiers. To ensure no possibility of hot switching, you may want to set this delay time to 10 milliseconds.

Figure 9 shows the interconnect diagram. Create a shorting plug for the amplifier keying input. Because the amplifier keying input is always grounded, it doesn't matter whether this is an old amplifier with a high-voltage keying requirement, or a newer amplifier with a low-voltage, low-current keying requirement. The bias

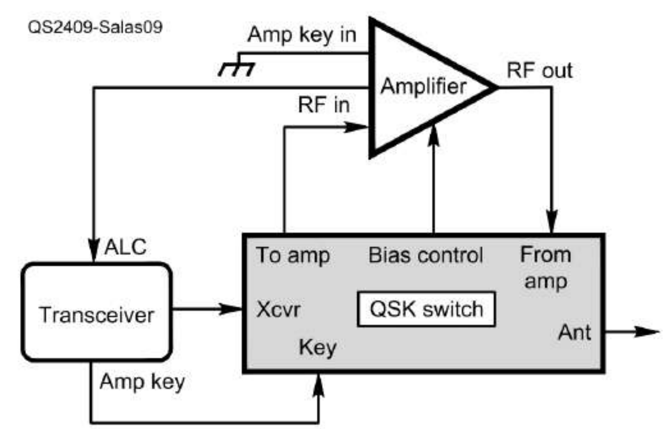

Figure 9 — Interconnect wiring diagram.

Compensating for Added Inductance in Circuits

The characteristic impedance of a transmission line is:

$Z_o = \sqrt{[(R+j\omega L)/(G+j\omega C)]}$ per unit length,

where $R+j\omega L$ is the series resistive loss and inductance, and $G+j\omega C$ is the shunt admittance loss and capacitance. Assuming low losses in the transmission line and high frequencies, this simplifies to:

$Z_o = \sqrt{(L/C)}$.

When building circuits, it is not uncommon to add extra inductance due to wiring. From the above equation, you can see that if you add series inductance, you can compensate by adding shunt capacitance to keep the impedance constant. This is not a new technique. I first became aware of it when I started work at Texas Instruments in 1972. Wide pads on substrate-to-substrate interfaces were used to simplify tack welding the substrate interconnect straps. Besides making assembly easier for the line operators, the pads were found to improve return loss.

If you have a VNA (such as the inexpensive NanoVNA), you can see the inductive reactance and the SWR over your frequencies of interest. I built up three pairs of clip-leaded capacitors: 10 pF, 15 pF, and 20 pF (see the figure below). You can clip these across your RF connectors and see the resulting improvement in SWR, and from there you can determine the final values needed. This works well up to 6 meters and significantly shortens the time necessary for determining the compensating capacitor values. Above 6 meters, you will need to tack solder various value capacitors across the RF connectors, as the clip-lead lengths become a problem. Over the years, I've found that 10 – 25 pF input/output capacitors are needed for my HF – 6-meter projects. For discrete wiring projects on 144 and 440 MHz, I've typically needed 5 pF and 2.2 pF capacitors, respectively.

The author's capacitor compensation kit.

control can be used if you have access to the bias in your amplifier (permits biasing off the final tubes between dits and dahs). Or, you can use these relay contacts to mute an external software-defined radio receiver if you have one. When you want to operate full break in, set your amplifier to **OPERATE**. The QSK switch will switch your amplifier in and out of line at your keying speed. While you can hear the relays operating, the sound level is fairly minimal and virtually unnoticeable if you are wearing headphones.

Conclusion

New high-current, fast-switching, inexpensive power relays can eliminate the need for vacuum relays often used to implement full break-in amplifiers. And besides being inexpensive, these power relays have a much greater lifespan than vacuum relays.

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.

Coaxial Cables with Foam Dielectric

A detailed look at the physical and electrical reasons that foam is used in low-loss coaxial cables.

José Luis Giordano, CA4GIO

Within the wide array of coaxial transmission lines there's a group known as low-loss coax, whose dielectric is polyethylene foam, or PE(F). I have translated my short article, "Coaxiales con dieléctrico de espuma," originally published in Spanish in the December 2023 issue of *Radioaficionados*, that explains why this material is used.

Coaxial Cable Loss with Frequency

The electrical conductivity of the dielectric located between the conductors of a coaxial transmission line represents a loss. Therefore, it can be thought that low-loss coaxial cables that use foam dielectrics do so because of the lower conductivity of the material. However, the most important losses in a coaxial cable have another origin, because they do not correspond to the conductance between conductors but to the resistance along them.

The propagation characteristics of the line (the transverse electromagnetic wave) cause currents and fields to flow in one direction in the central conductor, and in the opposite direction through the shield of the coaxial cable. Due to the skin effect, this current flow occurs through a surface layer of the central conductor and through the interior of the shield. This causes the specific electrical resistance R' (in Ω/m) and then coaxial cable losses to increase with frequency f in the form:

$$R' = \frac{1}{2\pi}\left(\frac{1}{d} + \frac{1}{D}\right)\sqrt{\frac{\pi f \mu_C}{\sigma_C}}\,.$$

In this expression d and D, respectively, are the diameter of the central conductor and the inner diameter of the shield (μ_C and σ_C, respectively, are the magnetic permeability and the electrical conductivity of the conductors, assuming the same material). However, because d is typically ⅓ of D, the expression for R' shows that most of the coax losses produced by skin effect are generated in the center conductor.

Low-loss coaxial cables, such as LMR-400, have less loss than cables like RG-8 or RG-213 because of the increase in the diameter of the center conductor. So, coaxial cables with lower losses generally have a larger outer diameter, thus permitting a larger center conductor. Table 1 lists the characteristics of several popular types of coaxial cables, including the attenuation over 100 meters at 150 MHz in the last column.

Effect of Dielectric on Impedance

To see the relationship between the dimensions and the dielectric, consider the following expression:

$$Z_0 = \sqrt{\frac{L'}{C'}}$$

This is the characteristic impedance of a transmission line where losses can be neglected. The specific inductance L' (H/m), and the specific capacitance C' (F/m) for coaxial cables are given by

$$L' = \mu\frac{ln\left(\frac{D}{d}\right)}{2\pi} = \text{ and } C' = \varepsilon\frac{2\pi}{ln\left(\frac{D}{d}\right)}, \text{ respectively.}$$

In these expressions, μ and ε are the magnetic permeability and the electrical permittivity of the dielectric. Because polymers are not magnetic, $\mu = \mu_0$ and $\varepsilon = \varepsilon_r\varepsilon_0$, where ε_r is the dielectric constant of the dielectric material, and μ_0 and ε_0 are the vacuum permeability and permittivity universal constants. Then, when we replace and rearrange the terms, we obtain

$$Z_0 = \frac{\eta_0}{2\pi} \times ln\left(\frac{D}{d}\right) \times V_F,$$

where the constant η_0 is the intrinsic impedance in vacuum:

$$\eta_0 = \sqrt{\frac{\mu_0}{\varepsilon_0}} \approx 376.73\ \Omega,$$

Table 1 — Characteristics of Popular Coaxial Cables

Type	Dielectric	d (mm)	D (mm)	V_F (%)	dB/100 m at 150 MHz
RG-58C/U	PE	0.91	2.95	65.9	20.10
RG-8X	PE(F)	1.42	3.94	84.0	11.15
RG-8A/U	PE	2.16	7.24	66.0	8.07
RG-213/U	PE	2.29	7.24	66.0	8.77
LMR-400	PE(F)	2.74	7.24	84.0	5.00
LMR-600	PE(F)	4.47	11.56	85.0	3.20
LDF4-50A	PE(F)	4.83	12.95	88.0	2.67

and V_F is the velocity factor of the transmission line:

$$V_F = \frac{1}{\sqrt{\varepsilon_r}}.$$

Therefore, to maintain the same value of Z_0, it must be

$$Z_0 = ln\left(\frac{D}{d}\right) \times V_F \approx \text{constant.}$$

So, by increasing the diameter d of the center conductor without changing the outside diameter too much, $ln\left(\frac{D}{d}\right)$ will decrease. Then, V_F must be increased. This means that the dielectric constant ε_r must be decreased. Because compact polyethylene has an $\varepsilon_r \approx 2.3$, you can reduce ε_r by adding air bubbles ($\varepsilon_r = 1$). In this way, the average value of the dielectric constant can be $\varepsilon_r \approx 1.5$ or less (making the velocity factor 0.82 or greater). This permits many low-loss coaxial cables to have a larger-diameter center conductor without significantly affecting the cable's outside diameter. Some larger cables, such as HELIAX®, employ a corrugated copper shield with air cavities that reduce the average dielectric constant. Again, this allows for a larger-diameter center conductor.

In Conclusion

Coaxial cables of a certain diameter manage to reduce losses by using a larger-diameter central conductor. Additionally, to maintain the characteristic impedance, the material between the conductors must have a lower dielectric constant. It is for this reason that coaxial cables of this type are recognized for having foam dielectric and a considerably higher velocity factor.

José Luis Giordano, CA4GIO, is a physicist who has worked at the Balseiro Institute and Bariloche Atomic Centre in Argentina, the University of Zaragoza in Spain, and the University of Talca in Chile. Now retired from academic life, Luis lives in Chile and obtained his amateur radio license in 2021. He is the author of four books, several papers on physics, and articles in *QST* and other ham radio magazines. Luis is especially interested in DX, HF, and broadband transformers. He can be reached at **jlgiordano@hotmail.com**.

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

New Products

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The actual values are provided as measured on our calibrated test equipment. The measured values are on a sticker on the back of the TEC-1. The TEC-1 is available from **www.freqdevinc.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.

January 2024

Charles W. Campbell, KØCWC	15
Douglas B. Diegert, N2KGT	15
George Wayne Moore, W8SUN	20

February 2024

Charlene K. Lewis, K8XCO	10
Douglas B. Powers, KD5DBP	10
Timothy J. Sinnott, KE2UM	10
Margot L. Wasz, KM6JWY	10
Lawrence Schall, KB2MN	20
Albert J. Whetter, W9WJ	20

March 2024

Mark A. Jessing, N4OJE	10
Stephen M. Riley, WA9CWE	10
Kenneth F. Robinson, K8SCA	10
Steven L. Myers, AI7OL	20
Bernard A. Poskus, KFØQS	20

April 2024

Joseph P. Kononchik, KS1I	10
Bill Durham, KG5ZCI	15
Joseph P. Kononchik, KS1I	15
Glenn R. Barr, Jr., WBØKFC	20
Daryl I. Hammond, WØBZ	20
Gabriel E. Donley, WN7JT	25

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

Congratulations to all of the recipients.

September 2024 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.

September Qualifying Runs will be transmitted by W1AW in Newington, Connecticut, at the times shown on 1.8025, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675, 50.350, and 147.555 MHz. The West Coast Qualifying Runs will be transmitted by K6KPH on Saturday, September 28, at 2 PM PDT (2100 UTC) on 3581.5, 7047.5, 14047.5, 18097.5, and 21067.5 kHz. Unless indicated otherwise, sending speeds are from 10 to 35 WPM.

Amateur radio operators who participate in Qualifying Runs may submit proof of 1 minute of the highest speed they have copied in the hope of qualifying for the Certificate of Code Proficiency, or an endorsement to their existing certificate.

Legibly copy at least 1 minute of text by hand, and mail the sheet to: W1AW Qualifying Runs, 225 Main St., Newington, CT USA 06111.

Include $10 (check or money order) if this is a submission for your initial Code Proficiency certificate; $7.50 if you are applying for an endorsement (available for speeds up to 40 WPM). Your test 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 — September 2024
(All times are in Eastern Daylight Time.)

Monday	Tuesday	Wednesday	Thursday	Friday
Labor Day		**9/4** 7 PM – 2300Z 35 – 10 WPM	**9/5** 10 PM – 0200Z **(9/6 – UTC)** 10 – 40 WPM	**9/6** 9 AM – 1300Z 10 – 35 WPM
	9/10 4 PM – 2000Z 10 – 35 WPM	**9/11** 7 PM – 2300Z 10 – 40 WPM	**9/12** 9 AM – 1300Z 35 – 10 WPM	**9/13** 10 PM – 0200Z **(9/14 – UTC)** 10 – 35 WPM
9/16 7 PM – 2300Z 10 – 40 WPM		**9/18** 10 PM – 0200Z **(9/19 – UTC)** 35 – 10 WPM	**9/19** 9 AM – 1300Z 10 – 35 WPM	**9/20** 4 PM – 2000Z 10 – 40 WPM
	9/24 10 PM – 0200Z **(9/25 – UTC)** 10 – 40 WPM		**9/26** 4 PM – 2000Z 35 – 10 WPM	**9/27** 9 AM – 1300Z 35 – 10 WPM

Product Review

Kenwood TH-D75A Tri-Band FM/Digital Transceiver

Reviewed by Steve Ford, WB8IMY
wb8imy@arrl.net

Is it accurate to call the Kenwood TH-D75A a "luxury handheld"? Maybe so, especially when you consider its plethora of features. Right off the bat you have the capability to transmit on three VHF/UHF bands — 2 meters, 1.25 meters, and 70 centimeters — at a maximum output of 5 W. And on each band, you can choose to operate analog FM or digital. Your digital options include D-STAR and packet radio (including the Automatic Packet Reporting System [APRS]).

Frequency ranges are divided into two "operation bands" in the display: A and B.

Band A — Frequency Range
Transmit: 144 – 148 MHz, 222 – 225 MHz, 430 – 450 MHz
Receive: 136 – 174 MHz, 216 – 260 MHz, 410 – 470 MHz
Band B — Frequency Range
Transmit: 144 – 148 MHz, 222 – 225 MHz, 430 – 450 MHz
Receive: 0.1 – 76 MHz, 76 – 108 MHz, 108 – 524 MHz

The TH-D75A receives FM and D-STAR on Band A. Band B also receives FM and D-STAR, but adds SSB, AM, and CW. Wide FM reception is reserved for FM broadcast frequencies.

The TH-D75A's predecessor, the TH-D74A, did all these things, but the new TH-D75A adds several new features (in addition to its redesigned appearance). With the TH-D75A you now can listen to two D-STAR signals simultaneously and access D-STAR reflectors through a "terminal" mode that doesn't require a D-STAR repeater. APRS enthusiasts will welcome the inclusion of a standalone digipeater function in the TH-D75A.

Lastly, the TH-D75A design adds a USB-C connector, enhanced voice guidance, and support for push-to-talk operation with a Bluetooth headset.

Initial Impressions

The TH-D75A arrives in a somewhat slender box that contains a male SMA flexible antenna, an 1800 mAh lithium-ion battery, a belt clip, a wall charger, and a sizable user guide. It is possible to charge the battery from a USB connection, but not all USB ports supply the 2 A necessary to do so — hence the wall charger.

Two items are not included, and you'll need them to enjoy full use of the radio: a microSD memory card and compatible USB cable. Fortunately, you'll find both available online and at many retailers. For this review I used a 32 GB memory card, which is the maximum size the transceiver supports.

With the battery installed, the TH-D75A has a substantial amount of heft, weighing almost 13 ounces. You can tell the radio is designed for rugged use, right down to the rubber port caps and its Ingress Protection (IP) weatherproof and toughness rating to IP 54/55 standard. You'll find a Global Positioning System (GPS) antenna at the top of the case, along with concentric knobs for audio volume and frequency/menu selection.

The display is bright and colorful. I had no difficulty reading it even in bright daylight. Below the display you have a multi-function keypad and a multi-position selector surrounded by four pushbuttons.

While the TH-D75A sports the usual "rubber duck" antenna, it also has an internal ferrite bar antenna for use on long-wave, medium-wave, and lower HF frequencies (below 10 MHz). In the menu system you can switch out the bar antenna and use an external antenna instead (more about this later).

Such a feature-packed transceiver is unavoidably complicated. The Kenwood engineers went to great lengths to make the various functions as easy to use as possible, and this attention to detail is particularly

Bottom Line

The Kenwood TH-D75A is perhaps the most feature-rich handheld tri-band transceiver available today. It does so much that it's almost a complete ham shack in the palm of your hand.

evident in the menu system. Even so, I needed to spend time carefully reading the manual. Yes, I was able to power up the rig and make an FM contact straightaway, but to do more than scratch the surface the user manual is invaluable. There's also an "Operating Tips" publication that was released at Hamvention 2024. It's available online at **https://kenwood.com/i/products/info/amateur/pdf/TH-D75AE_IDM.pdf**.

Listening Around

At first, I spent close to an hour just exploring the extensive receive capabilities of the TH-D75A. The ferrite bar antenna could pull in only the strongest signals, such as several AM broadcast stations in my area. It is fair to say that this antenna is for casual use; you won't be doing much DXing with it. Listening to amateurs and shortwave broadcasters between 160 and 40 meters produced similar results.

However, when I used an SMA adapter to attach my outdoor HF dipole antenna to the TH-D75A, it was a different experience. The receiver's performance seemed to compare favorably with that of a modern HF transceiver or shortwave receiver.

It was remarkable to listen to HF CW conversations on a handheld rig. The TH-D75A even offers a range of IF filter bandwidths. In CW mode, for example, you can narrow the filter to 300 Hz. The receive audio equalization is also selectable, as is the transmit equalization.

You have the ability to listen to separate frequency bands at the same time, stacking one atop the other in the display. VHF and UHF reception is available in both sections of the display. The TH-D75A also has a clever feature that allows you to adjust the audio balance between them via a graphical interface.

I found FM broadcast reception to be quite good, even with just the flexible antenna. With the radio connected to my outside antenna, I needed to switch in the attenuator to prevent overloading.

Aeronautical reception was top-notch. The AM signals were full-bodied and clear. With the flexible antenna you tend to pick up only the closest aircraft, but with the outdoor antenna the range was impressive.

On the Air

My first stop was good old analog FM. The TH-D75A turned in superb performance, with several hams remarking on my audio quality. This was before I began meddling with the radio's parametric equalizer to add a bit of crispness to the transmit audio.

Figure 1 — Connecting to a nearby D-STAR repeater. Thanks to the TH-D75A's GPS and D-STAR repeater list, finding available repeaters takes only seconds.

It had been many years since I had operated on 1.25 meters, so it was a joy to return to the band at long last with the TH-D75A. The transceiver has a built-in repeater list, but it displays only D-STAR machines. Nonetheless, I tracked down several 222 MHz FM repeaters in my area using the *ARRL Repeater Directory*.

D-STAR Digital Mode

The next destination was D-STAR, and the TH-D75A repeater list was put to effective use. Because the radio was always aware of my location (thanks to its GPS receiver), the list helpfully indicated all the nearest repeaters. In Figure 1 you can see the TH-D75A connected to one of my nearby D-STAR repeaters. Even with just the flexible antenna inside my house, I was able to access each one and enjoyed not only local, but also international conversations via the D-STAR reflector network. You can update the repeater list from the Kenwood website.

If you aren't within range of a D-STAR repeater, the TH-D75A offers a "terminal" mode as a new feature that allows you to access the reflector network via an internet-connected computer. The only catch is that you will need to have third-party software running on the computer (or mobile device). The TH-D75A user guide doesn't mention specific applications, and at the time this review was written, Kenwood had not introduced its own.

If you own an Android phone or tablet, you may want to investigate *BlueDV Connect* by David Grootendorst, PA7LIM. This free application, which is available in the Google Play Store, utilizes the TH-D75A's Bluetooth wireless data function to connect the transceiver in

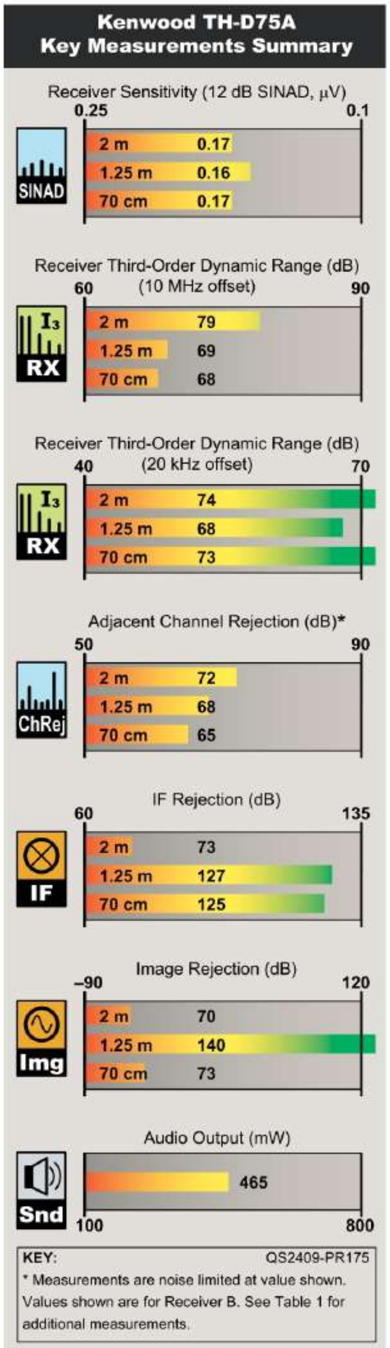

Table 1
Kenwood TH-D75A, Serial number C3C10945 Firmware Version 1.02 (FCC ID# K44521000)

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Band A receive, 136 – 174, 216 – 260, 410 – 470 MHz; Band B receive, 0.1 – 76, 76 – 108 (WFM), 108 – 524 MHz; transmit, 144 – 148, 222 – 225, 430 – 450 MHz.	Receive, Band A, 136 – 173.995, 216 – 259.995, 410 – 469.995 MHz (FM, DR); Band B, 0.1 – 75.999.98 MHz (AM, CW, SSB), 76 – 107.9 MHz (WFM), 108 – 135.995 MHz (AM, CW, SSB), 136 – 173.995 MHz (AM, FM, CW, SSB, DR), 174 – 215.995 MHz (AM, FM, CW, SSB), 216 – 469.995 MHz (AM, FM, CW, SSB, DR); transmit, 144 – 147.995, 222 – 224.995, 430 – 449.995 MHz.
Modes of operation: Receive: CW, AM, SSB, FM, DR, data. Transmit: FM, DR, data.	As specified.
Power requirements: Transmit, DC input, 1.4 A (H), 0.9 A (M), 0.6 A (L), 0.4 A (EL) at 13.8 V dc, battery, 2.0 A (H), 1.3 A (M), 0.8 A (L), 0.5 A (EL) at 7.4 V dc; single receive, 260 mA (rated power), 135 mA standby, 48 mA standby with power save on; dual receive, 310 mA (rated power), 185 mA standby, 50 mA with power save on; GPS logger on, 115 mA.	Transmit (H/M/L/EL), DC input, 1.170/0.815/0.525/0.359 A (146 MHz), 1.210/0.830/0.525/0.345 A (223 MHz), 1.150/0.720/0.468/0.275 A (440 MHz) at 13.8 V dc; battery, 1.475/1.360/0.860/0.580 A (146 MHz), 1.550/1.350/0.810/0.429 A (223 MHz), 1.460, 1.230/0.680/0.430 A (440 MHz) at 8.3 V dc (full charge); dual receive, battery, 530[1] mA (no signal max volume & lights), 207[1] mA (standby, max lights), 108 mA (standby, lights off), 42 mA (standby, battery save on), 1 mA (off) at 8.3 V dc.
Receiver	**Receiver Dynamic Testing**
Sensitivity, SSB 10 dB S/N: 0.4 µV (1.8 – 54 MHz), 0.79 µV (54 – 76 MHz), 0.16 µV (144 – 148, 430 – 450 MHz), 0.2 µV (222.225 MHz).	Noise floor (MDS), CW, 1 kHz bandwidth Band B: 0.137 MHz –98 dBm 2.8 µV 0.475 MHz –128 dBm 0.089 µV 1.0 MHz –132 dBm 0.056 µV 3.5 MHz –133 dBm 0.050 µV 14 MHz –134 dBm 0.045 µV 50 MHz –132 dBm 0.056 µV 70 MHz –133 dBm 0.050 µV 144 MHz –127 dBm 1.00 µV 222 MHz –133 dBm 0.050 µV 430 MHz –127 dBm 1.00 µV
Noise figure: Not specified.	14/50/144/430 MHz, 13/15/20/20 dB.
AM sensitivity: For 10 dB S/N, 4.0 µV (0.3 – 0.52 MHz), 1.59 µV (0.52 – 1.8 MHz), 0.63 µV (1.8 – 54 MHz), 1.12 µV (54 – 76 MHz), 0.5 µV (118 – 174 MHz), 0.63 µV (200 – 250 MHz), 1.12 µV (382 – 412 MHz).	10 dB (S+N)/N 1 kHz, 30% modulation, 3 kHz (measured) BW, Band B: 1.0 MHz 1.60 µV 3.8 MHz 0.75 µV 29 MHz 0.73 µV 50.4 MHz 0.86 µV 70.4 MHz 0.71 µV 120 MHz 0.68 µV 144.4 MHz 0.42 µV 222.4 MHz 0.45 µV 432.4 MHz 0.47 µV

terminal mode to the D-STAR network. Also, in the "Operating Tips," Don Arnold, W6GPS, provides instructions on how to use the D-STAR reflector terminal mode with *BlueDV Connect* and *BlueDV* for Windows.

APRS

The TH-D75A's APRS capability is versatile to say the least. Once you set it up in the menu system, you can beacon your position, send text messages, and, of course, receive position and text packets from others. I have quite a bit of APRS activity in my area, so the radio was receiving and displaying data almost nonstop (see Figure 2).

Unlike some APRS-capable transceivers, the TH-D75A includes a KISS (Keep It Simple, Stupid) packet radio terminal node controller (TNC). With the USB cable attached to my PC, my APRS software accessed the TNC for total control, displaying decoded information via its map. And sending APRS text messages from my PC was far easier than doing it through the TH-D75A's keypad.

This is an appropriate time to mention that while you can access the TNC using a wireless Bluetooth connection, the TH-D75A uses so-called "classic" Bluetooth. Some mobile devices rely on Bluetooth Low Energy (BLE) protocol instead. BLE operates within the same frequency range as classic Bluetooth but

FM sensitivity: Band B, 12 dB SINAD, 0.32 μV (28 – 54 MHz), 0.56 μV (54 – 76 MHz), 0.36 μV (118 – 144, 148 – 175, 200 – 222, 225 – 250, 400 – 412, 415 – 430, 450 – 524 MHz); Band A, 0.18 μV (144 MHz), 0.2 μV (220 and 430 MHz).	For 12 dB SINAD Band B / Band A 29 MHz: 0.31 μV 52 MHz: 0.48 μV 70 MHz: 0.42 μV 146 MHz: 0.17 μV / 0.17 μV[2] 162 MHz: 0.16 μV / 0.17 μV 223 MHz: 0.23 μV / 0.16 μV[2] 440 MHz: 0.17 μV / 0.17 μV[2] 100 MHz: 1.30 μV (WFM)
Two-tone, third-order IMD dynamic range: Not specified.	Band B, 20 kHz offset: 74 dB (146 MHz)[3] 68 dB (223 MHz), 73 dB (440 MHz)[3]; 10 MHz offset, 79 dB (146 MHz), 69 dB (222 MHz), 68 dB (440 MHz). Band A, 20 kHz offset: 76 dB (146 MHz)[3], 68 dB (222 MHz), 74 dB (440 MHz)[3]. 10 MHz offset, 77 dB (146 MHz), 71 dB (223 MHz), 71 dB (440 MHz).
Adjacent-channel rejection: Not specified.	Band B, 20 kHz offset: 72 dB[3] (146 MHz), 68 dB[3] (223 MHz), 65 dB[3] (440 MHz); Band A, 74 dB[3] (146 MHz), 69 dB[3] (223 MHz), 63 dB[3] (440 MHz).
Spurious rejection: Band B, VHF, ≥45 dB; UHF, ≥40 dB; Band A, ≥50; IF rejection, Band B, ≥55 dB, Band A, ≥60 dB.	IF rejection: Band B, 4 dB (14 MHz, CW), 5 dB (50 MHz, CW), 73 dB (146 MHz), 127 dB (222 MHz), >125 dB (440 MHz); Band A, 72 dB, (146 MHz), 131 dB (223 MHz), 135 dB (440 MHz). Image rejection: Band B, 54 dB (14 MHz), 66 dB, (50 MHz), 70 dB (146 MHz), 140 dB (223 MHz), 73 dB (440 MHz), Band A, 63 dB (146 MHz), 84 dB (223) MHz, 76 dB (440 MHz).
Squelch sensitivity: Not specified.	Squelch range, Band B, 0.15 – 1.7 μV (146 MHz), 0.24 – 1.3 μV (223 MHz), 0.13 – 1.2 μV (440 MHz), Band A, 0.15 – 1.7 μV (146 MHz), 0.13 – 1.2 μV (223 MHz), 0.13 – 1.2 μV (440 MHz).
IF/audio response: Not specified.	Range at –6 dB points: CW, 239 – 1359 Hz (1120 Hz); LSB and USB, 232 – 1666 (1434 Hz); AM, 260 – 1720 Hz (2920 Hz).
Audio output: ≥400 mW at 10% THD into 8 Ω @ 7.4 V dc.	Dual receive, 465 mW, single receive, 457 mW at 10% THD into 8 Ω at 8.3 V dc.
Transmitter	**Transmitter Dynamic Testing**
Power output: 5.0 W (high), 2.0 W (medium), 0.5 W (low), 0.05 W (extra low).	With battery pack, H/M/L/EL, 5.1/2.0/0.48/0.12 W (146 MHz), 5.0/2.0/0.6/0.16 W (223 MHz), 4.7/1.8/0.45/0.03 W (440 MHz); at 13.8 V dc input, 5.0/1.9/0.50/0.09 W (146 MHz), 4.9/2.0/0.62/0.14 W (223 MHz), 4.8/1.8/0.62/0.03 W (440 MHz).
Spurious signal and harmonic suppression: at least ≥60 dB (high/medium), ≥50 dB (low), ≥40 dB (extra low).	As specified. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 93 ms on all bands.
Receive-transmit turnaround time ("tx delay"): Not specified.	14 ms (146 MHz), 14 ms (223 MHz), 16 ms (440 MHz).
Size (height, width, depth): 4.8 × 2.2 × 1.3 inches. Antenna length: 7.4 inches. Weight: 12.13 ounces.	

[1] Single receive typically 50 mA less.
[2] FM mode, NFM mode increases sensitivity by 0.04 μV.
[3] Measurement was noise limited at the value indicated.

Figure 2 — Monitoring activity on the local APRS network.

uses a different set of protocols optimized for low-power consumption and intermittent data transmission, along with a different modulation scheme and packet structure. The result is that a device expecting a BLE connection won't "talk" to the TH-D75A.

A new addition to the TH-D75A's APRS feature list is the ability for the radio to function as a standalone digipeater. This would be extremely useful in public service applications to provide dependable APRS coverage throughout a specific area, such as a parade route.

Memories and More

It comes as no surprise that the TH-D75A offers an overwhelming number of memories, more than most of us will ever use. There are 1,000 memory channels, 1,500 repeater-list slots, and 30 slots for hotspots.

You can program the memories through the keypad, but a far more convenient alternative is Kenwood's *MCP-D75* software (see Figure 3). This free Windows application is available on the Kenwood website. By simply plugging in the USB cable, I was able to import all the contents of the TH-D75A's memory as well as various function settings. I added

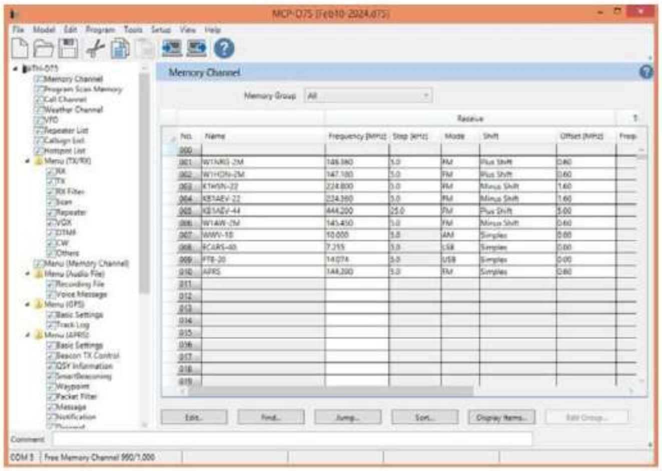

Figure 3 — Kenwood's free *MCP-D75* software for Windows makes it easy to program the TH-D75A's memories and functions.

Figure 4 — The free Kenwood *ARFC-D75* application allows remote control of the TH-D75A.

local FM repeaters, favorite HF frequencies, and several FM broadcast and aeronautical frequencies, and I tweaked a few functions while I was at it. I was able to save everything to my hard drive (always a good idea) before exporting the modified data back to the radio.

Another interesting piece of Kenwood software is the free *ARFC-D75* application (see Figure 4), also for Windows. With this software you can control the radio remotely via the USB connection, changing frequency, mode, etc. The *ARFC-D75* has a volume control, but this adjusts the audio level only at the radio.

The voice guidance function has been enhanced in the TH-D75A. It "speaks" information such as the displayed frequency, memory channels, and function settings. It will do so alphabetically or phonetically and at several different speeds. Playing with the speed function was entertaining, somewhat like copying fast CW. Voice guidance will also announce the sender's call sign when operating APRS as well as the content of any APRS messages addressed to your station. Voice guidance will even announce call signs when you're operating D-STAR.

Speaking of voices, if you have a memory card installed, the TH-D75A will record and play the audio from contacts you've made, or just received audio you've picked up at frequencies of interest. I recorded aeronautical signals, FM repeater activity, and even a bit of the ECARS net at 7.255 MHz. You can export the WAV audio files to another device, such as your computer, for playback or editing.

I would need several more *QST* pages to describe all the features of the TH-D75A, but one that I found particularly intriguing is the ability to tap the receiver's IF output. When this function is enabled, the radio provides an IF output signal at 12 kHz with a 15 kHz bandwidth. If you have compatible software running on your PC, you can display the signal as a kind of band scope, similar to what you'd see with a software-defined receiver. Unfortunately, I lacked the necessary software, and the user guide doesn't recommend applications. Still, if you can make this work, I believe it would be a very cool feature. I wouldn't be surprised to learn that some TH-D75A owners are already doing this. Again, in their "Operating Tips" manual they describe how to use the IF output signal as a band scope display using the *HDSDR* free Windows software.

Conclusion

The Kenwood TH-D75A is perhaps the most feature-rich handheld transceiver available today. Of course, all this functionality — and tri-band transmitting capability — comes at a substantial price. The value proposition hinges on whether a user is willing to thoroughly explore the radio and exploit all its benefits.

Manufacturer: JVCKENWOOD USA Corporation, Communications Sector, 1440 Corporate Dr., Irving, TX 75038, **www.kenwood.com/usa**. Price: $749.95.

DX Engineering NOISELOOP Portable Flag Antenna Kit and Portable Receive Preamplifier-Attenuator

Reviewed by Stephen Anderson, W1EMI
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I have been an ARRL RFI Engineer for a little more than 2 years now, and if there's one thing that I've learned it's that you can't find out *what* is making a noise until you know *where* the noise is coming from. The importance of ruling out your own home can't be overemphasized, but close behind that is having a go-to noise loop that you can depend on to find the offending RFI source. This loop certainly fits that bill. The availability of a companion preamp and attenuator makes this a good all-around tool for conducting a noise investigation.

This review consists of two DX Engineering products that work together: the DX Engineering NOISELOOP Portable Receive Flag Antenna Kit (DXE-NOISELOOP) and the DX Engineering Portable Receive Preamplifier-Attenuator (DXE-NL-PRE-ATT-1).

Description

The Flag Antenna (DXE-NOISELOOP)

This antenna comes from a design by Don Kirk, WD8DSB (see the March 2021 issue of *QST* for Don's article on the antenna design). The DX Engineering version of the design contains durable materials (sold as a kit), with fiberglass support rods for the loop, a sturdy fiberglass mast, and stainless-steel hardware. The kit also includes circuit boards for the transformer (which uses a double-aperture type of toroid core) and load resistor, antenna wire, and coaxial cable.

Bottom Line

The DX Engineering noise loop flag antenna uses a field-proven design and is an excellent choice for someone looking for a durable direction-finding loop. The preamp is both lightweight and versatile and makes a great addition to the loop.

DX Engineering bills the antenna as broadband, unidirectional, and portable. They also state that the antenna was designed to be as large as possible (to maximize gain), but at the same time enable the user to fit the antenna into a vehicle.

The antenna dimensions are 48 inches long and 24 inches high, and the mast is 48 inches in height. The receive frequency is between 1.8 and 30 MHz, and the radiation pattern is as stated by WD8DSB (see Figure 5). This is a receive loop only (don't transmit into the loop). The instruction manual states that the SWR will typically be between 1:1 and 2:1 when measured over the HF band (more on this later).

If you use a transceiver with the loop and it has a transmit prohibit option, it's best to use that to ensure you don't mistakenly damage the loop; it's the same for

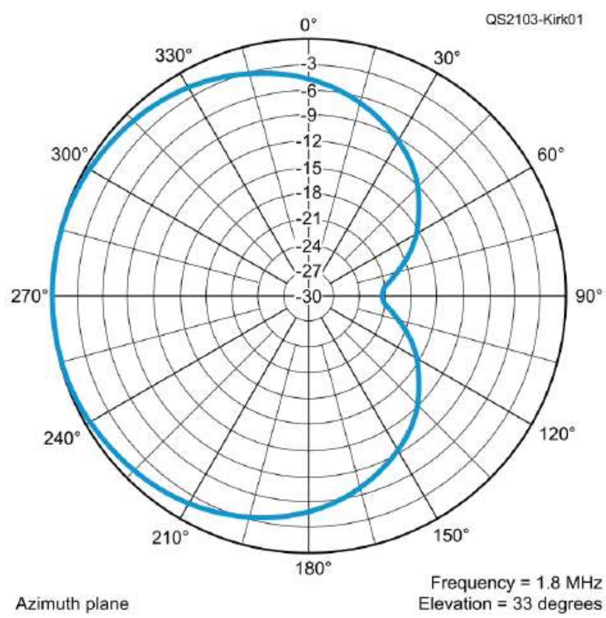

Figure 5 — Cardioid pattern as modeled in *4nec2* (as shown in the March 2021 issue of *QST*).

the preamplifier-attenuator unit.

Preamplifier-Attenuator (DXE-NL-PRE-ATT-1)

This preamp-attenuator is an excellent companion to the flag antenna. It's a relatively small unit, making it possible to attach to either the flag antenna mast or a receiver. I've seen it used in both configurations. If you have a lightweight receiver, it may be best to add it there instead of adding additional weight to the flag antenna. The device includes an AM broadcast band rejection filter, a preamp, and both 10 and 20 dB attenuators that can be switched in separately, giving the ability to attenuate by three levels: 10, 20, or 30 dB. For the manufacturer's specifications of this unit, see Table 2.

Figure 6 — DXE NOISELOOP Portable Receive Flag Antenna Kit contents of box, as shipped.

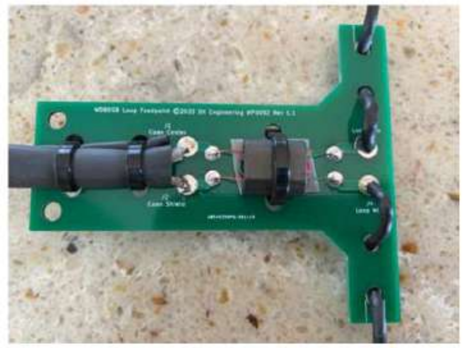

Figure 7 — DXE flag antenna noise loop feed-point board.

Figure 8 — DXE flag antenna noise loop load resistor board.

Figure 9 — DXE flag antenna noise loop as built.

Table 2 — DX Engineering NOISELOOP Portable Flag Antenna Kit

Receive frequency range	100 kHz – 30 MHz
Preamplifier gain	30 dB, nominal
Noise figure	4.5 dB
Receive feed-line connector type	BNC
Optimal voltage range	9 V dc, internal battery
Device dimensions (width, height, depth)	3.25 × 7.0 × 1.0 inches

Assembling the Noise Loop Flag Antenna

Remember, this is a kit, and Figure 6 shows the contents of the box with the noise loop. DX Engineering stated that simple hand tools and a soldering iron are all that are required for assembly, and that the antenna would take between 1 and 2 hours to build. I found this to be accurate, as it took me one evening (with typical interruptions) and no tools beyond the simple hand tools and soldering supplies we all keep in our workshops. Detailed instructions were provided with the antenna, along with a theory of operation, a parts list, quality photos for every step in the build process, and instructions for use of the antenna.

With respect to construction, there is really only one place I ran into trouble, and that was with the construction of the transformer, specifically the Teflon tube. The instructions require that the builder cut an already small Teflon tube in half (ensure your cut is exact because there really is no extra tubing). I wound up with an uneven cut that was not enough to affect the operation of the transformer, but it could easily have caused me to have to find another piece of tubing. It would have been nice to have an extra piece of tubing or pre-cut tubing to work with.

Once the antenna is constructed, if you did get the preamplifier unit, it's best to figure out a way to carry everything before you get out into the field with the antenna, the preamp, and your receiver. I've seen this dealt with in two different ways — one is to affix the preamp to the antenna, and the other is to affix it to the receiver. Either way will work. It's likely going to depend on what you have for a receiver and whether it's convenient to put it in one place or the other. I chose to use 3M Dual Lock fasteners and affix it to the antenna.

Figures 7, 8, and 9 show the constructed circuit boards and the as-built noise loop in my shack. Figure 10 shows the preamplifier, which requires no assembly.

Figure 10 — DXE Portable Receive Preamplifier-Attenuator.

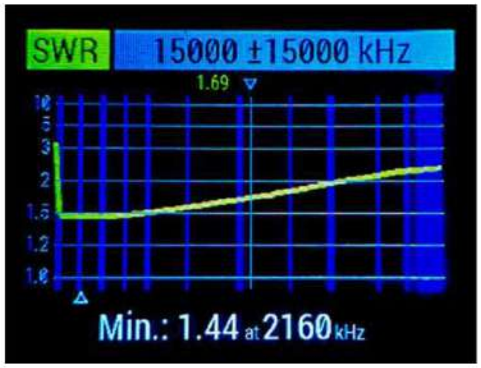

Figure 11 — The DXE flag antenna noise loop SWR results.

Figure 12 — Test lighting device.

Figure 13 — The DXE flag antenna noise loop in the Toyota Prius.

And the lead photo shows the loop with the preamplifier attached to the mast.

Using the Antenna and Preamp

Before heading out with the noise loop, as recommended in the instructions, it's good to use an antenna analyzer such as a RigExpert to run the test recommended in the instructions, looking at the SWR over the HF range from 0 to 30 MHz. If all goes well with the build, you should see an SWR between roughly 1:1 and 2:1. The results are shown in Figure 11.

Over the course of the last few months, I have used this loop on several occasions in the field, mostly looking for power-line noise. The loop is a good starting point, working from a ham's station, to find an initial direction for the noise. Of course, once you have a general direction, your search quickly becomes more of a VHF/UHF hunt for the actual power-line noise sources.

Similar to other noise loop testing I have done, I also brought home a noisy device and put the loop through its paces around my home. In this case, I used a set of strip lights that a ham recently provided to us for testing in our EMC lab. The lights failed to meet FCC Part 15 limits, and because the manufacturer had replaced them, the ham was kind enough to send them to us for the good of science. The lights are shown in Figure 12. Leaving the lights turned on in my garage, at a setting I knew to have the worst-case emissions, provided an excellent test bed for the loop.

The loop worked well under these conditions. I was able to go to the farthest edges of my 2-acre property and still pick up the noise from the lights using the preamp. Even without the preamp, with a decent receiver (I used my Yaesu FT-818), the noise could be heard from a good distance away. As specified, I found there was a good null produced when the back of the antenna was pointed toward the noise source. The attenuator also worked well, allowing me to keep checking for the null as I got closer to the noise source without overloading the receiver.

Conclusion

Don Kirk's, WD8DSB, design is a proven one, as evidenced by the number of hams I've seen come up with creative ways to mimic the design, using everything from the original wood design to those stakes folks use for the snowplow driver.

Based on both my controlled testing of the loop and my use of it in the field, I think this is an excellent noise loop. The loop itself is made of durable materials, the assembly instructions are clear and concise, and with some minor tweaks (mainly attachment of the preamp), it's an easy way to get yourself set up to locate interference sources around your station. Lastly, the loop is as portable as it can be and fits nicely into my Toyota Prius — both with and without the mast (see Figure 13).

Manufacturer: DX Engineering, 1200 Southeast Ave., Tallmadge, OH 44278, **www.dxengineering.com**. Price: Portable Receive Flag Antenna Kit (DXE-NOISELOOP), $135.99; Portable Receive Preamplifier-Attenuator (DXE-NL-PRE-ATT-1), $175.99.

Elk Antennas 2M/440L5 Dual-Band Portable Log-Periodic Antenna

Reviewed by John Leonardelli, VE3IPS
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With renewed interest in satellite communications and the need for a portable antenna for VHF/UHF operations, I found the Elk Antennas 2M/440L5 particularly compelling. Elk Antennas, owned by James (Jim) Siemons, W6LK, has been crafting antennas for more than 30 years. Although I already have several Yagi antennas, this one stands out due to its log-periodic design, which eliminates the need for a duplexer for dual-band use.

The log-periodic design offers wide frequency coverage from 144 to 470 MHz, accommodating both 2 meters and 70 centimeters in a compact, two-foot-long package. This feature simplifies most operating environments by removing the need for a duplexer, allowing the use of a single coaxial cable, and enabling operation at high power levels. Whether you are bouncing signals through satellites or working simplex two or three counties away, this antenna is a reliable choice. It is also an excellent option for ham radio operators using General Mobile Radio Service (GMRS) and Multi-Use Radio Service (MURS) radios.

My portable radios are the Icom IC-705 and Yaesu FT-818 due to their multi-band and multi-mode capability. These pair very well with the Elk 2M/440L5, and I can also add a 60 or 150 W amplifier for single-band use.

I can now replace several Yagi antennas with just one. For scanner and air show enthusiasts, this antenna is ideal for listening to domestic air, public safety, and military air bands. It is also perfect for Summits on the Air (SOTA) or Parks on the Air (POTA) activations, and it is a must-have for your ARES emergency communications go-kit. While waiting for this antenna to arrive, I realized how useful it would be as a multi-purpose antenna, even though my initial interest was in satellites.

My operating style demands antennas that are easy to deploy, lightweight, high-performance, and easy to transport by car or in a backpack.

Bottom Line

Whether you are operating portable or permanent, you will find that the dual-band log-periodic Elk antenna is an incredibly convenient and powerful tool for your communication operations.

Description

The Elk antenna comes packaged in a plastic bag with an instruction sheet. You can purchase the antenna with either a standard UHF or N-type connector, and even opt for a black powder-coated finish. With five anodized aluminum elements per boom, this antenna offers excellent gain and rust protection. The design includes two booms, with the elements attached sequentially to one or the other. Figure 14 shows the unassembled components, and the lead photo shows the assembled antenna.

The antenna elements are made from actual arrow rods and are fitted with hardware that allows for easy, tool-free, finger-tight installations. The manufacturer mentioned that the element material is custom-made for them by Easton Technical Products in Salt Lake City, Utah. The rods are color-coded for easy setup, and the rubber-tipped elements highlight the high-

Figure 14 — Unassembled Elk antenna.

quality construction and components used. Everything is precision-cut with no wobbly parts. Due to its design, the antenna can be sensitive to a metal mast adjacent to it when deployed in a vertical position.

Unlike a Yagi, a log-periodic antenna is fed at the front and has three boom elements. Two of these are aluminum tubes that are part of the feed system, providing energy in the correct phase to the radiating elements. In a log-periodic antenna, any of the elements could effectively be radiators depending on the frequency of operation. The screw-in elements range from 16.1 inches (41 centimeters) to 18.5 inches (47 centimeters) long, operating as approximate quarter-wave elements on 2 meters and as $^5/_8$ wave elements on 70 centimeters.

The third boom or mounting assembly is made from generic PVC plumbing tubing, which provides insulated mechanical support for the antenna. This design allows users to create various low-cost custom mounting methods. If fabricated from metal, the mounting component would have been expensive, but the PVC handle included for handheld operation proves to be extremely useful. This setup makes the antenna ideal for satellite communications, direction finding, emergency communications, and portable operation.

International Space Station (ISS) and Satellite Communications

The Elk antenna is a straightforward solution for listening to the ISS or for satellite communications, as a duplexer is not required. The design allows for feeding the 2-meter downlink and 70-centimeter uplink simultaneously through a single coaxial cable. This is ideal for connecting this antenna to my Icom IC-705 or Yaesu FT-818 or even a handheld radio. I mounted the boom on an adapter I made using some junk box PVC tubing, attached to a three-axis tripod head on a camera tripod. This setup allowed me to adjust both the azimuth and elevation. I used a standard elevation of about 25 degrees as a start.

I tracked the satellite passes using the ISS app and patiently waited for the bird to appear on the horizon. I was able to rotate the antenna as it made its pass across the sky listening to the operators share grids as fast as they could.

I also tried manually adjusting the direction of the antenna using the handle; its length and weight are manageable for the short 10- to 15-minute passes. Juggling the antenna, radio, and notepad with two hands is an acrobatic feat by itself. The Elk being lightweight will be ideal for automated rotation with an application like *PstRotator* and 3D-printed rotating solutions.

Comparing the Elk antenna to my other satellite Yagi antenna, I found the Elk is easier to use due to its shorter length and lighter weight, with reception quality on par with the Yagi. The Yagi offered more elements on 450 MHz with a few more dB gain. But its boom was more than 3 feet. The PVC mounting system is simpler to use than the typical Yagi antenna mount, and it allows for easy rotation of the antenna for horizontal or vertical polarization on the fly.

Initially, I had concerns about the generic PVC mounting system's usability, but after spending time with the antenna, I realized its great benefit in allowing easy customization. There are already 3D-printed parts available for this antenna to facilitate various mounting options. The instruction sheet also provides mounting suggestions for their antennas.

On the Air

The antenna is excellent for operating portable from various grid squares during the ARRL Spring Sprints Contest. Its wide frequency coverage allows me to use a single antenna and a single coax to cover both bands, and it can support power levels of 100 W or more. The SWR across the CW/SSB and FM portions of the bands was not an issue. The antenna fits easily in the back seat of the car, and I can deploy it quickly while roving to different grid squares.

As shown in Figure 15, I swapped out the PVC center mast coupler for one that provides ½ NPT threading,

Figure 15 — The Elk antenna on a mast out in the field.

which screws directly into my Buddipole masts for the portable deployment on 2-meter SSB.

I also tried a 65 W Daiwa 2-meter amplifier with this antenna, and this gave me a "big" signal combined with the antenna gain, with performance similar to a base station using a vertical.

I conducted a shakedown evaluation from Signal Hill with my Icom IC-705 at an elevation of 300 feet, overlooking the city. Using the Elk antenna, I was able to reach several previously scratchy repeaters more than 100 miles away with clear signals. This included repeaters in the Buffalo area, more than 80 miles away, which I couldn't access with just a mobile vertical antenna. I used a 20-inch length of PVC tubing for the mast, as recommended for vertical polarization.

When I switched to SSB, the antenna improved my signal by 2 – 3 S-units, consistent with its number of elements. I also confirmed that the front-to-back ratio aligns with the manufacturer's specifications (see Table 3).

Table 3 — Elk Antennas 2M/440L5
Dual-Band Portable Log-Periodic Antenna

Manufacturer's Specifications (not tested in the ARRL Lab)	
Operating frequencies	144 – 148 MHz and 427 – 450 MHz
SWR	1:1 SWR on both bands (144 – 148 MHz and 427 – 450 MHz)
Power rating	200 W on 2 meters, 100 W on 70 centimeters
Front-to-back ratio	20+ dB
2-meter gain	6.6 dBd (8.7 dBi)
70-centimeter gain	7 dBd (9 dBi)+
Weight	1.63 pounds (1.23 pounds without the handle)
Unassembled dimensions	24.5 × 3 × 3 inches
Connector type	Two options: UHF or N
Boom coating	Uncoated aluminum booms or black powder-coated booms

Rotating the boom to vertical for FM and horizontal for CW/SSB modes was easy, requiring just a twist of the PVC mounting assembly. I asked some friends to call me on 146.520 and 144.200 MHz for range checks, and they were impressed with the signal levels both on point and 90 degrees off point. It appears that this antenna has broader lobes than my five-element 2-meter Yagi, despite being less than 3 feet long. While weak-signal operators may prefer antennas with 17 elements and tight lobe patterns, the Elk offers improved signals and enhanced coverage in a portable package.

Foxhunts

I would not recommend using this antenna for foxhunts, as it may bend or break if caught in a tree branch or bounced against the ground. For such activities, a tape-measure Yagi would be more suitable. However, the Elk is ideal for fixed mobile use — perfect for taking a signal bearing, quickly jumping out of your vehicle for a scan, and then placing it back in the trunk to take another bearing elsewhere. Elk offers replacement parts at reasonable prices, allowing repairs to be made by the operators, increasing the lifespan of the antenna.

SOTA and POTA

This is a must for SOTA operations, and its size and weight make it backpack-friendly as many are enjoying operations above 2 meters from various summits. There are also many state parks for POTA with high points that can also be activated on 2 meters and 70 centimeters.

ARES/Emergency Communications/GMRS/MURS

I drove out to a fire station located in a valley, which had issues accessing the club repeater used for ARES simulated emergency test events. Using an 18-foot Buddipole mast and tripod, I was able to deploy the Elk antenna in less than 5 minutes. Pointing it toward the repeater site, the signal improved from unreadable to readable but still a bit noisy. The antenna provided communication capability that wouldn't have been possible with a mobile antenna or J-pole. Next time, I plan to position the antenna higher to see if the signal quality can be further improved.

The FCC in the US allows the use of GMRS repeaters, and I frequently hear hams using them during my travels across the border. GMRS is becoming more common with neighborhood watch groups and emergency communication teams. ARES groups are also adding MURS radios to their kits for interoperability with other emergency communication teams. This antenna covers GMRS and MURS frequencies along with other ham bands, providing a single, versatile solution. It can be quickly deployed on a PVC mast, significantly improving signal quality and communication range.

Scanning Public Safety, Air Shows, and Fleet Week

The Blue Angels and Snowbirds Airshow teams will use frequencies between 250 and 390 MHz. I have not seen any antenna to provide this coverage except a modified TV antenna (that is typically also a log-periodic design). The Elk antenna is ideal for this. The ability to have directionality and gain will allow reception of the airplanes a lot farther out. Of course, with marine band coverage this antenna will also improve reception for marine and naval vessels during Fleet Week.

I also found it beneficial in the standard air band pointing the antenna toward medical helicopters and, of

Figure 16 — The Elk antenna SWR sweeps for 144.200, 146.520, 223.500, 437.200, and 446.000 MHz.

Figure 17 — The Elk antenna SWR sweeps for 123.450, 156.800, 255.500, 462.000, and 446.000 MHz.

course, airport towers to improve reception. It was also helpful in pulling in signals from the Public Safety P25 repeater in the next county during a five-alarm fire that I heard via my Whistler scanner.

SWR Graphs

SWR is low across the ham bands for which it is designed, but it is not usable for transmit on 220 MHz or even the marine band at 156.8 MHz. However, it can be used on the UHF band beyond 70 centimeters covering GMRS and MURS frequencies. Figures 16 and 17 show the SWR sweeps on different frequencies. My testing showed excellent results on receive when connected to my scanning receiver.

Hacks or Modifications

My idea is to transport the antenna in a 3 × 24-inch PVC tube with endcaps. Elk offers a cloth carry case as an option, but a tube also offers good protection. The small size allows it to be compact and sit in the trunk of a car and be available for use anytime.

I used a PVC **T**-connector with ½-inch NPT threads so I can use it on a third-party mast. The Elk generic PVC mount makes this very easy to modify.

A 20-inch mast extender for use when the antenna is deployed vertically is just as easy to make.

With its PVC boom, it's possible to come up with various low-cost mounting solutions, especially with the availability of 3D printer files.

The last addition I made was to add 50 feet of RG316 coaxial cable and required SMA adapters to connect to my software-defined receiver and scanning receiver. The wide frequency coverage lends itself very well to listening or locating public safety repeaters as well as searching for activity on the scanner bands. I can now enjoy this activity from portable locations.

Conclusion

I had a couple of questions, and they were answered quickly by the owner, Jim. He also offers various accessories and a complete set of replacement parts. I suggested that they offer a hard-shell carrying case and a BNC connector option. The Elk antenna that started off as an antenna for satellite communications has now become a must-have antenna due to its broad frequency coverage that can be used for many other radio activities. Comparing the prices to several single-band fixed Yagis, the Elk offers a lot more capability and flexibility for the portable operator. You may find yourself buying a second one for the go-kit or for fixed use at home with a small TV rotator.

I also looked into using this antenna for travel purposes. I can fit the antenna into a checked 26-inch suitcase and its low weight doesn't cause any bag weight anxiety. I can see several SOTA locations in the San Francisco and Denver areas that can be easily activated on 2-meter simplex. The Elk would be a perfect antenna for this type of radio activity.

Manufacturer: Elk Antennas, 47 Big View Rd., Clark, WY 82435-8174, **www.elkantennas.com**. Price: between $137.95 and $170.95, depending on the selected options.

Dave Casler, KEØOG, askdave@arrl.org

Ask Dave

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

Inside SWR and Static Buildup

SWR Can Lead Down a Rabbit Hole

Q Elias Deverent asks: I always thought that a standing wave ratio (SWR) greater than 1:1 indicated some reflection in the transmission line. I built a simple circuit in *SimSmith* that contains only a constant RF voltage source with an output impedance of 50 Ω. I attached a 150 Ω resistor across the output and was surprised to see an SWR of 3:1 with a reflection coefficient of 0.5. What is going on?

A SWR measures how well the transmission line and antenna combination absorb power from a transmitter. A law in electrical engineering says that the most efficient power transfer takes place when a device's output impedance matches the input impedance of the load. In your case, the output impedance is 50 Ω, and the load impedance is 150 Ω. Thus, the power transfer law's prerequisites are not met, and the power transfer will not be 100%. In RF circuits, we see this partial power transfer as a reflection of some of the power back to the transmitter. If you connect an oscilloscope across the load input, you will see the combination of the forward RF power and the reflected power as a standing (not moving)wave. Of course, some power, 50% in this case, is being transferred, so the combination waveform will show progress.

The formula for SWR in terms of the reflection coefficient is SWR = $(1 + |\Gamma|)/(1 - |\Gamma|)$. $|\Gamma|$ is the magnitude of the reflection coefficient (the reflection coefficient is a complex number, but here we take the magnitude and ignore the phase angle). If the reflection coefficient is 0.5, this comes out to 1.5 / 0.5, or an SWR of 3:1. Reactance is not involved. The non-unity SWR arises from a violation of the maximum power transfer law.

Note that I have not yet defined the load as an antenna. It could be three 50 Ω dummy loads in a series, but we like to deal with antennas. A large majority of the transmitters we use have a 50 Ω output impedance. Much of the transmission line we use is 50 Ω. So, for maximum power transfer, we want a load of 50 Ω.

Let's look at the antenna. The load resistance will have a reactive component, as shown in Figure 1. In its simplest form, an antenna can be modeled as an ohmic resistance that dissipates power as heat and a radiation resistance that represents the coupling of the RF power to the electromagnetic field. The radiation resistance will have zero reactance at only one frequency. Given this is true for all antennas, what can we do?

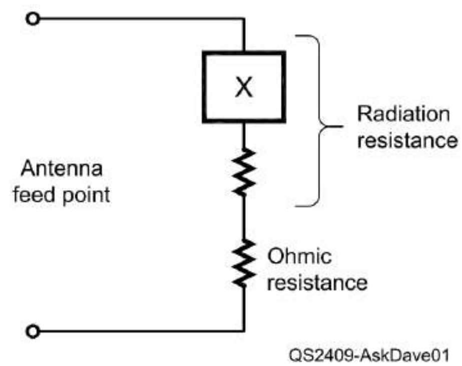


Figure 1 — A simple antenna model. Any antenna can be considered ohmic resistance in series with the radiation resistance. The ohmic resistance is the resistance in the antenna's components that creates heat. This heat is the antenna loss and can be reduced by making the wire or tubing more conductive. The radiation resistance represents the portion of energy that is radiated. This radiation resistance is composed of a resistive part and a reactive part. If the reactive part of the radiation resistance is zero, the antenna is resonant. If the reactance is zero, and the sum of the radiation resistance equals 50 Ω, we will have 1:1 SWR. This happens only on a single frequency.

We can add a matching device, usually an antenna tuner, between the transmitter and the combination of the transmission line and antenna. The most common configuration of an antenna tuner is two variable capacitors in a series with the load and a variable inductor connected between the two capacitors and the cable shield, usually grounded, as shown in Figure 2. The input impedance to the properly adjusted tuner is 50 Ω with no reactive component. The output impedance is equal to the complex conjugate of the impedance of the combined feed-line and the antenna impedances. This means that if the load impedance is inductive, an equal and opposite capacitive impedance

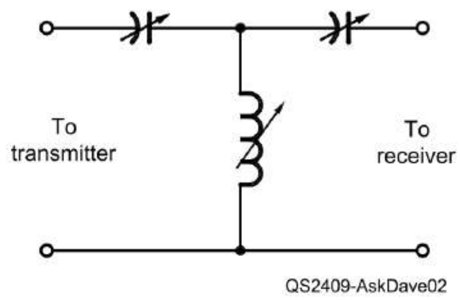


Figure 2 — A tee-tuner schematic. Most manual tuners use this circuit. When properly adjusted, the transmitter will see 50 Ω. The antenna will see the complex conjugate of its impedance. The tuner captures the reflected power from the antenna and sends it back to the antenna in sync with the RF signal.

can collect the reflected power and send it back to the antenna during the next RF voltage cycle. These two reactances form a tuned circuit. The circuit has ohmic resistance in the antenna and transmission line, which will dissipate power as heat, reducing the power radiated as RF. We can avoid these losses by carefully tuning our antennas so that we aren't relying on tuners so much.

Not every system works at 50 Ω. We encounter antennas that require a matching device to work with the transmission line, and many transmission lines are not 50 Ω. With some antennas, the tuner goes right at the input to the antenna, but the same principles apply.

Static Buildup on Wire Antennas

Q Chris Richmond, KK7DRM, asks: I attached my ARRL end-fed half-wave kit to the roof post of my deck and strung a 20-foot mast into the yard. At the unun box, a copper wire attaches the counterpoise terminal down to ground. I also have a lightning arrestor on a ground rod set up where the cable enters my house. Because of how the unun is wound, will that provide a proper path to ground for the static, so that it won't come into the radio?

A Yes. Think of dc, which includes static buildup, as different from RF. The RF sees proper impedances in the unun, but the unun is a dc short between all the inputs and outputs. Thus, the static buildup will easily find a path to ground.

The answer is not quite so simple if you're using a standard dipole. In a common feeding method, the coax inner cable is connected to half of the dipole, and the other half is connected to the coax shield. The coax shield is grounded at the lightning arrestor where it enters the house, which provides an easy path for static buildup. However, the other half of the antenna does not have an easy path to ground. Fortunately, when the voltage builds to a certain point, the lightning suppressor will arc over and send the static into the ground.

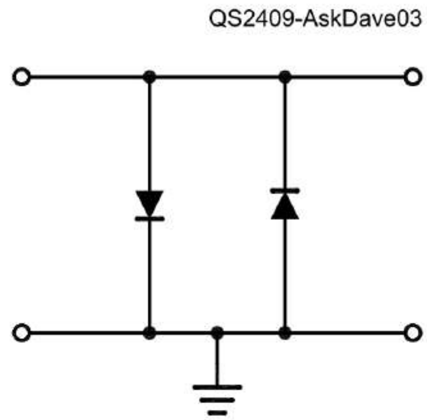


Figure 3 — A simple limiter circuit. Each silicon diode has a threshold voltage of about 0.7 V. If a signal is less than 0.7 V peak to peak, it will not be limited. This is true on nearly all received RF signals. However, if static buildup exceeds 0.7 V, one or both diodes conducts and bleeds off, protecting the receiver's front end.

Many radios have input filtering circuits that involve inductors across the input. This can pass a small amount of static buildup to ground. Too much static buildup can cause issues with these delicate circuits. A common fix for over-voltages of this sort is a set of back-to-back diodes, as shown in Figure 3, across the receiver input inside the transceiver. At first, it looks like a contradiction, but recall that a common diode such as the 1N914 will not conduct until the voltage across it exceeds 0.7 V. So, if the received signal is less than ± 0.7 V, which is true nearly all the time, it passes through to the receiver's front end. However, if the static voltage is greater than this, the diodes will conduct and limit the voltage. Such a circuit is a form of a limiter.

The best protection is to provide a dc path to ground. Many baluns and ununs provide a dc short across the terminals. When this is not the case, such as with common dipoles, a lightning arrestor can provide a path to ground.

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

Sharing Audio the Easy Way; Gutters as Stealth Antennas; A Wood Base for Prototyping

Dual Headphones and Speaker

If you need to share the audio output of a receiver or transceiver between two headphones, such as at the Scout gathering shown in Figure 1, Figure 2 shows a device that makes it easy.

I devised this simple circuit and built it into an existing external plastic speaker housing to enable two individuals — an operator and a guest — to simultaneously listen to a transceiver's audio output. Toggling the switch adds a speaker to the output stream to allow more people to listen. — *73, Allen Wolff, KC7O,* **kc7o@arrl.net**

Figure 1 — Hal Frank, KF6RRR (left), and William Green, a Scout from Pasadena, California, using the dual-headphone/speaker at a campout 4,800 feet above Lake Hughes, California. The dual-headphone/speaker box appears in the lower-left corner. [Michael Newman, KM6KAQ, photo]

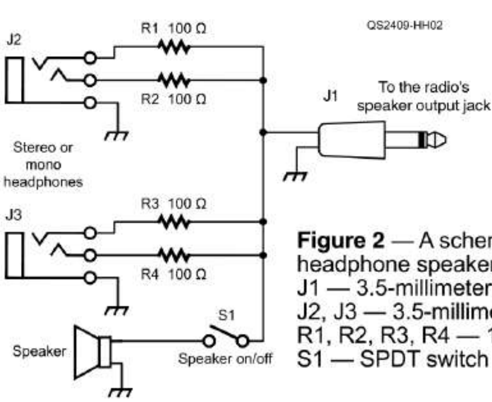


Figure 2 — A schematic of the dual-headphone speaker.
J1 — 3.5-millimeter plug
J2, J3 — 3.5-millimeter stereo jacks
R1, R2, R3, R4 — 100 Ω, ½ W resistors
S1 — SPDT switch

Another Approach to a Gutter Antenna

We recently moved into a home where the HOA rules severely limit my HF radio activities — especially when it comes to antennas. I tried an end-fed half-wave wire, but it was impossible to get it up high enough to be effective. It was also too noticeable, and it would have been in the maintenance folks' way. The attic turned out to be unusable for HF, too.

My wife suggested that I investigate the gutter system as a potential antenna. As far as I could tell, neither the gutters nor the connecting downspouts were grounded.

I ran the hot wire from my 49:1 balun (the type frequently used with end-fed antennas) via my patio door to the downspout. I also installed a ground rod outside the patio door for the ground side of the balun

Figure 3 — The 49:1 balun is mounted in the blue box with the antenna lead also shown, and the ground connection and feed line are at the opposite end. The antenna and ground wires exit through the patio door and are secured via self-adhesive cable tie anchors. [Rich Barnett, N9NP, photo]

Figure 4 — The finished stealth antenna system. Look closely and you can see the antenna and ground lines exiting the patio door and the white self-adhesive clips carrying the antenna wire over to the connection at the downspout of the left side of the building. [Rich Barnett, N9NP, photo]

and routed this wire through the door opening.

I kept the balun inside the home (see Figure 3) because while the door could easily close on the thin insulated wires, a coaxial cable connected to an outdoor balun would be too thick. Besides, not all baluns are designed for permanent outdoor installations. The finished installation is shown in Figure 4.

Using a manual antenna tuner, I can achieve standing wave ratios of less than 2:1 on 160 – 10 meters. The automatic tuner in my Icom IC-7300 transceiver will achieve an acceptable match on the 10-, 15-, 20-, and 30-meter bands. I keep my RF output low for safety concerns, and yet I am still able to make contacts throughout the world. In fact, I am even able to participate in a weekly net on 80 meters.

My gutter antenna can be mildly directional. For example, it has a sharp lobe to the southwest on 17 meters. And, of course, the antenna tunes differently when the gutters are filled with rain or snow! — *73, Rich Barnett, N9NP,* **n9np@arrl.net**

A Wood Foundation for Prototyping

After adding all of the parts to a PC board, I needed to add interface components to test my prototype. These consisted of two potentiometers, a pushbutton, an earphone connector, and a toggle switch. Rather than having these components hang loose during testing, I decided to try a more durable, yet temporary approach.

I secured the PC board to a wood plank with wood screws and small standoffs. I attached each interface component to the board by forming loops of #12 AWG copper wire that fit snugly around the threaded part of the device. With the copper wire bent at a right angle, the straight part of the wire is secured to the breadboard with a wood screw and a washer that has been bent slightly to capture and hold the wire (see Figure 5).

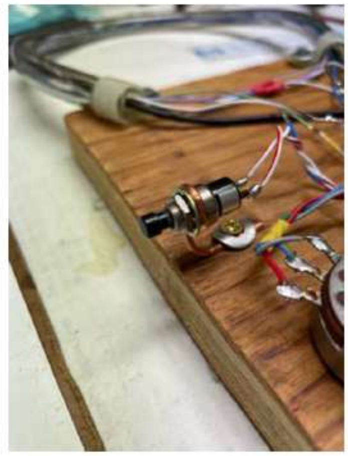


Figure 5 — In this close-up view, you can see how a pushbutton is held in place with a loop of copper wire that is secured to the wood plank with a screw. [Jim Kocsis, WA9PYH, photo]

Figure 6 — By using this technique, all of the interface components are firmly held in place for testing. Assuming the testing goes well, they can be easily removed for permanent installation in a suitable enclosure. [Jim Kocsis, WA9PYH, photo]

In addition to having a quick way to finish construction of a project's test phase (see Figure 6), a side benefit is that all of the leads are short, which keeps crosstalk to a minimum. — *73, Jim Kocsis, WA9PYH,* **wa9pyh@arrl.net**

"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.

Flash Drills

Create opportunities for your group to practice skills and prepare for an emergency situation.

Mike Pulley, WB4ZKA

Disaster simulations on the air are far too valuable for training to be relegated to an annual Simulated Emergency Test (SET) every October. However, a worthwhile simulation can be hard to design and conduct more often than that. Flash drills solve that problem so simulations can happen more frequently. They remain interesting and challenging, and exercise decision making and Incident Command System (ICS) principles, not just net protocols in the field.

Field Cell Structure

A unique feature of flash drills is that they're designed in small, manageable cells or modules of deployed and non-deployed role players located near one another, as shown in Figure 1. Each module has a leader, much like we're taught in the ICS. They are the Drill Facilitator for that cell and are responsible for the hams who take care of the simulated disaster.

We're not necessarily conducting an ICS simulation but borrowing the principles so they're familiar when trouble strikes. We're not in charge; we're in service, but we practice principles of modularity, management by objectives, span of control, and other fundamentals that make the ICS so powerful.

Each Drill Facilitator gives out assignments in advance, knows where each role player is and what skills and capabilities each role player has and wants to learn, and visits each role player during the drill. The Drill Facilitator assumes a mobile tactical call sign, a role that is expected to move around solving problems in a disaster.

The Drill Facilitator designs the cell's role-play instructions. As more hams sign up to participate, more Drill Facilitators should be acquired and spawn off cells using the same role-play material. There won't be repetitious duplication on the net because each role player's tactical call sign, traffic, and issues will be different from other hams with the same roles. This cell architecture makes flash drills scalable, so with one set of planning materials, drills can involve only a half dozen or up to several dozen role players.

Listen to Mike, WB4ZKA and his team tackle a flash drill in the digital edition of *QST* (**www.arrl.org/qst**).

In addition to the cells, role players need to exchange traffic with the other cell role players. For example, evacuation shelters need to talk with the American Red Cross chapter, someone at a downed power line needs to talk to a utility company liaison and maybe the police for traffic control, and someone monitoring a flooded stream crossing needs to talk to the Flood Control Department liaison at the county Emergency Operations Center (EOC). These role-play instructions are reusable for next time, so no preparation time is wasted.

Drills, Not Performances

One way to design a simulation is to give the role players scripts to read in sequence, like a stage play, which sounds good in theory but you're really only exercising the role player's ability to read aloud over the air. That's a performance, not a drill. Disasters don't come with scripts.

In contrast, flash drills provide instructions and objectives, not scripts, so role players learn to improvise. For instance, the role player is instructed to report when they're on the station. It's up to them to know (or learn) how to check into a net, receive a tactical call sign, note what other stations are on the net, get

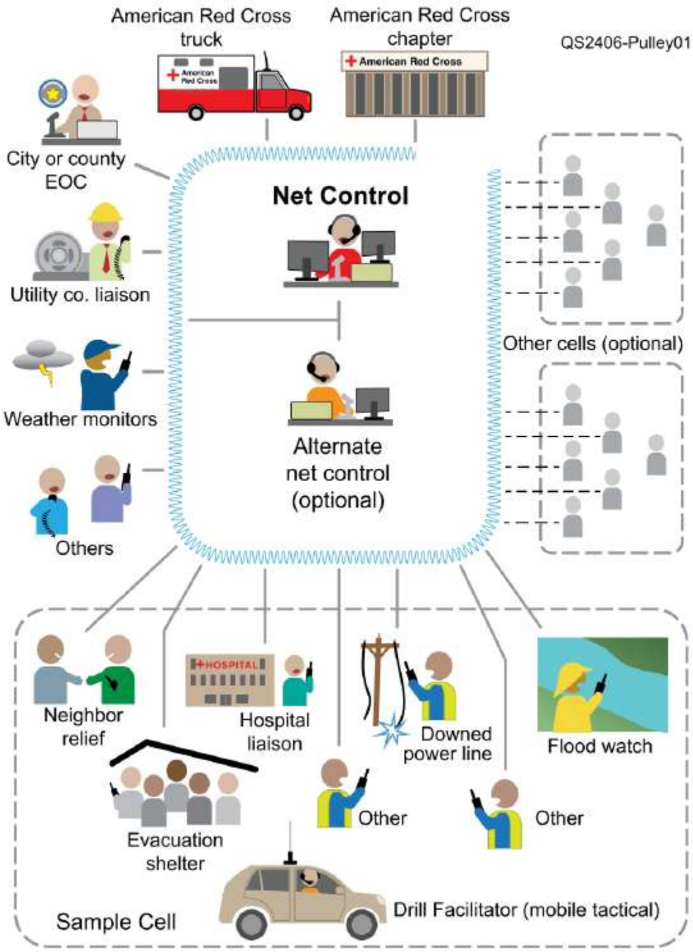


Figure 1 — A sample flash drill tactical net for a destructive storm. Expand the simulation by adding more cells. Design the cells and roles to complement your simulated disaster. You can have multiple evacuation shelters, hospital liaisons, or other roles within a cell, too. Cells don't have to be identical, just manageable by a Drill Facilitator.

net control's attention using their assigned tactical call sign, give their report succinctly and clearly, and close with their FCC call sign. If it's not second nature, it can be challenging. So, we tell them what they need to accomplish but not how. They get to learn these skills for next time.

By not scripting traffic, the role player has more information than they need, and they have to decide what to do with it. Do they blindly blurt out everything they know? If not, what do they report, and what do they keep to themselves unless asked? They must grasp what is important in the moment. Making useful traffic is much more than just saying it clearly over the air.

Furthermore, every flash drill is an exercise for net control and the Drill Facilitators, too. They don't know everything that will happen or when. Their job is to handle whatever comes up. No two drills are the same, based on who participates and what assignments they're given. So, it's a true drill for these leaders, too.

The results will probably amaze you. Your people will figure out how to adapt and overcome, but mistakes and failures will happen. A simulation is the right place for failures when life, limb, and property don't hang in the balance. So, embrace the mistakes, laugh at the funny ones, and learn and improve for next time.

Directed, Deliberate, and Actionable

One of the central aims of flash drills is to encourage role players to think before keying the mic button. The explanations for the following terms illustrate the importance of learning to make directed, deliberate, and actionable message traffic:

Directed — Who needs to receive your message? Or whom do you need to get information from? Just blurting out to net control isn't usually the answer. For instance, it's best if the role player begins their exchange with "I request direct with county EOC" so net control can connect those two parties and the message can be said once, not fumbled through several hands. Net control has no business relaying a message between stations; their job is to connect those two and let them handle their business directly.

Deliberate — Why does that person need your message? What parts of it do they really need, and what parts are useless to them? Leave out the useless parts.

Actionable — What do you want to happen as a result of your information? Don't throw traffic onto the net and hope someone will guess what to do about it. Tell the station what you want them to do up front.

Use the following command-tense verbs to communicate more effectively:

- Begin your message with "Be advised" if you just want them to know what you are going to say, but not necessarily do anything about it.
- Use "Notify" when you want them to pass your message to someone, such as an evacuation shelter captain.
- If you want the American Red Cross chapter to send more coffee cups, then say, "Send 250 coffee cups to this shelter by 5 AM tomorrow morning." Be specific.

Learn the list of other common command words, such as "confirm," "say again," "acknowledge," and "disregard." They pack a lot of information. Know what you want, and learn to say it clearly.

Directed, deliberate, and actionable traffic is foreign to most hams. Outside of disasters and drills, hams usually make social connections or staccato contest exchanges. They must be trained on the notion of radio with a purpose. A real communicator has a reason to key up and knows how to give or get the help they need.

Keep It Challenging

Because it's not a scripted performance, give every ham a challenging (but not overwhelming) job that can teach them something by doing. Flash drill role-play instructions are designed around a list of training objectives broken into beginner, intermediate, and advanced emergency communications topics. Each category has five levels of increasing skills, capabilities, and responsibilities to master.

Level 1 for beginners focuses on mastering simulation role play, basic net operations, VHF/UHF repeater operations, and making routine reports to the net. Deployed beginner role players get to exercise basic portable operations. They'll be assigned to a simulated evacuation shelter, flooded crossing, a power line that is down, or some other portable role. They'll operate from a school, church, park, or hospital near their home. Non-deployed role players get to practice base station operations. They'll be assigned to simulate a portable role or play a fixed role like an American Red Cross chapter, telephone liaison, or National Weather Service weather monitor.

Intermediate and advanced role players get to do more, from deploying a significant field antenna, passing formal message (radiogram) traffic, leading a field team, operating digital modes on VHF/UHF and HF, to serving as net control.

Each level has different traffic to handle, so even though a ham may simulate an evacuation shelter every time, their traffic will change as they advance up the skill ladder. That helps prevent flash drills from becoming predictable.

What You Need to Craft a Flash Drill

Once you grasp the basic nature of flash drills (the scalable field cell structure, deployed and non-deployed roles, reusable instructions and not scripts, and prescribed training levels), you only need the fiction writer's craft. You are, after all, writing a story for each role player to improvise.

Put yourself in the role, and craft realistic stories that an evacuation shelter might have that require on-air business with a net, an American Red Cross chapter, or other evacuation sites, and write scenarios that produce useful, relevant message traffic. Include a way to make each person's traffic details different for each role. It can be fun if you have a knack for fiction writing. If you don't, recruit someone who does.

An Hour Well Spent

In the Phoenix, Arizona, area, flash drills run for a single hour. The short time lends urgency to the net — the same feelings that will surface when people and property are really at stake. Adrenaline threatens to unravel you. Learning how to stay calm under stress separates the amateurs in the worst sense from the reliable amateur radio professionals.

For instance, we don't pre-assign tactical call signs. We assign them as stations check in during the simulation, just like it happens in an unfolding disaster. When time is short, and everyone needs the net's help, tensions rise as the net struggles to wrest order from the jaws of chaos. Then traffic can flow.

When the hour is up, regardless of any traffic still pending, we close the drill. Because several stations are deployed, we review what went well and what we could improve while tracking everyone safely back to their homes.

We learn about as much as we can absorb in the hour, and it lets the role players know what time commitment they're signing up for. We've found that longer isn't necessarily better. I confess it took us months to learn how to organize ourselves quickly and then get to the traffic at hand, but we eventually learned.

A World with Affordable Simulations

When disaster simulations are relatively cheap to produce, you can elect to have one a month. All year, you can get the excitement, training, and experience your group needs without burning out the organizers. As the group becomes more efficient, more traffic is handled, and more issues are identified and resolved before the hour expires. Hams grow to fill more responsible roles. The improvements become tangible and measurable.

Spark your fellow hams' imaginations by making the disaster and the stories they play out relevant to what they could likely encounter. Simulate what you would like everyone to gain some 20/20 hindsight on before it actually happens. Your disaster could simulate destruction from a hurricane, a tornado, a microburst, floods, mudslides, a paralyzing winter storm, a burp cloud from a thermonuclear power plant, a train derailment, a multi-vehicle highway pileup that overwhelms local services, or a ruptured gas line. You could rescue a lost hiker or exercise evacuations for wildfires (possibly including livestock rescue). Maybe build a simulation around Field Day. Sometimes, simulating a calm, routine bicycle or foot race public service event might be a nice change of pace, especially just before the start of the season for such events in your region. Pick your disasters based on what's likely to happen in your area, and mix it up to avoid getting into a rut.

You can find the beginner role-play instructions we've used on the *QST* in Depth web page at **www.arrl.org/qst-in-depth** to start conducting your own flash drills. You can see the format that has worked well for us, sample net control logs, and other types of assignments. Training objectives for each role-player level are also available so they can have fun, benefit from the situation, and come back next time.

When trouble strikes, you won't have to make everything up on the fly or try to remember what you heard in a classroom or on a discussion net. You've practiced for this very day. Best of all, everyone gets to have a good time honing their skills on something that matters in the company of others doing the same. That's radio with a purpose!

See *QST* in Depth for More!

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

- Flash drill portable operations exercises from various locations
- Net control logs and scripts
- Role-play instructions for various roles
- Sample odometer reading files for various locations

ARRL Life Member Mike Pulley, WB4ZKA, cut his emergency communications teeth on the tornadoes of Alabama. At age 16, he served as net control on the night of the 1974 Super Outbreak, the most violent tornado outbreak ever recorded at the time. Mike has lived, volunteered, and helped train ham volunteers in the Phoenix, Arizona, area for more than 30 years. He invented flash drills to bridge the gap between emergency events and the realities of disaster communications. Mike also invented the exercise-based Arizona Emergency Net — Maricopa (see "Reviving Your ARES Training Net" in the September 2016 issue of *QST*) to help train ham volunteers for public service. He led this net for more than a decade. For a limited time only, Mike is willing to help develop flash drills for your group. Contact him directly at **Mike.J.Pulley@cox.net**.

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

VOTE
If you enjoyed this article, cast your vote at www.arrl.org/cover-plaque-poll

New Products

Radio Separation Kit

SwapMyRigs (SMR) now has a radio separation system in kit form! The kit lets you swap radios without ever having to install new cables. By routing all the conductors through a common VGA cable, any radio with industry-standard RJ connectors can be installed or replaced without using manufacturers' proprietary, multi-cable separation systems. The photo below shows all the parts included in the kit. No soldering is required; all circuit boards are fully populated and soldered. Assembly requires only common tools.

The patented SMR kits are sold in pairs and include a 15-foot VGA cable with all the shunts and jumpers necessary for configuring the units for supported transceivers. The kit is substantially cheaper compared to assembled and configured units. The chart below shows a list of supported radios and tested separations. For more information or to purchase, please visit **www.swapmyrigs.com**.

Radios & Tested Separation

Yaesu		Kenwood		ICOM	
FT-891	100'	TM-D710A/G	75'	ID-880H	15'†
FT-857	75'	TM-V71	75'	IC-2720/30H	100'
FTM-350	75'	TS-480	100'	IC-2820H	25'
FTM-100/400	90'	TM-D700	100'	ID-5100	100'
FTM-200/300	15'†	TS-2000	100'	ID-4100	65'
FTM-500/6000	15'†			IC-7100	100'
FT-7-8xxx*	100'				

*Also TYT TH-9800

† Tested with 15' VGA cable only

New! Universal Kit with 15' VGA cable $69.99 complete

W/VE Island QSO Party: A Kayak Rove

Three experienced POTA operators teamed up to activate five islands in a Pennsylvania lake that are accessible only by water.

Matthew Brown, K2EAG

In 2023, members of the Radio Association of Western New York (RAWNY), W2PE, participated in the W/VE Island QSO Party (**https://usislands.org/qso-party-rules**) for the first time. We decided to include a five-island rove — all by kayak! I learned about the 2023 event while listening to RAWNY's weekly information net. Run by the US Islands (USI) Awards Program, this QSO party takes place once a year on the last Saturday in August.

Discovering Portable Operating

Angela Brown, N3ARB, and I have been active with Parks on the Air® (POTA) for a few years. Our first POTA activation was at a picnic table at Whirlpool State Park in Niagara Falls, New York. After that, we were hooked on portable operating. The next time out, we brought two of everything and operated simultaneously from nearby tables. During the colder months, we progressed from operating in a vehicle to operating in an ice fishing tent with a propane heater, and eventually began using an Aliner Scout pop-up camper that we can tow with our mid-size SUV. We've made upgrades to the camper that allow us to activate more quickly, such as mounting two Yaesu FT-450D HF/50 MHz transceivers and a Yaesu FT-8800R dual-band mobile in the front of the camper, just below where it folds down. Normally, all we have to do is deploy a couple portable HF antennas with coax fed into the camper. Our friend Dennis Schultz, N2DJS, also has gotten into camping through POTA and recently purchased a 16-foot Wolf Pup travel trailer that he modified by replacing the front queen bed with a custom desk and equipment rack for portable operations. We now partake in some sort of camping and portable operating every other weekend or so, including at dispersed sites in nearby state and national forests, even in the winter.

Deciding to participate in the W/VE QSO Party at the last minute was not something we were afraid to take on. However, this activation was going to be different from our regular park and forest activations, as four out of the five islands we selected to activate can be accessed only by water.

Matthew Brown, K2EAG, operated CW with a straight key from an inflatable kayak. The antenna was mounted a short distance away on one of the islands that made up Glenn Island.

Planning the Rove

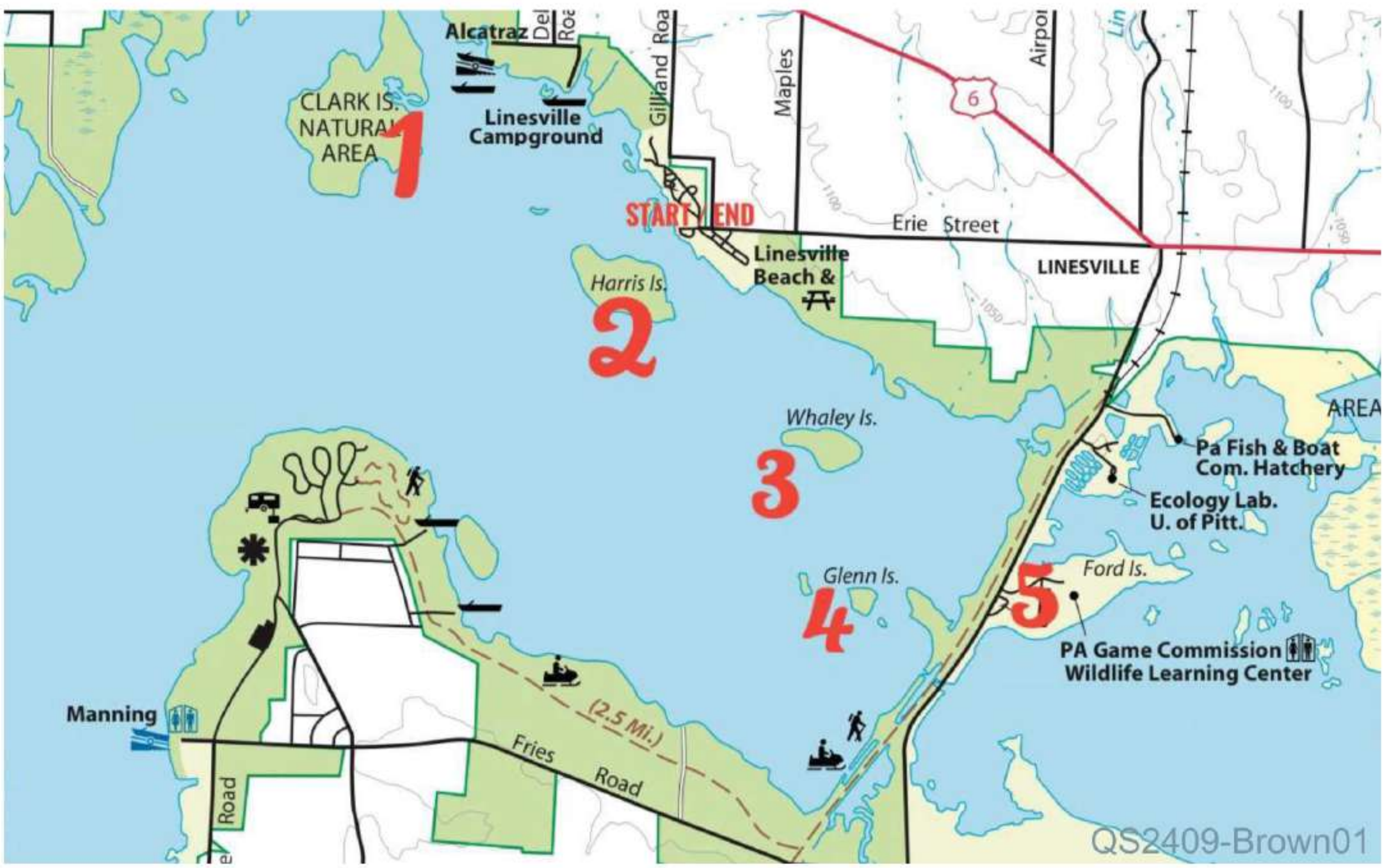
Learning about the W/VE Island QSO Party reminded me of the numerous islands I've seen at Pymatuning State Park in western Pennsylvania during recent POTA camping trips. The Pymatuning Reservoir is one of the largest lakes in Pennsylvania, stretching into Ohio, with state parks covering both sides of the lake. There are seven named islands and more than 20 unnamed islands. I thought this would be a great opportunity to combine portable operating with camping and kayaking, while potentially activating multiple islands.

In my research, I discovered that only one of Pymatuning Reservoir's seven islands (Ford Island) already qualified as a USI Awards Program island. *Qualification* refers to the initial activation of an island, when it completed at least 15 contacts. I reached out to the USI Qualifications Manager and submitted a request, along with my plan to qualify four other Pymatuning Reservoir islands (Clark, Harris, Whaley, and Glenn

Dennis Schultz, N2DJS, made SSB contacts on 40 and 20 meters with 20 W. This allowed the W2PE team to make contacts locally, regionally, and farther away.

Islands), each about a mile apart, which met the USI program requirements. The island reference numbers were assigned, and our planned activity got added to the award program's calendar. Once I had that confirmation, I made camping reservations for Friday night through Sunday morning at the Linesville Campground on the northern shore closest to our islands. Angela, Dennis, and I decided to participate in the W/VE Island QSO Party as an Island Rover. Because we would be using a single call sign, we approached RAWNY's Board of Directors and trustee with our plan and received permission to operate with the club's call, W2PE.

Travel between all the islands with all our gear was done by kayak. At least Angela and I had some experience, as we've been participating in a local kayak meetup group, getting to explore many local waterways while meeting new people. Together, we paddled two blue Sea Eagle Explorer 300X inflatable kayaks with our food and supplies. We used a Sea Eagle 465ft FastTrack inflatable kayak to carry additional radio equipment, folding tables, and chairs. These kayaks are extremely stable and were able to easily carry all our gear for the day.



The W2PE team's roving plan included paddling between each of the five named islands in the northern Pymatuning Reservoir and activating them for the W/VE Island QSO Party.

Matthew Brown, K2EAG, and Angela Brown, N3ARB, operated Glenn Island among the lily pads in their kayaks.

Matthew Brown's, K2EAG, portable station on one of the kayaks.

At each island, we worked together to set up and tear down our portable station, at which we took turns operating SSB, CW, and FT8 to maximize our multiplier at each island. Our station consisted of a Xiegu G90 for phone and CW operations and a Xiegu X6100 for FT8 operations. Both radios were powered by a 20 Ah lithium iron phosphate battery. We used a Chameleon MPAS 2.0 vertical antenna, which tuned up perfectly for us on 40, 20, and 15 meters, and it was easier than trying to deploy wire antennas in the thick, overgrown brush. We also had a second battery and antenna and additional coaxial cable to use for backup.

Island Operations

Of the five islands we were activating, Glenn Island was actually a group of islands and was a bit of a marshy jungle. We couldn't find a good place to operate from, so we operated from the kayaks, floating in the middle of a field of lily pads while tethered to the antenna mounted on land. We still managed to operate all three modes, including straight key CW, from the kayak. We were able to make a park-to-park contact with a close friend of ours, Junie Cassone, N1DUC. Another memorable contact was with Dave Thorne, VE3LDT. He was the only operator who contacted us on all five islands.

The fifth and final island we reached was Ford Island, which was the only one that was accessible by car. It was already dark by the time we were set up, and the insects were terrible. We probably should've started earlier, as we would've liked to have operated longer. There were a lot of folks fishing from where we docked and set up, and we got to share what we were doing with a few guests who stopped to say hello.

A Journey Well Traveled

We made about 30 contacts on each island, as traveling to each one and setting up and breaking down our station took a bit of time between activations. Despite being our first year participating, our team came in first place in the roving category!

It was a fun adventure and one I look forward to doing again this year (2024 marks the 30th anniversary of the US Islands Awards Program). We activated all five islands, qualified four new islands, and operated three modes on each island. At the end of the long day, we had a relaxing paddle back to our campsite under the moon and stars.

All photos provided by Matthew Brown, K2EAG, and Angela Brown, N3ARB.

Matthew Brown, K2EAG, is an ARRL Life Member, has been licensed for 25 years, and serves as a Regional Coordinator for POTA and as the ARRL Western New York Section Traffic Manager. He and his wife, Angela Brown, N3ARB, enjoy operating together from parks, while also participating in other outdoor activities, including camping, archery, and kayaking. Matt has been an active CW operator for 2 years, thanks to the Long Island CW Club and the Straight Key Century Club. Matt and Angela are active in the National Traffic System as Official Relay Stations and net control stations for their local Western District Net. Matt can be reached at **k2eag@arrl.net**.

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

Conducting a Foxhunt at a Scouting Festival

A Scouting volunteer was asked to showcase amateur radio at a community event; here's how he delivered.

John Abbott, K6PFN

Our local Scout District in western Los Angeles, California, was planning a Festival of Scouting in August 2023 to showcase the skills that youth can learn and use in Scouting. The event was for both current Scouts and youngsters who might be interested in joining a Cub Scout Pack, Scout Troop, Sea Scout Ship, or Venturing Crew.

The organizers wanted more science, technology, engineering, and mathematics activities among the various booths they were planning for the Festival. They asked me, a volunteer in my sons' troop (Troop 50), "Is there some radio thing you could do?" When a ham is asked that question, you know the answer is going to be a big "Yes!" But at first, I was wondering what "radio thing" I should do.

We needed something that would look interesting from afar and motivate Festival visitors to approach

The author (left) and his son Joseph (right) testing a tape-measure Yagi for the Festival of Scouting foxhunt. [John Abbott, K6PFN, photo]

our booth. I thought that if we did a foxhunt, the eye-catching Yagis would attract peoples' attention. A foxhunt, also known as amateur radio direction finding, is when participants use directional antennas and signal attenuators to find hidden transmitters (aka *foxes*). The activity also needed to be something tactile, and something that participants could get comfortable with at their own pace. With a foxhunt, they would be able to enjoy aiming their antenna, adjusting the attenuator, and learning how it all works while doing a fun activity.

Calling for Help

I have participated in a foxhunt before, but I have never run one. A fellow Scout leader, Walter Hicks, KN6FAT, put me in contact with Michael Hart, KC6MEH, who has previously conducted foxhunts for Scouts and is a serious foxhunter himself. Michael loaned me four directional PVC tape-measure antennas with plastic handles he made on his 3D printer; these handles also housed the attenuators. I purchased the foxes from Byonics (**www.byonics.com/mf**) and gathered some less expensive 2-meter radios from fellow hams.

The Plan

We planned for the transmitters to be on the same frequency and rotate transmission cycles. My sons and I programmed short melodies to serve as the signature tones for each transmitter. For example, participants would hear Song A in one direction to deduce that Transmitter A was in that same direction. Then, they'd hear Song B in another direction to deduce that Transmitter B was in that direction.

As Festival attendees came to our booth, we'd explain how the directional antenna and attenuator worked. One of the Scouts volunteering from my troop would walk along with each team to help them if they forgot how to work the attenuator knob, or if they needed a little encouragement to find a fox.

Michael gave us another activity for our booth: decoding Scout phrases in Morse code. Attendees would take a slip of paper with a Scout saying written in Morse code, and then they would use a decoder key and pencil to transcribe the message. I saw it as a way to give people something to do while they waited for an antenna to become available.

How It Turned Out

About 100 young people and various parents, grand-parents, etc. visited our booth. We had some especially young visitors (ages 2 – 4) who were delighted to hold the antenna and rotate it to hear the fox signals fade in and out.

The reception of the Morse code activity surprised me. It wasn't just something to do while waiting in line for the foxhunt; people really enjoyed it. It was touching to see parents working with the younger children on decoding the phrases. Morse code is fun for all ages!

Lessons Learned

The next time our troop takes part in a Festival of Scouting, we will plan to have other activities in addition to foxhunting and Morse code decoding. I'd like to add a Get on the Air station for those who want to hear radio traffic and maybe operate.

Be ready for any opportunity to bring amateur radio to a community event. Let your organizations and your neighbors know you're a ham who can do a "radio thing" — such as a foxhunt — at their next event.

John Abbott, K6PFN, has been a licensed amateur radio operator since 2017. He currently serves on the committees of Cub Scout Pack 55 and Scouts BSA Troop 50 in the Western Los Angeles County Council of the Boy Scouts of America. John can be reached at **k6pfn@arrl.net**.

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

2024 Simulated Emergency Test

The annual ARRL SET will be October 5 – 6, 2024.

Steve Ewald, WV1X,
ARRL Field Organization Supervisor

It's time to prepare for the 2024 ARRL Simulated Emergency Test (SET)! ARRL Field Organization leaders are planning simulated practice events that will actively involve the Amateur Radio Emergency Service® (ARES®), the Radio Amateur Civil Emergency Service (RACES), the National Traffic System (NTS), SKYWARN®, the Community Emergency Response Team (CERT), The Salvation Army Team Emergency Radio Network (SATERN), other auxiliary communications groups, and public service-oriented radio amateurs.

This nationwide annual event is among the best chances of the year for amateur radio operators to plan for and practice their emergency communications skills in an organized and coordinated effort with public service agencies and organizations in your community, ARRL Section, or state.

Coordination and Cooperation

ARRL has established formal relationships with national organizations and agencies such as the Federal Emergency Management Agency (FEMA), the American Red Cross, The Salvation Army, the National Weather Service, the National Communications System, the Association of Public-Safety Communications Officials-International (APCO-International), Citizen Corps, National Voluntary Organizations Active in Disaster (NVOAD), REACT International, Inc., the Society of Broadcast Engineers (SBE), and the Boy Scouts of America. More details about these organizations and agencies can be found at **www.arrl.org/served-agencies-and-partners**.

ARRL Field Organization leaders work closely with many of these organizations as well as others at the local, Section, and state levels. The SET offers a prime opportunity to test these working relationships and to help ensure efficient coordination when an actual emergency or disaster summons a call to action.

The ARRL SET encourages planning and coordination with public safety, emergency response, and amateur radio communities to be successful. [Andreas Ott, K6OTT, photo]

How to Get Involved

To find out how to get involved in this year's SET, contact your local ARRL Emergency Coordinator or Net Manager. ARRL Affiliated Clubs may know about the nearest ARES group and who the Emergency Coordinator is. In addition, refer to the ARRL Section web pages at **www.arrl.org/groups/sections**. Your ARRL Section Manager can assist, too. See page 16 in any issue of *QST* for a list of Section Managers' contact information.

In consideration of schedules, ARRL Field Organization leaders may conduct their annual ARRL SET events at other times throughout the year. Consult with your local or Section Field Organization leaders for more information.

Additional background information regarding the annual SET is presented in the article "Simulated Emergency Test 2023 Results" in the July 2024 issue of *QST*. Guidelines and specific SET reporting forms for ARRL Section and Field Organization leaders and reporting participants can be found at **www.arrl.org/public-service-field-services-forms**. If you are an Emergency Coordinator, Net Manager, or Section leader in charge of reporting this year's SET activity on behalf of your group, please fill out the online reporting forms.

The 2024 *QST* Antenna Design Competition

The *QST* Antenna Design Competition is back for 2024! You don't have to be an antenna expert to enter — or win. Just send us your best design for a portable, mobile, or base station antenna, and it will be evaluated according to the competition rules. Entrants are encouraged to consider the needs of new hams, as well as hams living in environments with antenna restrictions. Even if your design doesn't earn a prize, it may still be published in *QST*.

Choose your category wisely, and send only one entry per person or team. The deadline is **December 16, 2024!**

Official Competition Rules

Entry Categories:

Enter in one of three categories:

- 160 meters, LF or VLF
- 80 through 10 meters
- 6 meters and up

Entries Must Include:

- Drawings with dimensions (hand drawings are acceptable)
- A list of materials required to build the antenna
- A description and summary of any testing, modeling, and measurements (including SWR data)
- High-resolution photographs of the installed antenna
- The entry category you've chosen for your design
- Your name, call sign, postal address, and email address

Send your entry to:

QST
Attn: Antenna Design Competition
225 Main St.
Newington, CT 06111

Or email your entry to **qst@arrl.org**. In the subject line, include your call sign and the words "Antenna Design Competition."

When using email, the total size of all attached files must not exceed 6 megabytes (MB). If you need to send more than 6 MB of attachments, please use several separate email messages.

Only one entry per individual or team will be accepted. Entrants must be ARRL members. ARRL Headquarters staff and *QST* advertisers are not eligible.

Non-Commercial Designs Only: Antennas based on submitted designs must be the sole creation of the entrants and not available for sale.

Submission Deadline: December 16, 2024

Judging: All entries will be reviewed, and the most promising entries will be evaluated through software modeling. Winners will be chosen based on performance as predicted in modeling, as well as ingenuity of design, mechanical and electrical safety, and durability.

Prizes: First-place winners — individuals or teams — in each category will receive checks in the amount of $500. Second- and third-place winners — individuals or teams — in each category will receive checks in the amount of $250 and $100, respectively. Winning designs will also be eligible for publication in *QST* magazine.

Disclaimers: By participating in the competition, you are verifying that you are the owner and producer of the design, and that no third-party ownership rights or patents apply to your design. While ARRL will not claim ownership of your design, through your participation you are granting ARRL a perpetual, worldwide, non-exclusive, royalty-free right to publish your entry materials in all media now known or hereinafter created, anywhere in the world, for any lawful purposes.

This page displays two past winners of the 2017 *QST* Antenna Design Competition, 80 through 10 meters category, both published in the March 2018 issue of *QST*. The photo to the left is "'Cat Whiskers,' The Broadband Multi-Loop Antenna," by Jacek Pawlowski, SP3L. The background photo is "A Three-Element Moxon-Style Vertical Yagi Antenna for the 75-Meter Band," by Al Christman, K3LC, and Joe Johnson, K3RR.

Chris Tate, N6WM, n6wm@largeradio.org

2024 ARRL International DX Phone Contest Results

This year's ARRL International DX Phone Contest was held March 2 – 3, 2024.

Coming off of the ARRL International DX CW Contest, which had amazing conditions, hopes were high that similar conditions would hold up for the ARRL International DX Phone Contest, and for the most part, they did! With Solar Cycle 25 approaching its peak, reports of decent conditions, particularly in the first 24 hours of the contest, allowed for more DX to be worked, more fun to be had, and more participation than last year.

A total of 5,193 logs were submitted for the contest this year. This is an increase of 349 from 2023 and the highest number of logs submitted in the event's history.

Logs Received

Year	Number of Logs
2024	5,193
2023	4,844
2022	3,976
2021	3,737
2020	3,527
2019	3,120

The total number of contacts also had a healthy increase, with 306,454 more contacts reported this year. In looking at the number of reported contacts per band, there was an increase across the board from last year, with the largest increase being on 20 meters.

A real indication of the effect of Solar Cycle 25 on DX Phone is the number of contacts made on 10 and 15 meters between 2022 and 2024. While the activity on all the bands has increased in the last 2 years of the contest, both bands saw the largest increases.

The PJ2T team for the 2024 ARRL International DX Phone Contest poses for a photo after the contest. The team took second place overall in the Multioperator, Multitransmitter category and took first place in DX. Pictured from left to right are Andy Catanzaro, W9NJY; Dorothy; Ryan Dahlberg, NØOJ; Cindy Foote, N4LGL; Curtis Foote, WX4W; Jan Heise, K4QD; Ray Fallen, ND8L; Geoff Howard, WØCG/PJ2DX; Pete Gladysz, K8PGJ; Vince Weal, K4JC, and Walter Aucoin, K5LD. [Geoff Howard, WØCG/PJ2DX, photo]

Contacts by Band

Band	2022	2023	2024
160 meters	6,539	4,808	6,709
80 meters	46,356	49,825	56,872
40 meters	167,014	158,882	181,609
20 meters	390,778	328,245	434,885
15 meters	415,503	481,510	566,032
10 meters	217,513	789,506	871,099
Total	**1,243,703**	**1,812,776**	**2,119,230**

WRTC 2026 Qualification

The 2024 and 2025 ARRL International DX contests were selected as qualifying events for the World Radiosport Team Championship (WRTC) scheduled for 2026 in the United Kingdom. As such, many operators jumped into the contest full force, looking to qualify for their specific regions.

Top Ten – DX

Single Operator, High Power

8P5A (W2SC, op)	8,061,273
CR6K (CT1ILT, op)	7,018,380
V31XX (K4XS, op)	4,879,710
TI1K (TI5CDA, op)	4,748,850
E7DX	4,326,588
OM2VL	3,630,324
EW5A (EU1A, op)	3,582,621
FM5KC (F5VHJ, op)	3,578,175
KH7M (NA2U, op)	3,458,976
CT3KN	3,325,014

Single Operator, Low Power

NP4Z	4,265,028
HH2AA (N2TTA, op)	3,932,832
EA8RM	1,965,837
HI3T	1,858,950
CO8ZZ	1,572,468
HA3NU	1,375,290
TI2OY	1,249,794
HI8PAP	1,007,532
PY2NY	898,161
XE1YL	804,441

Single Operator, QRP

YV6BXN	202,860
PA2TMS	63,750
JH1OGC	58,869
JH7UJU	50,052
IZ4AIF	45,264
JQ1NGT	24,576
7N4WPY	18,216
PY2PLL	15,984
F4FSV	14,964
DM2DX	14,523

Single Operator Unlimited, High Power

V3O (DL8UD, op)	5,082,024
9A1P	4,105,485
EB5A	4,095,960
RW1F	3,881,520
ED8M	3,482,130
OM7M (SP9LJD, op)	2,985,048
TM1K (F5USK, op)	2,857,608
LY4A	2,813,796
PT5J	2,731,350
ED3X	2,475,846

Single Operator Unlimited, Low Power

WP3C	3,980,112
PJ5/SP9FIH	2,884,140
6Y1A (NØGJW, op)	2,109,756
S52NR	1,713,360
5K4X (KC1XX, op)	1,640,820
PJ7EE	1,351,371
VP9I (N1SV, op)	1,304,790
ZW8T (PS8HF, op)	894,672
PY7ZC	814,842
YV5RAB	812,670

Single Operator Unlimited, QRP

UR7U	76,398
PC2F	39,342
PG2AA	5,439
UT7AA	4,851
G1WVK	189
IN3JIO	75

Single Operator, High Power, 160 Meters

DL2SAX	180
UA7K	108
F5VLV	3

Single Operator Unlimited, High Power, 160 Meters

S56X	1,170

Single Operator, High Power, 80 Meters

KP4KE	89,676
T32AZ	18,348
YT4A	8,475
OL4N (OK1DTP, op)	2,376
F5VBD	990
JE2OTM	96

Single Operator, Low Power, 80 Meters

JE1SPY	930
F6EPO	90
UY7AM	75
JH4CES	27

Single Operator, QRP, 80 Meters

JH1APZ	48

Single Operator Unlimited, High Power, 80 Meters

F6AGM	91,416
HA1TJ	74,730
UT5EL	13,284
EU4E	10,575
GW9J (GWØGEI, op)	7,896

Single Operator Unlimited, Low Power, 80 Meters

OK2BFN	3,420
E74O	36

Single Operator, High Power, 40 Meters

KP4AA	350,460
TM6P (F4DVX, op @F6KNB)	217,326
LZ2AO	73,941
HA2KMR	50,256
LU2DVI	1,980
YB8MJG	1,386
YB4FIK	1,008
LZ2ZF	900
R5DF	540
YE9CZY	420

Single Operator, Low Power, 40 Meters

CO2JD	72,675
OA4DKN	25,440
YB9YBB	2,394
DS5TOS	1,080
OZ9V	714
YB8RW	357
DX2EVM (DV2ATQ, op)	336
M9M (G4BEE, op)	330
JH1RDU	231
YD3BSA	210

Single Operator, QRP, 40 Meters

JR1ABS	432
OK6OK	300

Single Operator Unlimited, High Power, 40 Meters

9A3K	206,190
YT1A	179,025
IV3YYK	80,295
S51CK	76,986
JH7MQD	52,773
DL1GLH	33,120
JA5WNH	31,584
IP8T	27,495
S56Y	20,202
JA2GTW	17,766

Single Operator Unlimited, Low Power, 40 Meters

HB9PUE	5,307
IO5T (IK5TBK, op)	2,664
JJ1AEB	630
DL1AMT	48
JH2MYN	36
YD4FYI	3

Single Operator Unlimited, QRP, 40 Meters

PA3CWN	240
JH3DMQ	210

Single Operator, High Power, 20 Meters

OH8L (OH8LQ, op)	299,205
CT1DVV	252,225
YT7B	210,453
GM2V (GM3WOJ, op)	201,300
S55G	89,700
IZ8GUQ	84,900
EI9FVB	66,297
NP4VM	49,950
IU4LEC	47,094
M3P (G4DBL, op)	35,190

Single Operator, Low Power, 20 Meters

YV4EK	176,436
EA9ACD	128,628
CT1FOQ	10,788
IG9ITO	9,135
PDØMGX	6,720
IW1RBI	4,758
SP2GTJ	4,032
UR5TM	3,036
DL3OHB	2,280
OM8JP	2,280

Single Operator, QRP, 20 Meters

F5BEG	7,722
OE1OPW	858
IU6SAW	495
SP9RQH	90
IU3POA	12
IW2EPE	12
JHØKFI	12
NH6O	12

Single Operator Unlimited, High Power, 20 Meters

HG5E (HA1AH, op)	303,414
S51YI	274,908
EA8ZS	219,834
EA3AQ	216,900
OK5H (OK1BOA, op)	198,771
SQ4MP	156,822
DH1TT	108,324
UY5ZZ	104,664
PY8WW	91,896
IV3ZYB	66,738

Single Operator Unlimited, Low Power, 20 Meters

HK3LRB	188,268
PP2CC	97,185
HI8SDR (HI8ESF, op)	63,066
YV5WL	62,400
OK1K (OK1XOE, op)	53,550
R3AQ	15,720
ES1TAR	10,185
HB9HBY	7,392
SP3WKW	5,913
TA3NE	4,350

Single Operator Unlimited, QRP, 20 Meters

IO6R (IK6QRH, op)	3,450
EM3ABM	27

Single Operator, High Power, 15 Meters

D4K (IZ4DPV, op)	708,288
HK1T	425,520
CR6T	399,489
PW2D (PY2BK, op)	334,800
ED5R (EA5Z, op)	314,760
9A5X	300,192
OG8M (OH8MCT, op)	293,166
SN5X (SP5GRM, op)	261,783
TI5GCO	248,124
OQ4U	233,460

Single Operator, Low Power, 15 Meters

EA8KY	217,038
PY2QT	106,533
EA8DED (OH2BP, op)	94,545
KH6WI	32,430
ZP5XF	24,969
F8CGL	16,728
JA7HYS	13,680
IWØBCF	13,455
OK2BZE	12,600
TA2IB	8,772

Single Operator, QRP, 15 Meters

JR4DAH	12,528
R6DVL	6,603
JI1NZA/1	1,836
YC4SIZ	270
SP7K	126

Single Operator Unlimited, High Power, 15 Meters

IB9T (IU3BTY, op)	328,485
SN2B (SP2WKB, op)	321,036
OK1GK	308,538
SN3A (SP3GEM, op)	304,146
F4GGQ	288,360
HI3K	281,784
S5ØK	278,100
E7CW (E79AA, op)	215,763
DF2F (DF2SD, op)	199,479
OG9X	186,735

Single Operator Unlimited, Low Power, 15 Meters

KP4PUA	209,214
SP7Y	104,940
PY2VZ	89,088
SV2AEL	82,296
HI3TT	71,775
EA3XR	55,845
UR2Y (USØYW, op)	39,015
EF7O (EA7ZC, op)	36,990
OK4FD	28,602
PY2IB	22,755

Single Operator Unlimited, QRP, 15 Meters

EE3O (EA3O, op)	38,634
HG1S (HA1DAE, op)	24,288
EF5U (EA5U, op)	3,300
3G3A (XQ3SK, op)	1,152
UT7A (UT7AA, op)	144

Single Operator, High Power, 10 Meters

PX2A (PY2LED, op)	596,214
KP4JA (EB7DX, op)	529,938
KP2B (NP2V, op)	504,804
NP2J (K8RF, op)	443,208
S55OO	373,116
D4M	271,080
EA5S	241,248
F6ARC	223,551
OL9Z (OK2PVF, op)	221,454
OM5R (OM5DX, op)	217,848

Single Operator, Low Power, 10 Meters

PY2EX	269,748
ZZ5K (PP5RT, op)	261,870
PY2CX	169,035
PU2WDX	148,770
AZ6H (LU3HIP, op)	127,194
XE1CT	115,974
EA8KR	111,882
MD2C (MDØCCE, op)	96,237
PU2UAF	88,218
4M1W (YV1SW, op)	84,402

Single Operator, QRP, 10 Meters

CB6LR (CE6GDR, op)	46,512
PY2BN	45,648
IZ5JLF	13,566
DL3AN (UT1AN, op)	10,368
HA7MF	5,184
MIØI	5,175
LB3HC	4,140
EC4AA	3,933
JK1CNL	3,600
IK2CLB	3,450

Single Operator Unlimited, High Power, 10 Meters

PV2G (PT2IC, op)	562,680
LT3E (LU3VMS, op)	423,828
OK7K (OK1BN, op)	387,630
HA5JI	348,000
TM7G (F4ARU, op)	330,990
DMØA (DK4EE, op)	315,768
9A7V	311,166
SN2M	305,820
V55Y (V51WH, op)	300,498
OK8NM (OM6NM, op)	300,324

Single Operator Unlimited, Low Power, 10 Meters

PY2UD	234,030
PY2HT	177,480
PU1JSV	164,787
EA8TR	143,898
PY2CPS	125,001
IB2M	101,808
PY1KV	97,962
PY3FOX	88,536
IZ3NYG	80,478
SP9XCN	71,898

Single Operator Unlimited, QRP, 10 Meters

CB3A (XQ3SK, op)	51,561
SP7M	15,120
YO8WW	5,880
IK5RUN	5,250
G4MJS	4,557
IT9/OLØM (OK1CDJ, op)	240
CS7AWJ	27

Multioperator, Single Transmitter, High Power

ZF1A	7,818,900
CN3A	5,912,136
CR2X	5,553,840
TM6M	5,513,508
TO5M	5,324,664
TI1T	4,660,335
HP3AK	4,352,610
IO5O	4,260,240
TO3Z	4,154,007
4A7S	4,090,500

Multioperator, Single Transmitter, Low Power

VP5M	4,101,432
NP2R	2,813,076
TI1E	1,361,802
ZB2BU	859,662
PY2ZR	454,812
EB3GMK	439,725
GBØROC	373,860
LP1D	157,590
9A1CCY	133,902
IIØK	127,374

Multioperator, Two Transmitter

P4ØL	11,570,895
J62K	10,679,340
PJ4G	10,641,510
EI7M	7,039,680
IP4X	6,611,160
ED8W	6,450,492
ED7W	6,126,816
IO6T	5,775,198
T42T	5,691,300
II2S	5,267,598

Multioperator, Multitransmitter

PJ2T	11,309,142
9A1A	7,970,853
LZ9W	4,585,185
ED1R	3,281,025
JA3YBK	2,656,866
HD1A	1,770,540
SK3W	152,055
OZ4GM	58,176
9M8J	1,785
7E3E	9

Continental Winners

Africa

Single Operator, High Power	CT3KN	3,325,014
Single Operator, Low Power	EA8RM	1,965,837
Single Operator Unlimited, High Power	ED8M	3,482,130
Single Operator, Low Power, 20 Meters	EA9ACD	128,628
Single Operator Unlimited, High Power, 20 Meters	EA8ZS	219,834
Single Operator, High Power, 15 Meters	D4K (IZ4DPV, op)	708,288
Single Operator, Low Power, 15 Meters	EA8KY	217,038
Single Operator, High Power, 10 Meters	D4M	271,080
Single Operator, Low Power, 10 Meters	EA8KR	111,882
Single Operator Unlimited, High Power, 10 Meters	V55Y (V51WH, op)	300,498
Single Operator Unlimited, Low Power, 10 Meters	EA8TR	143,898
Multioperator, Single Transmitter, High Power	CN3A	5,912,136
Multioperator, Single Transmitter, Low Power	S77HQ	7,776
Multioperator, Two Transmitter	ED8W	6,450,492

Asia

Single Operator, High Power	JA7NVF	1,172,565
Single Operator, Low Power	JS1OYN	244,545
Single Operator, QRP	JH1OGC	58,869
Single Operator Unlimited, High Power	JR2GRX	1,370,565
Single Operator Unlimited, Low Power	JH1EAQ	344,088
Single Operator, High Power, 80 Meters	JE2OTM	96
Single Operator, Low Power, 80 Meters	JE1SPY	930
Single Operator, QRP, 80 Meters	JH1APZ	48
Single Operator, High Power, 40 Meters	7M2FTR	105
Single Operator, Low Power, 40 Meters	DS5TOS	1,080
Single Operator, QRP, 40 Meters	JR1ABS	432
Single Operator Unlimited, High Power, 40 Meters	JH7MQD	52,773
Single Operator Unlimited, Low Power, 40 Meters	JJ1AEB	630
Single Operator Unlimited, QRP, 40 Meters	JH3DMQ	210
Single Operator, High Power, 20 Meters	RW9LL	3,528
Single Operator, Low Power, 20 Meters	4L9M	1,620
Single Operator, QRP, 20 Meters	JHØKFI	12
Single Operator Unlimited, High Power, 20 Meters	R9AE	64,200
Single Operator Unlimited, Low Power, 20 Meters	TA3NE	4,350
Single Operator, High Power, 15 Meters	JJØVNR	218,595
Single Operator, Low Power, 15 Meters	JA7HYS	13,680
Single Operator, QRP, 15 Meters	JR4DAH	12,528
Single Operator Unlimited, High Power, 15 Meters	JF9JTS (JAØTEA, op)	142,443
Single Operator Unlimited, Low Power, 15 Meters	JL4OUX	1,350
Single Operator, High Power, 10 Meters	JP7DKQ	140,616
Single Operator, Low Power, 10 Meters	JA6WFM	34,194
Single Operator, QRP, 10 Meters	JK1CNL	3,600
Single Operator Unlimited, High Power, 10 Meters	JA7OWD	140,397
Single Operator Unlimited, Low Power, 10 Meters	JG2TSL	56,154
Multioperator, Single Transmitter, High Power	JH4UYB	1,248,198
Multioperator, Single Transmitter, Low Power	BY4DX	13,968
Multioperator, Two Transmitter	JH8YOH	1,818,648
Multioperator, Multitransmitter	JA3YBK	2,656,866

Europe

Single Operator, High Power	CR6K (CT1ILT, op)	7,018,380
Single Operator, Low Power	HA3NU	1,375,290
Single Operator, QRP	PA2TMS	63,750
Single Operator Unlimited, High Power	9A1P	4,105,485
Single Operator Unlimited, Low Power	S52NR	1,713,360
Single Operator Unlimited, QRP	UR7U	76,398
Single Operator, High Power, 160 Meters	DL2SAX	180
Single Operator Unlimited, High Power, 160 Meters	S56X	1,170
Single Operator, High Power, 80 Meters	YT4A	8,475
Single Operator, Low Power, 80 Meters	F6EPO	90
Single Operator Unlimited, High Power, 80 Meters	F6AGM	91,416
Single Operator Unlimited, Low Power, 80 Meters	OK2BFN	3,420
Single Operator, High Power, 40 Meters	TM6P (F4DVX, op @F6KNB)	217,326
Single Operator, Low Power, 40 Meters	OZ9V	714
Single Operator, QRP, 40 Meters	OK6OK	300
Single Operator Unlimited, High Power, 40 Meters	9A3K	206,190
Single Operator Unlimited, Low Power, 40 Meters	HB9PUE	5,307
Single Operator Unlimited, QRP, 40 Meters	PA3CWN	240
Single Operator, High Power, 20 Meters	OH8L (OH8LQ, op)	299,205
Single Operator, Low Power, 20 Meters	CT1FOQ	10,788
Single Operator, QRP, 20 Meters	F5BEG	7,722
Single Operator Unlimited, High Power, 20 Meters	HG5E (HA1AH, op)	303,414
Single Operator Unlimited, Low Power, 20 Meters	OK1K (OK1XOE, op)	53,550
Single Operator Unlimited, QRP, 20 Meters	IO6R (IK6QRH, op)	3,450
Single Operator, High Power, 15 Meters	CR6T	399,489
Single Operator, Low Power, 15 Meters	F8CGL	16,728
Single Operator, QRP, 15 Meters	R6DVL	6,603
Single Operator Unlimited, High Power, 15 Meters	IB9T (IU3BTY, op)	328,485
Single Operator Unlimited, Low Power, 15 Meters	SP7Y	104,940
Single Operator Unlimited, QRP, 15 Meters	EE3O (EA3O, op)	38,634
Single Operator, High Power, 10 Meters	S55OO	373,116
Single Operator, Low Power, 10 Meters	MD2C (MDØCCE, op)	96,237
Single Operator, QRP, 10 Meters	IZ5JLF	13,566
Single Operator Unlimited, High Power, 10 Meters	OK7K (OK1BN, op)	387,630
Single Operator Unlimited, Low Power, 10 Meters	IB2M	101,808
Single Operator Unlimited, QRP, 10 Meters	SP7M	15,120
Multioperator, Single Transmitter, High Power	CR2X	5,553,840
Multioperator, Single Transmitter, Low Power	ZB2BU	859,662
Multioperator, Two Transmitter	EI7M	7,039,680
Multioperator, Multitransmitter	9A1A	7,970,853

North America

Single Operator, High Power	8P5A (W2SC, op)	8,061,273
Single Operator, Low Power	NP4Z	4,265,028
Single Operator Unlimited, High Power	V3O (DL8UD, op)	5,082,024
Single Operator Unlimited, Low Power	WP3C	3,980,112
Single Operator, High Power, 80 Meters	KP4KE	89,676
Single Operator, High Power, 40 Meters	KP4AA	350,460
Single Operator, Low Power, 40 Meters	CO2JD	72,675
Single Operator, High Power, 20 Meters	NP4VM	49,950
Single Operator Unlimited, Low Power, 20 Meters	HI8SDR (HI8ESF, op)	63,066
Single Operator, High Power, 15 Meters	TI5GCO	248,124
Single Operator, Low Power, 15 Meters	XE1AY	741
Single Operator Unlimited, High Power, 15 Meters	HI3K	281,784
Single Operator Unlimited, Low Power, 15 Meters	KP4PUA	209,214
Single Operator, High Power, 10 Meters	KP4JA (EB7DX, op)	529,938
Single Operator, Low Power, 10 Meters	XE1CT	115,974
Single Operator, QRP, 10 Meters	XE1AQY	1,053
Single Operator Unlimited, High Power, 10 Meters	HI6M	158,592
Single Operator Unlimited, Low Power, 10 Meters	TI3ATS	54,567
Multioperator, Single Transmitter, High Power	ZF1A	7,818,900
Multioperator, Single Transmitter, Low Power	VP5M	4,101,432
Multioperator, Two Transmitter	J62K	10,679,340

Oceania

Single Operator, High Power	KH7M (NA2U, op)	3,458,976
Single Operator, Low Power	KH6CJJ	726,516
Single Operator Unlimited, High Power	DU3T	237,006
Single Operator Unlimited, Low Power	KH6AQ	569,664
Single Operator, High Power, 80 Meters	T32AZ	18,348
Single Operator, High Power, 40 Meters	YB8MJG	1,386
Single Operator, Low Power, 40 Meters	YB9YBB	2,394
Single Operator Unlimited, Low Power, 40 Meters	YD4FYI	3
Single Operator, High Power, 20 Meters	VJ3O (VK3TX, op)	5,916
Single Operator, QRP, 20 Meters	NH6O	12
Single Operator Unlimited, High Power, 20 Meters	VK3X	20,418
Single Operator, High Power, 15 Meters	YB1DX	13,566
Single Operator, Low Power, 15 Meters	KH6WI	32,430
Single Operator, QRP, 15 Meters	YC4SIZ	270
Single Operator, High Power, 10 Meters	DU1EV	14,175
Single Operator, Low Power, 10 Meters	DW7EVQ	15,810
Single Operator Unlimited, High Power, 10 Meters	4GØT (DU1RB, op)	24,960
Single Operator Unlimited, Low Power, 10 Meters	YC1CMZ	9,675
Multioperator, Single Transmitter, High Power	7I6O	12
Multioperator, Two Transmitter	VL4A	383,040
Multioperator, Multitransmitter	9M8J	1,785

South America

Single Operator, High Power	PZ5RA	1,160,325
Single Operator, Low Power	PY2NY	898,161
Single Operator, QRP	YV6BXN	202,860
Single Operator Unlimited, High Power	PT5J	2,731,350
Single Operator Unlimited, Low Power	5K4X (KC1XX, op)	1,640,820
Single Operator, High Power, 40 Meters	LU2DVI	1,980
Single Operator, Low Power, 40 Meters	OA4DKN	25,440
Single Operator, Low Power, 20 Meters	YV4EK	176,436
Single Operator Unlimited, High Power, 20 Meters	PY8WW	91,896
Single Operator Unlimited, Low Power, 20 Meters	HK3LRB	188,268
Single Operator, High Power, 15 Meters	HK1T	425,520
Single Operator, Low Power, 15 Meters	PY2QT	106,533
Single Operator Unlimited, High Power, 15 Meters	ZW2A (PY2SGL, op)	172,221
Single Operator Unlimited, Low Power, 15 Meters	PY2VZ	89,088
Single Operator Unlimited, QRP, 15 Meters	3G3A (XQ3SK, op)	1,152
Single Operator, High Power, 10 Meters	PX2A (PY2LED, op)	596,214
Single Operator, Low Power, 10 Meters	PY2EX	269,748
Single Operator, QRP, 10 Meters	CB6LR (CE6GDR, op)	46,512
Single Operator Unlimited, High Power, 10 Meters	PV2G (PT2IC, op)	562,680
Single Operator Unlimited, Low Power, 10 Meters	PY2UD	234,030
Single Operator Unlimited, QRP, 10 Meters	CB3A (XQ3SK, op)	51,561
Multioperator, Single Transmitter, High Power	ZPØX	2,411,076
Multioperator, Single Transmitter, Low Power	PY2ZR	454,812
Multioperator, Two Transmitter	P4ØL	11,570,895
Multioperator, Multitransmitter	PJ2T	11,309,142

Top Ten – US and Canada

Single Operator, High Power

N5DX	8,188,440
NN3W (@N4RV)	6,648,345
K1RX	6,126,648
K5TR	6,061,689
XL3T (VE3AT, op)	5,705,064
VY2TT	5,461,425
ND7K (N6MJ, op @N6WIN)	5,249,673
K5GN	5,124,240
K4AB	5,020,470
W9RE	4,820,739

Single Operator, Low Power

N1UR	4,006,800
N8II	1,527,120
KF8N	783,558
K8ZM	718,074
VE6FI (VE6AQ, op)	705,120
K2PO	687,537
AC4G	657,045
ND1X	635,850
W6DVS	604,992
VE2HIT	531,288

Single Operator, QRP

KA8SMA	146,916
W7LG	73,440
N7IV	58,464
KD2CTZ	49,005
AC2N	41,454
K2ORC	13,452
NT4W	11,592
NS6X	11,130
K3SLH	10,140
NF9Z	5,880

Single Operator Unlimited, High Power

K5ZD	7,354,398
N3RD	6,353,550
AA3B	5,781,870
N2NT (KI7WX, op)	4,915,260
W4NF	4,860,171
WA1Z	4,521,600
WY3A	4,145,745
AB3CX	4,088,019
W8MJ	3,841,974
W1GD	3,769,884

Single Operator Unlimited, Low Power

K1XM	2,835,549
AJ9C	2,118,576
WE9R	1,694,412
ND4Y	1,662,840
W3KB	1,493,343
VA3WB	1,189,551
N3AAA	1,177,512
N2YO	1,129,773
KS1J	1,123,398
NA4DA	1,117,872

Single Operator Unlimited, QRP

VE3WG	185,319
WQ6X	123,576
W3EK	101,790
NO5V	48,510
K8ZT	26,508
K2YG	18,954
WMØG	2,418
W2/DL8CX	2,325
N9SM	768
N2DYT	168

Single Operator, High Power, 160 Meters

K1ZM	11,232
N4XD	9,933
W4JVN	48

Single Operator, High Power, 80 Meters

W3BGN	44,100
W1HI	14,406
NS8O	2,175

Single Operator, Low Power, 80 Meters

K4SXT	19,152
N7AU	4,140

Single Operator Unlimited, High Power, 80 Meters

W3NO	28,917
W1VT	12,750
VE6JY	3,813

Single Operator Unlimited, Low Power, 80 Meters

WA4JUK	15,453

Single Operator, High Power, 40 Meters

W7BJN	47,424
N7RK	23,166
AAØMQ	17,160
W4JKC	15,048
N8OL	7,626
NT4OM	1,587
VE7RME	768

Single Operator, Low Power, 40 Meters

KT4R	59,496
W1AM	2,277
VA3TSS	243
AC2FA	27

Single Operator Unlimited, High Power, 40 Meters

WD6T	58,734
W9RN	40,176
VA3SK	29,580
K9CJ	7,830
K7STO	3,360
AC8Y	2,178
NW7E	768
WA2VIU	675
VE4IM	12

Single Operator Unlimited, Low Power, 40 Meters

K1NY	26,496
KT3T	24,375
KK4BZ	18,231
W8WTS	2,916
KY6AA	75

Single Operator, High Power, 20 Meters

W7WA	419,175
W1AVK	259,368
N3MWQ	39,372
W8GOC	25,545
AJ4SN	5,328
4U1WB (AJ3M, op)	3,096

Single Operator, Low Power, 20 Meters

NG3Q	76,362
VE3OOZ	33,165
K9LA	27,300
W9WJ	21,924
NG2S	15,870
VY2DIY	15,105
WB2KLD	13,230
K4RDU	10,350
KQ4AHO	7,626
W3EH	7,605

Single Operator, QRP, 20 Meters

VE3BFU	3,159
W4NBS	540
W1WAH	18

Single Operator Unlimited, High Power, 20 Meters

N7TU	73,644
NM5M	37,233
KJ5CF	9,576
N9TTK	3,840
NQ7R	3,528

Single Operator Unlimited, Low Power, 20 Meters

K9RO	109,440
VE9RA	43,428
WX2N	30,636
KC1RLS	28,620
N1KJS	16,536
K4RVR	3,906
VE9MO	1,404
KBØKFH	168
K6CTA	12

Single Operator Unlimited, QRP, 20 Meters

VA3OGG	10,998

Single Operator, High Power, 15 Meters

KU2M	668,520
WIØWA (WØEWD, op)	406,788
N7RQ	392,040
N6WM	302,304
KE8FT	164,160
NN2NN	73,350
KØBBB	70,470
W6RKC	44,928
KW6G	22,152
N4EK	18,354

Single Operator, Low Power, 15 Meters

NF7E	93,075
VA3SP	56,862
VE3FH	45,225
VE3AJB	31,680
ADØH	29,673
N1DC	23,580
KJ6DQ	15,756
N9HDE	15,756
WB2NVR	8,436
NX7W (N7FLT, op)	8,208

Single Operator, QRP, 15 Meters

N5AW	12,699
N8URE	4,257
K2TV	675

Single Operator Unlimited, High Power, 15 Meters

VA2WA	752,928
K7RL	623,298
VO1KVT	337,995
W2FU	326,340
AA7A	234,531
K1TR	197,274
WX5S	154,752
KC4GL	139,200
VA7KK	128,583
NØMHL	9,522

Single Operator Unlimited, Low Power, 15 Meters

W5DX	178,770
N4IJ	144,060
N9TGR	130,977
WA1FCN	125,685
N7UVH	90,000
KR2H	55,458
VA3DCB	20,880
K3TXT	17,808
K2HVE	17,550
WU8T	11,700

Single Operator, High Power, 10 Meters

KQ2M	761,400
N1PGA	604,296
K9BGL	562,695
N4OX	556,830
N1DD	299,100
K1TO	292,410
N6KN	252,954
VE3DZ	188,460
VE6UM	115,830
N7MGW	104,850

Single Operator, Low Power, 10 Meters

N1WRK	191,373
W2AW (N2GM, op)	124,872
WA7BNM	102,510
WB4TDH	84,816
K6GHA	77,688
N4MM	74,181
W3DF	70,374
W9ILY	68,598
WBØLQC	62,622
KA8JBK	59,796

Single Operator, QRP, 10 Meters

NDØC	90,036
WB2AMU	20,328
K9JK	18,285
NK8Q	10,956
NØJK	9,384
VE3GJP	8,190
KC3WCB	4,752
W4ER	2,646
KN6ODG	1,500
W3TS	576

Single Operator Unlimited, High Power, 10 Meters

N2IC	778,830
KVØQ	605,625
KY7M (@NA7TB)	500,040
K3EST	422,136
K4WI	400,890
KØAP	365,967
K6LL	342,240
K1JB	336,312
N1MM	319,347
N5TJ	275,946

Single Operator Unlimited, Low Power, 10 Meters

WF7T	313,938
W9XT	301,056
KB1EFS	172,710
VE1ANF	144,000
VA1CHP	112,050
VA3IPG	107,793
W1ZZ	98,532
KØKX	85,440
W8RKW	60,060
AC8CE	53,946

Single Operator Unlimited, QRP, 10 Meters

NØUR	61,770
K3TW	55,770
W4/DJØMY	39,690
VA3HY	4,554

Multioperator, Single Transmitter, High Power

K1LZ	10,386,360
W4RM	5,257,692
NY6DX	4,942,674
N4SS	4,488,750
K3ND	4,441,440
K8AZ	4,165,920
KQ3F	3,450,144
WW4LL	3,169,140
W3MF	2,778,135
N1BA	2,623,200

Multioperator, Single Transmitter, Low Power

W1FM	1,137,420
WA1F	1,000,620
W3ZGD	998,598
W1JSR	488,037
N8YXR	193,920
K1WAS	129,504
K4TG	124,278
K1RQ	61,341
W2ZJ	41,796
NØTJN	6,048

Multioperator, Two Transmitter

W3LPL	12,929,616
K9CT	8,923,200
W2PV	7,388,160
N2AA	7,075,908
K2AX	6,877,791
K9RS	6,472,890
KB4DX	5,503,302
KA1ZD	5,124,765
WG3J	4,297,110
W2CG	3,791,034

Multioperator, Multitransmitter

K3LR	18,463,860
K1TTT	11,226,831
WX3B	10,357,137
AA1K	6,949,908
NE3F	5,553,975
K1VR	2,865,288
N3DPB	2,112,096
K1KP	1,977,801
N2PA	1,374,600
VE6AO	478,860

Sponsored Plaque Winners

Thanks to the generous support of numerous clubs and individuals, we are pleased to list the winners of the sponsored International DX Phone Contest plaques below. For more information on plaque sponsorship or to order a duplicate plaque, contact the ARRL Contest Program at 860-594-0232 or **contests@arrl.org**. Plaques cost $95, which includes all shipping charges.

Winner	Plaque Category	Plaque Sponsor
CW Winners		
N5DX	W/VE Single Operator, High Power	Frankford Radio Club
N1UR	W/VE Single Operator, Low Power	The CW Operators' Club
W2FU	W/VE Multioperator, Single Transmitter, High Power	The CW Operators' Club
W3LPL	W/VE Multioperator, Two Transmitter	The CW Operators' Club
W3BGN	W/VE Single Operator, High Power 3.5 MHz	The CW Operators' Club
N2MF	W/VE Single Operator, High Power 14 MHz	The CW Operators' Club
CR6K (CT1ILT, op)	World Single Operator, Low Power	The CW Operators' Club
D4L (IK2NCJ, op)	World Single Operator, QRP	The CW Operators' Club
TO4A (VE3DZ, op)	World Single Operator Unlimited, High Power	The CW Operators' Club
VP9I (AB2E, op)	World Single Operator Unlimited, Low Power	The CW Operators' Club
KP2M	World Multioperator, Two Transmitter	Frankford Radio Club, K2TD, Memorial
OM2XW	World Single Operator, High Power 7 MHz	The CW Operators' Club
W1FJ	North America Single Operator, QRP	The CW Operators' Club
ZF1A	North America Multioperator, Single Transmitter	The CW Operators' Club
KP2M	North America Multioperator Unlimited	The CW Operators' Club
W9KM	Central Division Single Operator, Low Power	Society of Midwest Contesters
K9NW	Central Division Single Operator Unlimited, High Power	Society of Midwest Contesters
WE9R	Central Division Single Operator Unlimited, Low Power	Society of Midwest Contesters
AA9A	Central Division Multioperator, Single Transmitter	Society of Midwest Contesters
K1NY	Hudson Division Single Operator Unlimited, Low Power	Albany ARA — In memory of George Wilner, K2ONP
W2XX	Pacific Division Single Operator Unlimited, Low Power	J. P. Kleinhaus, W2XX
CR3DX (OM3RM, op)	Africa Single Operator	The CW Operators' Club
JE6RPM (JH5GHM, op)	Asia Single Operator, High Power	The CW Operators' Club
JH4UYB	Asia Multioperator, Single Transmitter, High Power	Yankee Clipper Contest Club
NP4Z	Caribbean Single Operator, Low Power	Frankford Radio Club, 9Y4VU, Memorial
LY9A	Europe Single Operator, QRP	The CW Operators' Club
ED7W (EB7A, op)	Europe Single Operator Unlimited, High Power	The CW Operators' Club
IO4X	Europe Multioperator, Single Transmitter	The CW Operators' Club
CR2N	Europe Multioperator, Two Transmitter	The CW Operators' Club
JI1RXQ	Japan Single Operator, Low Power	The CW Operators' Club
KH6J (N6TJ, op)	Oceania Single Operator	The CW Operators' Club
P44W (W2GD, op)	South America Single Operator	The CW Operators' Club
CW/Phone Combination Winners		
N1UR	W/VE Single Operator, Low Power Combined Score	Ellen White, W1YL, Memorial — ARRL Contest Branch
KE8RJU	W/VE Youth Overall Winner	Frankford Radio Club, W2OX, Memorial
Phone Winners		
N5DX	W/VE Single Operator, High Power	Frankford Radio Club
K1XM	W/VE Single Operator Unlimited, Low Power	Swamp Fox Contest Group — In memory of Marc Tarplee, N4UFP
V3O (DL8UD, op)	World Single Operator Unlimited, High Power	Charles Dietz, W5PR
W9RE	Central Division Single Operator, High Power	Society of Midwest Contesters
WD9CIR	Central Division Single Operator, Low Power	Society of Midwest Contesters
K9NW	Central Division Single Operator Unlimited, High Power	Society of Midwest Contesters
AJ9C	Central Division Single Operator Unlimited, Low Power	Society of Midwest Contesters
JH4UYB	Asia Multioperator, Single Transmitter, High Power	Yankee Clipper Contest Club
DU1EV	Oceania Single Operator, High Power 28 MHz	Ken Taylor, KH6QJ
T32AZ	Oceania Single Operator, High Power 3.5 MHz	Burton M. Parmeter, KG7MD, Memorial Award
KH7M (NA2U, op)	Oceania Single Operator, High Power	Albert Crespo, F5VHJ — In memory of Carl Cook, AI6V

The next ARRL International DX Phone Contest will be held March 1 – 2, 2025.

Full Results Online

You can read the full results of the contest online at **http://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.

Happenings

Hurricane Beryl Aftermath and Update

Remnants of Hurricane Beryl, which became a post-tropical cyclone as of the writing of this article, moved northeast with heavy rain and 35 mph winds. The storm was forecasted to move through Pennsylvania, upstate New York, northern New England, and Canada. Beryl was the fastest and earliest storm of the hurricane season, and during its 8-day run it left behind severe damage to the Windward Islands and Mexico before making landfall in Texas.

More than 7,000 residents in New York, Michigan, Pennsylvania, and New England lost power. Houston entered recovery mode after the core of Hurricane Beryl passed very close to the downtown area. Wind gusts of more than 80 mph caused power outages on a massive scale.

Amateur radio had been active since the early formation of the hurricane. The Hurricane Watch Net concluded operations for Tropical Cyclone Beryl on July 8, 2024, at 12:00 PM EDT (1600 UTC). Net Manager Bobby Graves, KB5HAV, said, "Solar activity was not kind to us over the past few days. Propagation on both 20 and 40 meters was horrible and iffy at times. But our dedicated team of operators banded closely together to get the job done."

"I've said this for many years, and it remains true to this day. We greatly appreciate the daily users and various nets who use 14.325.00 and 7.268.00 MHz for allowing us a clear frequency. It certainly makes our job easier, and I know those in the affected area appreciate it as well," added Graves.

The voice over IP (VoIP) Hurricane Net also secured operation on July 8 at 11:00 AM EDT as Beryl weakened to a tropical storm. The VoIP net fielded dozens of reports from online weather stations reporting wind gusts between 50 and 98 mph, with winds above 74 mph being hurricane-force wind gust criteria.

Director of Operations for the VoIP Hurricane Net Rob Macedo, KD1CY, reported, "We wish to extend a special thank you to the South Coast Reflector and amateur radio operator N6KNE (hopefully, we got that call sign correct) for allowing a connection into our net, where close to 10 amateur radio operators checked in and provided storm reports that were sent to WX4NHC." He added, "We would love to see more of this cooperation in the future with other parts of coastal areas threatened by hurricanes." WX4NHC is the amateur station at the National Hurricane Center in Miami, Florida.

The VoIP Hurricane Net also relayed reports of storm damage via social media and public safety radio feeds during the 9-hour net activation from 2:00 to 11:00 AM EDT.

Forecasters at the National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center predict above-normal hurricane activity in the Atlantic basin this year. NOAA's outlook for the 2024 Atlantic hurricane season, which spans from June 1 to November 30, predicts an 85% chance of an above-normal season, a 10% chance of a near-normal season, and a 5% chance of a below-normal season.

Celebrating Software-Defined Radio

At HAM RADIO 2024, the international amateur radio exhibition in Friedrichshafen, Germany, the Software Defined Radio Academy (SDRA) celebrated its 10-year anniversary. Founded in 2014, the SDRA has become a new platform for the exchange of knowledge surrounding software-defined radio (SDR). In the early years, the academy's lectures were recorded with primitive camera technology, but today, a video team takes the recordings to a completely different level. The SDRA's YouTube channel now has 150 uploads, 4,850 subscribers, and many more viewers.

The winners of the Ulrich L. Rohde Award, created in 2022 for innovative research in the field of SDR, were also announced:

- The GNU Radio project for its good software solutions for SDR technology. GNU Radio is a free software development toolkit that provides signal processing blocks to implement SDRs and signal-processing systems.
- The German Amateur Radio Club AJW team for the SDR questions in a new amateur radio questionnaire, and for the standardization of education. According to an X post by group leader Matthias Jung, DL9MJ, the team's work "focused on integrating SDR into the German amateur radio exam and educational materials."

- Rob Robinett, AI6VN, and Paul Elliott, WB6CXC, for their fundamental work and influence on scientific research in other areas.
- Christoph V. Wüllen, DL1YCF, and Laurence Barker, G8NJJ, for fundamental work on stations.

Dr. Ulrich Rohde, N1UL, is an avid amateur radio operator holding several licenses in the US and Germany. He has been licensed since 1956 and has received worldwide recognition for his involvement in technology and systems. In 2015, he won first place in the ARRL DX Contest in the Northern New Jersey Section. He also operates as N1UL/MM on his yacht, the *Dragonfly*, and he is Trustee of the Marco Island Radio Club, K5MI.

2024 ARRL Field Day Wrap-Up

The 2024 ARRL Field Day was successful despite severe weather and extreme temperatures impacting much of the country. Social media has hundreds of photos and stories from the US. As of the writing of this article, nearly 2,200 log entries have been received, with more arriving hourly.

ARRL member-volunteers on the Board of Directors, along with Section Managers and other Field Organization staff, fanned out to visit as many sites as possible in their areas.

Kenzie Denton, KO4GLN, is the Assistant Section Manager for Youth in the ARRL Virginia Section, and she was the 2023 winner of the Roanoke Division ARRL Service Award, the Division's highest honor. A junior at Old Dominion University (ODU) majoring in pre-med, she is president of the ODU Amateur Radio Club and undertakes many youth outreach initiatives. Her latest was a foxhunt aimed at encouraging girls to participate by using the legacy of Amelia Earhart as inspiration. The Williamsburg Area Amateur Radio Club (WAARC) is known for having a high percentage of active woman members.

Denton and her mother, Nicole, made 62 pennants to memorialize Silent Key members of WAARC. The pennants were strung on two lines that hung adjacent to the park shelter where the club was operating for category 3A. It took about 30 minutes to make each pennant, and the collection will remain a fixture for future club events.

ARRL Treasurer John Sager, WJ7S, joined the Utah Valley Amateur Radio Club (UVARC) at their Field Day operation in Trout Creek, Utah. "I joined what was supposed to be a three-man team of CW operators: John Mitton, KK7L; Ralph Nunn, K7RLN, and me...as a 3A station operating under the UVARC call sign, K7UVA," said Sager. "We were joined by Forrest Stephenson, KI7QCF, a fairly new CW operator and Parks on the Air activator, who wanted to see our CW effort in action. We ended up making about 500 CW 3A [contacts] during Field Day for the K7UVA effort."

Assistant Section Manager for Youth of the ARRL Virginia Section Kenzie Denton, KO4GLN. [Bill Morine, N2COP, and Jim Boehner, N2ZZ, photo]

The Trout Creek, Utah, ARRL Field Day operating site. ARRL Treasurer John Sager, WJ7S, is operating next to the RV. [John Mitton, KK7L, photo]

International Amateur Radio Union Secretary Joel Harrison, W5ZN (background), and ARRL Delta Division Director David Norris, K5UZ (foreground), operating for ARRL Field Day with the North Central Arkansas Amateur Radio Service in Searcy, Arkansas. [David Norris, K5UZ, photo]

ARRL Hudson Division Vice Director Ed Wilson, N2XDD, drove a total of 947 miles to visit 18 different Field Day sites within the Division. He started by visiting the Warren County (New York) Radio Club. After a last-minute cancellation of their original site, they quickly secured a new location in Lake George, New York. "It was great visiting all of the clubs and speaking about my passion for bringing more clubs together on joint efforts, as well as my strong beliefs on increasing education outreach within the hobby," said Wilson. "Along the way, I got to meet various club officials and members, listening to their concerns and sharing my visions for the future. I was also able to meet 10-year-old Michael Jones and his 12-year-old brother, Zaydin Jones, grandchildren of April MacMurray, WU2BBY, at the Schenectady Curling Club joint site. On Long Island, at the Long Island Mobile Amateur Radio Club site, I met two more kids, Aiden Reiter, KE2BXH, and Caleb Sullivan, who were busy making contacts when I arrived."

Colorado Teacher and Ham Accepted to the Albert Einstein Distinguished Educator Fellowship Program

Dara Gardner, KF0NIX, a member of the Pikes Peak Radio Amateur Association (PPRAA), has been accepted to the Albert Einstein Distinguished Educator Fellowship (AEF) Program. The AEF Program provides a unique opportunity for accomplished K–12 educators in the fields of science, technology, engineering, and mathematics (STEM) to serve in the national education arena.

"It's pretty exciting," said Gardner. "I'm overwhelmed and honored. I've known about the Einstein program for a few years. The program invests a lot in the teachers, but the teachers get back tremendous amounts of professional development. It's also exciting that a person like me can have their voice heard on Capitol Hill." Gardner added that she is still learning how the whole process works, but she wants parents to have a choice in their childrens' education and to better prepare students for the workforce.

As an AEF Fellow, Gardner will serve on the House Committee on Education and the Workforce in Washington, DC. Her 11-month assignment began on August 19 and will run until July 2025.

Gardner is a teacher at the Thrive Home School Academy and helped establish a special program with Amateur Radio on the International Space Station, which brought shuttle astronaut General (Ret.) Kevin Chilton and shuttle and ISS astronaut Lieutenant General (Ret.) Susan Helms, KC7NHZ, to Harrison High School in Colorado Springs, Colorado. The highlight of the program was an amateur radio contact with astronaut Jeanette Epps on April 22, 2024, as the ISS passed over Stratton Meadows Elementary School.

Public Information Coordinator of the ARRL Colorado Section and member of PPRAA John Bloodgood, KD0SFY, said Gardner is highly motivated and very energetic when it comes to working on STEM activities. "She's a dedicated teacher and completed the ARRL Teachers Institute, and [she] brings a wealth of knowledge to the classroom," he added.

For more information about the AEF Program, visit **https://science.osti.gov/wdts/einstein.**

Contest Corral September 2024

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	1700	2	0300	All, no WARC	Tennessee QSO Party	CW Ph Dig	RS(T), TN county or SPC	**tnqp.org**
2	1900	2	2030	3.5	RSGB 80m Autumn Series, SSB	Ph	RS, serial	**www.rsgbcc.org**
2	2300	3	0300	1.8-28,50	MI QRP Labor Day CW Sprint	CW	RST, SPC, mbr or pwr	**www.miqrp.net**
3	0000	3	0200	3.5-28	ARS Spartan Sprint	CW	RST, SPC, pwr	**ars-qrp.com**
4	2000	4	2100	3.5	UKEICC 80m Contest	Ph	6-char grid	**www.ukeicc.com**
5	0000	6	0300	7	Walk for the Bacon QRP Contest	CW	RST, SPC, name, mbr or pwr; 13 WPM max	**qrpcontest.com**
5	1800	5	2200	28	NRAU 10m Activity Contest	CW Ph Dig	RS(T), 6-char grid	**nrau.net**
7	0000	8	2359	1.8-28	All Asian DX Contest, Phone	Ph	RS, 2-digit age	**www.jarl.org**
7	0600	7	0800	7,14	Wake-Up! QRP Sprint	CW	RST, serial, suffix of previous QSO	**qrp.ru**
7	0800	8	1000	50,144,432	SARL VHF/UHF FM Contest	Ph	RS(T), 6-char grid	**www.sarl.org.za**
7	0800	8	1000	1.8-28	SARL Field Day Contest	CW Ph Dig	RS(T), # of rigs, category, province or "DX"	**www.sarl.org.za**
7	1300	8	1259	1.8-28	IARU Region 1 Field Day, SSB	Ph	RS, serial	**www.darc.de**
7	1300	8	1300	3.5-28	RSGB SSB Field Day	Ph	RS, serial	**www.rsgbcc.org**
7	1400	7	2200	3.5-28	Ohio State Parks on the Air	Ph	OH park abbreviation or SPC	**ospota.org**
7	1400	8	1400	145	IARU Region 1 145 MHz Contest	CW Ph Dig	RS(T), serial, 6-char grid	**www.iaru-r1.org**
7	1600	7	1900	7	AGCW Straight Key Party	CW	RST, serial, class, name, age	**www.agcw.de**
7	2000	7	2359	1.8-28	CWOps CW Open	CW	serial, name	**cwops.org**
7	2000	8	2000	3.5	PODXS 070 Club Jay Hudak Memorial 80m Sprint	Dig	RST, SPC	**www.podxs070.com**
8	0000	8	0359	3.5-14	North American Sprint, CW	CW	Other's call, your call, serial, name, SPC	**ncjweb.com**
8	1000	8	1400	144	WAB 144 MHz QRO Phone	Ph	RS, serial, WAB square or country	**wab.intermip.net/Contests.php**
9	0000	9	0200	1.8-28	4 States QRP Group Second Sunday Sprint	CW Ph	RS(T), SPC, mbr or pwr	**www.4sqrp.com**
9	1900	9	2300	144	144 MHz Fall Sprint	CW Ph Dig	4-char grid	**www.packratvhf.com**
11	1900	11	2030	3.5	RSGB 80m Autumn Series, CW	CW	RST, serial	**www.rsgbcc.org**
14	0000	15	2359	3.5-28	WAE DX Contest, SSB	Ph	RS, serial	**www.darc.de**
14	1500	14	1900	3.5-14	Africa FT4 DX Contest	FT4	Signal report, 4-char grid	**www.sarl.org.za**
14	1800	16	0259	50 and up	ARRL September VHF Contest	CW Ph Dig	4-char grid	**www.arrl.org/september-vhf**
15	0000	15	0359	3.5-14	North American Sprint, RTTY	Dig	Other's call, your call, serial, name, SPC	**ncjweb.com**
15	1700	15	2059	3.5-28	BARTG Sprint PSK63 Contest	PSK63	Serial	**bartg.org.uk**
15	2300	16	0100	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or pwr	**qrpcontest.com**
16	1900	16	2030	3.5-28	RSGB FT4 Contest	FT4	Signal report	**www.rsgbcc.org**
17	1900	17	2300	222	222 MHz Fall Sprint	CW Ph Dig	4-char grid	**www.packratvhf.com**
19	0000	20	0300	14	Walk for the Bacon QRP Contest	CW	RST, SPC, name, mbr or pwr; 13 WPM max	**qrpcontest.com**
19	0030	19	0230	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or pwr	**naqcc.info**
19	1900	19	2000	3.5-14	NTC QSO Party	CW	Max 25 WPM; RST, mbr or "NM"	**pi4ntc.nl**
20	1600	20	1700	3.5	AGB NEMIGA Contest	CW Ph Dig	RST, serial, mbr (if any)	**ev5agb.com**
21	0000	22	2359	2.3 GHz and Up	ARRL EME Contest	CW Ph Dig	See rules	**www.arrl.org/eme-contest**
21	0900	23	0759	10 GHz to light	ARRL 10 GHz and Up Contest	CW Ph Dig	6-char grid	**www.arrl.org/10-ghz-up**
21	1200	22	1200	3.5-28	Scandinavian Activity Contest, CW	CW	RST, serial	**www.sactest.net**
21	1400	22	0159	3.5-28	New Jersey QSO Party	CW Ph Dig	RS(T), NJ county or SPC	**www.k2td-bcrc.org**
21	1400	22	0200	All, no WARC or 60	Iowa QSO Party	CW Ph Dig	RS(T), IA county or SPC	**www.w0yl.com**
21	1400	22	2000	All, no WARC	Texas QSO Party	CW Ph Dig	RS(T), TX county or SPC	**www.txqp.net**
21	1600	21	2300	All, no WARC	Wisconsin Parks on the Air	CW Ph Dig	WI park number or SPC	**wipota.com**
21	1600	22	2200	3.5-28	New Hampshire QSO Party	CW Ph Dig	RS(T), NH county or SPC	**www.w1wqm.org**
21	1600	22	2359	1.8-28,50	Washington State Salmon Run	CW Ph	RS(T), WA county or SPC	**salmonrun.wwdxc.org**
25	1900	25	2300	432	432 MHz Fall Sprint	CW Ph Dig	4-char grid	**www.packratvhf.com**
25	2000	25	2100	3.5	UKEICC 80m Contest	CW	6-char grid	**www.ukeicc.com**
26	1900	26	2030	3.5	RSGB 80m Autumn Series, Data	Dig	RST, serial	**www.rsgbcc.org**
28	0000	29	2359	3.5-28	CQ Worldwide DX Contest, RTTY	Dig	RST, CQ zone, (US/VE state/prov)	**www.cqwwrtty.com**
28	1200	29	1200	1.8-28	Maine QSO Party	CW Ph	RS(T), ME county or SPC	**www.ws1sm.com**
28	1400	28	2200	3.5-28	Masonic Lodges on the Air	Ph	Lodge name, lodge no., jurisdiction or SPC	**cqmorelight.com**
28	2000	29	2359	1.8-14,28	AWA Amplitude Modulation QSO Party	Ph	Name, SPC	**antiquewireless.org**
29	0700	29	1000	50	UBA ON Contest, 6m	CW Ph	RS(T), serial, ON (for ON)	**www.uba.be**

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.*

Rick Palm, K1CE, k1ce@arrl.net

Public Service

Meet KPARN Volunteer Coordinator Duane Mariotti, WB9RER

Duane Mariotti, WB9RER, is veteran volunteer coordinator of the well-known, well-respected Kaiser Permanente Amateur Radio Network (KPARN; **www.kparn.org**) in southern California. He is an electrical engineer, specializing in biomedical integration, and has been involved in emergency communications for almost 30 years as an engineer, responder, and policy leader in various roles.

Following the events of September 11, 2001, he served on several state and national committees working to improve hospital emergency preparedness and communications systems, and published works on these topics. Most recently, Duane was a Clinical Engineer for Kaiser Permanente, integrating patient safety initiatives and medical technology in new facilities.

KPARN is comprised of radio amateurs who serve hospital emergency preparedness and response by providing redundant communications systems, or multiple backup communication modalities. It serves five counties in southern California and, along with similar amateur radio organizations, such as Western Washington Medical Services Emergency Communications and the South Carolina Healthcare Emergency Amateur Radio Team, serves as a model program from which other groups can glean best practices and technical operational details to improve their internal planning and response.

KPARN-supported hospitals have dedicated amateur radio stations installed near the hospital emergency operations centers. Each station has multiple single-band Alinco radios with dedicated antennas operating on 2 and 6 meters, as well as 220 and 440 MHz. A few locations have roll-out portable setups, and there are go-box portable systems that can be deployed in the field. Some hospital stations in the Los Angeles and San Diego areas also have HF radios, primarily to augment communications between these areas, where VHF and UHF repeaters may be out of range.

I reached out to Duane to find out more about his experience, as well as KPARN.

KPARN Volunteer Coordinator Duane Mariotti, WB9RER. [Photo courtesy of WB9RER]

Q How did your professional experience with hospital emergency preparedness, medical technology, and public safety communications dovetail with your KPARN management role?

A It was a natural fit. In college, I combined my coursework with amateur radio. I already had an interest in being a first responder, and my coursework led me to biomedical electronics. I also earned my EMT certification and worked for the local ambulance service, while actively participating with the local ham club to relocate repeaters and participate in public service work. Eventually, these two things merged, and I found that on an ambulance at a public service event, I could be an unpaid radio operator assigned to the ambulance and also be an EMT.

At that time, interoperability wasn't really a thing, but I upgraded the single-channel ambulance radio to three channels and four tones, so we could talk to hospitals, county sheriffs, and the state police station. It turned out that police officers, firefighters, and EMS relied on radios, but had little knowledge of how the radio system worked.

When I landed my first job in a hospital, I found RF knowledge to be helpful with understanding operating room equipment (and RF noise), as well as getting portable radios to work better in the building. My electrical and amateur radio education and practical experience, combined with book knowledge, turned out to be of great value in planning, building, and inspecting new hospital facilities.

While working at a hospital, I earned my paramedic certification, and my knowledge base of medical and amateur radio information helped me gain acceptance in those communities. I assisted with regional hospital disaster drill planning, emergency preparedness, and the design and implementation of regional and statewide (State Department of Public Health) hospital-specific radio communication systems. While at the University of Washington Harborview Medical Center in Seattle, which functions as Disaster Medical Hospital Control (DMHC) for all King County hospitals, I was the Emergency Preparedness Liaison. I was responsible for DMHC functions and interfacing with other agencies for emergency preparedness planning, drills, and event executions. This kind of experience led me to using amateur radio for critical hospital preparedness and functioning in natural or manmade disasters and ultimately, with KPARN.

Q Has other experience played a role in your pursuit of using amateur radio as a hospital disaster resource?

A Yes. I coordinated numerous mass casualty incidents and drills with city and county agencies in Washington. I've served on the Seattle Local Emergency Planning Committee, Central Region EMS and Trauma Council, King County Hospital Disaster Committee, Washington State Hospital Bioterrorism Oversight Committee, and various committees related to hospital disaster planning for the US Department of Health and Human Services.

Q Does KPARN hold training nets and/or drills?

A Yes. KPARN net control stations conduct a monthly drill with a 6-meter command net, followed by a net on 40 meters. KPARN members are encouraged to attend community events that promote emergency preparedness and the KPARN mission.

Q Can you tell us about the KPARN training regimen?

A Members must sign the KPARN Member Expectations document and complete six mandatory courses, which include the FEMA Independent Study courses on the Incident Command System (ICS), as well as the Introduction to the California Standardized Emergency Management System. These courses provide the fundamental knowledge necessary to understand the emergency management environment. Other courses include the Volunteer Amateur Radio Operator Hospital Orientation and the Health Insurance Portability and Accountability Act (HIPAA) Privacy Training. These courses are necessary for amateur radio operators to successfully work in the California hospital environment.

Q Are there any additional resources or requirements for new KPARN members?

A There's a required reading list for new members, including "When Hospitals Respond to Disasters" and the "LA County Health Amateur Radio Policy," among others. New operators also receive a KPARN Technical Orientation, KPARN organizational documents, and an introduction to KPARN and the relevant ICS forms.

Q What kind of disaster or emergency response is likely to involve KPARN activations?

A Fortunately, the number of events requiring KPARN activation are few. Southern California doesn't have regular severe weather events like tornadoes and hurricanes, so our primary response plan revolves around responding to earthquakes. Therefore, most of KPARN's activities are drills and training that are local, regional, and statewide such as the annual Great California ShakeOut earthquake drills.

Our activations have generally been large-area utility failures that affect only a couple of hospitals over our five-county coverage area, which is approximately the size of Indiana.

Q KPARN places high value on volunteers recording their volunteer hours. Why is that?

A KPARN needs to track its efforts to justify support and funding. The hours reported must be accurate and consistent with the KPARN mission.

It's amazing the number of hours members spend interfacing with local emergency managers, testing and programming radios, with web programming, and implementing and documenting business practices. Participation in KPARN is much more than push-to-talk.

Club Station

Fostering Club Partnerships with Dual Field Days

Field Day isn't just a June event, at least as far as one southern Illinois club is concerned. Since 2019, the Southern Counties Amateur Network (SCAN) has held a second Field Day every fall. In this month's column, SCAN member Buddy Adelsberger, K9BJA, shares why they started a second Field Day and how it differs from ARRL's annual June event.

SCAN's fall Field Day grew from several years of cooperation with the Shawnee Amateur Radio Association (SARA). Both clubs have operated at the Saline County State Fish and Wildlife Area at the Glen O. Jones Lake campground in southeastern Illinois during ARRL Field Day for years. This location is a bottomland along the Saline River and the hills that border the Shawnee National Forest. The campsite itself is primitive — no electricity, running water, or modern restrooms. This allows amateur radio operators to experience setting up under conditions that they could find in an emergency, where they must supply all the basics, like food, water, power, etc.

Because that site works so well for the June Field Day, we thought it would also be a good place for our fall Field Day. Despite being held at the same location, the June event is often a competitive one, with clubs and operators wanting to rack up points and make lots of contacts. SCAN President Roy Glasscock, KB9ORF, describes fall Field Day as being more educational, making it "more relaxed and giving us an opportunity to schedule classes ranging from antenna construction to digital communications without interfering with [the competitive nature of June Field Day]."

The 2022 fall Field Day drew radio operators from several local clubs. Some arrived early to camp out, work on their radios and antennas, and be off the grid for most of the week. Roy gave tours to visitors, provided radio demonstrations, and discussed his solar system, which powered many of the trailers, tents, radio equipment, and lights at the campsite. Radio stations were operational with antennas in nearly every tree; ground-mounted antennas were also used. Members operated CW and phone on HF, VHF, and UHF.

A local Boy Scouts of America troop working toward their radio badges at one of SCAN and SARA's fall Field Days.

A Focus on Education

SCAN's main goals for Field Day (ARRL Field Day and our fall Field Day) are having fun, sharing knowledge, and learning. We also like to extend an invitation to non-hams who are camping in the area to see what we're doing and introduce them to amateur radio.

SCAN makes both of our Field Days open to everyone, including kids, but our fall Field Day has proven to be a great opportunity to promote the hobby, especially to young people. At our fall 2020 event, an entire local Boy Scouts of America troop came out to earn their radio badges. ARRL Illinois Section Manager Thomas Beebe, W9RY; the troop's Scout Leader Shawn Banks, K9PWW, and a couple of other radio operators provided a class on the fundamentals of amateur radio operations. "Afterward, each Scout made a radio contact using HF, VHF, and UHF," Roy said. "It was rewarding all around — 10 Scouts earned their radio badge."

We also provide VE testing at both Field Days for those who want to earn their license or upgrade their current one.

Shared Benefits

An advantage of having a second Field Day in the fall is that it gives clubs another opportunity to highlight amateur radio to the public. "When people see the banners and multiple antennas strung in trees and

During SCAN and SARA's fall Field Day, participants often set up near one another to create a communal area. Each night often ends with dinner around a campfire — SCAN member Bill Killion, KD9IWV, volunteers to cook.

ground-mounted on poles, there's a natural curiosity as to what is going on," Thomas added. "Operating our Field Days — particularly in a public campground surrounded by vacation campers — twice a year is a great way to generate interest in amateur radio."

In addition to drawing the public's attention, SCAN and SARA cast a wide net when it comes to inviting amateur radio operators to participate in their June and fall Field Day activities. Several members of SCAN and SARA are members of other local clubs, and some even serve as club officers.

SCAN visits local radio clubs to share information and coordinate radio nets and events. These relationships are more than an exchange of ideas and skills; SCAN and SARA also have linked repeaters that cover a huge area from Missouri to Indiana and Kentucky and are used for general contacts and storm spotting by the Illinois District 11 Amateur Radio Emergency Service® (ARES®) group (which covers the bottom 11 counties in Illinois), and they're used for public service events like the annual River to River Relay, an 80-mile course that spans the Mississippi River to the Ohio River. Clubs from across the area also provide communications for the 100-mile Shawnee Hills Trail Race through the Shawnee National Forest.

Our fall Field Day provides a broad setting for local clubs and individual hams to discuss and learn more about amateur radio. In addition to the traditional Field Day communications focus, the event provides an informal setting for club meetings, discussions on the role of and relationship between amateur radio and the National Weather Service, storm spotting, ARES training, and interactions with local emergency training agency officials (something not normally offered in June).

"We get together in times of non-emergency and stress-free situations and let our members' knowledge and expertise shine," Roy said. "Then, during emergencies and high-stress situations, we know who to count on for any particular task that may be required by the professional agencies that we serve."

In Conclusion

The turnout for the first fall Field Day was small, with several radio amateurs camping out for up to a week. Since then, it's grown rather quickly. Recently, there were at least 10 to 15 participants who came in their trailers or campers, showing off their radio trailers and portable radio setups. The event has also developed into an unofficial hamfest. If hams have extra gear to sell, our fall Field Day is a good place to offer equipment to other radio enthusiasts.

"The informality of an event like this works to solidify why ham operators enjoy their hobby, right down to the informal supper and conversation around a campfire and the challenge of operating in an open environment," Roy said. "The satisfaction of holding Field Day twice a year works for us — you just can't beat it."

All photos by the author.

Write for "Club Station"

QST's "Club Station" column is a designated space for clubs to share specific and practical ideas about what has contributed to their success, in the hope that the information will help other clubs grow and thrive. Visit **www.arrl.org/qst-club-station-guidelines-and-profile-form** for more information, including author guidelines and a Club Profile Form (this form is required in order for "Club Station" submissions to be considered complete).

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 July 11, 2024.

Renewing SSCs

Nellis Radio Amateur Club, KC7TMC	Las Vegas, NV
Shreveport ARA, K5SAR	Shreveport, LA
Delaware Valley Radio Association, W2ZQ	West Trenton, NJ

Steve Goodgame, K5ATA, sgoodgame@arrl.org

Ham Media Playlist

Portable Antenna Projects

With the weather beginning to cool off enough to make the outdoors more inviting, one can't help but consider portable operating. Keeping things compact and lightweight is an important factor to consider. Because I am gearing up for some fall POTA activations, I thought I would delve into some portable antenna projects on YouTube.

Many hams find it rewarding to build a piece of equipment and get it on the air. It's tremendously satisfying to turn a box of parts into a completed, functioning project, so I thought I'd look around and choose my next build.

Ham Radio Tube

With 10 meters being a favorite band right now, I decided to look at some options for a wire antenna. Yes, I know how to build one, but I always like to watch a few videos just to see how other hams do things. One great video I found was at Ham Radio Tube (**www.youtube.com/@hamradiotube**). "DIY 10 Meter Dipole For Under $10" (**https://tinyurl.com/10-M-Dipole**) combines not only an easy-to-build antenna, but also the ability to do it very inexpensively.

Mike, K8MRD, explains the equipment and materials needed and where to get them. He then steps viewers through the actual build process. Even though he takes the time to stop and explain why he is taking various steps, Mike quickly gets viewers to the completed antenna and shows how to deploy it. With the video being targeted at Technician-class operators, the antenna was built for the Tech portion of the 10-meter band. Mike also shows how to tune the antenna in the field. The editing of the video helps to keep this section short.

Mike, K8MRD, tests the SWR of his newly constructed antenna.

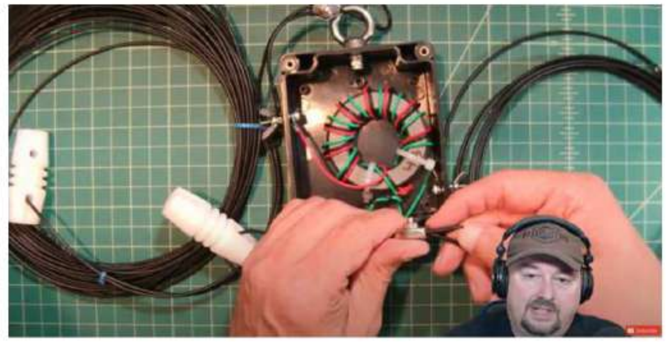
Coastal Waves and Wires

Next, I headed over to Salty Walt's, K4OGO, channel, Coastal Waves and Wires (**www.youtube.com/@COASTALWAVESWIRES**; see the Ham Media Playlist column in the June 2024 issue for more information about this channel). Walt posts a lot of videos of him operating from beaches. Walt starts his video titled "Top Ten Wire Antennas for HF Ham Radio" (**https://tinyurl.com/Wire-Antennas**) by saying he is making it in response to questions and comments he received on a previous video. He enjoys responding to viewers, and this video is evidence of that. Walt steps viewers very quickly through some relatively basic wire antennas. He doesn't get into the nitty gritty of the build, instead opting to give a brief description of each antenna, a general use case, and a picture of it deployed. While not all of the antennas are lightweight and compact, the video shows a great variety of what can be done, serving as a catalyst to get us thinking about ideas to build something on our own.

Mike, K8MRD, demonstrates how to build your own antenna insulator.

Salty Walt, K4OGO, shows one of his favorite portable antennas.

Salty Walt, K4OGO, shows the small size and compactness of one of his favorite portable antennas.



Ape demonstrates how to build an end-fed half-wave antenna.

TheSmokinApe

A trip down the YouTube antenna-building rabbit hole would not be complete without stopping by TheSmokinApe's channel (**www.youtube.com/@TheSmokinApe**). In Ape's video titled "DIY 9:1 Unun End Fed Random Wire Antenna for Ham Radio" (**https://tinyurl.com/Unun-End-Fed**), he starts out by explaining basic terminology. In an avocation that is full of abbreviations and acronyms, this is a step that many YouTubers leave out, to the chagrin of viewers.

Ape then goes on to explain why one might choose this antenna, discussing the low cost and ease of build. He shows some options to deploy the completed antenna, explaining that the ease of use while operating is key, eliminating the need to manually adjust the antenna. He makes sure to discuss some of the potential disadvantages, equipping viewers to make an educated decision prior to building one.

Ape then goes through the process of building the antenna. As is typical of TheSmokinApe's videos, he shows each step in detail and explains the reasoning behind what he is doing. Viewers are shown the entire process of building the antenna and toroid, preparing the enclosure, and displaying the finished results.

There are thousands of antenna-building videos available on YouTube. The beauty of using the platform as a learning tool is that you can tailor what you watch for your personal preferences. No matter what part of amateur radio you are interested in, the odds are there are many videos catering to your interest. Head over to YouTube now, fall down a rabbit hole, and learn something about amateur radio.

New Products

COMPACtenna 20/40 Micro HF Antenna

The new revolutionary COMPACtenna is a compact antenna ideal for condos and other HOA-restricted areas. Designed for the 20- and 40-meter HF bands, it is 10 inches long and weighs only 2.5 pounds.

Its plug-and-play design allows you to connect it right to your radio or coaxial lead and operate in seconds. It does not require a ground plane or counterpoise system.

Place the antenna one or two floors above ground level, such as in an attic. It can also be placed outside, on or in a wooden, fiberglass, PVC, or other structure made of non-RF-interacting material. The new COMPACtenna 20/40 Micro HF Antenna is available from **www.COMPACtenna.com** and other retailers.

How's DX?

6O — Somalia

Somalia is divided into seven federal member states, which are apportioned into 18 regions and multiple districts. The federal states are Puntland, Jubaland, Galmudug, Khatumo, South West, Hirshabelle, and Somaliland. The capital of Somalia is Mogadishu, which has a population of about 2.6 million people. Somaliland is in the northwest part of Somalia, just south of the Gulf of Aden and bordering Djibouti and Ethiopia. In May 1991, Somaliland, whose capital is Hargeisa, claimed independence. In recent years, multiple DXpeditions have taken place from the western regions of Somaliland, where it is much safer than other regions of the country.

Abraham Moyo, 7Q4AM (left); Urgent Jere, 7Q6UJ (middle), and Blessings Msimuko, 7Q5BM (right), are three of Malawi's newest ham radio operators. [Don Jones, 7Q6M, photo]

6O3T DXpedition

In December 2023, a group from Italy announced plans for a 2024 DXpedition to Somalia. These are the teammates who brought you TY1KS, D64K, and XR0ZR. This DXpedition was planned for early 2024, but it has been pushed to September. Their initial press release indicated a "focus on the low bands and 6 meters" using SSB, CW, and digital modes on 1.8 – 50 MHz, including 60 meters (5 MHz). In January, the team announced their plans on Facebook (**www.facebook.com/Dxexplorernet**) to go to Somaliland using the call sign 6O3T, with the exact dates to be announced later due to safety concerns.

Currently, Somalia ranks number 46 on Club Log's DXCC Most Wanted List. The last DXpedition to Somalia took place in 2019 and was conducted by Ken Opskar, LA7GIA, who operated as 6O7O. Around that same time frame, Ali Solhjoo, EP3CQ, was working for the United Nations in Mogadishu and was active in his spare time as 6O1OO. There are no resident amateur radio operators in Somalia at present, although Alex Alessandro, IT9HRK, occasionally operates as T5/IT9HRK from the capital.

This past April, the 2024 6O3T team announced that their operators would include Fabri, IV3JPP; Paolo, IV3DSH; Frank, IZ8GCE; Maurizio, IV3ZXQ; Mauro, IV3AZV, and a yet-to-be-announced "young operator." They also created a website at **www.dxexplorer.net**. A few weeks later, the team announced their young operator will be Kris Misa, YL3JA, from Latvia, and they also revealed that the DXpedition would take place in fall 2024.

The 6O3T team plans to operate from Hargeisa in Somaliland. They will be operating for 15 days from a safe compound sometime in September; watch your favorite DX outlet for exact dates as September approaches. Plans are to have three Yaesu FT**DX**10s, two FT-991 rigs, two SPE 1.5Ks, and other LDMOS amplifiers. They will also have two Spiderbeams, one hexbeam, verticals for the low bands, and a seven-element Yagi for 6 meters. In addition, they expect to have a beacon running on 6 meters.

CY9 — St. Paul Island

The Canadian St. Paul Island is located some 24 kilometers (15 miles) northeast of Cape Breton Island and 71 kilometers (44 miles) southwest of Newfoundland (VO1). The island is 4.8 kilometers (3 miles) long and 1.6 kilometers (1 mile) wide with the highest point, Crogan Mountain, being 147 meters (482 feet) high.

St. Paul Island was not on the original postwar DXCC list but was added to the list in 1976 under what was then the Point 3 criteria (separation by foreign land). Point 3 stated, "Where foreign territory divides a country, there will be a minimum distance of 75 miles of foreign land separating the two areas or places in question. In the case of island groups this distance requirement does not apply."

Contacts made with St. Paul Island on or after November 15, 1945, would count as a new DXCC country. The first operation there was by VE1UC in 1949. At the time (1976) that St. Paul was added to the ARRL DXCC Country List, the prefix was VY0. In the early 1980s, the prefix was changed to CY0, but it was

Blessings Msimuko, 7Q5BM, operating FT8 from Malawi. He can also be found operating SSB. [Don Jones, 7Q6M, photo]

changed to CY9 shortly after and has remained as such ever since.

CY9C DXpedition

In April 2023, Murray Adams, WA4DAN, who led the very successful March 2023 CY0S DXpedition to Sable Island, announced that the team's next project would be to once again activate CY9C from St. Paul Island — this time from August 26 to September 5, 2024. They will be using a boat and two helicopters to transport equipment and operators. Plans are to be active on 160 – 6 meters on SSB, CW, FT8, and RTTY, along with satellite and Earth-moon-Earth activity. This "tent-and-generator DXpedition" will count for not only DXCC, but also Parks on the Air (CA-0122) and Islands on the Air (NA-094). Additionally, it will count as a lighthouse (STP-002).

The team will include Jay, K4ZLE; Craig, K9CT; Mike, K9NW; Pat, N2IEN; Lou, N2TU; Dan, W4DKS; Glenn, W0GJ; Larry, W0PR; Murray, WA4DAN, and Lee, WW2DX. St. Paul Island currently ranks number 52 on Club Log's DXCC Most Wanted List. It's number 22 in Asia, 26 in Oceania, and 41 in Africa. The team has a very helpful website (**www.t-rexsoftware.com/cy9c**) with many details.

7Q — Malawi

There are now eight amateur radio operators in Malawi (7Q). The three latest additions are teenage Malawian nationals. 7Q5BM (**www.qrz.com/db/7q5bm**) is 16-year-old Blessings Msimuko (aka KC3ZHE), 7Q6UJ (**www.qrz.com/db/7q6uj**) is 17-year-old Urgent Jere (aka KC3ZHC), and 7Q4AM (**www.qrz.com/db/7q4am**) is Abraham Moyo (aka KC3ZHD), who is also a teenager. All three were trained by Don Jones, K6ZO (aka 7Q6M). They were first licensed under the Volunteer Examiner Coordinator program, which qualified them for 7Q licenses. Some countries do not provide ways to take the tests and get licensed, but they often allow those who have a US license to get a respective license for said country. "These youngsters will be participating in contest activities," said Don. The three fledgling teens expect to attend the Youngsters On The Air Camp being held in Prague, Czech Republic, on August 16 – 23. Travel arrangements were made thanks to a grant by the Yasme Foundation.

Quick Bits from Around the Globe

Rikk, WE9G, plans to be active from Futiga, American Samoa, as WE9G/KH8 on August 15 – 29. Alan, VK1AO, will be back in East Timor as 4W/VK1AO from August 19 to September 4. Yann, F1SMB, plans to be back in the French Polynesian Islands as FO/F1SMB from August 15 to September 15, with stops in Tahiti (OC-046), Fakarava (OC-066) Tahaa (OC-067), and Moorea (OC-046). Listen for him on SSB and FT8 on 40, 20, 17, 15, 10, and 6 meters.

Take, JG8NQJ (JG8NQJ/JD1), should be ending his work assignment on Minami Torishima around September 20. He's mostly on CW on 17 and 15 meters. Adam, M6NXW, will be visiting family in Kumasi and Accra, Ghana, and operating low power in his spare time as 9G5AS between August 26 and September 4.

HA5AO will be on an African tour with stops in Zimbabwe (Z22AO) on September 3 – 13, Zambia (9J2AO) on September 14 – 23, Botswana (A25AO) on September 24 – October 4, and Namibia (V51/HA5AO) on October 5 – 14. Visit his website at **www.ha5ao.com/index.php/dxpeditions/africa-tour-2024/africa-tour-2024**.

Last but not least, Vlad, OK2WX, is planning to be active as 5H1WX from Mafia Island (AF-054), Tanzania, from September 17 to October 8 (**www.mdxc.support/5h1wx/2024/06/17/hello-world**).

Wrap-Up

That's it for this month, with thanks to IV3JPP, K6ZO, WA4DAN, and The Daily DX for helping to make this month's column possible. I hope to see many of you at this year's W9DXCC on September 13 and 14. Don't forget to send your DX news, photos, and club newsletters to **bernie@dailydx.com**. Until next month, see you in the pileups! — *Bernie, W3UR*

The World Above 50 MHz

E51EME South Cook Islands

Bob Sutton, ZL1RS, operated from the South Cook Islands on 6 meters on June 8 – 24, 2024, as E51EME. Despite this being a less-than-optimal season to work North America and Europe from the South Pacific — and a lackluster, uneven North America sporadic-E season — Bob was very successful. His first opening to North America was on June 12 when he worked N9PGG. Later, he logged UN3G via transequatorial propagation (TEP). The next morning, he had W4, W5, W8, W9, and WØ stations in for nearly 4 hours. On June 13, he worked northeast stations as far as K1TOL in Maine. The next day, Mike, KMØT (EN13), put E51EME in his log despite his computer trying to do a Windows update in the midst of the contact. Jim, K5ND (EM12), and Rich, K1HTV (FM18), worked E51EME on June 17. On June 18, Bob noted a flurry of W8 and W9 stations in, as well as a few WØs. Phil, NØPB (EM39), logged Bob at 2242 UTC. Phil noted that E51EME was in for almost an hour. Bob made a contact with a station in Ireland at 15,600 kilometers away, and he worked KJ9I on Earth-moon-Earth. E51EME had a PSK flag from CU2DX on June 22, but CU2DX was not at the radio. Bob ended up with more than 1,000 6-meter contacts.

The E51EME station consisted of an Icom IC-705 and a homebrewed laterally diffused metal-oxide semiconductor (LDMOS) amplifier. An LDMOS is a planar, double-diffused metal-oxide semiconductor field-effect transistor used in amplifiers. LDMOS amplifiers are compact and efficient. Antennas for the E51EME station were stacked, three-element Yagis at 7.5 and 10.5 meters high. The Yagi stack had a wider azimuth than a single long 6-meter Yagi. As for propagation, Bob reported typical TEP to Japan and mid-Asia. To North America, there was likely a combination of TEP linking to sporadic E. There was summer seasonal sporadic E in North America that may have facilitated the links. Usually, this type of propagation is better around the equinoxes. High solar activity from Solar Cycle 25 also helped increase the F-layer maximum usable frequency. The solar flux was around 170. A G1-class geomagnetic storm took place on June 15, but it didn't seem to help. However, regular mid-latitude sporadic E in North America let the magic happen.

YOTA Member 7Q6UJ Now on 6 Meters

On July 1 at 1821 UTC, Greg Cerny, WQØP (EM19), copied Urgent Jere, 7Q6UJ, on 50.313 MHz FT8 at –19 dB. Phil Baldwin, NØPB (EM39), worked 7Q6UJ on FT8 on July 23 at 1752 UTC. It may have been Urgent's first US contact on 6 meters. I noted PSK flags from 7Q6UJ to Europe on 6 meters. Urgent is 17 years old. He said, "I am one of three new amateur radio operators in Malawi. I hope to see you on the air. I am licensed as a result of a project created by the HacDC Amateur Radio Club of Washington, D.C. Please visit **www.w3hac.org/project-malawi**."

Urgent appreciates Don, 7Q6M; Junior, 7Q7JN, and Elayi, 7Q7EB, "for helping me along the way!" With the peak of Solar Cycle 25 approaching this fall, Urgent may make many contacts on 6 meters. He has been invited to attend the Youngsters On The Air (YOTA) summer camp. For more information about YOTA summer camp, visit **www.ham-yota.com**.

June Grid Expeditions

Numerous expeditions to rare grids were conducted by adventurous explorers. Nick, VA2VT, went to FN57 during the ARRL June VHF contest. Propagation was poor, but he put more than 30 stations in his log. Chuck, NJ6D, operated from DM27 and DM28. He made 83 contacts from DM27 and 62 from DM28, again with poor E_s propagation. The AEØEE group was on from DN85, and KØDAS/R operated from several South Dakota grids during the June VHF Contest. Jeff, WB8LYJ, operated from several rare Texas grids. He was in EL28 on June 2 – 10. He worked Fred Fish Memorial Award (FFMA) chasers Edfel, KP4AJ, and Tac, JA7QVI, along with 395 others. Jeff later went to EL17 on June 10 and made 11 contacts before going to EL07 the next day, but it was too hot to set up and operate. He proceeded to EL08 for 2 nights, and he finally went to EL18 on June 13, making 92 contacts on 6 meters.

I, NØJK, did a brief pop-up activation of DM89 from eastern Colorado on June 6, where I made seven contacts. I ran 100 W and a quarter-wave whip antenna. I was back in DM89 on June 28, and I made one contact with K6TW (DM03); it was too hot to stay for longer. Ed, N7PHY, did an awesome operation from DN77 on June 27 – 30 while running 400 W and a six-element loop-fed array Yagi. A severe thunderstorm on June 28 destroyed his tent. Ed noted:

> The end result was the total annihilation of my operating shelter. However, I was able to move the radio gear into the truck between rain squalls and continue operating. I had a couple of decent propagation days. At one time or another, I was able to hit most of the country, with the exception of the fox grids, which were conspicuously absent. I especially wanted to work Edfel, KP4AJ, but didn't get any closer than Florida. I also spent some time pointing at JA land, but [there was] absolutely nothing in that direction. All in all, however, this has been my most productive grid expedition this year. I logged 401 6-meter contacts and a handful of 2-meter contacts, the farthest 6-meter contact being Belize.

Portable grid operations — big or small — give people pursuing the VHF/UHF Century Club and FFMA awards the opportunity to work a rare grid.

On the Bands

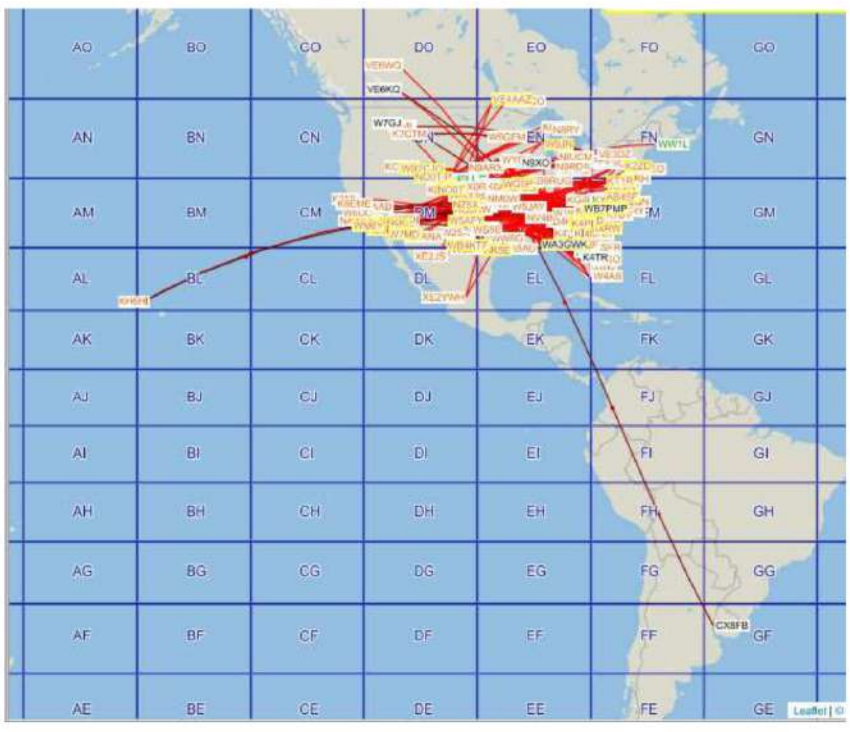
50 MHz. Mike White, K7ULS (DN41), worked Dean, 9A5AFF (JN64), on June 4. Dean was running 100 W and a four-element YU7EF Yagi. From Florida, Chip, KM4SJN, worked 13 different grid squares on June 9 for the June VHF Contest. On June 11, K1HTV logged HQ9EB (Mike, AB5EB). TG9AJR (EK44) was into the midwest states on June 12. On June 17, Ken, AC4TO (EM70), logged UN3GX (MN83) and UN3G, and he copied EY8MM. Later, an E_S-to-TEP opening to South America occurred for me. I, NØJK (EM28), logged LU9FVS and CX8FB (GF06). That afternoon, AC4TO logged JA8LJL and had strong single-hop E_S to the WØ region and double hop to VE6. Ken then saw a CQ from Rick, DU6/PE1NSQ (PK10). Ken said, "I immediately answered and — to my utter shock — quickly completed the [contact]! It goes to show you must be diligent all the time." Rick said it was his first Florida contact on 6 meters from the Philippines. K1HTV worked a 90-minute opening to Europe on June 18, with best DX being HB9CQK. He noted that Mike, W3IP, copied SU1SK at 1015 UTC but did not complete a contact. On June 20, WQØP (EM19) had a strong opening to Europe. Greg worked two stations in France while running just 20 W and a five-element Yagi. On June 21, Jim, K5ND, logged 19 stations in Japan. He noted 25 JA stations on one FT8 frame sequence! Ron Klimas, WZ1V (FN31), also had Japan in, and he logged 20 JA stations from 2235 to 2328 UTC. He said W1VD (FN31) worked stations in Japan, too. On June 28, John Lock, KFØM (EM17), worked KH6HI (BL01). John mentioned that WBØDBS (EM17) also worked KH6HI using only a Squalo antenna in his attic. On July 1, K7ULS (DN41) worked CE2SV via an E_S-to-TEP link at 2308 UTC.

144 MHz. Tropospheric propagation appeared in the midwest on June 23. Larry Lambert, NØLL (EM09), worked AA9MY (EN50) on FT8.

432 MHz. Sam, K5SW (EM25), reported reception of N5PYK/B (DM93) at 652 kilometers away on June 14 via tropospheric propagation.

Here and There

The peak of Solar Cycle 25 appears to be almost here, per the National Oceanic and Atmospheric Administration. This fall and next spring may feature the best 6-meter F-layer propagation of the Solar Cycle. Geomagnetic storms may be more numerous, with opportunities for aurora contacts around the fall equinox due to the Russell-McPherron effect, which involves how the Sun's and the Earth's geomagnetic fields line up.



A DX Map showcasing the E_S-to-TEP opening when I, NØJK (EM28), logged Rainer Pauls, CX8FB (GF06). [**www.dxmaps.com**]

Special Events

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

Aug. 11 – Aug. 16, 0000Z – 0000Z, N7HG, Chinle, AZ. N7HG. **Navajo Code Talkers**. 7.265 14.265 18.133 21.265. Certificate. Herbert Goodluck, N7C, P.O. Box 06, Chinle, AZ 86503. **n7hgster@gmail.com**

Aug. 17, 1400Z – 1800Z, W0CXX, Cedar Rapids, IA. Collins Amateur Radio Club. **Celebrating Gene Senti's Birthday**. 14.263. QSL. Brice AntonJensen, 1110 Lyndhurst Dr., Hiawatha, IA 52233. **www.qrz.com/db/w0cxx**

Aug. 17 – Aug. 18, 0001Z – 2324Z, W7FLO, Florence, OR. Oregon Coast Emergency Repeater Inc. **International Lighthouse Lightship Weekend 2024**. 14.265. QSL. COCARC, P.O. Box 254, Florence, OR 97439. **info@w7flo.com**

Aug. 17 – Aug. 19, 0001Z – 0000Z, T44IJ, Isla de la Juventud, Cuba. Radioclub Isla de la Juventud (CO9DAA). **International Lighthouse Lightship Weekend**. 7.091 10.131 14.090 21.091. QSL. Vasiliy, P.O. Caja "8," g. Novopavlovsk, distrito de Stavropol, Rusia 357300, Cuba. *Activating Carapachibey Lighthouse, NA-056*. **www.qrz.com/db/t44ij**

Aug. 31 – Sep. 2, 1600Z – 2200Z, K7R, Ellensburg, WA. Kittitas County Amateur Radio Club. **Ellensburg Rodeo and Kittitas County Fair 2024**. 14.055 14.275 21.055 21.335. Certificate. KCARC, 110 West Sixth Avenue, Ellensburg, WA 98926. **www.qsl.net/kcarcs/rodeo.html**

Sep. 1 – Sep. 30, 0000Z – 2359Z, CG3CBHC, Sault Ste. Marie, ON, Canada. Algoma Amateur Radio Club. **100th Anniversary of the Ontario Provincial Air Service**. 7.074 14.074. Certificate. Dave Rowlinson, 315 Old Garden River Rd., Sault Ste. Marie, ON P6B 5A7, Canada. **www.aarclub.ca**

Sep. 7, 1400Z – 2000Z, W2MNR/W1QI, Danbury, CT. Metro-North Railroad and Candlewood Amateur Radio Associations. **Commemorating the Danbury Railway Museum's 30th Anniversary and First Responders Day**. 7.235 14.235; other frequencies as conditions permit. Certificate. PDF available on request. **www.cararadioclub.org**

Sep. 7 – Sep. 15, 0700Z – 1559Z, W6Q, Brookfield, IL. Citrus Belt Amateur Radio. **Route 66 On the Air**. 14.266 28.366 146.970 443.300; HF, CW, SSB, FT8, and FM. QSL. Mike Huedepohl, 3532 Raymond Ave., Brookfield, IL 60513. **www.w6jbt.org**

Sep. 7 – Sep. 15, 0000Z – 2359Z, K9ONA, Brookfield, IL. Six Meter Club of Chicago. **Route 66 On the Air**. 28.366. QSL. Mike Huedepohl, 3532 Raymond Ave., Brookfield, IL 60513. **www.k9ona.com**

Sep. 8, 1300Z – 2100Z, W4CA, Roanoke, VA. Roanoke Valley Amateur Radio Club. **Blue Ridge Bonanza**. 7.265 14.265. QSL. Roanoke Valley ARC, P.O. Box 2002, Roanoke, VA 24009. *Multiple stations and frequencies, 20 and 40 meters, along the Blue Ridge Parkway. See website for frequencies and QSL information.* **www.blueridgebonanza.info**

Sep. 8 – Sep. 12, 0000Z – 0000Z, K4A, Cordova, AL. Alabama Contest Group/WA1FCN. **9/11 Remembering Our Heroes**. 7.040 14.040 21.040 28.040. Certificate & QSL. Robert Sarnecki, NF7D, 591 Deer Run Rd., Alabaster, AL 35007. *Certificate for three QSOs on three bands any mode/band combination.* **wa1fcn@charter.net** or **www.alabamacontestgroup.org**

Sep. 14, 1300Z – 2100Z, K3S, Baltimore, MD. Nuclear Ship *Savannah* Amateur Radio Club. **Baltimore Defenders Day**. 7.1 14.1 21.1 28.1. QSL. K3LU, 980 Patuxent Rd., Odenton, MD 21113. *Check spotting networks.* **www.qrz.com/db/k3s**

Sep. 14, 1400Z – 1800Z, W0CXX, Cedar Rapids, IA. Collins Amateur Radio Club. **Celebrating Arthur Collins' Birthday**. 14.263. QSL. Brice AntonJensen, 1110 Lyndhurst Dr., Hiawatha, IA 52233. **www.qrz.com/db/w0cxx**

Sep. 14, 1400Z – 2000Z, W3A, Holtwood, PA. State Line Radio Club. **State Line Radio Club Annual Picnic**. 7.240 14.240 21.280. QSL. Ted Reichenbach, 108 Park Cir., Elkton, MD 21921. *Muddy Run Park, open to the public, Scout groups welcome.* **www.statelineradioclub.com**

Sep. 14, 1400Z – 2000Z, KS0LV, Leavenworth, KS. Pilot Knob Amateur Radio Club. **Fred Harvey House Museum on the Air**. 14.303 21.361 28.355; FT8 and JS8Call. QSL. Steve Rice, 6850 Deer Ridge Dr., Shawnee, KS 66226. **www.pkarc.org**

Sep. 14, 1600Z – 2300Z, NI6IW, San Diego, CA. USS *Midway* Museum Ship. **Commemorating the USS *Midway*'s Commissioning on 9/10/45**. 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**

Sep. 14 – Sep. 15, 0000Z – 2359Z, N1A, East Freetown, MA. US Coast Guard Auxiliary. **Commemorating the 85th Birthday of the US Coast Guard Auxiliary**. 7.190 14.300 28.493. QSL. Paul G. Sadeck, 90 Doctor Braley Rd., East Freetown, MA 02717.

Sep. 14 – Sep. 15, 0000Z – 2359Z, K4D, Homosassa, FL. US Coast Guard Auxiliary District 7 Division 15. **Commemorating the 85th Birthday of the United States Coast Guard Auxiliary**. 7.074 14.074 14.080 21.074. Certificate. Melissa Frank, 6854 W. Holiday St., Homosassa, FL 34446. **melissa.frank09@yahoo.com**

Sep. 14 – Sep. 15, 0900Z – 0500Z, W1H, Elkins, NH. KB1QXJ. 7.250 14.285 21.300 18.150. **Coast Guard Anniversary**. QSL. Bill Hopwood, P.O. Box 272, Elkins, NH 03233.

Sep. 14 – Sep. 15, 1400Z – 1700Z, W5NX, Springdale, AR. Bella Vista Radio Club. **Highest Point in Arkansas**. 7.040 7.260 14.040 14.260. QSL. Don Banta, 3407 Diana St., Springdale, AR 72764. *Portable operation from Mount Magazine, highest point in Arkansas*. **www.qrz.com/db/w5nx** or **www.bellavistaradioclub.org**

Sep. 14 – Sep. 15, 1400Z – 2300Z, N4A, Crystal River, FL. US Coast Guard Auxiliary Division 15 District 07. **US Coast Guard Auxiliary 85th Anniversary**. 7.250 14.250 21.350 28.350. QSL. D. Thomas, 4515 N Loquat Pt., Crystal River, FL 34428-5946. **solutionsdebra@gmail.com**

Sep. 14 – Sep. 15, 1415Z – 1515Z, N2S, Cape May, NJ. United States Coast Guard Auxiliary. **Commemorating the 85th Birthday of the United States Coast Guard Auxiliary**. 7.250 14.310 18.200. Certificate. Mike Slepian, 12 Continental Ln., Marlton, NJ 08053. **www.cgaux.org**

Sep. 14 – Sep. 15, 1600Z – 2359Z, N6A, Los Angeles, CA. United States Coast Guard Auxiliary. **Commemorating the 85th Birthday of the United States Coast Guard Auxiliary**. 14.065 14.330 18.075 18.160. QSL. Edward Little, 19816 Ridge Manor Way, Yorba Linda, CA 92886. **www.cgaux.org**

Sep. 17 – Sep. 19, 1200Z – 2000Z, K8A, London, OH. Madison County Amateur Radio Club. **The Ohio State University Farm Science Review**. 7.275 14.320 28.320. QSL. MCARC, 4665 Lilly Chapel Opossum Rd., London, OH 43140. *Check spotting networks*. **www.mcarcoh.org**

Sep. 18 – Sep. 22, 0000Z – 2359Z, K4MIA, Loxahatchee, FL. PBSEC. **National POW/MIA Recognition Day**. 7.195 14.265 18.150 28.400; SSB, CW, FM, digital modes, SSTV, satellite, and EME is possible. QSL. Michael Bald, 6758 Hall Blvd., Loxahatchee, FL 33470. *There will be 15 sister stations in operation, K4MIA/1 through K4MIA/8. Please take time to remember our POWs, MIAs, and KIAs, as well as their families.*

Sep. 18 – Sep. 23, 0001Z – 2359Z, N5D, Albuquerque, NM. Duke City Hamfest, Inc. **Duke City Hamfest**. 145.330 100 Hz tone, 444.000+ 100 Hz tone. Certificate. Jeff Burmeister, W5OMU, 7344 Tree Line Ave. NW, Albuquerque, NM 87114. **dukecityhamfest.org**

Sep. 20, 1800Z – 2100Z, N3TAL, Lanham, MD. American Legion Post 275 A.R.T. **National POW/MIA Recognition Day**. 7.275. QSL. American Legion Post 275 Amateur Radio Team, 8201 Martin Luther King Jr. Hwy., Lanham, MD 20706. **n3tal275@gmail.com** or **www.qrz.com/db/n3tal**

Sep. 21, 0000Z – 2359Z, K3IEC, Mechanicsburg, PA. Cumberland Amateur Radio Club. **60th Anniversary**. 7.250 14.300 21.300 28.400. QSL. Frank Mellott, 1010 Good Hope Rd., Mechanicsburg, PA 17050. **www.radioclub-carc.com**

Sep. 21, 1230Z – 1930Z, W4G, Villa Rica, GA. West Georgia Amateur Radio Society. **Villa Rica Gold Rush Special Event**. 15, 20, 40, and 80 meters; CW, SSB, digital. Certificate. Downloadable from website. **www.wgars.com**

Sep. 21 – Sep. 30, 0000Z – 2359Z, W7Y, Cheyenne, WY. Shy-Wy Amateur Radio Club. **W7Y Come and Get Wyoming**. All bands, all modes. Certificate & QSL. Shy-Wy ARC, P.O. Box 22483, Cheyenne, WY 82003. *All logs will be uploaded to LoTW and QRZ at the conclusion of the event.* **shywyarc.net/wp/comeandgetwyoming**

Sep. 22, 0000Z – 2359Z, NJ2KC, Vineland, NJ. New Jersey Knights of Columbus Amateur Radio Club. **22nd Annual Padre Pio Festival**. 7.250 14.250 18.140 21.350. Certificate & QSL. Thomas M. Perrotti, N2JIE, 785 Vineland Ave., Bridgeton, NJ 08302-4822. **www.nj2kc.org**

Sep. 28, 1400Z – 2200Z, W8PAR, Parkersburg, WV. Parkersburg Amateur Radio Klub. **Volcano Days, West Virginia Oil and Gas History**. CW 7.050 14.050, SSB 7.200 14.250, FT8 on 20 and 40 meters. Certificate & QSL. Jerry Wharton, 1722 20th St., Parkersburg, WV 26101. **www.w8par.org**

Sep. 28 – Sep. 29, 1521Z – 1519Z, W9WKP, Lincoln, NE. Southeast Nebraska Amateur Radio Club. **88th Anniversary, 1936-2024**. 7.265 7.285. Certificate & QSL. Charles Bennett, P.O. Box 67181, Lincoln, NE 68506. **senebrradioclub@gmail.com**

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 **December** *QST* would have to be received by **October 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**.

Convention and Hamfest Calendar

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

Abbreviations

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

Alabama (Gadsden) — Sept. 21 D F H R S T V
8 AM – 1 PM. *Spr:* Gadsden ARC. The Venue at Coosa Landing, 201 George Wallace Dr. *TI:* 146.670 (100 Hz). *Adm:* $5. **www.gadsdenhamfest.com**

Arizona (Payson) — Oct. 5 D F H T V
8 AM – noon. *Spr:* Tonto ARA. Advantage Realty, 609 Beeline Hwy. *TI:* 147.39 (100 Hz). *Adm:* Free. **www.n7tar.org**

MICROWAVE UPDATE 2024

October 3 – 5, Delta, British Columbia

F H R S
8 AM – 5 PM. *Spr:* WCWSA, PNWVHFS. Cascades Casino Delta, 6005 Hwy. 17A. *TI:* 146.52. *Adm:* $275 (Canadian dollars), $199.49 (US dollars) Advance; TBD door. **www.microwaveupdate.org**

Colorado (Longmont) — Oct. 6 D F H R V
9 AM – 1 PM. *Spr:* Boulder ARC. Boulder Co. Fairgrounds, 9595 Nelson Rd. *TI:* 146.70. *Adm:* $5; under 18, free with paid adult. **www.barcw0dk.org**

Illinois (Belvidere) — Sept. 22 D F R T V
6 AM – 3 PM. *Spr:* Chicago FM Club. Boone Co. Fairgrounds, 8791 IL-76. *TI:* 146.760 (107.2 Hz). *Adm:* $8 Advance, $10 door. **www.chicagofmclub.org**

ARRL ILLINOIS SECTION CONVENTION

September 21 – 22, Chillicothe, Illinois

D F H Q R S T V
Sat. 8 AM – 4 PM, Sun. 8 AM – 1 PM. *Spr:* Peoria-Area ARC. Three Sisters Park, 17189 IL-29. *TI:* 147.075 (156.7 Hz). *Adm:* $8 Advance, $10 door. **www.w9uvi.org/midwest-superfest**

Illinois (Naperville) — Sept. 13 – 14 D H Q S
Fri. 8 AM – 5 PM, Sat. 9 AM. *Spr:* Northern Illinois DX Association. Chicago Marriott Naperville, 1801 N. Naper Blvd. *Adm:* CTU/DXU $45 (13th), $60 Advance; $65 door (14th). Email: **robert.r.ronk@gmail.com**

Iowa (Columbus Junction) — Oct. 6 D F H R S T V
7 AM – 2 PM. *Spr:* Muscatine ARC. Louisa Co. Fairgrounds, 101 Fairground Rd. *TI:* 146.985 (192.8 Hz). *Adm:* $10. **www.muscatinearc.org**

Kentucky (Lexington) — Oct. 5 D F H R S T V
8 AM – 2 PM. *Spr:* Bluegrass ARS. Highlands Baptist Church, 2032 Parallel Rd. *TI:* 147.76 (67 Hz). *Adm:* $5 Advance, $6 door. **www.bluegrassars.org**

Kentucky (Paintsville) — Sept. 28 H R T V
9 AM – 1 PM. *Spr:* Amateur Radio Community Services. Paintsville Recreation Center, 232 Preston St. *TI:* 147.225. *Adm:* $5. **www.ky4arc.com**

Kentucky (Richmond) — Sept. 14 D F H R T V
8 AM – 1 PM. *Spr:* Central Kentucky ARS. Madison Co. Fairgrounds, 3237 Old Irvine Rd. *TI:* 145.370 (192.8 Hz), also Fusion. *Adm:* $7 Advance, $8 door. **www.ckars.org**

Maine (Alexander) — Sept. 21 D F H R T V
8 AM – noon. *Spr:* St. Croix Valley ARC. Alexander Elementary School, 1430 Airline Rd. *TI:* 147.330 (118.8 Hz). *Adm:* $5. **www.stcroixvalleyamateurradioclub.com**

Maryland (West Friendship) — Oct. 6 D F H Q R T V
6 AM – 3 PM. *Spr:* Columbia ARA. Howard Co. Fairgrounds, 2210 Fairgrounds Rd. *TI:* 147.39 (156.7 Hz). *Adm:* $10. **www.carafest.org**

Michigan (Adrian) — Sept. 15 D F H R T V
8 AM. *Spr:* Adrian ARC. Lenawee Co. Airport, 2651 W. Cadmus Rd. *TI:* 145.37. *Adm:* $6. **www.w8tqe.com**

Michigan (Gaylord) — Sept. 28 D H R T V
9 AM – 1 PM. *Spr:* Top of Michigan, Thunder Bay ARCs. Gaylord Knights of Columbus Hall, 2573 Wilkinson Rd. *TI:* 146.82 (118.8 Hz). *Adm:* $5. **www.nm8rc.org**

Michigan (Kalamazoo) — Oct. 5 D H Q R S V
9 AM – 4 PM. *Spr:* Kalamazoo ARC, Southwest Michigan Amateur Radio Team. Kalamazoo Co. Fairgrounds and Expo Center, 2900 Lake St. *TI:* 147.04 (94.8 Hz). *Adm:* $8. **www.kalamazoohamfest.org**

Michigan (St. Clair Shores) — Oct. 6 D Q R
8 AM – 1 PM. *Spr:* Utica Shelby Emergency Communications Association. VFW Post #1146 (Bruce Post), 28404 E. Jefferson Ave. *Adm:* $5. **www.usecaarc.org**

Michigan (Shelby Township) — Sept. 14 F R
8 AM – noon. *Spr:* General Motors ARC. Packard Proving Grounds Historic Site, 49965 Van Dyke Ave. *TI:* 443.075 (PL 123.0 Hz). *Adm:* $5 per car; GMARC members, free. **www.gmarc.org**

Michigan (West Branch) — Sept. 14 F R
9 AM – 1 PM. *Spr:* Ogemaw Arenac ARS. Ogemaw Nature Park, 5626 W. Rose City Rd. *TI:* 146.94 (103.5 Hz). *Adm:* Free. **www.k8oar.club**

ARRL MINNESOTA STATE CONVENTION

October 5, Brooklyn Park, Minnesota

D H Q R S V
9 AM – 4 PM. *Spr:* Minnesota Amateur Radio Consortium. Hennepin Technical College, 9000 Brooklyn Blvd. *TI:* 146.76 (114.8 Hz). *Adm:* $30 Advance, $40 door. **www.mnconvention.org**

Minnesota (Lake Elmo) — Sept. 14 F H T
9 AM – noon. *Spr:* Metro Area Repeater Association. Helwig Farm, 8247 27th St. N. *TI:* 146.85. *Adm:* Free. Email: **wb0wot@arrl.net**

Nevada (Reno) — Sept. 14 F R T
7 AM – noon. *Spr:* Sierra Nevada ARS. Cabela's Reno, 8650 Boomtown Garson Rd. *Tl:* 147.210 (100.0 Hz). *Adm:* Free. **www.renohamswap.com**

New Jersey (Tinton Falls) — Sept. 28 D F Q R V
8 AM – 1 PM. *Spr:* Garden State ARA. MOESC, 100 Tornillo Way. *Tl:* 147.045 (67 Hz). *Adm:* $5. **www.gsara.club**

New Jersey (Wayne) — Sept. 14 D F H
7 AM – noon. *Spr:* Wayne Radio Amateur Emergency Team. United Methodist Church, 99 Parish Dr. *Tl:* 145.210 (79.7 Hz). *Adm:* $5. **www.wraet.com**

ARRL NEW MEXICO STATE CONVENTION

September 20 – 22, Albuquerque, New Mexico

D F H Q R S T V

8 AM – 5 PM. *Spr:* New Mexico Hamvention, Inc. University of New Mexico Continuing Education Center, 1634 University Blvd. NE. *Tl:* 145.33 (100 Hz). *Adm:* $15 Advance, $20 door. **www.dukecityhamfest.org**

New York (Henrietta) — Oct. 1 – 5 D F H R S T
All day long, each day. *Spr:* Antique Wireless Association. RIT Inn and Conference Center, 5257 W. Henrietta Rd. *Adm:* See website. **www.antiquewireless.org/homepage/annual-conference**

North Carolina (Lexington) — Sept. 28 V
8 AM – 1:30 PM. *Spr:* The Healing Springs Mountain VHF Society. Farmers Market Flea Market, 366 Livestock Market Rd. *Tl:* 146.910 (107.2 Hz). *Adm:* $5. **www.w4par.org**

ARRL DAKOTA DIVISION CONVENTION

September 28, West Fargo, North Dakota

F H Q R S V

8 AM – 1 PM. *Spr:* Red River Radio Amateurs. West Fargo Fairgrounds Hartl Bldg., 1805 Main Ave. W. *Tl:* 145.350 (123 Hz). *Adm:* $10. **www.rrra.org**

Ohio (Athens) — Sept. 1 H T V
8 AM – noon. *Spr:* Athens Co. ARA. Athens Masonic Lodge, 12 W. Carpenter St. *Tl:* 145.15. *Adm:* Free. **www.ac-ara.org**

Ohio (Berea) — Sept. 22 D F H Q R S T V
8 AM – noon. *Spr:* Hamfest Association of Cleveland. Cuyahoga Co. Fairgrounds, 160 Eastland Rd. *Tl:* 145.410 (110.9 Hz), 442.225 (131.8 Hz). *Adm:* $10. **www.hac.org**

Ohio (Lima) — Oct. 5 F H R T
6 AM – 2 PM. *Spr:* Northwest Ohio ARC. New Hope Christian Center, 2240 Baty Rd. *Tl:* 146.67 (118.8 Hz). *Adm:* Free; donation accepted. **www.nwoarc.com**

Ohio (Piketon) — Oct. 5 D F T V
8 AM – noon. *Spr:* Scioto Valley ARC. Pike Co. Fairgrounds, 311 Mill St. *Tl:* 146.850 (74.4 Hz). *Adm:* $5. Email: **kd8chp@cqohio.com**

Oklahoma (Enid) — Sept. 14 D F H Q R S T V
8 AM – 3 PM. *Spr:* Enid ARC. Chisholm Trail Event Center, 111 W. Purdue Ave. *Tl:* 444.825. *Adm:* $10. **www.enidarc.org**

Pennsylvania (East Stroudsburg) — Sept. 15 F H R S T V
8 AM. *Spr:* Eastern Pennsylvania ARA. Moose Lodge 1336, 705 Stokes Mill Rd. *Tl:* 147.045 (131.8 Hz). *Adm:* $7. **www.qsl.net/n3is**

Pennsylvania (New Holland) — Oct. 5 F H R S T V
8 AM. *Spr:* Red Rose Repeater Association. Garden Spot Fire Rescue, 339 E. Main St. *Tl:* 147.015 (118.8 Hz). *Adm:* $5. Email: **rett42@yahoo.com**

Wisconsin (Milwaukee) — Sept. 20 – 21 D Q S V
Fri. noon – 5 PM, Sat. 9 AM – 3 PM. *Spr:* Ham Radio Outlet. Ham Radio Outlet Milwaukee, 5710 W. Good Hope Rd. *Tl:* 145.130 (127.3 Hz). *Adm:* Free. Email: **w9tjp@hamradio.com**

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 **October 1** to be listed in the **December** 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**.

At the Foundation

ARRL Foundation Presents the 2024 Scholarship Recipients

The ARRL Foundation is pleased to present the students selected to receive scholarship awards for 2024. Scholarships are made possible through the generosity of individuals and clubs. This year, 135 scholarships totaling more than $715,000 were awarded. The ARRL Foundation Board of Directors offers these amateur radio operators best wishes for continued success as they pursue their college degrees. The 2025 application period is expected to open in October 2024. For more information, please visit **www.arrl.org/scholarship-program**.

Andrej Antunovikj, K8TUN
The Amateur Radio Digital Communications (ARDC) Scholarship

Ithyca Bacon, KI5QOS
The Fred R. McDaniel Memorial Scholarship

Joshua Banister, KB4JHB
The IRARC Memorial, Joseph P. Rubino, WA4MMD, Scholarship

Cameron Bannasch, KN6YZZ
The Dick Warren, K6OBS, Memorial Scholarship

Allan Baum, K2AJB
The East Coast Amateur Radio Service (ECARS) Scholarship

McKayla Beldyk, KO4NXG
The North Fulton Amateur Radio League (NFARL) Scholarship

Ariel Berger, K2NYS
The Anthony J. (Tony) Medeiros, Jr., W1PM, Scholarship

Ryan Bibby, KN4RQL
The Atlanta Radio Club Scholarship

Ian Bigler, KC3DTE
The Amateur Radio Digital Communications (ARDC) Scholarship

Aaron Bilow, KC3WAM
The Maryland Military Auxiliary Radio Service, Inc. (MMARSI) Scholarship

Ethan Boyd, WV8EHB
The Alfred E. Friend, Jr., W4CF, Memorial Scholarship

Christopher Brault, KD8YVJ
The Amateur Radio Digital Communications (ARDC) Scholarship

Nolan Brechtel, KI5TJO
The Richard W. Bendicksen, N7ZL, Memorial Scholarship

Beau Chennault, N5BOA
The Hy and Mimi Ginsberg Memorial Scholarship

Geneva Cline, N3VAC
The Helen Laughlin AM Mode Memorial Scholarship

Aaron Cocke, KI5PSN
The Amateur Radio Digital Communications (ARDC) Scholarship

Caroline Conolly, KI7AJB
The Wilse Morgan, WX7P, Memorial ARRL Northwestern Division Scholarship

Dominic Cronauer, KC3NNW
The Richard G. Kirkpatrick, K8WU, Memorial Scholarship

Giulietta Dean, N6DLG
The Ernest L. Baulch, W2TX, and Marcia E. Baulch, WA2AKJ, Scholarship

Alison Dean, KO4IOK
The Fort Myers Amateur Radio Club Scholarship

Corey Dennen, NW1BB
The Michael, K8MJH, and Mary Holt, KC8OIP, Scholarship

McKenzie Denton, KO4GLN
The Amateur Radio Digital Communications (ARDC) Scholarship

Krish Desai, KD9RGN
The Rev. Paul E. Bittner, WØAIH, Memorial Scholarship

Sean Donelan, KM6NGN
The YASME Foundation Scholarship


Silas Ernst, KE0NQO
The Paul and Helen L. Grauer Scholarship


James Ervin, KI5UXW
The Robert A. Rodriguez, K5AUW, Scholarship


Isabella Eves, KQ4NCC
The Gwinnett Amateur Radio Society Scholarship


Robert Feuerriegel, N4THS
The Charles Clarke Cordle Memorial Scholarship


Dylan Fielding, KJ7MFU
The Charles N. Fisher Memorial Scholarship


Katherine Forson, KT5KMF
The World Wide Radio Operators Foundation, Inc. (WWROF) Scholarship


Landon Gale, AI7HE
The Amateur Radio Digital Communications (ARDC) Scholarship


Jacob Gardner, KE8NIX
The Amateur Radio Digital Communications (ARDC) Scholarship


Ryan Gedminas, WW6RAG
The Michael R. Ware, NN3I, Scholarship


Andrew Gentry, K4UPX
The Gary Wagner, K3OMI, Scholarship


Michael Gilbert-Cabaceira, KI5TXS
The Amateur Radio Digital Communications (ARDC) Scholarship


Ruslan Gindullin, KE8ZCA/R9WFW
The Donald Riebhoff Memorial Scholarship


Nicholas Glennon, KQ4LII
The Amateur Radio Digital Communications (ARDC) Scholarship


Raj Gohil, KI5TLO
The Robert A. Rodriguez, K5AUW, Scholarship


Russell Goss, KD9FAL
The Six Meter Club of Chicago Scholarship


Elaine Gross, KI7PWR
The Scholarship of the Morris Radio Club of New Jersey


John Michael Hall, KQ4DNY
The Dayton Amateur Radio Association Scholarship


Thomas Hardin, KO4FFA
The Challenge Met Scholarship


Nathaniel Harmon, KQ4FCT
The Amateur Radio Digital Communications (ARDC) Scholarship


Elijah Hawk, KD8DQH
The PhD ARA Scholarship


Brynn Hebert, KG5KRV
The Amateur Radio Digital Communications (ARDC) Scholarship


Sarah Hedberg, KE0YXG
The Amateur Radio Digital Communications (ARDC) Scholarship


Andrew Hendricks, KD0ZQK
The Pikes Peak Radio Amateur Association (PPRAA) Memorial Scholarship


John Horan, AE0ZY
The Dayton Amateur Radio Association Scholarship


William Houser, KN4EZW
The Walter Gallinghouse, K5DSL, Scholarship


Anika Huang, KN6OQK
The Yankee Clipper Contest Club, Inc. Youth Scholarship


Mikayla Hunt, KK7HSE
The Amateur Radio Digital Communications (ARDC) Scholarship


Andrew Johnson, N4HFR
The Amateur Radio Digital Communications (ARDC) Scholarship


Rachel Jones, KO4HLC
The Amateur Radio Digital Communications (ARDC) Scholarship


Ryan Kaelle, KN6OJE
The K2TEO Martin J. Green, Sr., Memorial Scholarship


Akshay Kapur, K5AKX
The Amateur Radio Digital Communications (ARDC) Scholarship


Jonathan Keiser, AG5SY
The Amateur Radio Digital Communications (ARDC) Scholarship

Aidan Kern, N3AMK
The CARA Merit Scholarship

William Klipfel, KFØJQD
The Ray, NØRP, & Katie, WØKTE, Pautz Scholarship

Caroline Kuebert, KM4VCO
The Amateur Radio Digital Communications (ARDC) Scholarship

Drew Laikin, KQ4AIG
The Free Family Scholarship

Vincent Lambraia, K4VBL
The Potomac Valley Radio Club (PVRC) Scholarship

Alexander Lanari, WØBBE
The Amateur Radio Digital Communications (ARDC) Scholarship

Hope Lea, ND2L
The Amateur Radio Digital Communications (ARDC) Scholarship

Zechariah Lea, WX4TVJ
The Amateur Radio Digital Communications (ARDC) Scholarship

Joshua Lee, KN6GFZ
The Maryland Military Auxiliary Radio Service, Inc. (MMARSI) Scholarship

Maggie Li, KI5YMO
The Dayton Amateur Radio Association Scholarship

Sarah Li, K7SLI
The Amateur Radio Digital Communications (ARDC) Scholarship

Joao Lima, KQ4AUS
The North Fulton Amateur Radio League (NFARL) Scholarship

Alisha Lin, K6AML
The Palomar Amateur Radio Club (PARC) Scholarship

Ashley Lin, K6BOO
The Palomar Amateur Radio Club (PARC) Scholarship

Lauren Linxweiler, K7LRN
The Joel R. Miller, W7PDX, and Martha C. Miller STEM Scholarship

Jake Long, KO4JUZ
The Maryland Military Auxiliary Radio Service, Inc. (MMARSI) Scholarship

Matthew Lyon, KN4MXH
The Amateur Radio Digital Communications (ARDC) Scholarship

Ian MacDonnell, NØIAN
The Amateur Radio Digital Communications (ARDC) Scholarship

Zachary Martin, KC3EWK
The L. B. Cebik, W4RNL, and Jean Cebik, N4TZP, Scholarship

Anna Matson, KN4IVD
The Amateur Radio Digital Communications (ARDC) Scholarship

Audrey McElroy, KM4BUN
The Amateur Radio Digital Communications (ARDC) Scholarship

McKenzie Menefee, KI5MHA
The Medical Amateur Radio Council (MARCO) Scholarship

Javan Miller, W8UA
The Ronald Hesselbrock, WA8LOW, Memorial Scholarship and The CWops Scholarship

Jeremiah Moix, KG5TZR
The Amateur Radio Digital Communications (ARDC) Scholarship

Tiana Molina, WB7TIA
The Amateur Radio Digital Communications (ARDC) Scholarship

Aleksey Moshkov, KD2SEM
The ARRL Scholarship to Honor Barry Goldwater

Boris Moshkov, KD2HXI
The Dr. James L. Lawson Memorial Scholarship

Iain Nicol, KQ4BDT
The New England Federation of Eastern Massachusetts Amateur Radio Associations (FEMARA) Scholarship

Ava Grace Noe, KI5HNH
The Mississippi Scholarship

Evan Odya, KD9YYJ
The David Knaus Memorial Scholarship

Grace Papay, KE8RJU
The L. B. Cebik, W4RNL, and Jean Cebik, N4TZP, Scholarship

Theo Pastrana, W8QI/LU1XOP/VE7XOP
The Amateur Radio Digital Communications (ARDC) Scholarship

John Patrick, KJ7QQG
The Mary Lou Brown Scholarship

Joseph Patton, WU3N
The You've Got a Friend in Pennsylvania Scholarship

Colin Pokowitz, WWØCJ/M7WCJ
The Jake McClain Driver, KC5WXA, Scholarship

Ryan Pribulsky, W3LID
The K2PLF Martin J. Green Jr. Memorial Scholarship

Campbell Reed, KD9GEK
The Dayton Amateur Radio Association Scholarship

Maria Reichard, KE8SPB
The Alan G. Thorpe, K1TMW, Memorial Scholarship

Luke Rickert, KEØMDW
The World Wide Radio Operators Foundation, Inc. (WWROF) Scholarship

Aidan Riley, W9POG
The Clive Frazier, K9FWF, Scholarship

Thomas Riley, KA4ACE
The L. Phil and Alice J. Wicker Scholarship

Delaney Ringer, N1DMR
The Byron Blanchard, N1EKV, Memorial Scholarship

Luz Naomi Rivera, KFØMVN
The Dayton Amateur Radio Association Scholarship

Paola Rivera, KFØNIC
The RFinder LLC – Arthur L. Greenberg, W2LH, and Madeleine Greenberg, W2EEO, Memorial Scholarship

Jack Roberts, W9RFT
The Indianapolis Amateur Radio Association Scholarship

Emma Schaefer, KC9YGJ
The Amateur Radio Digital Communications (ARDC) Scholarship

Michael Schlesier, KE2BXM
The Frankford Radio Club Scholarship

Isaac Schofer, AC3CJ
The Potomac Valley Radio Club (PVRC) Scholarship

Victoria Schousek, KD9UXW
The Clive Frazier, K9FWF, Scholarship

Tyler Schroder, NT1S
The Amateur Radio Digital Communications (ARDC) Scholarship

Matthew Shook, KQ4JQU
The Gulf Coast Amateur Radio Club Scholarship

Robert Snyder, KD2UCJ
The Irving W. Cook, WAØCGS, Scholarship

Savannah Steele, KK6NLY
The K6GO Gayle Olson and NA6MB Mike Binder Scholarship

Declan Steele, KC1NPL
The Henry Broughton, K2AE, Memorial Scholarship

Nathan Streitmatter, KD9UDN
The Bill, W2ONV, and Ann Salerno Memorial Scholarship

Sophia Strobel, KY4ZQ
The Amateur Radio Digital Communications (ARDC) Scholarship

Augustine Terneus, KEØTRN
The William C. Winscott, N6CHA, Memorial Scholarship

Dahnesh Upton, KB1OTB
The New England Amateur Radio Festival (NEAR-Fest) Memorial Scholarship

Liam Van Citters, KN6QXK
The William Bennett, W7PHO, Memorial Scholarship

Kees Van Oosbree, WØAAE
The Amateur Radio Digital Communications (ARDC) Scholarship

Sean Warwick, KI7ODS
The Dayton Amateur Radio Association Scholarship

Ruth Willet, KM4LAO
The Amateur Radio Digital Communications (ARDC) Scholarship

Photos were unavailable for the following scholarship recipients:

Joan Amacker, K5JOZ
The Magnolia DX Association Scholarship

Jennifer Daugherty, KO4BIL
The William Gordon Buckner, WØVZK, Memorial Scholarship

Tradd Edwards, KN4IXC
The Fritz Nitsch, W4NTO, Memorial Scholarship

John Ferguson, KN4YGJ
The Vienna Wireless Society Scholarship

McKenzie Garrett, KJ7IRT
The Carole J. Streeter, KB9JBR, Scholarship

Malaki Guenther, KK7ACX
The Lois Manley, K7LMZ, and Randall Pitchford, WW7ZZ, Scholarship

Benjamin Honecker, KC3YFM
The Maryland Military Auxiliary Radio Service, Inc. (MMARSI) Scholarship

Alyssa Hunt, KK7HTJ
The Bill, W2ONV, and Ann Salerno Memorial Scholarship

Maximus Johnson, AI7MD
The Central Arizona DX Association Scholarship

Alex Kinch, K8CD
The Amateur Radio Digital Communications (ARDC) Scholarship

Dana Morris, K8OOF
The Betty Weatherford, KQ6RE, Memorial Scholarship

Miriam Olson, KF5MPD
The Allen and Bertha Watson Memorial Scholarship

Parker Siebe, KJ7VSW
The Amateur Radio Digital Communications (ARDC) Scholarship

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**.

Maria Somma, AB1FM, VEC Manager, ab1fm@arrl.org

ARRL VEC Volunteer Examiner Honor Roll

Special Edition

It's been more than 40 years that ARRL has been authorized by the FCC to give amateur radio exams. Prior to today's volunteer-based examination system, the FCC conducted testing at its field offices around the country on specified schedules. In late 1982, President Ronald Reagan signed into law the Goldwater-Wirth Bill, known as Public Law 97-259. This bill amended the Communications Act of 1934, permitting the FCC to accept the voluntary and uncompensated services of licensed radio amateurs to serve in preparing and administering examinations. The amateur community would conduct the testing itself, under a new Volunteer Examiner (VE) program drafted by ARRL with the FCC staff. ARRL and the FCC signed the Volunteer Examiner Coordinator (VEC) Memorandum of Agreement at the ARRL National Convention in New York City on July 21, 1984. The agreement officially authorized ARRL to accredit VEs and coordinate amateur radio exam sessions.

ARRL VEC Volunteer Examiners

July 21, 2024, marked the 40th anniversary of the inception of the ARRL VEC. Our program has a longstanding tradition of serving the amateur radio community and the FCC with integrity and expertise. The ARRL VEC program is nationally and globally known as a great contributor to the amateur radio community and is a symbol of excellence.

As the largest VEC in the nation, the ARRL VEC and our VEs have had a positive effect on our community's growth and have truly made a difference in the future of amateur radio.

To give you an idea of what the ARRL VEC and our VEs have accomplished, here are some statistics. In the first 40 years, we have accredited more than 81,000 licensees as VEs. These VEs have conducted more than 183,000 test sessions. At these sessions, approximately 1.1 million individuals have taken 1.4 million examinations.

We would like to thank our VEs for playing an important role in the success of the ARRL VEC and for their contributions to the amateur radio community.

Serving the Amateur Radio Community

There are approximately 30,000 VEs currently accredited in our program. More than 5,800 of those VEs have been accredited for 20 years or more. ARRL VEs generously devote their time, energy, and skills to help expand our community. They support us around the country by offering exam opportunities for our community and by helping exam candidates fulfill their amateur radio aspirations.

Visit the ARRL VEC VE session counts web page (**www.arrl.org/ve-session-counts**) to view your ARRL VE accreditation start date.

The regular VE Honor Roll will return in December 2024.

Become an ARRL VE

If you haven't already, we hope you will embark on this rewarding journey and become an ARRL Volunteer Examiner. If you are interested in becoming an ARRL VE, it's easy! Visit **www.arrl.org/VE** for more information.

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 June 2024 activity report of the VM Program.

◆ Two licensees in Florida received notices to stay off repeaters in Boca Raton, and the case was referred to the FCC for further enforcement action as appropriate.

◆ Uncoordinated repeater licensees in Virginia and New Jersey received advisory notices concerning interference to coordinated repeaters in their areas. The owners are taking steps toward resolution.

◆ A licensee in New York received an advisory notice about SSB operation below the permitted frequency of 14.150 MHz.

◆ A licensee in New Jersey received an advisory notice concerning interference to an HF net and his refusal to comply with the net control directive to cease using the net. He was also warned that his license renewal date was imminent and that administrative review of his license application, if filed, would be recommended to the FCC.

The totals for hours of monitoring by Volunteer Monitors during April and May 2024 will be reported in the July VM report upon full restoration of our website. — *Thanks to Volunteer Monitor Program Administrator Riley Hollingsworth, K4ZDH*

Congratulations

June 2024
QST Cover Plaque Award Winner

Joe Reisert, W1JR

In his article, "Simple, Small 2- and 6-Meter Yagis," Joe provides construction details for a remarkable Yagi antenna that has a proven design with a very simple match and outstanding performance.

QST Cover Plaque Awards are given to the author or authors of the most popular article in each issue. *You* choose the winners by casting your vote online at

www.arrl.org/cover-plaque-poll

Log in now and choose your favorite article in this issue!

Simple, Small 2- and 6-Meter Yagis

Gain, pattern, and an easy, wide-band match.

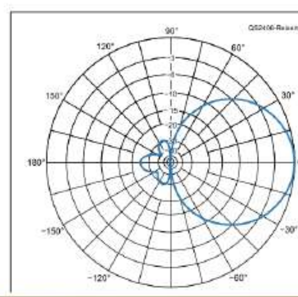
Joe Reisert, W1JR

Sometimes a ham needs a small, efficient handheld 2-meter antenna with moderate performance, especially for emergency communication. They may also need an entry-level 6-meter antenna, especially for chasing DX and utilizing F2 propagation as we approach the peak of Solar Cycle 25.

The basic Yagi is still a good choice for a compact and efficient antenna. Radiation pattern and impedance are determined by the number of elements, the length and diameter of the elements, and the spacing between the elements. Many trade-off studies were conducted 25 years ago on Yagis with 0.1 – 1.0-wavelength booms. The results, which you can read at **www.arrl.org/qst-in-depth**, were published in the winter 1998 issue of *Communications Quarterly*. For a visual representation of these concepts, see the sidebar, "Yagi Gain."

A three-element Yagi on a 0.35-wavelength boom can have a gain of 5 dBd. Inserting an additional director between the driven element and the existing director, and readjusting the element lengths and spacing, can improve the radiation pattern. A front-to-rear ratio greater than 20 dB is possible, and the gain will increase to about 6 dBd with a direct 50 Ω match increased bandwidth. The lead image shows this Yagi as built, and its radiation pattern is shown in Figure 1. It uses a ¾ × ¾-inch square boom that is at least 36 inches long, but similar round tubing can be used. Booms with square tubing tend to have improved symmetry and better, long-lasting contact between the elements and the boom.

The 2-meter Yagi mounted in the vertical polarization. [Joe Reisert, W1JR, photo]



Field Organization Reports — June 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**.

391 KE8BYC

370 WA3EZN

330 AD8CM

310 N9VC

290 WM5N

275 W7EES

268 WB8YYS, KC8YVF

265 W7PAT

250 N8LC

245 KD2GXL

240 WØPZD

230 KT2D

225 NW3X

220 NØDMP

209 KT5EM, WV5Q

200 KE8ANW, N4CNX, KK4PUX

195 ND8W, W4DNA

191 KO4KUS

190 KB8PGW

185 K9LGU

182 W9EEU

180 K8AMH, N5MKY

174 KA9IKK

172 KD2LPM

170 WA2BBS

168 N3KRX

165 KC9FXE, WK4WC

164 KE8HKA

163 KC8T

160 KK4F, WM2C

156 NI2W

155 AC8NP, KD8UUB

151 K3EAM

150 KR4PI, W4CMH, WB9WKO, N8SY

149 KE8DON

148 KY2MMM

145 KT4WX

141 N2DW, W4CAC

140 W2PAX, WO2H

135 AG9G, KDØHHN

133 KE8CYC

132 K5OB

131 WD8USA

130 ACØKQ, K8MDA, KW1U, N1UMJ, WZØC, N2JBA, KB3YRU

128 N3RPB

127 W3YVQ

125 WA3QLW, KE5YTA

124 KC1HHO

122 KV2J

120 WA4VGZ, N4NOA, WC4FSU, AD4DO, KF5OMH, W2AH, KA9QWC

119 K8RDN, KV2J

118 KC3MAL

117 KM4WXX, KB5PGY

115 K7OED

112 K3JL

110 W9GRG, KM4WHO, KC8WH, KF5IOU, KB2QO, N1IQI, W1RVY, N1ILZ, WB8TQZ

109 K1XFC

107 W9BGJ

105 AA3N, K5ANP

104 W8IM

102 N8RWF

101 KD8ZCM, AE5MI

100 NX9K, KZ8Q, WB4RJW, KE4RS, W8GSR, KB8GUN, WB8SIQ, N8MRS, KL7RF, W4EDN, KA5AZK, K3YAK, KA2HZP, N1LAH, KC1KVY, W1TCD, K8ED, K2MTG

95 N3GE

93 KV8Z, WB2VUF

92 K4NWX, NØJAR

91 WW3S

90 KB9GO, KC9UC, KT5SR, WA3QPX, K8KRA, KN4AAG, W4KX, KA2GQQ, W2QMI, N1CVO, N3SW, WB8R, KB1NMO, WX2DX, AB9ZA

88 W5WMC, KF7GC

86 AA4XZ, N8OD

84 K6JT

83 K4FHR

82 W5XX

81 KB4OLY, K2PHD

80 AE2EY, KR4ST, KG5AOP, KA8BJA

78 KB1NAL

77 W7FSC, K1STM

76 NØET

75 W7MIN, WB3FTQ, KB3MXK

74 KD2TDG, W2OOD, W3ZR

72 KBØDTI

70 KA1G

The following stations qualified for PSHR in May 2024, but were not acknowledged in this column yet. W9EEU 322, KA9QWC 120, AB9ZA 90.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, EMA, ENY, EPA, GA, IN, KS, LA, MI, MO, MS, NC, ND, NFL, NLI, NM, NNJ, NNY, NTX, OH, OR, RI, SD, SFL, SJV, SNJ, STX, TN, VA, WCF, WMA, WPA.

Section Emergency Coordinator Reports

The following Section Emergency Coordinators reported: IN, MI, ND, NV, SCV.

Brass Pounders League

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

W2AH 1,195, NX9K 1,187, KE5YTA 935, KK3F 729, WB9WKO 687, KW1U 646, WA3QLW 575, W2PAX 502.

Strays

QST Congratulates...

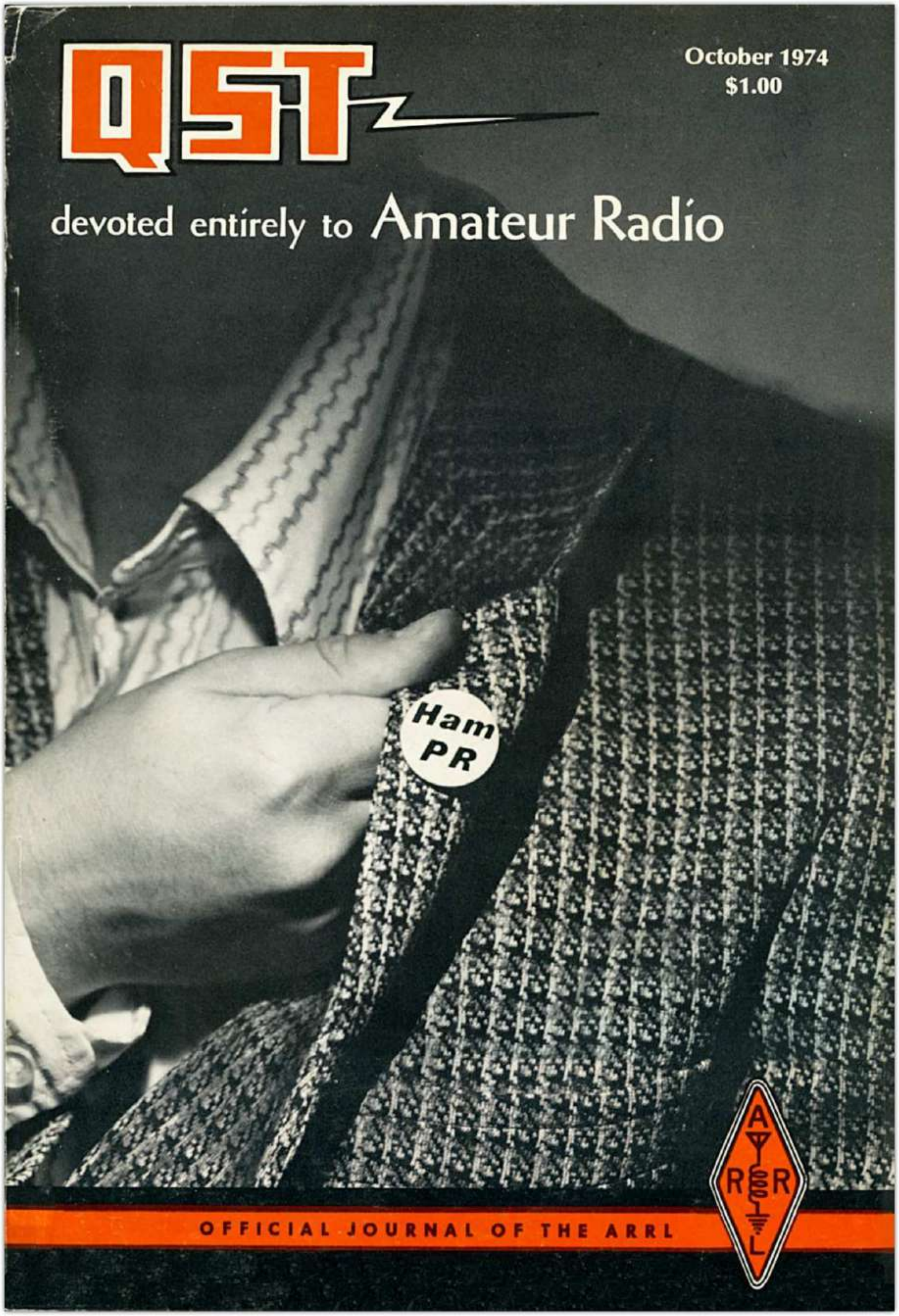
■ Meg Blubaugh, K5MEG, for earning the #26 Straight Key Century Club (SKCC) Marathon QSO Award. Out of 30 award recipients, K5MEG is the third woman to receive the award — Ai Nguyen, AI8AI, was the first, earning #15, and Teri Beard, KO4WFP, was the second, earning #23.

To qualify, one must engage in 100 contacts, each 60 minutes or longer, and each with a different SKCC member using their assigned call, SKCC member number, and SKCC-qualified keying devices; there is no time limit. The Marathon QSO Award was designed to be a demanding achievement for operators by creating a challenge that involves the fundamental ideals of ham radio as celebrated by SKCC: operating skill, a good station, conversational ability, and a consistent, quality fist.

Feedback

In the August 2024 issue, the first sentence in the second full paragraph of "The Challenge and the Beauty of IOTA from Yanuca Island, Fiji" contains an error. In "…the only inhabited island among the seven that form the Ringgold Islands…" the "seven" should be "17." Also, in the first paragraph under the "Yanuca On the Air" subhead, the "3Y2LYC" call sign should be "3D2LYC." These errors have been corrected in the digital edition.

A Look Back


QST
October 1974
$1.00
devoted entirely to Amateur Radio
Ham
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OFFICIAL JOURNAL OF THE ARRL
ARRL

Celebrating Our Legacy

A Life-Changing Toy

When I was eight or nine, I got a Rocket germanium radio for Christmas. This toy changed my life. I was amazed at how many Boston radio stations I could hear. A few years later, my dad bought a National SW-54 receiver. I found listening to shortwave broadcast stations and hams even more interesting. I heard them talking and wanted to do that, too.

In 1963, when I was 16, I got my Novice license and worked CW exclusively. After graduating high school, I attended the Massachusetts Radio and Telegraph School in Boston. I got my associate degree as an electronics technician. I made a career out of my interest in radio, which still amazes me today.

Domenic Correggio, WA1AYY
Saugus, Massachusetts

Domenic Correggio, WA1AYY, in his shack. [Domenic Correggio, WA1AYY, photo]

An Amazing Contact

Most of us have probably had at least one contact that stands out above the rest. For the 53 years I have been in this hobby, one contact of mine stands out above all the others.

It was a Saturday morning in 1969. I was still a relatively new ham, having been licensed the year before at age 16. My radio was on, tuned to the CW band on 15 meters. A weak station came on the frequency and started calling CQ. His call sign was DL5BA, a German station. He was weak, so I was surprised when he returned my call sign.

We exchanged RST, name, and location. After he received my report, there seemed to be excitement in his CW as he told me that, at that moment, he had a friend in his shack from my hometown, Columbus, Mississippi. I asked him if his friend's name was Hank, and he said, "Yes!" What makes this so amazing is that Hank and I never met or spoke to each other before. I didn't know of Hank until the night before.

One of my best friends and his girlfriend had come to my house for supper the previous evening. My friend's girlfriend was Hank's daughter. During dinner, she told us that she rarely saw her dad because he was in the service and stationed in Germany.

After telling Hank, through DL5BA, that his daughter and her boyfriend were at my house the previous evening, we spent the next several minutes talking about his family and he asked me to relay his love.

After the contact ended, I gathered my notes, took them to Hank's family, and told them about it. A few months later, when Hank was home, he called me, and we had a nice chat. He said that day was special, and we remarked about the odds of that contact taking place, and we were certainly glad that it did.

George R. Winship, Jr., NC5G
Gallatin, Texas
Life Member

Radio in the Military

One day in 1964, while browsing the electronics books at my local library, I came across the little black and red books published by ARRL describing amateur radio, how to get started, and how to learn Morse code, all while building your equipment.

I didn't have a Morse code oscillator, so I built one with one transistor and a few parts. The earphone kept falling out of my ear, and while I didn't have a telegraph key, I started learning Morse code by touching the two battery wires together. Later, I bought a straight key.

When I joined the Air Force, that put a damper on ham radio. While stationed in Biloxi, Mississippi, for my aircraft radio career, I became a member of the Keesler Amateur Radio Club, K5TYP. Watching the various members communicate with other stations around the world made me wish I had a license to join them.

Then, I was stationed in the Panama Canal Zone, and finally, in December 1967, I took the Novice exam. A few weeks later, I received my license from the FCC. I was permitted to operate the military's Collins KWM-2/2A linear amplifier. Operating on 20 SSB and talking to various countries was a pleasure. I had the most fun on the 15-meter Novice band in cross-band operation on SSB. I managed to contact several hams in and around Moscow.

Later, I found out about a Spektrum DX20 Tx and Heathkit HR-10 Rx that someone was selling and got them. One Saturday evening, I wandered down to my radio shop where I used to work on radio equipment. I pulled out the trusty BC-348 receiver and started scanning the AM broadcast band, and the first station I heard was WCKY in Cincinnati, Ohio. That station was extremely strong that evening, perhaps 50,000 dB over S9. Later on, I calculated that Cincinnati was roughly 2,100 miles from Panama.

Theodore Turk, WB8ADA
Euclid, Ohio
Life Member

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.

George J. Misic, KE8RN, ke8rn@arrl.net

Classic Radio

A Comprehensive Review of the Hammarlund HQ-110 Family

The ham band receivers in the Hammarlund HQ-110 family were often thought of as being poor receivers because they shared a cabinet with the not-so-great Hammarlund HQ-100 and HQ-100A, but they were surprisingly good. They were dual conversion with a first IF of 3045 kHz and a second IF of 455 kHz; the receivers were single conversion on 80/75 and 160 meters using only the 455 kHz IF. The HQ-110 and HQ-110A covered 160 to 6 meters without the World Administrative Radio Conference bands, and the HQ-110A VHF added the 2-meter band.

The HQ-215 had a different look than most of the Hammarlund HQ receivers. [Photo courtesy of **www.rigreference.com**]

The HQ-110 entered the ham radio market in 1957. It was discontinued 5 years later because of its upgrade to the HQ-110A, which was available until 1969. The HQ-110 followed the introduction of the mediocre single-conversion general-coverage HQ-100, which was introduced in 1956. Hammarlund sold the larger and more expensive HQ-170, HQ-170A, and HQ-170A-VHF receivers from 1958 to 1967. All Hammarlund HQ receivers looked similar, except for the HQ-215. They all had two tuning dials, an S-meter (often in the center), and the option to include a clock in the left corner. Below the dials were two large knobs, and the one on the left was the main tuning knob. On most general-coverage receivers, the left dial was used for general coverage and the right dial tuned the ham bandspread. However, on the HQ-110 family of receivers, the right knob was the function switch. The two large front dials on the HQ-110 and HQ-170 families of ham band receivers were both for ham radio bands and moved together.

Circuitry Design and Power Supply

The HQ-110 and HQ-110A were similar in design, as they both used the same tubes. But other than similarities in size, the HQ-110 family of receivers weren't like the HQ-100 and HQ-100A. The design of the HQ-110 family was much more like that of the larger Hammarlund HQ-145 and HQ-145A dual-conversion general-coverage receivers. One odd difference was that the HQ-110 family had a first IF of 3045 kHz, while most other Hammarlund receivers with a first IF around 3 MHz had an IF of exactly 3035 kHz — a difference of 10 kHz. I have found no reason for this difference.

All the receivers in the HQ-110 family used a type 6BZ6 pentode tube as the RF amplifier. A 6BE6 pentagrid mixer was used as the first mixer, and a separate 6C4 triode was used as the tunable first conversion oscillator. I assume that a separate tube was used in hopes that this design might improve stability. A second 6BE6 was used as the second mixer and was also the oscillator for the conversion from 3045 to 455 kHz. A 6BA6 pentode was used as the first IF amplifier at 455 kHz, and a 6AZ8 was used as the second IF and the beat frequency oscillator (BFO); the BFO was completely separate from the Q-multiplier circuit, unlike with the HQ-100. The Q multiplier operated at 455 kHz and used a 12AX7 tube. A 6BJ7 served as the diode detector, automatic noise limiter (ANL), and automatic gain control (AGC) diode. A common 6AQ5 was used in the audio output stage, providing about 1 W root mean square of audio power to a 3.2 Ω external speaker.

The AGC and ANL built into the HQ-110 family of receivers only operated when receiving AM signals (they didn't work on SSB or CW). Sadly, the HQ-110 receivers didn't include a product detector for better performance on SSB and CW. The similar but larger general-coverage HQ-145 and HQ-145A also didn't have a product detector. For only about $100 more, the ham band

HQ-170 and HQ-170A and the general-coverage HQ-180 and HQ-180A were supplied with a product detector and variable-speed AGC on SSB and CW. The HQ-110 family did have an RF gain control with a very wide gain control range that allowed SSB and CW to be well received by setting the RF gain low enough to avoid distortion of SSB or CW.

All of the receivers in the HQ-110 family used a 5U4GB vacuum tube as the B+ rectifier. The HQ-110A didn't switch to solid-state silicon diodes when advancing to the later-upgraded A models, like the HQ-145, HQ-170, and HQ-180 models did when they were upgraded. All models, except the HQ-200, used gas-filled voltage regulator tubes; the HQ-110 family used a 0B2 voltage regulator tube, regulating at about 108 V dc.

This August 1962 *QST* advertisement for Hammarlund detailed the HQ-110's upgrade to the HQ-110A.

Receiver Options

None of the Hammarlund communication receivers had built-in speakers, so they sold two speakers with similar styling — the S-100 and S-200. All the speakers and outputs were rated at 3.2 or 4.0 Ω but worked fine with 3.2 to 8 Ω speakers. All receivers had a ¼-inch monophonic phone jack, which was located on the rear panel of most of the receivers and muted the speaker when a headphone plug was inserted. All had provisions to mute the receivers when an amateur station was transmitting.

Many models of Hammarlund receivers had the option to include clocks. In general, a 12-hour clock was supplied with the original offerings, and 24-hour clocks were supplied for the models with A suffixes. A timer could be set on the clock to automatically turn on the receiver before the operator planned to use it, thus allowing the unit to fully warm up and minimizing the amount of frequency drift. If a factory-supplied clock was included, a C was added to the model number. A clock could also be purchased as an accessory to be installed by the owner. For units sold in areas where the power voltage was 220 to 240 V ac, Hammarlund marketed a version that could operate from 110 to 120 V ac or 220 to 240 V ac; these radios had an E added to their model number to signify provisions for export power. The Hammarlund HQ-110 family of receivers came with built-in 100 kHz crystal calibrators.

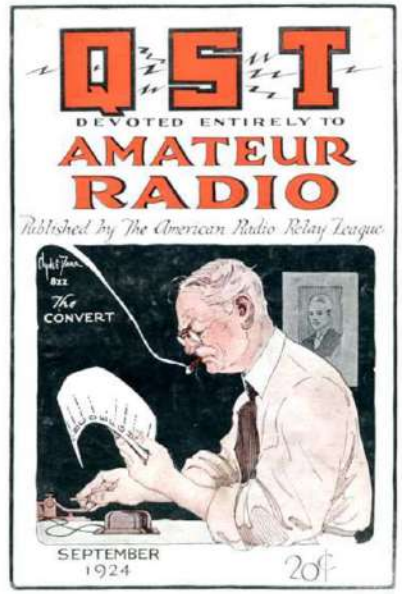
2- and 6-Meter Coverage

When the HQ-110 was upgraded to the HQ-110A, it gained a dial scale for use with a 2-meter converter having a 6-meter output. It also gained a separate antenna input for 6 meters that was separate from the input for 160 to 10 meters. The separate 6-meter antenna input was a great benefit, as a different antenna was virtually always used for 6 meters. The HQ-110A-VHF included two additional features: a 2-meter converter with an output of 6 meters and the 2-meter tuning dial scale that was added to the HQ-110A. The converter used four RCA 6DS4 Nuvistor triode tubes. A 6-meter preamplifier was also provided with the HQ-110A-VHF using two 6DS4 Nuvistor tubes. The separate input for the 6-meter antenna aided Hammarlund in adding the 2-meter converter and 6-meter preamplifier. In order to select the 2-meter converter, the receiver was set up for 6-meter reception. The 2-meter converter was selected by pulling out the RF gain control and putting relays in front of the 6-meter input — a separate 2-meter antenna input fed the converter.

Market Competitor

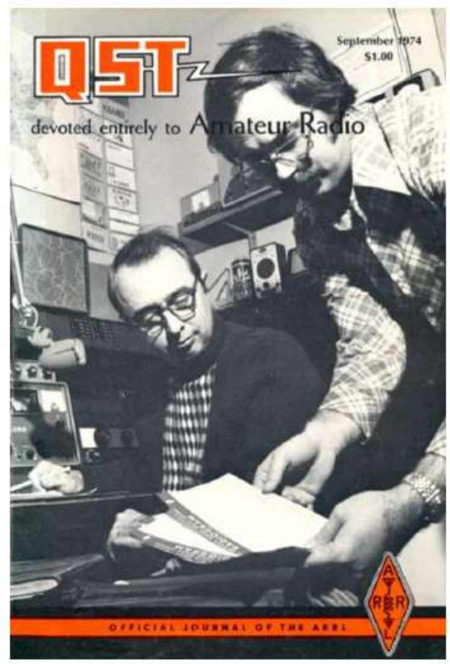
While the Hammarlund HQ-110 family was on the market, R. L. Drake Company released the 2A and the well-known 2B and 2C. The HQ-110 family covered 160 and 6 meters, with the option of 2 meters — Drake's receivers did not. They used a crystal-controlled first-conversion and tunable IF, plus product detectors, which really boosted the SSB and CW operation and improved stability and frequency readout.

100, 50, and 25 Years Ago



September 1924

- The cover illustration, titled "The Convert," shows an aspiring ham practicing with a straight key, buzzer, and Morse code alphabet list.
- After a year of hard work, Amateur Radio, through the efforts of A.R.R.L., has been given five bands of short waves. Regulations are outlined in "Editorials: The New Short Waves."
- The first meeting of the recently elected A.R.R.L. Board of Directors was held in Hartford, Connecticut on July 25 and 26. Highlights appear in "The Annual Board Meeting" by K.B. Warner, 1BHW.
- Proper construction for a good wavemeter is discussed in "Wavemeters for the New Ranges" by S. Kruse, 1OA.
- What useful information should be on a QSL card? Howard S. Pyle, 8FT, follows up with a study of the international fad that 8UX started in "The Amateur DX Report Card."
- A review of the work that's been done regarding an aggravating case of radio interference by power lines in Augusta, Georgia, is presented in "The Augusta Case," by P.C. Herault.
- H.F. Mason, 1ID, describes "A Five Watt Sending Set for $25" in "The Amateur Builder."



September 1974

- The cover photo shows WA3ODQ and K3ULJ inspecting radiograms from backup communications. The related story with details on an emergency test with Oscar appears in "Simulated Emergency to Demonstrate Amateur Satellite Capabilities: Tremor Hits Alaska."
- The impact of rapid inflation, rising costs, and financial losses is discussed in "It Seems to Us…Membership Dues."
- Martin Davidoff, K2UBC/WA3VCI, describes a simple, effective 146-MHz antenna suitable for amateurs using, or planning to use, Oscars 6 and 7 in "A Simple 146-MHz Antenna for Oscar Ground Stations."
- Instructions for reusing ball-point pens to make test prods is presented in "Gimmicks and Gadgets: Ball-Point Pen Test Prods" by Thomas G. Socci, W2RUK.
- An address by Richard E. Wiley before the ARRL National Convention in New York City, on the occasion of ARRL's 60th Anniversary, is retold in "FCC Chairman Speaks…"
- A story of how amateur radio and Sister Cities International came together is told in "The Oaxaca Experience" by John Troster, W6ISQ, and M.C. "Chuck" Towns, K6LFH.

September 1999

- The cover photo shows the mist-enshrouded WB1GQR contest operation at the summit of Mount Equinox in Vermont during the 1997 ARRL September VHF QSO Party.
- Casual operation in small sub-band portions of popular VHF/UHF bands can wreak havoc on weak-signal transmissions. David Sumner, K1ZZ, voices options in "It Seems to Us…Regulation or Education?"
- A look at the first DXpedition to the newest country on the DXCC list, as seen by a first-time DXpeditioner, is shared in "E44DX, Palestine Calling!" by Bernie McClenny, W3UR.
- Most of this 2-meter transceiver is in the software. Bob Larkin, W7PUA, describes "The DSP-10: An All-Mode 2-Meter Transceiver Using a DSP IF and PC-Controlled Front Panel."
- Rick Palm, K1CE, takes us on a journey through the history of NTS in "Golden Anniversary: A Look at Fifty Years of the National Traffic System."
- Lyndel Thiesen, N7LT, lets us in on the fun from the remote 10,000-foot mountains near Yellowstone National Park in "VHF Contesting Without a Hitch?"
- Randy Pirtle's, N6GN, "Op-Ed: A Farewell to HF?" expresses that technology will improve, but HF communications will remain a welcome challenge.

Silent Keys

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

KB1FGF	**Wood**, David M., Scarborough, ME
K1GUG	**Jolls**, Richard W., Braintree, MA
VK1GZL	**Morgan**, Charles L., Lancaster, NH
N1HLI	**Mullin**, Patricia S., Rutland, VT
W1JLA	**Heck**, Robert L., Sutton, MA
WA1KPA	**Tufts**, Robert B., Victor, NY
•KA1LLW	**Flood**, Richard E., Pittsfield, MA
V♦♦KA1SAW	**Swenor**, Neal H., Westborough, MA
V♦WA1SDJ	**Rooney**, John G., Sunapee, NH
VKL1VQ	**Lewellen**, Robert, Wasilla, AK
VN2AIZ	**Mayes**, Alfred I., Bellmawr, NJ
VW2LID	**Gagne**, Donald J., Lakewood, NJ
NY2NY	**Buscemi**, Jay R., Laurel, NY
•WB2OMS	**Kuhlthau**, Leston R., Milltown, NJ
♦N2QDQ	**DiLucchio**, Robert F., Havre de Grace, MD
KW2T	**Pedtke**, Dan, Fitchburg, MA
WB2TGN	**Leavenworth**, David J., Knoxville, TN
KA2VYY	**Magarelli**, Nicholas J., Fair Lawn, NJ
K2WA	**Andreychik**, Wayne T., Flemington, NJ
W2WDD	**Dallessandro**, David M., Tonawanda, NY
KC2YKV	**Schreffler**, Roger, Hudson, NY
♦W3HL	**Lacey**, Herbert, Cary, NC
KA3IKW	**Brennan**, Sarah, Bensalem, PA
VWA3IRG	**Kiehlmeier**, Robert R., Jr., Wilmington, NC
KB3LBB	**Bliss**, Ralph, Kingston, PA
VW3NRL	**Lerro**, Nicholas R., Sr., Woodlyn, PA
KB3ORG	**Willans**, Steven H., Morrisville, PA
N3ZVK	**Delhez**, Frans, York, PA
KB3ZWM	**Souders**, Julian M., Hollywood, MD
VAB4AO	**Hatch**, Earl R., Melbourne, FL
•KB4BOL	**Hall**, William E., Jr., Charlotte, NC
V♦K4CMY	**Wolfe**, Thomas E., Hixson, TN
VKG4DJM	**Bryson**, William H., Sadieville, KY
KC4DTP	**Findley**, William J., Cordele, GA
W4EPF	**Faiver**, Edward P., Mooresville, NC
AB4ET	**Weatherley**, John Leonard, Melbourne, FL
VW4FHC	**Crosby**, Fredrick H., Goldsboro, NC
•KM4G	**Lamar**, Marvin C., Jr., Port Washington, WI
WB4GSE	**Wenger**, Paul L., Sarasota, FL
V•KQ4HS	**Jackson**, Rodney D., Grovetown, GA
N4ICK	**Gossman**, Nick C., Evansville, IN
KD4IJS	**Hester**, Ronald L., Thurmond, NC
VKI4IRG	**Weltman**, William C., Baltimore, MD
K4ISB	**Aust**, Milton N., Draper, VA
N4JAR	**Rackley**, Julius A., Elizabethtown, NC
K4JBJ	**Johnson**, Walter R., Lawrenceville, GA
N4JCL	**Coffey**, Lloyd L., Waynesboro, VA
W4KEZ	**Forston**, Richard L., Lexington, KY
V•KD4LBJ	**Barger**, Harrison, Harriman, TN
VWB4LMH	**Youngblood**, Curtis, Greensboro, NC
KF4LPL	**Reese**, Steven, Catawba, NC
VK4NGC	**Bennett**, Donald H., Jr., Woodbridge, VA
VW4NTG	**McNutt**, George R., Trinity, NC
WA4OMR	**Tarpley**, Clarence L., Roanoke, VA
VW4OMT	**Tomblin**, Otis M., Cumming, GA
AB4RJ	**Morgan**, Ernest E., Henderson, KY
AF4RK	**Dalnes**, John R., North Miami, FL
K4RLZ	**Wilmoth**, George K., Hamilton, VA
VN4UI	**Mallard**, Brian J., Hilton Head Island, SC
KI4UNV	**Eagle**, Bonnie L., Trenton, TN
VW4VR	**Grandmaison**, Ronald J., Fredericksburg, VA
V•N4WSP	**Pace**, Steve S., Florence, AL
♦N4XM	**Schrader**, Paul D., Louisville, KY
•N4YMU	**Hartley**, Ernest B., Boone, NC
KE5BR	**Maberry**, Robert A., III, Olathe, KS
VK5CT	**Winter**, John W., Wichita, KS
W5DDR	**Rush**, David D., Clovis, NM
VW5DFN	**Norman**, David F., Fountain, FL
VW5DHD	**Beadles**, Tony G., Santa Fe, NM
VN5EXY	**Doughtie**, Charles T., Austin, TX
KI5FNH	**Almaguer**, Mike A., Richmond, TX
N5HCH	**Alexander**, Leone S., Hendersonville, NC
VKD5IBT	**Palacios**, Juan P., Big Spring, TX
VN5KQA	**Boline**, Rodney J., San Antonio, TX
KI5UHA	**Boyett**, Gary L., Rogers, AR
♦♦K5XG	**Essary**, Larry L., Sachse, TX
♦K5ZG	**Hudson**, Wayne R., Lamar, CO
VKC5ZTN	**Beevers**, Larry D., Clovis, NM
V•KB6ERG	**Meigs**, Arthur C., Long Beach, CA
V•W6GDP	**Kimball**, Pleasant P., Arvada, CO
VK6KAP	**Myovich**, Mach L., Merced, CA
KB6KBA	**Shaw**, Robert H., Fairfax, VA
KI6POY	**Larkin**, Laura K., Walterville, OR
•KD6QIP	**Pierce**, Lisa M., Lamont, CA
♦N6RTD	**Dickinson**, Richard T., Apple Valley, CA
KK6YK	**Seale**, Patrick H., Galesville, WI
K7AIL	**Benedict**, Jeffrey E., Chimacum, WA
AF7BU	**Rampton**, Dennis T., Gilbert, AZ
VK7DPM	**Mohr**, Daniel, Orlando, FL
N7DRW	**Hamby**, Horace, III, Aiken, SC
NK7L	**Madison**, Thomas D., Washougal, WA
W7MOY	**Humpherys**, Boyd V.N., Logan, UT
V♦N7SC	**Chastain**, Steven C., Medford, OR
V♦♦•K7VC	**Flanagan**, Dick, Minden, NV
KC7WET	**O'Dea**, Thomas M., Miles City, MT
KA8AUQ	**Zemke**, George P., Clare, MI
VW8CFO	**Hinkle**, Charles W., Columbus, OH
WD8CRL	**Bugg**, Mary J., Massillon, OH
KF8D	**Williams**, Dan L., Clarksville, TX
VK8HLB	**Burkhardt**, Howard, Mentor, OH
W8JEE	**Brehmer**, William T., Farmington Hills, MI
KD8JKN	**Kren**, William W., Warren, OH
N8KBC	**Kaltenborn**, David, Chula Vista, CA
K8MHC	**Angle**, Alvin A., Jr., Buckhannon, WV
VKC8NNV	**Allen**, William L., West Branch, MI
WB8OFU	**Reed**, Gary A., Southfield, MI
•KB8POK	**Kirkpatrick**, Matthew B., Circleville, OH
VWB8TAR	**Martin**, Francis W., Ludington, MI
KB8YDK	**Green**, Janice C., Tippecanoe, OH
V♦KD8YL	**Hulka**, John W., West Palm Beach, FL
WA9BR	**Rossetter**, Brad J., Lafayette, IN
♦W9CHD	**Merten**, Charles, Waukesha, WI
KD9CXN	**Reynolds**, David J., Marion, IN
VW9EIL	**Davis**, Timothy R., Franklin, WI
WD9FQW	**Behlen**, Michael J., Grafton, WI
W9ILA	**Frederick**, Robert A., Greenfield, IN
VKD9ISV	**Detommaso**, Richard F., Fort Wayne, IN
W9LME	**Laird**, Michael E., Logansport, IN
VW9MAL	**Lunsford**, Malcolm A., Merrillville, IN
V♦WB9PKM	**Yackey**, Allan L., Avon, IN
WB9QAA	**Smith**, Steven Rocky, Frankfort, IN
♦K9QED	**Rider**, Philip A., Mundelein, IL
VW9RYV	**Hamann**, Howard H., Manitowoc, WI
K9SAL	**Lunsford**, Shirley, Merrillville, IN
VKA9VQU	**May**, Bob, Muncie, IN
K9VXW	**Bergstedt**, Carleton R., Wheeling, IL
KD9WLV	**Cremeens**, Michael J., New Douglas, IL
VN9XRH	**Robinson**, Robert W., South Bend, IN
WDØAFJ	**Holesovsky**, Florence M., Loveland, CO
KØBZK	**Stanard**, Robert L., Kansas City, KS
♦♦KØCA	**Ahrens**, Cliff, Hannibal, MO
KCØCUV	**Lewis**, Albert M., Topeka, KS
VNKØH	**Fiala**, La Verne F., Kearney, NE
KØHNC	**Meisinger**, Charles W., Hillsboro, KS
VWØIXQ	**Tietbohl**, Frederick J., III, Green Lake, WI
VWØKEN	**Kendall**, Oliver F., Florence, CO
VKEØLCK	**Ring**, John Michael, Windsor, CO
WØQPX	**Nelson**, Jerome L., Richfield, MN
VNØSD	**Waltner**, John R., Hurley, SD
KDØTWH	**Haynes**, Gregory D., Hermantown, MN
VNØVJH	**Miller**, Robert J., Saint Paul, MN
WBØVNL	**Doorneweerd**, Fay A., Port Richey, FL
NØWAR	**Cathcart**, Aaron S., Princeton, IL
•NØWCM	**Begley**, Mason E., Maryland Heights, MO
KCØWUD	**Bartlett**, Charles R., Licking, MO
WNØWWY	**Feldhausen**, Dale E., Manhattan, KS
KEØY	**Elliott**, Ben A., Raymond, NE

♦ Life Member, ARRL
♦ Current Diamond Club
V Veteran
• Former call sign

For information on how to list a Silent Key in *QST*, please visit **www.arrl.org/silent-key-submission-guidelines**.

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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• HF/50/144/430/440 MHz Multi-band, Multi-mode, IF DSP • D-STAR DV Mode (Digital Voice + Data) • Intuitive Touch Screen Interface • Built-in RTTY Functions
IC-2730A | VHF/UHF Dual Band Transceiver
• VHF/VHF, UHF/UHF simultaneous receive • 50 watts of output on VHF and UHF • Optional VS-3 Bluetooth® headset • Easy-to-See large white backlight LCD • Controller attachment to the main Unit
ID-5100 AD
VHF/UHF Dual Band Digital Transceiver
• Analog FM/D-Star DV Mode • SD Card Slot for Voice & Data Storage • 50W Output on VHF/UHF Bands • Integrated GPS Receiver • AM Airband Dualwatch
IC-V3500 | 144MHz FM Mobile
• 65W of Power for Long Range Communications • 4.5 Watts Loud & Clear Audio • Modern White Display & Simple Operation • Weather Channel Receive & Alert Function
ID-50A | VHF/UHF D-STAR Portable
• High Visible LCD with Backlight Function • Find Nearby Repeaters with the Built-In GPS • Easy D-STAR Settings for Beginners • Voice Recorder Function • Share Pictures in DV Mode
IC-V86 | VHF 7W HT
• 7W OutputPower Plus New Antenna Provides 1.5 Times More Coverage • More Audio, 1500 mW Audio Output • IP54 & MIL-STD 810G–Rugged Design Against Dust & Water • 19 Hours of Long Lasting Battery Life • 200 Memory Channels, 1 Call Channel & 6 Scan Edges
IC-T10 | Rugged 144/430 MHz Dual Band
• Disaster Ready - Excellent Fit for Your Emergency Bag • Loud Audio - New Speaker Design • Long Bettery Life - Up to 11 Hours • FM Broadcast & Weather Channels
ID-52A | VHF/UHF D-STAR Portable
• Bluetooth® Communication • Simultaneous Reception in V/V, U/U, V/U and DV/DV • Enriched D-STAR® Features Including the Terminal Mode/Access Point Mode • UHF (225~374.995MHz) Air Band Reception
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Amateur Radio Emergency Service® (ARES®)

The Amateur Radio Emergency Service (ARES)

Amateur Radio Operators use their training, skills, and equipment to provide communications during emergencies When All Else Fails®. The ARRL Amateur Radio Emergency Service (ARES) consists of radio amateurs who have voluntarily registered their qualifications and equipment, with their local ARES leadership, for communications duty in the public service when disaster strikes.

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.

Get Involved in ARES

- Ask local hams about involvement
- Contact your Section Manager or Section Emergency Coordinator, **www.arrl.org/sections**
- 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**
- Reach out to ARRL for assistance, email **ares@arrl.org**

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- Use with separate passive speakers or headphones
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- DSP noise canceling versions EQ20-DSP, EQ20B-DSP (with added Bluetooth on input)

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!

DESKTOP MKII

10W amplified DSP noise canceling speaker
- Simple controls
- 8 filter levels
- Separate line level and speaker level audio inputs
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*Values are measured examples. (2kHz spacing:14.1 MHz, CW, BW 500 Hz, Pre Amp OFF)

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❷ 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

❸ 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

❹ COMET GP-9 / GP-9N DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA

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❺ 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

❻ 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

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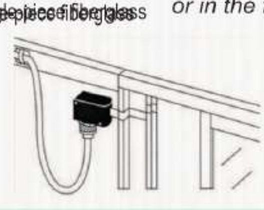

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Power Rating	1.5KW (1.8~60MHz) 1KW (144MHz)	2KW (1.8~60MHz) 1KW (144MHz)	200W (140~525MHz)
Tolerance	±10% at Full Scale	±10% at Full Scale	±10% at Full Scale
SWR Measurement	1:1~1:∞	1:1~1:∞	1:1~1:∞
SWR Detection Sensitivity	4W MIN	4W MIN	4W MIN
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Input/Output Connectors	SO-239	SO-239	SO-239 or N-Type

CN-501
Economy Series

Compact HF/VHF AVG reading SWR/Power Meter Cross needle technology displays:

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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
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Input/Output Connectors	SO-239	SO-239	SO-239 or N-Type	N-Type

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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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The Legend Continues

TS-520

TS-570D/S

TS-590S

The TS-590SG

Back in 1973, Kenwood introduced the first affordable HF radio to the world, the legendary TS-520... 27 years later, the TS-570D and the TS-570S with 6 meters were by far the most popular HF and HF+6 transceivers on the market.

Be witness to the evolution of KENWOOD's pride and joy - the TS-590S HF transceiver - pushing performance and technology to its utmost limit, with the receiver configured to capitalize on roofing filter performance and IF AGC controlled through advanced DSP technology. Enter the TS-590SG. A new generation of high performance transceiver, with the type of high level response to meet DX'ers needs.

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