

QST



DIGITAL EDITION



ARRL The National Association for
Amateur Radio®

October 2025

www.arrl.org

DEVOTED ENTIRELY TO AMATEUR RADIO

Parks on the Air, In the Air



QST Reviews

Alinco DR-CS10HT 2-Meter
FM Transceiver

APC Schneider Electric
Pro BN1500M2 UPS

CyberPower CP1500PFCLCD UPS

Tripp-Lite SMART1500PSGLCD
UPS

HF Enthusiasm

Single Side Band DNA passed down over 70 years

FTX-1 series

HF/50/144/430MHz ALL MODE TRANSCEIVER

FTX-1 Field

10W Version for Field Operation

FTX-1 optima

100W Version for 10W Field Operation and 100W Base Station



*Stand is commercially available product
not included in the optional accessories

YAESU
Radio for Professionals

YAESU USA
6125 Phyllis Drive, Cypress,
CA 90630 (714) 827-7600

For the latest Yaesu news, visit us on the Internet: <http://www.yaesu.com>

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

C4FM/FM 144/430MHz Dual Band Digital Mobile Transceiver

FTM-310DR ASP

FTM-310DR (SPU-1 is required for ASP Operation)

All New C4FM/FM Dual Band Mobile

C4FM

Excellent Digital Audio Quality
thanks to Outstanding C4FM BER (Bit Error Rate Characteristics)

Super-DX+ASP

Unparalleled Expanded FM Communication Range
with Super-DX + ASP Noise Cancelling for Weak Signals

PMG

Up to 5 frequencies can be easily registered and monitored
in real time in a bar graph

AESS

The Phase Modification Dual Speaker System
for Clear and High-Fidelity Audio



* BU-5 is required for Bluetooth Operation

■ Super-DX+ASP expands the communication range

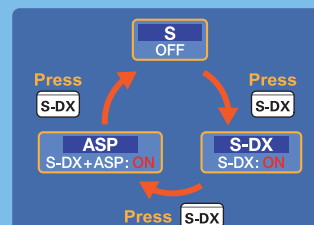
The Super-DX with the ASP ensures reliable audio quality for weak signals and expands the communication range. ASP AUTO mode is also selectable. In this mode, the ASP is automatically activated when the transceiver detects weak signals in FM analog mode and AM mode.

Analog FM Super-DX Super-DX+ASP



ASP MANUAL MODE

Press the S-DX key to enable or disable S-DX and ASP.



YAESU
Radio for Professionals

YAESU USA
6125 Phyllis Drive, Cypress,
CA 90630 (714) 827-7600

For the latest Yaesu news, visit us on the Internet: <http://www.yaesu.com>

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

Choose Your LDG Interface Cable



Y-ACC-1



Y-ACC-2



Y-ACC-3



IC-PAC

YAESU - Press Tune button on LDG tuner

Radio

FT-100,857,897,891,991,710

FT-dx10,1200

FT-dx101,3000

Cable

Y-ACC-1

Y-ACC-2

Y-ACC-3

Notes

891/991-set to LAMP
710- set TUN/LIN to LIN
& set Tuner Type to EXT

100W LDG Tuners Only

100W LDG Tuners Only

ICOM - Press Tune button on radio or LDG tuner

Radio

Any Compatible with AH-4
or AH-3

Cable

IC-PAC

Notes

Press Tune button on
radio or LDG tuner

OTHER - Key radio and Press Tune button on LDG tuner

Radio

Other

Cable

None

Notes

Key radio and Press
Tune button on
LDG tuner



www.LDGelectronics.com

410-586-2177

support@ldgelectronics.com

DIGITAL MODES

Fun & Affordable!

RIGblaster Plug & Play

\$99 ~~\$119.95~~

Save \$20 with
Discount Code: **QSTPP**
expires: 12/28/25



Low cost digital mode operation, real CW keying and TTL rig control!

- **Works with Windows, Linux and OSX!**
- **CW output jack** for use with MRP-40, CwType, HRD and other software!
- **Built in rig control** runs Icom CI-V or Yaesu TTL CAT (optional cable required). Perfect for automatic frequency tuning in Winlink Express or running Ham Radio Deluxe and other loggers.
 - Ideal for Yaesu FT-817/818/857/897 and most Icom HF radios!

Adapter for Xiegu G-90
58102-1807 \$14.95



Includes free software! Operate: FT-8 • WSPR • VarAC • RTTY • PSK31 • SSTV • Feld-Hell • Packet Radio (HF & VHF) • VARA • MFSK • Olivia • ALE • WEFAX • Navtex and many more!

Computer has only a single audio jack?

No problem! Order our USB External Sound Card Adapter with the RIGblaster Plug & Play for a complete USB audio solution. 58141-1633 \$9.95



Convenient hook up!

The RIGblaster Plug & Play connects to the radio's data jack. An adapter is required for some radios that don't use a 6 pin mini DIN data jack.

See our Plug & Play compatibility chart here:
www.westmountainradio.com/pnpradiomatrix



www.westmountainradio.com/QST1025

Email: sales@westmountainradio.com
Phone: (262) 522-6503 Ext 35

David A. Minster, NA2AA
Publisher

Becky R. Schoenfeld, W1BXY
Editorial Director

Dana Kasowitz, KC1SEB
Managing Editor

Sam Shaner, KE1SAM
Editor

Tanajah Fryer
John McKenna
Assistant Editors

Paul Bourque, N1SFE
Contest Program Manager

Phil Salas, AD5X
John Stanley, K4ERO
Technical Editors

Dave Casler, KE0OG
Leanna Figlewski, KC1RMP
Steve Ford, WB8IMY
Steve Goodgame, K5ATA
Sierra Harrop, W5DX
Jon Jones, N0JK
Bernie McClenny, W3UR
Rick Palm, K1CE
Pascal Villeneuve, VA2PV
Paul Wade, W1GHZ
Contributing Editors

Terese Newman
Assistant Production Supervisor

Matt Ali
Layout & Production Specialist

Maty Weinberg, KB1EIB
Production Coordinator

David Pingree, N1NAS
Senior Technical Illustrator

Janet Rocco, W1JLR
Advertising Relationship Manager

Bob Inderbitzen, NQ1R
Director of Marketing & Innovation

Steve Ewald, WV1X
Field Organization Supervisor

9

Second Century
Future-Proofing ARES®

30

Using AI to Improve the
Readability of Weak Beacons
Hal Feinstein, WB3KDU

33

An Exponential Spiral Antenna
Yasuhiro Kawai, JH1KOJ

36

A 160/80-Meter Trap Vertical
Bill Wortman, N6MW

40

Product Review
Pascal Villeneuve, VA2PV
Alinco DR-CS10HT 2-Meter FM Transceiver;
APC Schneider Electric Pro BN1500M2 UPS;
CyberPower CP1500PFCLCD UPS;
Tripp-Lite SMART1500PSGLCD UPS



56

SOTA and POTA Holidays
Andrea Borgnino, IW0HK

58

A WAC Award 48 Years in the Making
Phil Miguez, WA3NUF, and Walt Bohlman, K3BPP

60

Putting Rally Cars and Radios
to the Test in Pennsylvania
DP Dunn, AB2NM



63

POTA Hot-Air Ballooning over US-1015
Ron Ochu, KO0Z

65

A Mobile Station in a Jeep
Alan D. Kline, KB1DJ

67

ARRL Board Reviews and Approves By-Law
Changes, Establishes 2026 as Year of the Club,
and Creates 10-Band DXCC

69

Upcoming Elections and How to Vote

78

2024 – 2025 School Club Roundup Results
Lew Malchick, N2RQ, and Ken Gunther, WB2KWC

79

The 2025 ARRL November Sweepstakes

94

A Look Back — November 1975



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

Columns

Amateur Radio World.....	73
Ask Dave	52
Celebrating Our Legacy.....	97
Classic Radio	98
Club Station	80
Contest Corral.....	77
Correspondence	24
Ham Media Playlist.....	82
Happenings.....	70
How's DX?.....	84
Member Spotlight.....	13
Microwavelengths	54
Public Service	75
The World Above 50 MHz.....	86
Up Front	20
100, 50, and 25 Years Ago	100

Departments

ARRL Section Managers.....	16
ARRL Special Service Clubs.....	81
Certificate of Code Proficiency Recipients	92
Convention and Hamfest Calendar	88
Field Organization Reports	93
Guide to ARRL Member Benefits.....	14
Ham Ads	124
Index of Advertisers	126, 127
Officers, Division Directors, and Staff.....	15
QST Cover Plaque Award	91
Silent Keys	101
Special Event Stations.....	90
Strays	64
This Month in QEX.....	91
Volunteer Monitor Program Report	39
W1AW Qualifying Runs	92
W1AW Schedule	28



Our Cover

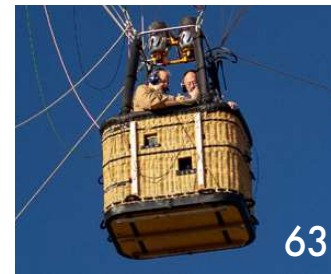
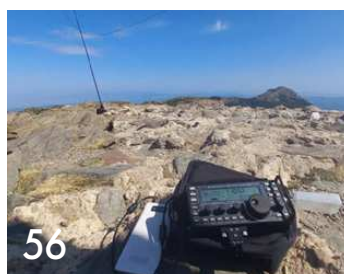
Making POTA contacts from a beautiful hot-air balloon 75 feet in the air is one way to increase the excitement of a POTA activation! Members of the Macoupin County (Illinois) Amateur Radio Club, K9MCE, invited some ham friends to join them at Pere Marquette State Park (POTA designator US-1015), where three teams of two hams took turns being carried aloft with their gear. To learn more about their preparations and setup, as well as the contacts they made, read "POTA Hot-Air Ballooning over US-1015," by Ron Ochu, KO0Z. [John Nell, K9JDN, photo]

Digital and Mobile Editions

ARRL members can access the digital edition via a link at www.arrl.org/qst, download our iOS app from the iTunes Store, and download our Android app from the Google Play Store.

Write for QST

www.arrl.org/qst-author-guide
email: qst@arrrl.org



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 109, Number 10. 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.

ARRL Membership and QST cannot be separated. All ARRL members have digital, online access to QST. Print subscriptions are available and sold separately. For ARRL members in the US, a subscription to QST via mail is

\$25 per year. For libraries and institutions, a subscription to QST is available for \$84 per year; single copies \$7.

ARRL Membership is available to individuals at \$59 per year. A reduced rate is available for licensed radio amateurs under 26 years old, for \$30 per year. Membership is available to the immediate family of a member living at the same address, and to anyone who is legally blind, for \$12 per year. A complete list of dues rates is available at www.arrrl.org/join. Foreign remittances should be by international postal or express money order or bank draft negotiable in the US and for an equivalent amount in US funds.

Copyright © 2025 by the American Radio Relay League, Inc. Title registered at the US Patent Office. International copyright secured. All rights

reserved. Quedan reservados todos los derechos. Printed in the USA.

QST®, DXCC®, VUCC®, DX Century Club®, ARES®, Amateur Radio Emergency Service®, Logbook of The World®, LoTW®, and ARRL The National Association for Amateur Radio® are registered trademarks of the American Radio Relay League, Inc.

ARRL and QST in no way warrant the products described or reviewed herein.

QST is available to blind and physically handicapped individuals from the Library of Congress, National Library Service for the Blind and Physically Handicapped. Call 1-800-424-8567 or go to www.loc.gov/nls.

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

To ensure prompt delivery, we ask that you periodically check the address information on your mailing label. If you find any inaccuracies, please contact Member Services at circulation@arrrl.org or 860-594-0200.

Reprints and permissions: permission@arrrl.org

Online Privacy Policy: www.arrrl.org/online-privacy-policy
Telephone: 860-594-0200

ANTENNA DESIGNS

FOR DISCREET AMATEUR RADIO OPERATING!

Stealth Antennas for Ham Radio is full of antennas to get you on the air no matter where you live. Even radio amateurs who live with antenna restrictions or covenant limitations will find solutions in this book. Learn how to install a multiband vertical that looks like a flagpole, or how to run an end-fed random wire along your roof, so the neighbors never notice. If you are looking for an invisible repeater connection, try the Ham Walking Stick. If you want five bands but cannot put wires in trees or display anything even remotely antenna-like, try the Compact Stealth Inverted L.

These **28 unobtrusive stealth antennas** will get you on the air and making contacts without raising any concerns. Try them out today.

- FLAGPOLE AND VERTICAL ANTENNAS
- LOOP AND SLOT ANTENNAS
- DISGUISED AND NOVELTY ANTENNAS
- LOW PROFILE WIRE ANTENNAS



Stealth Antennas for Ham Radio

ARRL Item No. 2288 | Retail \$22.95 | Member Price \$19.95

Order online at www.arrl.org/shop | Call 860-594-0200



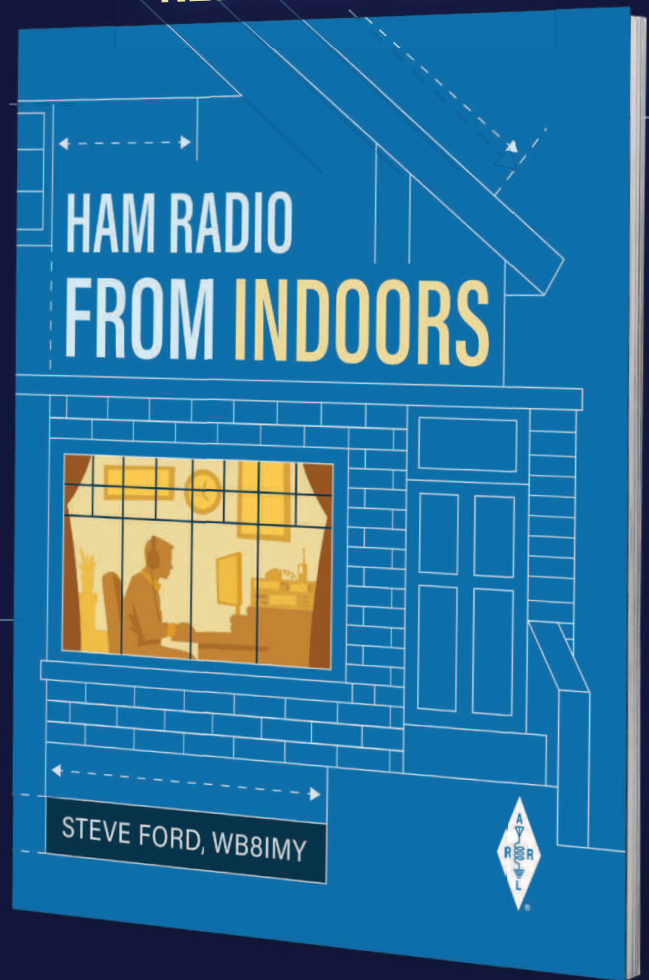
NEW ARRL BOOK

NO OUTDOOR ANTENNA? NO PROBLEM!

Don't let outdoor antenna limitations keep you from enjoying amateur radio.

It is possible to operate on the HF bands with equipment and antenna systems that are entirely inside your house, apartment, or condominium.

All it takes is some creative thinking!



Ham Radio from Indoors shows you how to install an effective station and indoor antenna system in any setting – even your living room. Get the most out of your indoor station by exploring different operating styles such as CW and popular HF digital modes for low power. This book includes indoor antenna solutions like simple wire designs for an attic, or a loop that fits neatly on a tripod. *Ham Radio from Indoors* offers advice to help you cure interference problems, as well as a detailed discussion of RF safety.

- The Indoor Challenge
- Indoor Antenna Designs
- Dealing with Interference
- RF Safety
- Appendix — A Collection of Indoor Antenna Articles



ARRL
The National Association for
Amateur Radio®

ARRL Item No. 2189 | ARRL Member Price \$15.95 (Retail \$17.95)
Order online at www.arrl.org/shop | Call toll-free US 1-888-277-5289

DIAMOND ANTENNA

diamondantenna.net

When it comes to quality and performance, DIAMOND ANTENNA is the worldwide leader in VHF/UHF base and mobile antennas.

DIAMOND ANTENNAS help you get the most out of your on-air experience.

For all your base station and repeater needs, DIAMOND has an antenna that will work for you.

You've tried the rest, now own the best!

Here is a small sample of our wide variety of antennas

Model	Bands	Length Ft.	Max Pwr. Rating	Conn.
Dualband Base Station/Repeater Antennas				
X700HNA (4 section)	2m/70cm	24	200	N
X510HD (3 Section)	2m/70cm	17.2	330/250	UHF or N
X300A (2 Section)	2m/70cm	10	200	UHF or N
X200A (2 Section)	2m/70cm	8.3	200	UHF
X50A (1 Section)	2m/70cm	5.6	200	UHF or N
X30A (1 Section)	2m/70cm	4.5	150	UHF
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
AZ504SP	2m/70cm	15.5 in.	50	UHF
NR7900A	2m/70cm	57 in.	300/250	UHF
Monoband Mobile Antennas				
NR22L	2m	96.8 in.	100	UHF
M285	2m	52.4 in.	200	UHF or NMO

X700HNA Special Features:

- Heavy duty fiberglass radomes
- Four section assembly
- Overlapping outer shells for added strength
- Stainless steel mounting hardware & radials
- Strong waterproof joint couplings
- Type-N cable connection
- Wideband performance
- Highest gain Dual-band Base Antenna!

The Standard By Which All Others Are Judged

NR770H Series

SG7900A

X30A / X50A

X700HNA



RF PARTSTM
COMPANY

Diamond Antenna is a division of RF Parts Company



Second Century

Future-Proofing ARES®

In my July 2025 column, I focused on being personally prepared and resilient, highlighting some of the organizations and resources that ready us to provide emergency communications. ARRL leads one of those national organizations, the Amateur Radio Emergency Service® (ARES®).

ARES exists to help us meet the *expectation* that we use the amateur radio spectrum to serve “the public as a voluntary noncommercial communications service, particularly with respect to providing emergency communications” (from FCC Part 97.1[a]).

There are two very important things to take note of. The first is that this is not *exclusively* for emergency communications. I often hear ARES members disparage the notion that providing public service communications is in some way a black eye to the program because it dilutes the focus on emergency communications. It does not. It enhances it.

The second is that communications during the time of a disaster are not strictly constrained to RF. The reliance on internet-based services and specialized apps has become commonplace among first responders and local authorities. The image of ARES and its members is greatly enhanced when there is both awareness of, and demonstrated expertise in, using these technologies.

At the July ARRL Board meeting I mentioned that no one has ever shown me how ARES has integrated Starlink capabilities into their deployment strategy. During the break, one Director walked out to his car and brought in a beautiful Starlink mobile case, ready to bring instant internet access to any situation with a clear view to the sky! The conversation continued after the Board meeting, looking at smartphone apps that EmComm groups are using to communicate and coordinate. Yes, using amateur radio spectrum has its place, but these teams are using other methods and techniques to enhance their capabilities.

To future-proof ARES, a radical yet constructive shift in perspective will be required. ARES can be (re)designed to leverage the entire assortment of communication solutions available today, including:

- **Traditional Radio Frequency (RF) Communications:** This remains the core strength. This includes HF for long-distance, redundant communications, VHF/UHF for local tactical links, and increasingly, digital modes like Winlink for email over radio, DMR/D-STAR/Fusion for digital voice and data, and APRS for situational awareness, and tracking. The focus should be on optimizing these capabilities for data throughput, interoperability, and redundancy.
- **Satellite Communications:** The advent of accessible satellite internet services like Starlink revolutionizes remote connectivity. A future-proofed ARES must not only understand but actively integrate such capabilities into its deployment strategies, providing instant internet access for incident command posts or remote disaster sites. This could involve direct deployment or providing expertise in setting up and managing such systems for served agencies.
- **Internet-Based Services:** Beyond satellite, ARES must become proficient in leveraging terrestrial internet (where avail-

able or rapidly restorable) and cellular networks. This includes understanding IP networking, secure VPN connections, and various Voice over IP (VoIP) solutions.

- **Modern Applications and Software:** Emergency management agencies and first responders increasingly rely on sophisticated software for coordination, mapping, messaging, and data sharing. Smartphone applications for incident management, secure chat applications, and common operating picture (COP) platforms are now standard. ARES members must be trained not only to use these tools but to understand their underlying architecture, security protocols, and how to integrate amateur radio data into these systems. This will enhance ARES's value by making its communications directly usable and digestible by partner agencies.
- **Mesh Networking and Alternative Data Pathways:** Exploring technologies like goTenna Mesh, LoRaWAN, or other localized ad-hoc networks can provide resilient data communication layers in environments where traditional infrastructure is down, complementing both RF and IP-based solutions.

In my July report to the Board, I included that “ARES is broken.” I know it is from the hundreds of in-person discussions I have had with ARES members who passionately challenge ARRL to do more to make ARES relevant. It often leads to a dialogue pitting ARES against AUXCOMM, which is a fruitless exercise.

How do we ensure that our 90-year-old ARES program is future-proofed to continue to serve amateurs for the public's benefit? What does it mean to do a “greenfield exercise” for ARES? Not tearing down the program, but rather to plan from a clean sheet of paper, a green field, and see what providing emergency communications might look like given the full assortment of radio, satellite, internet, and applications solutions available today. Once we have created this model, plans for future-proofing ARES should jump off the page. And not all of them will be popular! During 2026 we'll be focusing on canvassing ARES groups across the country to contribute their modernized capabilities to the discussion about future-proofing ARES.

So please, be radio active. If you have an interest in EmComm, seek out your local ARES group using our online tool at www.arrrl.org/find-an-ares-group. Be a connector. Share the great ideas you encounter. And contest season is here! See you on the air.

David A. Minster, NA2AA
Chief Executive Officer

bhi

HEAR WEAK SIGNALS CLEARLY WITH A BHI DSP NOISE CANCELLING PRODUCT!

**DON'T PUT UP WITH NOISE &
INTERFERENCE ANY LONGER**

Discover our range of noise cancelling
in-line modules & speakers



In-Line Module

- 5W amplified DSP noise cancelling in-line module
- 8 filter levels 8 to 40dB
- Use in-line with a loudspeaker
- Audio bypass feature



Dual In-Line

- Dual channel DSP noise cancelling in-line module
- 8 filter levels 9 to 40dB
- 3.5mm speaker & line level connections



Compact In-Line

- Powerful audio processor
- Removes noise & interference
- Use with headphones
- Easy to use with "real-time" audio adjustment



NES10-2 MK4

- 5W amplified DSP noise cancelling speaker
- 8 to 40dB noise cancelling
- Audio bypass feature
- Use mobile or base station



DESKTOP MKII

- 10W Amplified DSP noise cancelling base station speaker
- 8 DSP filter levels
- "Real-time" adjustment
- Suitable for all radios

Testimonial: "The DESKTOP speaker is great, audio is crisp and clear, brilliant!"

Don't forget to check out our range of retrofit DSP install modules and our unique bhi accessories

bhi

WEBSITE:
bhi-ltd.com

DX
ENGINEERING

R&L
ELECTRONICS
www.randl.com

HAM
RADIO
OUTLET

GigaParts
Technology Superstore

Deploy Anywhere - Proven Results Without the Footprint.



HG1 Deluxe MLA

80-10m *
Portable - LMR600 Radiator
45W PEP
Manual Tuning 6:1 Calibrated Dial

\$535

HG3 Stepper MLA

45W PEP
80-10m * - LMR600 Radiator
Remote Tuning Stepper Motor
Auto Tuning with SWR bridge

\$1195

SOTA-1 QRP MLA

Ultra Light - Great for SOTA Expeditions
40-10m
15 W PEP
3:1 manual tuning

\$435

When it comes to antennas, nothing beats the convenience and performance of a top-rated Magnetic Loop Antenna (MLA). Our MLAs are the ideal solution for operators facing HOA restrictions, thanks to their compact, lightweight design that makes deployment easy in virtually any setting. But don't let the size fool you—these antennas deliver powerhouse performance, often matching or even exceeding that of a traditional dipole. With the integrated digital SWR bridge in our HG3 Series, auto-tuning is faster, easier, and more efficient than ever.

No space for a tower? HOA giving you trouble? Want to avoid unwanted attention? Our compact, high-performance MLAs are designed for hams who need to stay low-profile without compromising DX performance, audio clarity, or signal reliability. Trusted by seasoned operators and praised in QST and other leading ham radio publications, they're proven performers. Whether you're limited by space, regulations, or simply prefer to operate discreetly, this is the HF antenna you've been waiting for.

Here's Why Seasoned Hams Choose These MLAs - Stealthy, HOA-Friendly, and Proven Performance:

- ✓ **Nearly Invisible Installation**
 - Compact and self-contained
 - Blends into balconies, rooftops, or indoor spaces
 - No need for wires, masts, or radials
- ✓ **Outstanding Noise Rejection**
 - Inherent directional nulls reduce local electrical noise
 - Crisp signal clarity despite heavily QRM-polluted areas
 - Excellent signal-to-noise ratio in urban environments
- ✓ **Efficient, Even in Tight Spaces**
 - Optimized for 80 to 10 meters, with 80m option
 - Strong signal without a large yard or tower
 - Performs well in confined spaces
- ✓ **HOA-Friendly & Ready Anywhere**
 - No towers, no height restrictions, no hassle
 - Sets up easily in tight spaces—attics, patios, RV sites, and more
 - Perfect for HOA-regulated neighborhoods and portable operations
- ✓ **Stealthy by Design**
 - Low-visibility black LMA-600 radiator blends into the surroundings
 - Built tough with weather-resistant materials for year-round use
 - Ideal for discreet installations where appearance matters
- ✓ **Trusted by Experienced Hams**
 - Proven performance with expert support you can rely on
 - Preferred by knowledgeable operators who demand results
 - Backed by a community of real-world users and verified success

Visit us at [preciserf.com](https://www.preciserf.com) to purchase your MLA today!

SAVE THE DATE!

ARRL ONLINE AUCTION

20TH ANNIVERSARY

2025 ARRL ONLINE AUCTION • OCTOBER 10-16

PREVIEW BEGINS OCTOBER 7

FEATURING:

VINTAGE BOOKS

MYSTERY JUNK BOXES

EQUIPMENT AND GEAR

ARRL LAB PRODUCT REVIEW

FEATURING EQUIPMENT REVIEWED BY THE ARRL LAB!

- PreciseRF DPM6000A SWR/Power Meter
- Icom IC-R15 Communications Receiver



Proceeds benefit ARRL education programs and projects.
www.arrl.org/auction

SPONSORED BY:

rt SYSTEMS 
RADIO PROGRAMMING MADE EASY

Member Spotlight

Brian Karcher, KG5GJT

When Brian Karcher, KG5GJT, was young, his father, Ronald Karcher, and grandfather, Louis Karcher, built the framework for his love of amateur radio. They brought CB radios with them on pretty much every adventure they went on — family road trips, hunting trips, fishing trips, etc. On road trips, they used CB to find out about traffic and weather conditions, if they needed to change their route, and where to stop for gas. “You name it, they talked about it on the CB radio,” Brian recalled.

He wasn’t your typical kid who grew up dreading boring family trips because these trips meant he got to experience and use radios. “I loved everything about them — the way the radio would crackle to life, setting the squelch just right, and watching the signal strength meter,” Brian said.

It wasn’t only at home that Brian was surrounded by radio; other kids in the neighborhood enjoyed it as well, and they often operated together. He still has two Realistic TRC-214 handheld CB radios that he used back then, and they still work. Once he got older, Brian continued the tradition started by his father and grandfather and kept a CB radio in his car.

Radio Runs in the Family

In 2015, Brian and his 7-year-old son, David, attended a ham radio demonstration at a Cub Scout event in Louisiana. David enjoyed it so much that he asked his dad to get him an amateur radio. It was at that moment that Brian decided to study for and earn his ham radio license. He’d put it off for so long because he assumed it would be too time-

consuming and difficult. But, to his surprise, it wasn’t. “I just had to set my mind to it and make time to study. Now I regret not getting licensed earlier — I missed out on a ton of fun,” Brian said. He wanted to learn everything he could about ham radio, so he took his time studying from *The ARRL Ham Radio License Manual* and watching Dave Casler’s, KEØOG, training videos.

It didn’t take long after Brian earned his ham radio license for his wife, Liz, and 13-year-old daughter, Ellie, to see how much fun it was, and they soon became a family of hams. “Having my wife and kids licensed is great. Over the years, we’ve operated together for ARRL Field Day, special events, and radio nets, among other radio activities,” Brian said.

Ham Operations

Brian enjoys operating D-STAR because of the “ease [with] which you can make QSOs around the world just about any time you want.” He’s even started the D-STAR Net of Southeast Louisiana in hopes of promoting its use in the area.

Brian has also tried his hand at operating Morse code, because his father gave him the Bunnell-Martin flash key that his grandfather used as a radio and CW operator at the port of embarkation in New Orleans during World War II. In 2020, Brian joined the Long Island CW Club hoping to learn how to send CW. “My journey to learn CW has been a rough one,” he said. “I’ve started and stopped trying to learn several times now, but I haven’t given up hope — I will learn it one day and put my grandfather’s key on the air.”



Brian’s most memorable contact was with the International Space Station, NA1SS, with astronaut Serena Maria Auñón-Chancellor, KG5TMT. He had been trying to contact her for weeks and had all but given up before deciding to try from a different location — on his roof. From there, he was able to hear contacts being made and waited for her to call before putting his call sign out there. “I was shocked when she called me back,” he said. “We had a very brief QSO, and she was on to the next station.”

More than Just Having Fun

Brian has no regrets about getting his amateur radio license (aside from not getting it sooner). He’s made lifelong friends and had a lot of fun throughout his experience as a ham, but amateur radio has also been a huge help for him and his family while living in the New Orleans metro area. “I have used amateur radio during hurricanes to get information about the storm before, during, and after and to stay in touch with family and friends,” he said. “Amateur radio has become a huge part of my life.”

Guide to Member Benefits



ARRL Online | www.arrl.org/myarrl

Create an online ARRL Member account, and get access to members-only benefits. Register at www.arrl.org/myARRL. Already registered? Log in at the top of the ARRL website.

ARRL Magazines | www.arrl.org/magazines



Members can access the digital editions of four ARRL magazines from a web browser and the free ARRL Magazines app available from Apple's App Store, Google Play, and Amazon Kindle. Members need a valid ARRL account to access the digital magazines, Periodicals Archive and Search, and Product Review Archive. Print subscriptions are available and sold separately.

QST – ARRL's monthly membership journal

On the Air – for new and beginner-to-intermediate-level radio amateurs

QEX – A Forum for Communications Experimenters

NCJ – the National Contest Journal

E-Newsletters | www.arrl.org/opt-in-out

Subscribe to the weekly ARRL Letter, the monthly ARRL Current, and a variety of other e-newsletters and announcements for members. Keep up with ARRL News, publications, podcasts, and calendars.

Email Forwarding Service

Email sent to your arrrl.net address will be forwarded to any email account you specify.

ARRL Learning Center | learn.arrl.org

This online learning environment is designed to help members get the most out of amateur radio. Courses, tutorials, and resources cover getting on the air, emergency communications, and electronics and technology.

Technical Information Service | www.arrl.org/tis

Call or email our expert ARRL Lab specialists for answers to all of your technical and operating questions.

Join or Renew

www.arrl.org/join

Donate

www.arrl.org/donate

Benefits

www.arrl.org/benefits

Shop

www.arrl.org/shop

Advocacy | www.arrl.org/regulatory-advocacy

ARRL supports legislation and regulatory measures that preserve and protect meaningful access to the radio spectrum. Our **ARRL Regulatory Information Branch** answers member questions concerning FCC rules and operating practices.

Logbook of The World – LoTW

www.arrl.org/lotw

Record your contacts and qualify for awards using ARRL's premier logging service.

Group Benefits* | www.arrl.org/benefits

ARRL Ham Radio Equipment Insurance Plan *US only

Find...

...a License Exam Session | www.arrl.org/exam

...a Licensing Class | www.arrl.org/class

...a Radio Club (ARRL-affiliated) | www.arrl.org/clubs

...a Hamfest or Convention | www.arrl.org/hamfests

Interested in Becoming a Ham?

www.arrl.org/newham

newham@arrl.org | Tel. 1-800-326-3942 (US)

Connect with ARRL

ARRL The National Association for Amateur Radio®

225 Main Street, Newington, CT 06111-1400 USA

1-860-594-0200, or 1-888-277-5289 (toll-free US only)

Mon. – Thurs. 8 AM to 7 PM EST, and Fri. 8 AM to 5 PM EST, except holidays

Email: hq@arrl.org

Contact ARRL: www.arrl.org/contact-arrl



Website: www.arrl.org

Facebook: [@ARRL.org](https://www.facebook.com/ARRL.org)

X: [@arrrl](https://twitter.com/arrrl), [@w1aw](https://twitter.com/w1aw), [@arrrl_ares](https://twitter.com/arrrl_ares)

Threads: [@arrrlhq](https://www.threads.net/@arrrlhq)

Instagram and Instagram TV: [@arrrlhq](https://www.instagram.com/arrrlhq)

YouTube: [ARRLHQ](https://www.youtube.com/ARRLHQ)

LinkedIn: www.linkedin.com/company/american-radio-relay-league

The American Radio Relay League, Inc.

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

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

ARRL is noncommercial, and no one with a pervasive and continuing conflict of interest is eligible for membership on its Board.

"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A *bona fide* interest in Amateur Radio is the only essential qualification of membership; an amateur radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters: ARRL, 225 Main St., Newington, Connecticut 06111-1400 USA.

Officers, Division Directors, and Staff

As an ARRL member, you elect the Director and Vice Director who represent your Division on ARRL policy matters. If you have a question or comment about ARRL policies, contact your representatives listed below.

Officers

Founding President 1914-1936
Hiram Percy Maxim, W1AW

President
Rick Roderick, K5UR*
P.O. Box 444, Vilonia, AR 72173
501-988-2527; k5ur@arrl.org

First Vice President
Kristen McIntyre, K6WX*
900 Golden Wheel Park Dr., #85
San Jose, CA 95112
510-703-4942; k6wx@arrl.org

Second Vice President
Mike Ritz, W7VO
33643 Burma Rd.
Scappoose, OR 97056
503-987-1269; w7vo@arrl.org

International Affairs Vice President
Rod Stafford, W6ROD
5155 Shadow Est.
San Jose, CA 95135
408-238-4671; w6rod@arrl.org

Chief Executive Officer and Secretary
David A. Minster, NA2AA*
225 Main St.
Newington, CT 06111
860-594-0404; dminster@arrl.org

Treasurer
John Sager, WJ7S

Chief Financial Officer
Diane Middleton, W2DLM

Staff

VEC Manager
Maria Somma, AB1FM

Field Services Manager
Mike Walters, W8ZY

Radiosport & Regulatory Information Manager
Bart Jahnke, W9JJ

Laboratory Manager
George Spatta, W1GKS

Director of Emergency Management
Josh Johnston, KE5MHV

Director of Marketing & Innovation
Bob Inderbitzen, NQ1R

Marketing Operations Manager
Jason Leonard, KJ7FEZ

Retail Sales & Marketing Manager
Jackie Ferreira, KB1PWB

Advertising Relationship Manager
Janet Rocco, W1JLR

Public Relations & Outreach Manager
Sierra Harrop, W5DX

Director of Publications & Editorial
Becky R. Schoenfeld, W1BXY

Education & Learning Manager
Steve Goodgame, K5ATA

Director of IT
Justin Biamonte

Director of Development
Kevin Beal, K8EAL

Development Operations Manager
Christina Lessard, KC1TDM

Controller
Thomas Bell, KC1MHQ

Human Resources Manager
Amber von Hone

Atlantic Division

www.atldiv.org
Robert B. Famiglio, K3RF
P.O. Box 9, Media, PA 19063
610-359-7300; k3rf@arrl.org

Vice Director: Marty Newingham, AG3I
6003 Autumn View Ct., Greensburg, PA 15601
724-875-5385; ag3i@arrl.org

Central Division

www.central.arrl.org
Brent Walls, N9BA
2151 E. Bomar Ln., Greenfield, IN 46140
317-557-7224; n9ba@arrl.org

Vice Director: Joshua Long, W9HT
8725 Edwardsberg Pl., New Haven, IN 46774
260-749-9851; w9ht@arrl.org

Dakota Division

www.arrldakota.org
Bill Lippert, AC0W*
2013 6th Ave. SE, Austin, MN 55912
507-993-9181; ac0w@arrl.org

Vice Director: Lynn Nelson, W0ND
3204 Willow Ln. SE, Minot, ND 58701
701-833-1000; w0nd@arrl.org

Delta Division

www.arrldelta.org
David A. Norris, K5UZ
1200 Becky Ln., Redfield, AR 72132
870-613-1606; k5uz@arrl.org

Vice Director: Ed B. Hudgens, WB4RHQ
1441 Wexford Downs Ln., Nashville, TN 37211
615-630-2753; wb4rhq@arrl.org

Great Lakes Division

www.arrl-greatlakes.org
Scott Yonally, N8SY*
258 Valley Hi Dr., Lexington, OH 44904
419-512-4445; n8sy@arrl.org

Vice Director: Roy Hook, W8REH
6611 Steitz Rd., Powell, OH 43065
w8reh@arrl.org

Hudson Division

www.hudson.arrl.org
Ed Wilson, N2XDD
P.O. Box 483, Shirley, NY 11967
631-484-8826; n2xdd@arrl.org

Vice Director: David Galletly, KM2O
540 Wemple Rd., Glenmont, NY 12077
518-421-8324; km2o@arrl.org

Midwest Division

www.arrlmidwest.org
Art Zygielbaum, K0AIZ*
6601 Pinecrest Dr., Lincoln, NE 68516
402-421-0840; k0aiz@arrl.org

Vice Director: Dave Propper, K2DP
747 Old Bonhomme Rd., University City, MO
63132, 314-225-5167; k2dp@arrl.org

How to Contact ARRL Staff

To send an email to any ARRL Headquarters staff member, put his or her call sign (or first initial and last name) in front of @arrl.org. For example, to send to Hiram Maxim, First President of ARRL, use w1aw@arrl.org or hmaxim@arrl.org.

*Executive Committee Member

New England Division

<https://nediv.arrl.org>
Tom Frenaye, K1KI
P.O. Box J, West Suffield, CT 06093
860-597-4539; k1ki@arrl.org

Vice Director: Phillip E. Temples, K9HI
125 Coolidge Ave. #803
Watertown, MA 02472-2875
617-331-0183; k9hi@arrl.org

Northwestern Division

www.arrlnwdiv.org
Mark J. Tharp, KB7HDX
P.O. Box 2222, Yakima, WA 98907
509-952-5764; kb7hdx@arrl.org

Vice Director: Michael A. Sterba, KG7HQ
212 Laurel Dr., Sedro Woolley, WA 98284
360-708-2757; kg7hq@arrl.org

Pacific Division

www.pacific.arrl.org
John Litz, N26Q
1434 Douglas Rd., Stockton, CA 95207
209-687-0774; n26q@arrl.org

Vice Director: Dr. Carol Milazzo, KP4MD
P.O. Box 665, Citrus Heights, CA 95611
916-259-3221; kp4md@arrl.org

Roanoke Division

www.arrl-roanoke.com
Dr. James Boehner, N2ZZ*
525 Barnwell Ave. NW, Aiken, SC 29801-3939
803-343-9040; n2zz@arrl.org

Vice Director: Bill Morine, N2COP
101 Windlass Dr., Wilmington, NC 28409
910-452-1770; n2cop@arrl.org

Rocky Mountain Division

www.rockymountaindivision.org
Jeff Ryan, K0RM*
9975 Wadsworth Pkwy. K2-275
Westminster, CO 80021
303-432-2886; k0rm@arrl.org

Vice Director: Dan Grady, N2SRK
8706 S. Buchanan Way, Aurora, CO 80016
720-236-7397; n2srk@arrl.org

Southeastern Division

www.facebook.com/ARRLSoutheasternDivision
Mickey Baker, N4MB
14764 Black Bear Rd., West Palm Beach, FL
33418, 561-320-2775; n4mb@arrl.org

Vice Director: Dr. Andrew Milluzzi, KK4LWR
440-829-1187; kk4lwr@arrl.org

Southwestern Division

www.kkn.net/n6aa
Richard J. Norton, N6AA
21290 West Hillside Dr., Topanga, CA 90290
310-455-1138; n6aa@arrl.org

Vice Director: Edward Stearns, AA7A
7038 E. Aster Dr., Scottsdale, AZ 85254
480-332-8255; aa7a@arrl.org

West Gulf Division

www.westgulfdivision.org
John Robert Stratton, N5AUS
P.O. Box 2232, Austin, TX 78768-2232
512-445-6262; n5aus@n5aus.com

Vice Director: Lee H. Cooper, W5LHC
2507 Autrey Dr., Leander, TX 78641
512-658-3910; w5lhc@arrl.org

ARRL Section Managers

The 15 Divisions of ARRL are arranged into 71 administrative Sections, each headed by an elected Section Manager (SM). Your SM is the person to contact when you have news about your activities, or those of your radio club. If you need assistance with a local problem, your SM is your first point of contact. He or she can put you in touch with various ARRL volunteers who can help (such as Technical Specialists). Your SM is also the person to see if you'd like to become a Section volunteer. Whatever your license class, your SM has an appointment available. Visit your Section page at www.arrl.org/sections.

Atlantic Division DE, EPA, MDC, NNY, SNJ, WNY, WPA

Delaware: Steven Keller, KC3DSO, 803 Meadow Brook Ln., Milford, DE 19963-3000 240-515-0620; kc3dso@arrrl.org

Eastern Pennsylvania: Bob Wilson, W3BIG, 2223 West Helms Manor, Upper Chichester, PA 19061-3325; 484-836-9367; w3big@arrrl.org

Maryland-DC: Chris Van Winkle, AB3WG, 24 Tattersaul Ct., Reisterstown, MD 21136-2431; 240-755-4257; ab3wg@arrrl.org

Northern New York: Rocco Conte, WU2M, 152 W. Bush Rd., Gloversville, NY 12078-6405; 518-848-9028; wu2m@arrrl.org

Southern New Jersey: Ron Fish, KX1W, 29 S. Canary Way, Galloway, NJ 08205-6208; 845-988-6705; kx1w@arrrl.org

Western New York: Scott Bauer, W2LC, 1964 Connors Rd., Baldwinsville, NY 13027-9743; 315-430-6368; w2lc@arrrl.org

Western Pennsylvania: Joe Shupienis, W3BC, P.O. Box 73, Falls Creek, PA 15840-0322; 814-771-3804; w3bc@arrrl.org

Central Division IL, IN, WI

Illinois: Thomas Beebe, W9RY, 3540 Market Rd., Marion, IL 62959-8940 618-534-6282; w9ry@arrrl.org

Indiana: Bob Burns, AK9R, P.O. Box 808, Brownsburg, IN 46112 317-520-1188; ak9r@arrrl.org

Wisconsin: Jason Spetz, KC9FXE, E5910 490th Ave., Menomonie, WI 54751-5644 715-231-7722; kc9fxe@arrrl.org

Dakota Division MN, ND, SD

Minnesota: Bill Mitchell, AE0EE, 7412 Colfax Ave. S., Richfield, MN 55423 510-529-5658; ae0ee@arrrl.org

North Dakota: Ralph Fettig, N0RDF, 6650 County Rd. 12 W., Minot, ND 58701-3003 701-822-3467; n0rdf@arrrl.org

South Dakota: Chris Stallkamp, K10D, P.O. Box 271, Selby, SD 57472-0271 605-848-3929; k10d@arrrl.org

Delta Division AR, LA, MS, TN

Arkansas: James D. Ferguson, Jr., N5LKE, 1500 Lauren Dr., Searcy, AR 72143-8477 501-593-5695; n5lke@arrrl.org

Louisiana: Houston Polson, N5YS, 309 Arkansas St., Winnfield, LA 71483 318-209-8843; n5ys@arrrl.org

Mississippi: Malcolm Keown, W5XX, 64 Lake Circle Dr., Vicksburg, MS 39180 601-636-0827; w5xx@arrrl.org

Tennessee: David Thomas, KM4NYI, 205 Linford Rd., Knoxville, TN 37920 865-654-5489; km4nyi@arrrl.org

Great Lakes Division KY, MI, OH

Kentucky: Alan Morgan, KY1O, 1711 Willisburg Rd., Lawrenceburg, KY 40342-9555 859-753-5092; ky1o@arrrl.org

Michigan: Larry Camp, WB8R, 71 Oakdale Ln., Coldwater, MI 49036-1200 517-617-4883; wb8r@arrrl.org

Ohio: Tom Sly, WB8LCD, 1480 Lake Martin Dr., Kent, OH 44240-6260 330-554-4650; wb8lcd@arrrl.org

Hudson Division ENY, NLI, NNY

Eastern New York: John K. Fritze, Jr., K2QY, 4 Normanskill Blvd., Delmar, NY 12054-1335; 401-261-4996; k2qy@arrrl.org

NYC-Long Island: Jim Mezey, W2KfV, 38 Appletree Ln., Carle Place, NY 11514-1336 516-315-8608; w2kfv@arrrl.org

Northern New Jersey: Nomar Vizzarondo, NP4H, P.O. Box 245, Tenafly, NJ 07670-0245 917-443-2664; np4h@arrrl.org

Midwest Division IA, KS, MO, NE

Iowa: Barry Buelow, W0IY, 4109 Cedar Heights Dr., Center Point, IA 52213-9206 319-651-4985; w0iy@arrrl.org

Kansas: Ronald D. Cowan, KB0DTI, P.O. Box 36, La Cygne, KS 66040 913-757-4456; kb0dti@arrrl.org

Missouri: Cecil Higgins, AC0HA, 27995 County Rd. 220, Hermitage, MO 65668-8493 417-493-8208; ac0ha@arrrl.org

Nebraska: Matthew N. Anderson, KA0BOJ, 14300 NW 98th St., Raymond, NE 68428-4254; 402-480-5515; ka0boj@arrrl.org

New England Division CT, EMA, ME, NH, RI, VT, WMA

Connecticut: Douglas Sharafanowich, WA1SFH, 168 Housatonic Dr., Milford, CT 06460-4936; 203-494-3887; wa1sfh@arrrl.org

Eastern Massachusetts: Jon McCombie, N1ILZ, 75 Northwest St., Eastham, MA 02642 508-246-4982; n1ilz@arrrl.org

Maine: Philip Duggan, N1EP, 195 Kansas Rd., Milbridge, ME 04658-3120 207-598-5397; n1ep@arrrl.org

New Hampshire: Peter Stohrer, W1FEA, 9 Gladstone St., Concord, NH 03301-3130 603-345-1470; w1fea@arrrl.org

Rhode Island: Nancy Austin, KC1NEK, P.O. Box 4941, Middletown, RI 02842-0941 401-935-3070; kc1nek@arrrl.org

Vermont: Paul N. Gayet, AA1SU, 11 Cherry St., Essex Junction, VT 05452 802-878-2215; aa1su@arrrl.org

Western Massachusetts: Raymond Lajoie, AA1SE, 245 Leominster Rd., Lunenburg, MA 01462-2031; 978-549-5507; aa1se@arrrl.org

Northwestern Division AK, EWA, ID, MT, OR, WWA

Alaska: David Stevens, KL7EB, 8521 Golden St., Apt. 4, Anchorage, AK 99502 907-242-6483; kl7eb@arrrl.org

Eastern Washington: Jo Whitney, KA7LJQ, P.O. Box 2222, Yakima, WA 98907 509-952-5765; ka7ljq@arrrl.org

Idaho: Don Lynn, ND7L, 41 N. Hastings Dr., Nampa, ID 83687-7504 208-899-5801; nd7l@arrrl.org

Montana: Kevin Kerr, W1KKG, P.O. Box 69, Plains, MT 59859-0069 406-242-0109; w1kgk@arrrl.org

Oregon: Scott Rosenfeld, N7JI, 3662 Vine Maple St., Eugene, OR 97405-4473 541-684-9970; n7ji@arrrl.org

Western Washington: Bob Purdom, AD7LJ, P.O. Box 65171, University Place, WA 98464-1171; 253-691-2388; ad7lj@arrrl.org

Pacific Division EB, NV, PAC, SCV, SF, SJV, SV

East Bay: Mike Patterson, N6JGA, P.O. Box 30627, Walnut Creek, CA 94598 925-200-8300; n6jga@arrrl.org

Nevada: Craig McVeay, N0CSM, 3820 Twilight Ave., Pahrump, NV 89048 305-712-0254; n0csm@arrrl.org

Pacific: Alan Maenchen, AD6E, 2164 Kamaile St., Wailuku, HI 96793-5458 408-382-1008; ad6e@arrrl.org

Sacramento Valley: Jay Ballinger, N6SAC, 8448 Misty Oak Way, Antelope, CA 95843-5830; 916-622-2746; n6sac@arrrl.org

San Francisco: Dr. Antonis Papatsaras, AA6PP, 48 Bayo Vista Ave., Larkspur, CA 94939-1006; 415-861-5053; aa6pp@arrrl.org

San Joaquin Valley: Steven Hendricks, KK6JTB, P.O. Box 630, Inyokern, CA 93527-0630; 760-977-2590; kk6jtb@arrrl.org

Santa Clara Valley: James Armstrong, NV6W, 2048 Paseo Del Sol, San Jose, CA 95124-2048; 408-679-1680; nv6w@arrrl.org

Roanoke Division NC, SC, VA, WV

North Carolina: Marvin K. Hoffman, WA4NC, P.O. Box 2208, Boone, NC 28607 828-964-6626; wa4nc@arrrl.org

South Carolina: Matthew Crook, W1MRC, 220 Star Hill Ln., Lexington, SC 29072-6948; 803-386-1069; w1mrc@arrrl.org

Virginia: Jack Smith, KE4LWT, 515 New Life Dr., Ruckersville, VA 22968-3045 662-523-0000; ke4lwt@arrrl.org

West Virginia: Dan Ringer, K8WV, 18 W. Front St., Morgantown, WV 26501-4507 304-292-1999; k8wv@arrrl.org

Rocky Mountain Division CO, NM, UT, WY

Colorado: Amanda Alden, K1DDN, 230 Glenmoor Rd., Canon City, CO 81212-7705 719-735-8444; k1ddn@arrrl.org

New Mexico: Bill Mader, K8TE, 4701 Sombereite Rd. SE, Rio Rancho, NM 87124 505-250-8570; k8te@arrrl.org

Utah: Brett Pruitt, K7BDP, 239 S. Valley View Dr., Hurricane, UT 84737-4413 435-922-1114; k7bdp@arrrl.org

Wyoming: Garth Crowe, Sr., WY7GC, 2342 Sagewood Ave., Casper, WY 82601-5018 307-689-1340; wy7gc@arrrl.org

Southeastern Division AL, GA, NFL, PR, SFL, VI, WCF

Alabama: Dennis Littleton, K4DL, 2230 Bishop Rdg., West Blocton, AL 35184-4246 205-718-4410; k4dl@arrrl.org

Georgia: Hank Blackwood, K4HYJ, 406 Dawnville Rd. NE, Dalton, GA 30721 706-529-5647; k4hyj@arrrl.org

Northern Florida: Scott Roberts, KK4ECR, 2361 Oak Hammock Ln., Orange Park, FL 32065; 904-759-7812; kk4ecr@arrrl.org

Puerto Rico: Carmen N. Greene Rodriguez, KP4QVQ, Parc. San Romualdo 52 Calle H, Hormigueros, PR 00660-9735; 787-246-5634; kp4qvq@arrrl.org

Southern Florida: Barry M. Porter, KB1PA, 10605 S. Jog Rd., Apt. 215, Boynton Beach, FL 33437; 561-499-8424; kb1pa@arrrl.org

Virgin Islands: Fred Kleber, K9VV, P.O. Box 24275, Christiansted, VI 00824-0275 k9vv@arrrl.org

West Central Florida: Jimmy Russ, AB4KA, 560 S. Clayton Ave., Lakeland, FL 33801-5408; 912-809-7570; ab4ka@arrrl.org

Southwestern Division AZ, LAX, ORG, SB, SDG

Arizona: Rick Paquette, W7RAP, 1600 W. Sunkist Rd., Tucson, AZ 85755-9561 520-425-6877; w7rap@arrrl.org

Los Angeles: Diana Feinberg, AL6DF, P.O. Box 4678, Palos Verdes Peninsula, CA 90274-9618; 310-544-2917; ai6df@arrrl.org

Orange: Bob Turner, W6RHK, P.O. Box 973, Perris, CA 92572 951-236-8975; w6rhk@arrrl.org

San Diego: Bruce Krypton, AG6X, 5755 Castleton Dr., San Diego, CA 92117-4058 619-813-5505; ag6x@arrrl.org

Santa Barbara: John Kitchens, NS6X, P.O. Box 178, Somis, CA 93066 805-216-2569; ns6x@arrrl.org

West Gulf Division NTX, OK, STX, WTX

North Texas: Steven Lott Smith, KG5VK, 125 Contest Ln., Ben Franklin, TX 75415-3830 318-470-9806; kg5vk@arrrl.org

Oklahoma: Mark Kleine, N5HZR, 2651 84th Ave. SE, Norman, OK 73026 405-410-6756; n5hzh@arrrl.org

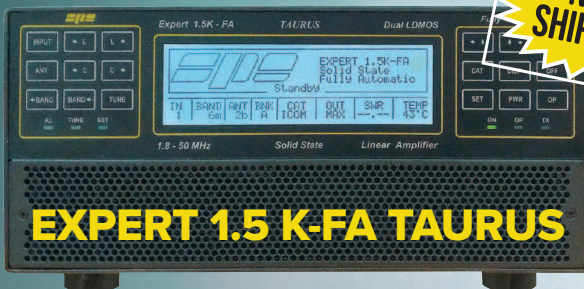
South Texas: Stuart Wolfe, KF5NIX, 408 Cedar Grove Rd., Rockdale, TX 76567 512-660-9954; kf5nix@arrrl.org

West Texas: David Overton, W5JDO, 2812 W. Shandon Ave., Midland, TX 79705-6101 432-553-5597; w5jdo@arrrl.org

EXPERT AMPLIFIERS

Command the Airwaves Like Never Before –
The SPE Expert Amplifier Is Scary Powerful!

Trade in your old tube type hotbox
today for a cool new SPE Solid state amp



Our amplifiers work great with Kenwood Icom and Yaesu

Fully automatic • Built in ATU • Built in coax switch • Built in watt meter • 1.3k and 1.5k models are portable • Small and lightweight • Takes up minimal space on the desk

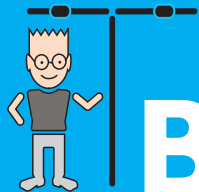
We Take Trade-Ins!

1875 17th NE St.,
Suite 100
Paris, TX 75460
www.expertamps.com
sales@expertamps.com
Telephone: (903) 737-0773



**EXPERT
AMPS USA**





BUDDIPOLE

Secure online ordering:
www.buddipole.com

See our videos:
www.youtube.com/buddipole

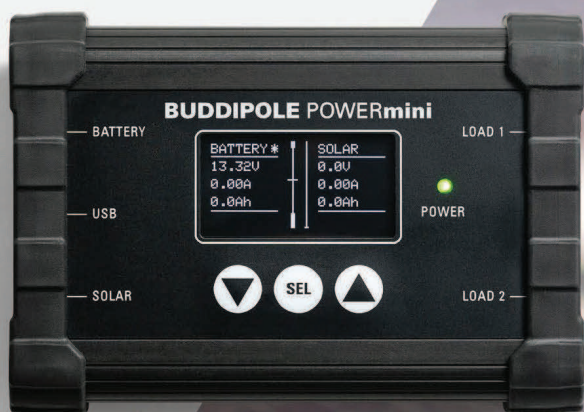
BUDDIHEX

- **Ultra Lightweight:** Just 9.5 lbs fully loaded
- **6 Bands:** 6, 10, 12, 15, 17 and 20 meters
- **Quick setup** – less than 20 minutes
- **Power Handling** from 600W (BNC) to 1500W (SO239)
- **Use with a Telescopic Push-up Mast**
- **Perfect for Field Day, Camping, POTA, or in your backyard**



POWERMINI 2

- **Compact Portable DC Power Management System** with built-in Solar Charge Controller
- **Power Management** includes Current and Voltage readout
- **High Contrast OLED display**
- **User-definable Low Voltage Alarm + Cutoff**
- **Solar Controller** for use with Panels up to 6 amps
- **Maximum Current Handling Capacity** – 40 amps



BUDDISTICKPRO

- **New Versahub Feedpoint** with Quick-Attach Shockcord Tripod Legs
- **Multi-band Design** works 9 bands (40m – 2m) with one adjustable coil
- **Lightweight** at less than 3 lbs
- **Compact and perfect for POTA, SOTA, and portable operating**
- **Rated from QRP to 250 Watts PEP**



OUR PRODUCTS
ARE PROUDLY
MADE IN USA



NEW ADDRESS:

2011 W 3000 S, Suite C
Heber City, UT 84032

CONTACT US:

info@buddipole.com
(435) 244 2211

ON THE EDGE OF ADVENTURE FALL SPECIALS AWAIT!



THE GO-TO RADIO FOR DXPEDITIONS, DXERS AND CASUAL USERS

- Crystal-clear, low-fatigue RX audio
- 160-6M all-mode operation with a rugged 100W PA
- Ultra-low RX/TX phase noise and TX CW bandwidth
- Precision DSP filtering down to 50 Hz
- Color panadapter with touch and mouse tuning
- Built-in remote operation (server and client)



KPA1500 AMPLIFIER

The K4 interfaces seamlessly with the KPA1500 and KPA500 Amplifiers

SHOP NOW & SAVE BIG!

"While Elecraft radios have had a reputation as great CW rigs, the K4 also has great SSB performance. The K4 compression processing more than doubles your average power with no degradation in audio quality, and no splatter."

- Rick Miller, N1RM

ELECRAFT.COM 831.763.4211

ELECRAFT

Up Front



[John Petrocelli, KD2UUI, photo]

Slices of Ham-Themed Cake

National Cake Decorating Day is on October 10. To get us into the holiday spirit, here are two ham radio-themed creations. Linda Cronk, KD2ZDF, put together this amazing replica (at left) of the Overlook Mountain Amateur Radio Club repeater site, made entirely of delicious chocolate cake, for the club's annual winter party. Members of the Las Vegas Radio Amateur Club celebrated the club's 64th birthday with a beautiful cake (below) and a bit of portable operating from Majestic Park, using the special event call sign N7V.



[Paul Talbot, K7RKO, photo]

Ham Electric

Bill Kirk, NJ1X, snapped a photo of this sweatshirt while out and about. Ham Electric is an electrical contracting company operating out of Georgetown, Massachusetts, and while their website doesn't tout any relation to amateur radio, they might be able to lend a hand with your shack's electrical needs.



[Bill Kirk, NJ1X, photo]

A Personalized Cane

Last year, Paul Lux, K1PL, broke his femur and had an 18½-inch titanium rod put in his leg. After Paul got out of the hospital and finished rehab, his daughter Diane, N1PYV, personalized his new cane, complete with his call sign and the ARRL logo. Now he'll always know which one is his — and, Paul noted, his new titanium rod might perform well on 2 meters.

[Paul Lux, K1PL, photo]



If you see something ham-related out in the world, take a photo of it and send it to upfront@arri.org.

TRAVELING
WITH
500 WATTS
OF POWER
IN ONE UNIT
HAS NEVER
BEEN EASIER.
ACTUALLY,
IT'S NEVER
BEEN
POSSIBLE.

Welcome to Aurora.

Experience **500 watts of
HF performance** - without the clutter.

Aurora is the first of its kind:
a compact, high-efficiency HF radio with
everything built in. With an **integrated
antenna tuner, and power supply** and over
80% efficiency, it's a complete
HF station in a single 18lb. package.
Whether you are simplifying your shack,
activating parks, or setting up a remote
station, **Aurora delivers powerful, quiet
performance** - anywhere you go.

No amps. No extras. Just plug in and operate.

Welcome to **Aurora** - the all-in-one revolution
for every HF operator.

Available Models:

AU-510 / AU-510M / AU-520 / AU-520M

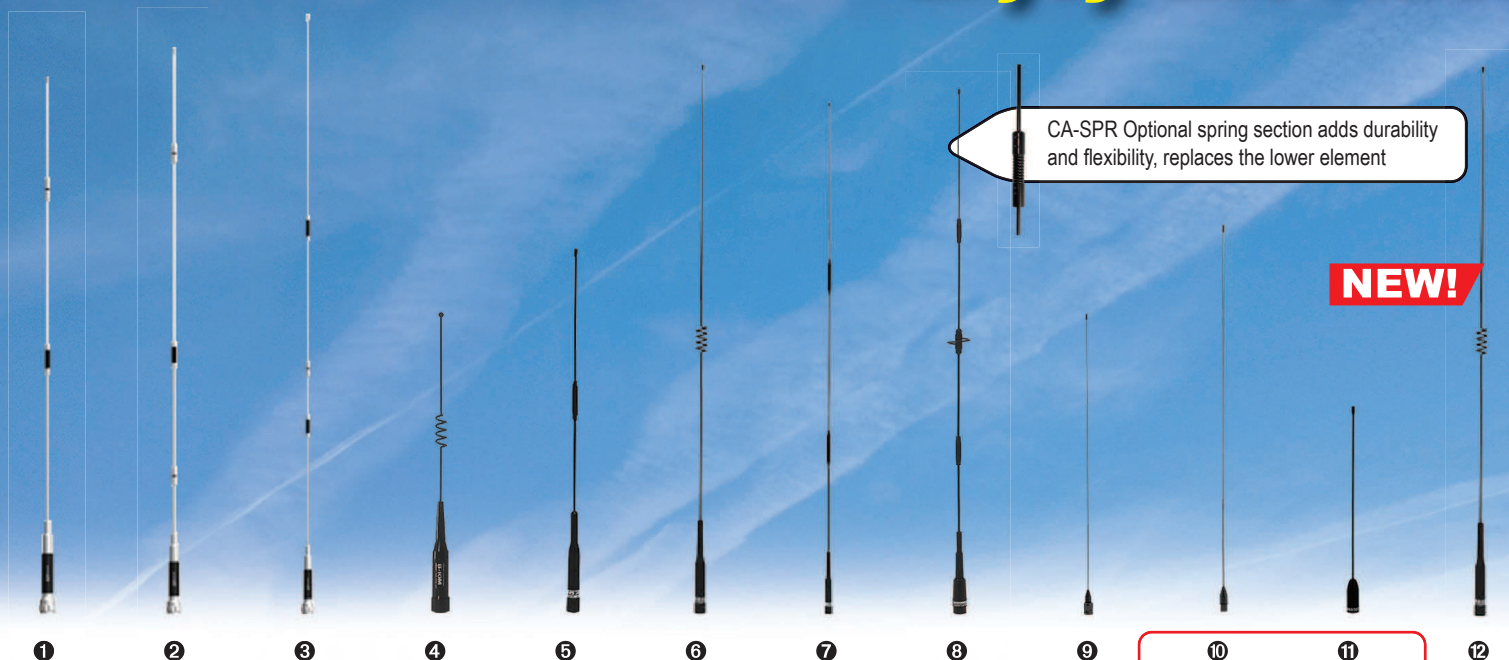
FlexRadio.com/Aurora

AURORA  TM
A NEW DAY FOR THE UNEXPLORED





Life is a JOURNEY.
Enjoy the ride!



CA-SPR Optional spring section adds durability and flexibility, replaces the lower element

NEW!

SMA-Female Connector
Versions Available

Mobile Antennas

❶ **COMET CSB-750A DUAL-BAND 2M/440MHz w/FOLD-OVER**

2M: 1/2 wave • 440MHz: 5/8 wave x 2 • VSWR: 1.5:1 or less • Length: 42" • Conn: PL-259 • Max. Pwr: 150W

❷ **COMET CSB-770A DUAL-BAND 2M/440MHz w/FOLD-OVER**

2M: 5/8 wave center load • 440MHz: 5/8 wave x 2 center load • VSWR: 1.5:1 or less • Length: 51" • Conn: PL-259 • Max Pwr: 150W

❸ **COMET CSB-790A DUAL-BAND 2M/440MHz w/FOLD-OVER**

2M: 7/8 wave center load • 440MHz: 5/8 wave x 3 center load • VSWR: 1.5:1 or less • Length: 62" • Conn: PL-259 • Max Pwr: 150W

❹ **COMET B-10/B-10NMO DUAL-BAND 2M/440MHz**

2M: 1/4 wave • 440MHz: 1/2 wave • Length: 12" • Conn: B-10 PL-259, B-10NMO - NMO style • Max Pwr: 50W

❺ **COMET SBB-2/SBB-2NMO DUAL-BAND 2M/440MHz**

2M: 1/4 wave • 440MHz: 5/8 wave center load • VSWR: 1.5:1 or less • Length: 18" • Conn: SBB-2 PL-259, SBB-2NMO - MNO style • Max Pwr: 60W

❻ **COMET SBB-5/SBB-5NMO DUAL-BAND 2M/440MHz w/FOLD-OVER**

2M: 1/2 wave • 440MHz: 5/8 wave x 2 • Length: 39" • Conn: SBB-5 PL-259, SBB-5NMO - NMO style • Max Pwr: 120W

❼ **COMET SBB-7/SBB-7NMO DUAL-BAND 2M/440MHz w/FOLD-OVER**

2M: 6/8 wave • 440MHz: 5/8 wave x 3 • Length: 58" • Conn: SBB-7 PL-259, SBB-7NMO - NMO style • Max Pwr: 70W

❽ **COMET CA-2X4SR/CA-2X4SRNMO WIDE-BAND 140-160MHz 435-465MHz w/FOLD-OVER**

2M: 5/8 wave • 440MHz: 5/8 wave x 3 • Length: 40" • Conn: CA-2x4S PL-259, CA-2x4SRNMO NMO style • Max Power: 150W

❾ **COMET BNC-24 DUAL BAND 2M/440MHz HT ANTENNA**

RX range: 100-1200MHz • Length: 17" • SuperFlex featherweight whip • Conn: BNC

❿ **COMET SMA-24, SMA-24J DUAL BAND 2M/440MHz HT ANTENNA**

RX range: 100-1200MHz • Length: 17" • SuperFlex featherweight whip • Conn: SMA-24: SMA-male / SMA-24J: SMA-female

⓫ **COMET SMA-503, SMA-503J DUAL BAND 2M/440MHz HT ANTENNA**

RX range: 100-1200MHz • Length: 8.75" • Conn SMA-503: SMA-male, SMA-503J: SMA-female

⓬ **COMET NEW! FC5/FC5NMO DUAL-BAND GMRS & MURS w/FOLD-OVER**

MURS: 1/2 wave • GMRS: 5/8 wave x 2 • Length: 37" • Conn: FC5 PL-259 style, FC5NMO - NMO style • Max Pwr: 120W

Comet offers several
"No-holes to drill"
lip mounts, in a
variety of sizes
and connectors

CP-5M
pictured



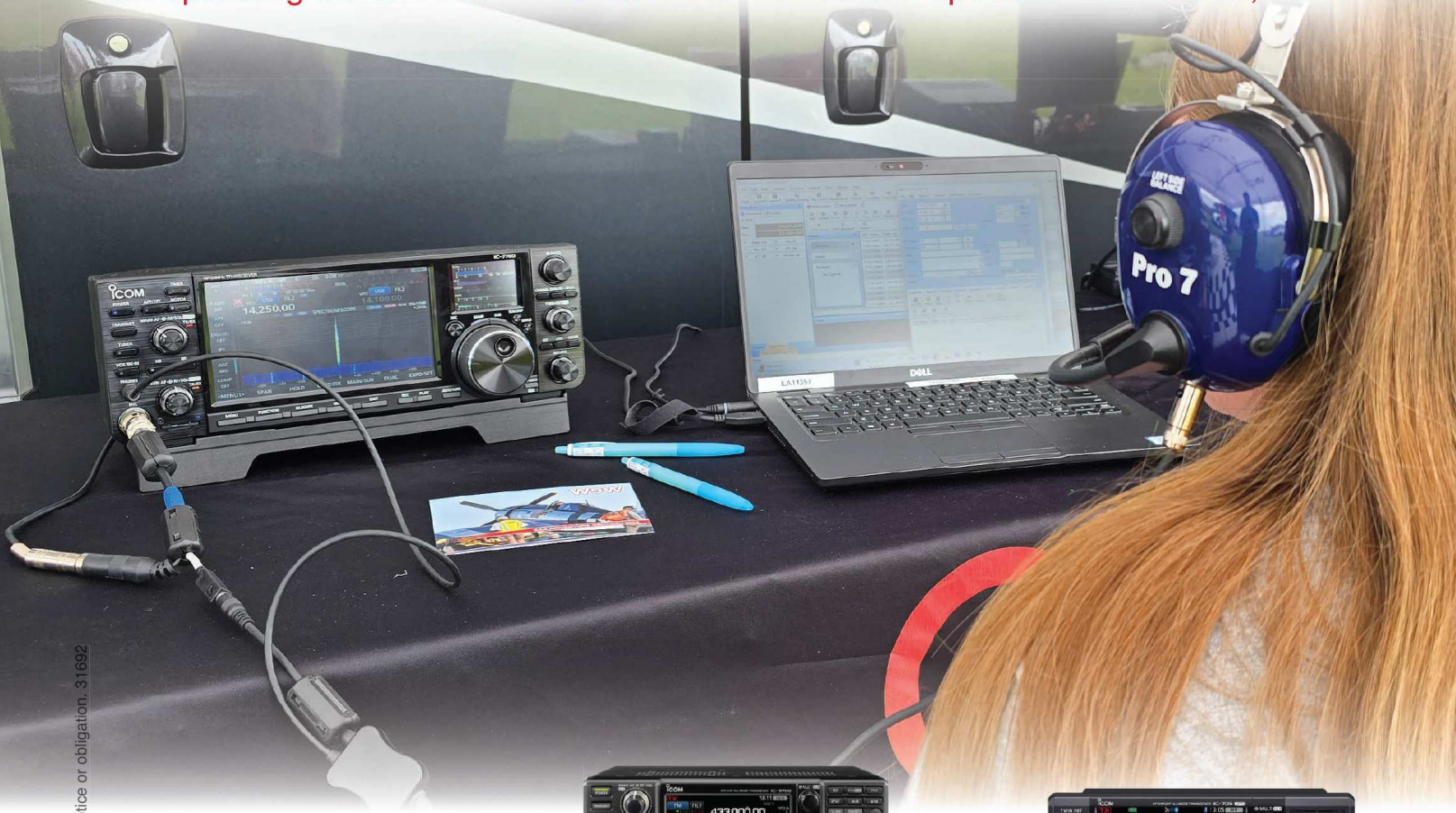
Call or visit your local dealer today!

www.cometantenna.com | 800-962-2611



Heard It. Worked It. Logged It.

YL operating the IC-7760 at the 2025 EAA AirVenture Special Event Station, W9W



IC-9700
2M / 70CM / 23CM



IC-705
HF / 6M / 2M / 70CM



IC-7300
HF / 6M



IC-PW2
HF / 6M 1 kW Amplifier



IC-7760
HF / 50 MHz
Additional control heads available (RC-7760)

For the love of **ham radio.**



www.icomamerica.com/amateur
insidesales@icomamerica.com



Correspondence

Letters from Our Members

The Mode that Can Endure All Things

Amateur radio is a hobby with many layers — like an onion. Repeaters are one layer, HF is another, antennas are another, etc. There's a layer of that onion that's made up of amateur radio's many digital modes. The list of modes — as well as the means to implement them — is too long to put here; my opinion of these various modes will likely differ from yours.

Some years ago, I was well versed in software packages like *WSPR*, and I have many QSL cards to attest to my skills. As time passed, however, I abandoned all digital modes except one: Morse code, also known as the original digital mode. When Morse code was invented, it was the basis for the successful telegraph system, and it evolved into radiotelegraphy.

There are many software programs that can effectively decode Morse. But what if there were no more computers, electricity, or gasoline? Morse code is the one mode that is always there. Properly trained hams can send Morse code to a cave across a canyon using a campfire or flashlight. How many of us can say we can do that?

James Harvey, W7YV
Taylorsville, Utah

Honoring More than Half a Century of Membership

I'm turning 73 this year, and I wanted to say thank you to ARRL and its staff through the years. I started my membership in 1971 as a Novice, and now I'm an Amateur Extra-class

operator. Your educational publications, *QST*, and *QEX* have been there for me every step of the way.

James Fox, N7ENI
San Diego, California

Paper QSLs Forever

I operate 2-meter SSB, and I try to get a QSL card from every station I contact. I have five long file drawers full of cards, including 246 2-meter E-skip contacts and more than 600 counties in nine US call areas and six Canadian provinces.

It's unreasonable to expect everybody to have paper cards — or to spend time filling them out. My mentor, Peter Beck, WA2GFN, asks each station he contacts if they have paper QSLs. If he needs the card for a specific county, grid, etc., he asks if they're willing to sign and return a templated computer-generated card in an included self-addressed stamped envelope; if it's a foreign contact, he includes a couple of dollars to help pay for postage.

Most hams note their willingness, or lack thereof, to exchange paper QSL cards on their QRZ page. This is useful when cards go astray or otherwise don't arrive.

Richard Kaplan, WB2CUT
Metuchen, New Jersey
Life Member

A Rare Encounter

As I was reading the June issue, my attention was drawn to the "Classic Radio" column on page 98. I recognized a name at the bottom of the first page: Centimeg. The article says

that this company was only active during the beginning of the 1960s and became defunct after merely a few years, and that the 432 MHz transmitter is such a rare item that even photographs are lacking.

When I was 9 years old, around 1963, my father had brought me to meet one of his friends, Marcello Centamori, I1IF (there were no call areas in Italy at the time, and all calls began with "I1"). Marcello had a fantastic station, equipped with Hallicrafters gear and a very visible three-element Yagi on the roof of his house.

Marcello kindly gave me some issues of *Radio Rivista*, the Italian Amateur Radio Association's magazine, that I treasured. Centimeg was mentioned in one of the issue's advertisements, and the name stuck in my mind. The 432 MHz transceiver mentioned in *QST* had to have had a power of some tens of watts, being equipped with a 2C39 tube; it also used an audio amplifier as an AM modulator (SSB on UHF was yet to come in 1963). The advertisement also showed other pieces of equipment, like receiving converters and custom-built equipment.

Francesco Basta, IU0PJS
Perugia, Umbria, Italy

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.

A High-Performance and Robust Antenna with GRAZIOLI BRAND STANDARDS

- ✓ Grazioli MV6
- ✓ No Traps, No Coils, No Moving Parts, No Additional Radials Required
- ✓ 1/4 Wave Ground Plane
- ✓ Full Length 1/4 Wave Elements for 20, 17, 15, 12, 10, and Six Meters!
- ✓ Single Coax Feed
- ✓ 3000 Watts!
- ✓ Available Now at MTCradio.com
- ✓ ALL Grazioli Products in Stock



KENWOOD

ICOM

YAESU
Radio for Professionals

1875 17th NE St.,
Suite 100
Paris, TX 75460



We Take Trades!

sales@maintradingcompany.com
Telephone: (903) 737-0773

rt SYSTEMS
AMATEUR RADIO PROGRAMMING

and



Team up to give you
ROUTE SEARCHES
in the RT Systems Programmers

Why You'll Love It!

- Avoid manual data entry
- Quickly find repeaters along your travel path
- Get the most current frequency information available
- Perfect for road trips and new operating locations

RT Systems Programmer

Available through Help | Check for Updates

Version 5 (Win) programmers.

*Updates are always **FREE** in current version
of RT Systems Programmers.*

RepeaterBook Plus

Subscription required.

Check repeaterbook.com to sign up.

With RT Systems and RepeaterBook Plus,
travel smarter, talk farther, and never miss a contact.

800-921-4834 • www.rtsystemsinc.com

"The best preparation for tomorrow
is doing your best today."

H. Jackson Brown, Jr.



Your Partner in Contesting & DXing Success!

We make it easy to get what you need for higher scores and logging those rare QSOs: ACOM, OM Power, and 403A Power Genius Amplifiers; DX Engineering Transceiver Amplifier Keying Cables and DVA Dual Vertical Array Systems; and top-quality DX Engineering coaxial cable and custom-ordered assemblies.

Plus, you'll receive the industry's best support—not a sales pitch but genuine advice from active hams who will help you reach your operating goals.

Make the Change to a More Satisfying Ham Radio Purchasing Experience

- Easy ordering by phone or web
- Products from over 180 leading manufacturers
- Friendly customer service from hams with a combined 1,000+ years in amateur radio
- Fastest shipping in the industry
- Responsive and ongoing technical support
- Not 100% happy? We make it right!



Order by Phone

800-777-0703 Country Code: +1
9 am to midnight ET, Monday-Friday
9 am to 5 pm ET, Weekends



Order Online

www.DXEngineering.com
Most orders over \$99 ship free
Request a Free Catalog



Tech Support

330-572-3200
DXEngineering@DXEngineering.com
9 am to 7 pm ET, Monday-Friday
9 am to 5 pm ET, Saturday



OnAllBands.com is dedicated to educating and informing the Amateur Radio community.

W1AW Schedule

PAC	MTN	CENT	EAST	UTC	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM	1300		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-12 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, 18.0775, 21.0675, 28.0675, 50.350, and 147.555 MHz.

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

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

Code bulletins are sent at 18 WPM.

For more information, visit us at

www.arrl.org/w1aw

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

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

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

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

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

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

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

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



KENWOOD

Versatile and Flexible Radio Returns with
a New Look and Soaring Functions
That'll Thrill Amateur Radio Enthusiasts.

NEW TRIBANDER

TH-D75A

144 / 220 / 430 MHz TRIBANDER

Key Features

- **APRS® Protocol^{*1} compliant**
To exchange GPS location data and messages in real-time.
- **D-STAR^{*2} with Simultaneous Reception on DV mode**
Compatible for transferring voice and digital data over D-STAR networks.
- Reflector Terminal mode to access D-STAR Reflectors
- USB Type-C for Data Transfer and Charging
- Built-in Digipeater (a digital repeater) station to transmit received data
- Built-in GPS unit
- Easy-to-read Transflective Color TFT Display
- Call Sign Readout
- Tough & Robust - meets IP54/55 Standards
- Wide-band and multi-mode reception
- Built-in IF Filter for comfortable reception (SSB/CW)
- DSP-based Voice Processing and Reputable KENWOOD Custom Tuned Sound Quality
- Bluetooth®, microSD/SDHC Memory Card Slot for flexible link with a PC

^{*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).

All other company names, brand names and product names are registered trademarks or trade names of their respective holders.

Specifications, design, and availability of accessories may vary due to advancements in technology. Actual product colors may differ from photograph due to photography or printing conditions.

Brand or product names may be trademarks and/or registered trademarks of the respective holders.

The content of this document is based on information available at the time of its publication and may be different from the latest information.

This device has not been authorized as required by the rules of the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased, until authorization is obtained.

Using AI to Improve the Readability of Weak Beacons

Discover how a modest setup, Python programming, and ChatGPT-assisted code can recover 10-meter CW beacons from the noise.

Hal Feinstein, WB3KDU

I enjoy hunting for beacons on 10 meters. However, propagation on this band can make it challenging to hear beacons from certain parts of the world if the band isn't open in that direction. Ten meters is often open with weak or barely audible signals that are at or near the noise floor. These kinds of signals can be heard for a few seconds, then fall in strength, becoming nearly inaudible before dropping below the noise.

In an effort to improve weak signals by making them loud enough to recover the beacon's CW ID and message, I decided to look into simple signal-processing methods, which no longer require expensive custom equipment (or skilled technicians to build and operate it).

My requirements for this project were to use equipment I already had on hand, to learn what I could do with Python programming language signal-processing

routines, and to not get bogged down learning the details of using these tools and the idiosyncrasies of the calling parameters. Artificial intelligence (AI) is being used to successfully write computer code, so I wanted to see if I could use it to write code for this project.

I focused on using digital signal processing (DSP) by filtering spectrum noise as close to the beacon signal as possible. A similar function is provided by *SDRplay* and *SDRuno* and is available with other software-defined radios (SDRs) and even analog radios. It's a good place to start to become familiar with equipment capabilities and procedures, as well as with programming DSP routines using AI.

There are many good reasons to process in-phase (I) and quadrature (Q) components (I/Q) versus basic audio, including spectrum capture, phase control, advanced demodulators, filter options, and several noise-reduction treatments. These are substantial advantages, but they're also considerably complex. This didn't fit with my goal of using a simple approach. (I want to try I/Q-format DSP after exploring what can be done with the audio signal.)

My programming was done in the Anaconda distribution of Python 3, and I used Jupyter Notebook

```
import numpy as np
import matplotlib.pyplot as plt
from scipy.io import wavfile

def plot_audio_spectrum(wav_file):
    # Read the WAV file
    sample_rate, data = wavfile.read(wav_file)

    # If stereo, take one channel
    if data.ndim > 1:
        data = data[:, 0]

    # Normalize data
    data = data / np.max(np.abs(data))

    # Compute the Fourier Transform
    n = len(data)
    fft_data = np.fft.fft(data)
    freqs = np.fft.fftfreq(n, d=1/sample_rate)

    # Get the magnitude spectrum
    magnitude = np.abs(fft_data)

    # Limit to the first 5 kHz
    limit = 3000
    indices = np.where(np.abs(freqs) <= limit)

    plt.figure(figsize=(12, 6))
    plt.plot(freqs[indices], magnitude[indices])
    plt.title('Audio Spectrum up to 3 kHz')
    plt.xlabel('Frequency, (Hz)')
    plt.ylabel('Magnitude')
    plt.grid()
    plt.xlim(0, limit)
    plt.show()

# Replace 'your_audio_file.wav' with the path to your WAV file
plot_audio_spectrum('7Users/argo/Desktop/SDRuno_20240915_103635_28274000HZ.wav')
```

Figure 1 — ChatGPT-generated Python code to read a .wav file and produce an audio spectrum of up to 3 kHz.

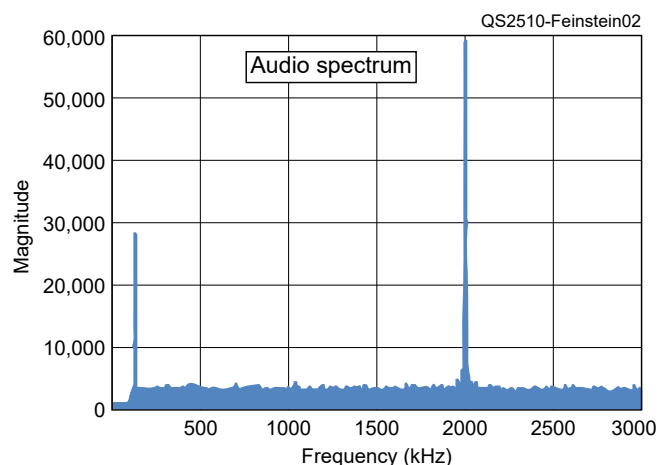


Figure 2 — Audio spectrum of the .wav file read by the program shown in Figure 1. The spike near 0 is ignored.


```

import numpy as np
import scipy.io.wavfile as wav
import matplotlib.pyplot as plt

def find_max_frequency(wav_file):
    # Read the WAV file
    sample_rate, data = wav.read(wav_file)

    # If stereo, take only one channel
    if data.ndim == 2:
        data = data[:, 0]

    # Normalize the data
    data = data / np.max(np.abs(data))

    # Perform FFT
    n = len(data)
    fft_data = np.fft.fft(data)
    fft_magnitude = np.abs(fft_data)

    # Frequency array
    freqs = np.fft.fftfreq(n, d=1/sample_rate)

    # Find the peak frequency
    peak_index = np.argmax(fft_magnitude[:n // 2]) # Only look at
    # the positive frequencies
    peak_freq = freqs[peak_index]
    peak_magnitude = fft_magnitude[peak_index]

    return peak_freq, peak_magnitude

# Example usage
if __name__ == "__main__":
    wav_file = "/Users/argo/Desktop/SDRuno_20240915_103635_282740_00HZ.wav"
    frequency, magnitude = find_max_frequency(wav_file)
    print(f'Max frequency: {frequency:.2f} Hz, Magnitude: {magnitude:.2f}')

Max frequency: 2000.77 Hz, Magnitude: 58907.04

```

Figure 3 — ChatGPT-generated Python code that finds the frequency of the strongest component in the audio spectrum of a .wav file.

```

import numpy as np
from scipy.io import wavfile
from scipy.signal import butter, lfilter

def butter_bandpass(lowcut, highcut, fs, order=5):
    nyq = 0.5 * fs
    low = lowcut / nyq
    high = highcut / nyq
    b, a = butter(order, [low, high], btype='band')
    return b, a

def bandpass_filter(data, lowcut, highcut, fs, order=5):
    b, a = butter_bandpass(lowcut, highcut, fs, order=order)
    y = lfilter(b, a, data)
    return y

def filter_wav_file(input_file, output_file, lowcut=1950.0, highcut=2200.0):
    # Read the WAV file
    sample_rate, data = wavfile.read(input_file)

    # Check if the data is stereo or mono
    if len(data.shape) > 1:
        data = data[:, 0] # Take only one channel if stereo

    # Apply the bandpass filter
    filtered_data = bandpass_filter(data, lowcut, highcut, sample_rate)

    # Save the filtered audio to a new WAV file
    wavfile.write(output_file, sample_rate, filtered_data.astype(np.int16))

# Example usage
if __name__ == '__main__':
    input_wav_file = "/Users/argo/Desktop/SDRuno_20240918_112528_28274000HZ.wav" # Replace with your input WAV file path
    output_wav_file = "/Users/argo/Desktop/output.wav" # Replace with your desired output file path

    # Set the cutoff frequencies
    lowcut = 1980.0 # Low cutoff frequency in Hz
    highcut = 2050.0 # High cutoff frequency in Hz

    filter_wav_file(input_wav_file, output_wav_file, lowcut, highcut)

```

Figure 4 — ChatGPT-generated Python code that reads a .wav file, applies a Butterworth band-pass filter on the audio, and writes the output to another .wav file.

(<https://jupyter.org>), a web application for creating and sharing computational documents, for code development. Python has sub-routine libraries that provide pre-written routines for various tasks. I used SciPy (which includes a signal library with Fast Fourier Transform, various filters, and helper functions), as well as Matplotlib (which provides versatile tools for showing signal and spectrum displays).

Modest Equipment

I used an *SDRplay* RSPdx receiver and *SDRuno* receiving software. The later versions of this software allow for capturing signals in audio and I/Q format. My initial experiments used received audio captured to .wav file format. *SDRuno* can also capture audio signals in MP3, which is a lossy compression scheme that is not suitable for this work, although it's much more compact than .wav format. With .wav, 60 seconds of audio becomes a 10-megabyte file. This means capturing more than short audio spans results in big .wav files, so that's something to keep in mind.

SDRuno runs on Windows, so I transferred my saved files to a thumb drive, which I then opened on my iMac for signal processing. I chose this method because it was quick.

Writing Python Programs with AI

One of my goals for this project was to spend most of my time trying various DSP methods, and less time writing code and debugging. In the past, this required programming skills, such as knowledge of DSP, the underlying DSP libraries, a programming language, and the language constructs that supported DSP data formats. AI large language models (LLMs), such as *ChatGPT*, *Copilot*, *Gemini*, and others, have been used to write programs that solve many types of tasks.

For this project, I used *ChatGPT-4o* to generate DSP programs in Python. (Keep in mind that AI models like *ChatGPT* occasionally generate programs with bad syntax. I discovered this when using it to generate a program in a different scripting language. When I asked *ChatGPT* if a specific statement it generated used the correct syntax, it fixed the error and rewrote the program.)

I developed three tools to try to improve the 10-meter beacon signal: a spectrum display, a program that reports the frequency of a peak signal, and a .wav-to-.wav file filter program. I used my iMac's .wav file player to listen for any improvements to the readability of the signal.

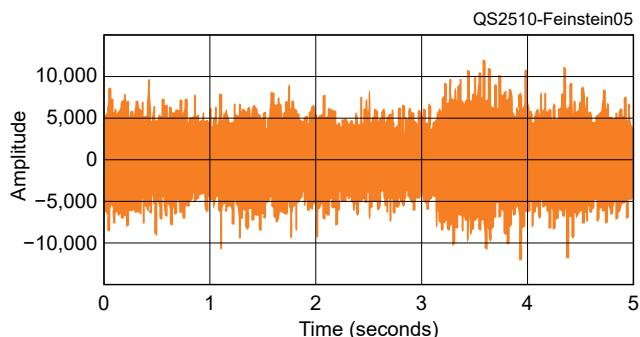


Figure 5 — The first 5 seconds of the original audio from the first beacon .wav file.

Program One — Display the Audio Spectrum

Using the *SDRplay* RSPdx and *SDRuno* audio, I captured CW beacon signals in two .wav files, in which the beacon had some reasonably strong portions followed by weak and “washed-out” sections. Concentrating on these sections, I used *ChatGPT* to write code for and use an audio spectral display to get an idea of what the .wav file spectrum looked like to try to improve the signal.

Creating the audio spectrum display program using *ChatGPT* is straightforward. In the *ChatGPT* dialog box, enter: “Write a program that reads a .wav file and displays the first 3 kHz of its audio spectrum.” The results are shown in Figure 1. The file name was changed to one of the captured .wav files, but otherwise, it’s the exact code output by *ChatGPT*. The Python program code is well documented. *ChatGPT* added a brief explanation of what each part of the program does. The spectral display output is shown in Figure 2.

The audio tone generated by *SDRplay* and *SDRuno* occurs because the beacon signal (which is sent using unmodulated CW) is being received in sideband mode.

Program Two — Report the Peak Frequency

Next, I had *ChatGPT* write a program that reports the frequency of the strongest signal component in the audio spectrum. Figure 3 shows the code with the resulting strongest frequency listed at bottom left.

In program one’s spectrum display there was a significant frequency component somewhere around 2 kHz, but you can’t tell if it’s above or below 2 kHz, or by how much. This program reports the file’s peak value, showing a frequency of 2000.77 Hz. The fractional 0.77 Hz can be dropped, concentrating only on the 2 kHz value.

Program Three — Butterworth Audio Filter

The third program reads the .wav file and applies a

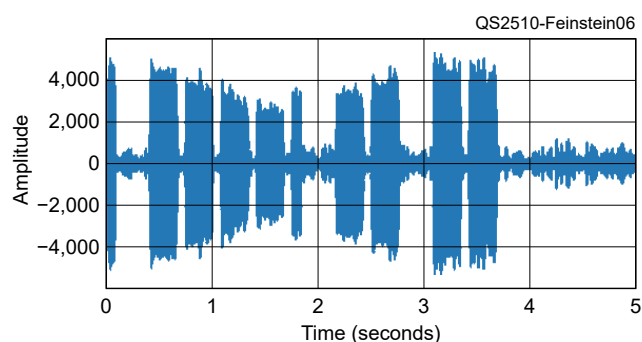


Figure 6 — The filtered output produced by program three. Here we see only the first 5 seconds of the filtered beacon .wav file filtered with a Butterworth audio band-pass filter shown in Figure 4. The CW letters visible are “9MM,” which are part of the beacon’s Maidenhead coordinate, EK19MM (near Mexico City, Mexico). Notice the scale difference between Figures 5 and 6.

Butterworth band-pass filter that removes noise at frequencies below and above a specific band-pass cutoff. A small section of spectrum showing the 2 kHz signal is what’s left.

In the *ChatGPT* dialog box, enter: “Write a Python program to read a .wav file and filter it so only the frequencies between 1900 kHz and 2200 kHz are passed, and write it out as an output .wav file.” The program is shown in Figure 4. Figures 5 and 6 show the output before and after the filter.

Parting Thoughts

This project successfully used simple signal-processing procedures to improve the readability of a weak beacon signal. Figure 6 shows the filtered beacon signal with part of its location coordinates being decipherable. The audio quality of the signal is significantly improved as well, extending the ability to read the beacon transmission at least partially down into the noise.

This was my first time using *ChatGPT* to write programs that support simple signal-processing tasks. The tasks were relatively simple, but I’d like to see how far this approach to program construction can go.

The techniques used in this article open new doors to amateur radio experimenters. Experimenting with code developed by *ChatGPT* is limited only by your imagination!

Hal Feinstein, WB3KDU, can be reached at wbkdu588@gmail.com.

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



An Exponential Spiral Antenna

This no-tune antenna for 160 to 10 meters won third place in the 80 through 10 meters category of the 2024 QST Antenna Design Competition.

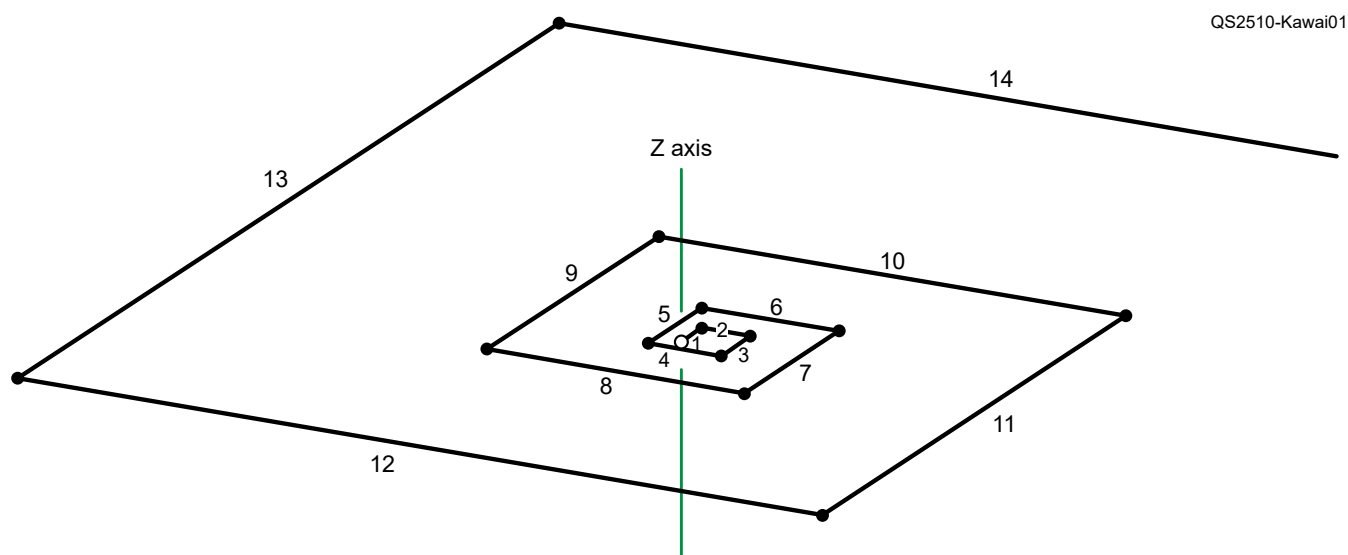


Figure 1 — Layout of wire segments 1 through 14.

Yasuhiro Kawai, JH1KOJ

This antenna is designed to operate across all HF bands without requiring tuning, and it has some circular polarization. For wide bandwidth, it's necessary to employ antenna structures such as self-complementary or traveling-wave types. Because I thought it would be easier to build without a terminating resistor, I considered a helical- or spiral-type design. A circular- or polygonal-shaped foundation would make the design more complex, so I opted for a shape based on a quadrilateral. If constructed at a constant height, it becomes a spiral antenna, and if the height gradually increases, it forms a helical antenna. I chose a simple spiral design. Because bifilar spiral antennas are difficult to construct, I opted for a single-wire design working against the ground. The antenna's gain was not a priority, and I considered a level of around 0 dBi to be acceptable.

To achieve broadband characteristics, the length of each element is adjusted exponentially. The 14-element configuration uses a base of 1.34 for the exponential adjustment, ensuring the longest element is approximately 45 meters (17 feet). By calculating $L_1 = 1$, $L_2 = 1.34$, $L_3 = (1.34)^2$, $L_4 = (1.34)^3$, and so on, you can easily determine the lengths using spreadsheet software like *Excel* (see Table 1 and Figure 1).

In practice, the 90-degree angles and element lengths differ slightly from the calculated values, as guy wires are secured using existing trees or buildings.

I used stainless-steel stranded wire with a diameter of 1 millimeter for the antenna elements. This

type of wire is lightweight, durable, and unobtrusive. Additionally, when purchasing from Amazon or similar online retailers, you often receive figure-eight-shaped crimping sleeves, which are very convenient. Be sure to use sharp pliers when cutting stainless-steel wire so you get a clean cut. Otherwise, threading the wire through the holes of the figure-eight-shaped crimping

Table 1 — Length of Each Segment

Segment Number	Length (Meters)	Length (Feet)
1	1.0	3.3
2	1.3	4.4
3	1.8	5.9
4	2.4	7.9
5	3.2	10.6
6	4.3	14.2
7	5.8	19.0
8	7.8	25.4
9	10.4	34.1
10	13.9	45.7
11	18.7	61.2
12	25.0	82.0
13	33.5	109.9
14	44.9	147.3



Figure 2 — Corner supports of the wires.



Figure 3 — Trees are used for wire support (the antenna is nearly invisible in the trees).



Figure 4 — A 450 to 50 Ω balun.



Figure 5 — Measuring at ground level into the vertical feed wire using a LiteVNA-64. Four short radials were used as a counterpoise.

sleeves can be difficult. For insulators, I repurposed lightweight polycarbonate clothespins with pre-drilled holes by removing the spring ring (see Figure 2). You can thread a 4-millimeter parachute cord through the clothespins to support the corners of the spiral-to-tree (or other) supports, as shown in Figure 3 (because this antenna was set up around a peach tree, the elements are thin and not very visible).

The simulator software I used was *Antenna Model Version 2.0* (it hasn't been available for quite some time now, but I really like using it). I found that even with a relatively rough setup, the antenna works surprisingly well. The feed impedance was determined to be optimal at 450 Ω based on the simulation results, so I

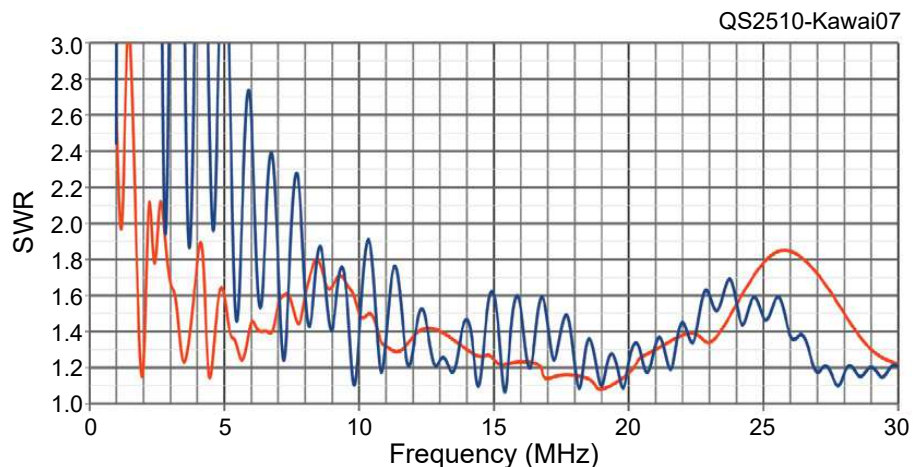


Figure 6 — SWR versus frequency using NEC-simulated (blue curve) and measured values (red curve).

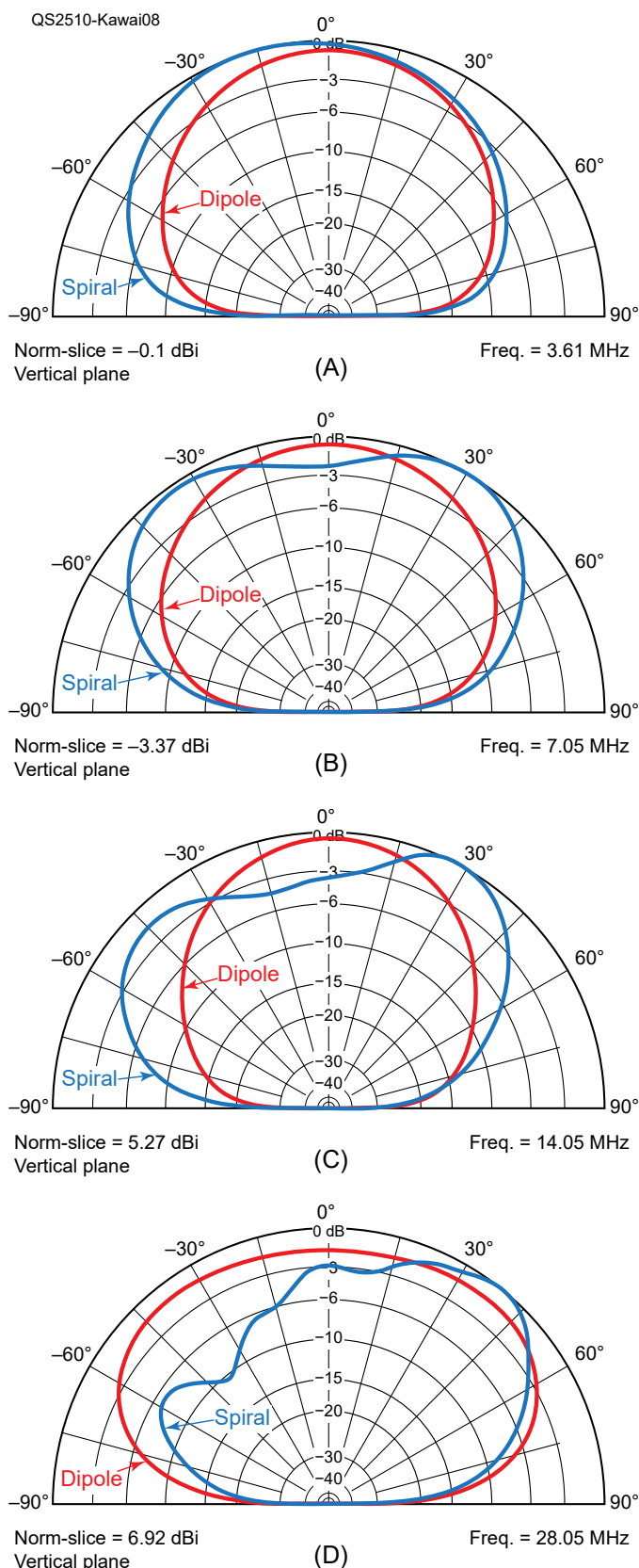


Figure 7 — Patterns of the spiral versus dipole antennas. Both were 10 feet above average ground. The red curve is the dipole, and the blue curve is the spiral. The gains are similar, and the shape of the spiral pattern varies with frequency.

constructed a 9:1 balun. I made a trifilar winding of six turns using 16-AWG (1.25-millimeter) insulated wire on an Amidon FT-114-43 ferrite toroidal core, and it works from 1.8 to 30 MHz (see Figure 4). I used a LiteVNA-64 analyzer for antenna measurements, because it allows screen images and S parameters to be easily saved on a microSD card (see Figure 5).

Measured Results

The measurement results showed a return loss of 10 dB (SWR = 2.0) or better from 1.8 to 28 MHz, making it usable without an antenna tuner. After operating with it for nearly 3 weeks, I concluded that it feels slightly inferior to a dipole antenna. I compared the antenna with a sloping V with a side length of 40 meters, a 3.5 MHz/7 MHz dipole, a 40-meter horizontal loop antenna, and a 14 to 50 MHz wire log-periodic antenna using a six-position antenna switch. Circular polarization was confirmed in the simulation, but I couldn't notice a difference when I used it. Although the height above ground was low (ranging from 5 to 20 feet), it was confirmed to be sufficiently practical.

With a total wire length of 571 feet, this spiral antenna provides very good reception for medium-wave (AM) broadcasts. Through this project, I found that the spiral antenna is worth trying as a wideband antenna. The calculated and measured SWR are shown in Figure 6, and typical patterns are shown in Figure 7.

All photos provided by the author.

See QST in Depth for More!

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

- ✓ NEC files for the antenna
- ✓ More photographs
- ✓ Simulation gain curves versus frequency

Yasuhiro Kawai, JH1KOJ, obtained his amateur radio license in 1968. He worked at the Owada Weather Intercept Site in Saitama Prefecture, Japan, for 7 years, where he was engaged in CW and RTTY reception operations. After that, Yasuhiro worked as an RF engineer at the US Yokota Air Base in Fussa City, Tokyo, for 35 years, designing and manufacturing antennas, baluns, and filters. Since his retirement, Yasuhiro has been enjoying building wire antennas and RF/SDR circuits. He can be reached at kawai@bishop.avexnet.or.jp.

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



A 160/80-Meter Trap Vertical

Consider building this two-band, no-switch antenna for your next contest or DX opportunity.

Bill Wortman, N6MW

In this article, I describe how I developed a dual low-band vertical trap antenna. It uses a fiberglass Spiderbeam mast and a combination of conventional design elements, in addition to construction features that combine modest cost with effective performance. It needs no real-time tuning or switching at the antenna base, and within CW bandwidth needs, it needs no tuner. I primarily intended to use it for CW, but it can be modified a bit for 80-meter phone, or it can be matched with a tuner on that band. If you wish to duplicate this antenna, you will need only readily available components.

Help from the Community

This project originated with my request to the Contesting.com Topband forum. I wanted other hams' thoughts on a transportable and easy-to-install antenna for 160 meters that might be used for personal DX or DXpeditions, or one that could be made available to hams in locations that are rarely on 160 meters. From their suggestions (and filtered by my personal preferences), I decided to use a Spiderbeam 60-foot fiberglass mast-based vertical with T-style top loading (see page 11.26 in the 25th edition of *The ARRL Antenna Book*) and two elevated radials. I later enhanced it for 80-meter capability by using a trap at the top of the mast to isolate the T wires on that band. So, it also has features of the venerable Battle Creek Special featured in the fourth edition of John Devoldere's, ON4UN, *Low-Band DXing*.

QS2510-Wortman-01

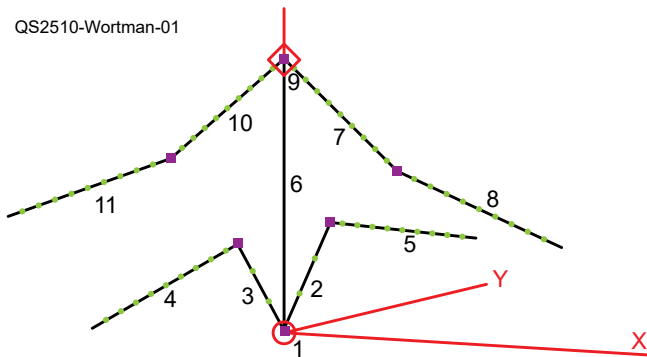


Figure 1 — The EZNEC model of the antenna elements, redrawn for clarity.



The antenna and support poles for the elevated radials.

Special Components

The trap is a coaxial type (based on Figure 12.29 in the 25th edition of *The ARRL Antenna Book*, which is the same as Figure 4 in Al Buxton's, W8NX, "Two New Multiband Trap Dipoles" in the August 1994 issue of *QST*). That is, it doesn't use the effective inductance increase with a second current path through the coiled coaxial braid. It is resonant near 3.4 MHz. I chose low Z because the length of the required sloping top-loading wires (two as a T to reduce those signals going straight up) allows me to adjust them from the ground. The trap's 160-meter inductive impedance for high-Z mode would have made the T top sections too short for such adjustments.

The radial field consists of two elevated radials (as seen in Rudy Severns', N6LF, "An Experimental Look

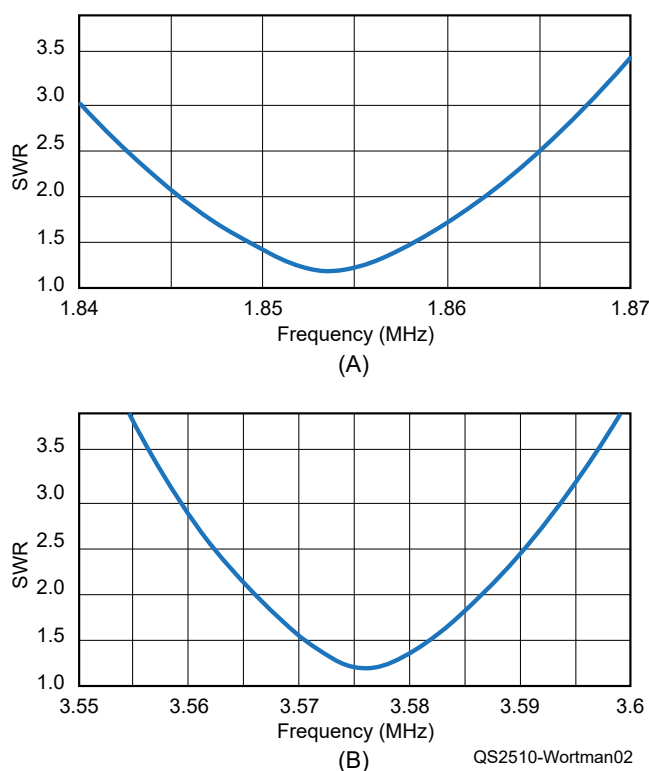


Figure 2 — NEC optimized SWR plots, redrawn for clarity.

at Ground Systems for HF Verticals” in the March 2010 issue of *QST*) in opposite directions, in the gull-wing configuration. With some planning, it is possible to provide one elevated support for each of the radials near the mast by using two of the guy ropes that also hold up the mast.

EZNEC Model Analysis

I proceeded with the idea that this 160-meter antenna would be short compared to a quarter wave with a low radiation resistance and narrow bandwidth. I used RG-58 coax for the trap and did some *EZNEC* experimentation, and I came to a set of nominal dimensions (at reactance $X = 0$) that could allow resonance in both bands. The final measured 80- and 160-meter unmatched impedances taken at the antenna were near $20\ \Omega$ at resonances of 1.88 and 3.54 MHz, in modest contradiction to *EZNEC* expectations. You can move the 80-meter resonance by adjusting the radial lengths, and you can move the 160-meter resonance by adjusting the top wires. The $20\ \Omega$ feed-point resistance on 160 meters may be higher than expected due to ground losses not included in the model.

My plan was to match the 160-meter band to $50\ \Omega$ with a “hairpin match” (as discussed in my feature, “The Hairpin Match,” in the June 2013 issue of *QST*) using a coil shunted across the input. This is simple and

requires no high voltage- and current-rated capacitor. However, it required me to carefully tune the lengths of the top wires (shorten from resonance) to get the needed mildly capacitive reactance in the unmatched antenna on 160 meters.

Runs of *EZNEC*, including the trap and hairpin match, suggested the seemingly miraculous possibility that a single value of the hairpin coil would work for both bands, meaning no required coil changes or other switches for a band change. This is perhaps not so remarkable when you realize that 80 meters shouldn’t need a coil, and the reactance of the coil that matches 160 meters is doubled on 80 meters. It is thus high enough that having it across the feed point has little effect on that match.

Figure 1 is an *EZNEC* model illustrating the general geometry; the short model wire 9 has the trap, and wire 1 has the hairpin. Figure 2 is the modeled standing wave ratio (SWR) showing that, when hairpin matching inductance is included, it is possible to match both bands without switching or tuning.

Based on my experience with translating *EZNEC* results into real antennas, each model is only a general guide, especially for wires near the ground. However, they are useful for predicting impedance changes due to changes in wire lengths. With the aid of an antenna analyzer, wire pruning will be necessary because of local environmental effects.

The Physical Reality; Some Problems

Armed with the *EZNEC* model information, I cut long lengths of pre-trimmed wires and placed the trap on the top segment of the mast. I telescoped the mast to its full height and guyed it with the recommended two sets of Dacron® rope.

My plan was to tune the antenna at 80 meters by adjusting the lengths of the radials. After that, I was going to adjust the two top loading T wire lengths together to tune for 160 meters; the top wires do not affect the 80-meter adjustment due to the trap.

This was when the first problem arose. The trap, mounted on a light tube, weighs only 6 ounces. But, after trying different guying heights and even three sets of guys, I realized that it was too heavy to be placed on the top because it was causing the upper section of the mast to bend. I went back to *EZNEC* to see what might happen if I placed the trap about 5 feet down from the top of the mast (next to the segment that is second from the top and tapers to $\frac{1}{16}$ of an inch). It appeared to be possible based on the model. So, I re-mounted the trap at the 55-foot level while leaving the highest mast



Figure 3 — The trap, which is resonant near 80 meters. The aluminum tube has no effect on the trap.

segment in place. After that, I had no problem using the two sets of guys.

I tuned for 80 meters by adjusting the radial lengths, using *EZNEC* as a guide and checking with the analyzer. This method works well; a nominal impedance match is attainable with no additional components.

For 160-meter tuning, only the top load T wire lengths were adjustable without affecting 80 meters, as the radial lengths were already established. After the adjustment, I found an unmatched input impedance of about $20\ \Omega$ in my frequency range of interest.

I added the hairpin matching coil and adjusted the coil tap and top wire lengths for a reasonable SWR, which I measured via the analyzer at the antenna input. The prior match to 80 meters did not change.

I encountered another problem — this time, with the 160-meter match. When the long coaxial feed line was connected and run back to my shack, the 80-meter match was similar, but the SWR and impedance for 160 meters bore no relation to that seen at the antenna. There was no resonance even remotely close to 1.8 MHz.

The integrity of the analyzer and cables was okay. It turned out that the longer the cable, the worse the SWR difference. It dawned on me that there may be high levels of common-mode current (CMC) on the outside of the feed coaxial braid, as it did not have a choke. It became obvious that this 160-meter antenna was really an off-center-fed device, and those are famous for needing a good choke to prevent CMC. I coiled 75 feet of spare coax and placed it near the antenna's feed point to provide a choke reactance



Figure 4 — The hairpin coil, feed point, and start of the radials. Note that the coil form can also serve as a rain gauge unless drain holes are used.

of more than $1000\ \Omega$ at 160 meters. I repeated the in-shack measurements, and the results were much better. However, they still weren't perfect, and there was a modest frequency offset in the SWR minimum at the ends of the cable run. The offset was significant enough that I needed to adjust the wire lengths and the coil tap while looking at the SWR in the shack.

The Finer Details

The coaxial trap (see Figure 3) has a capacitance of about 260 pF and an inductance of about $8\ \mu\text{H}$. It uses 107 inches of RG-58 in an approximately 4.75-inch-diameter coil of roughly seven turns. It is resonant at about 3.4 MHz. The aluminum rod, which I originally selected to fit over the smallest segment of the fiberglass mast, was actually not used for that purpose, but it provides a connection point for the top wires; solid #18 AWG copper-clad steel was used for those wires. The choice of wire was based on economy, strength, weight, and lack of insulation for fold-back tuning. You can see the trap near the top of the mast in the lead photo.

The following final dimensions are about 5 percent short of *EZNEC* predictions. The vertical wire is about 55 feet and attached to the mast with cable ties. The two top loading T wires slope down at approximately 45 degrees, with lengths of about 60 feet. The radials are about 75 feet long, and they slope up from the base to the first support at about 45 degrees. They are nearly horizontal out to the end support at approximately 12 feet. The hairpin coil (see Figure 4) is solid copper wire, and it's tapped at about six turns with about $\frac{1}{2}$ -inch spacing on a 4-inch-diameter lightweight form, giving it an inductance of $3\ \mu\text{H}$. For the antenna, matched in its final configuration (coil tap optimized for 160 meters),

there is a minimum SWR of 2 at 3.53 MHz and 1.8 at 1.86 MHz. In the shack (connected by 200 feet of RG-8 coax), where I did the final tuning, I measured an SWR of 1.6 at 3.53 MHz and 1 at 1.83 MHz, in addition to an SWR of less than 2 at a bandwidth of 20 kHz on 160 meters and 40 kHz on 80 meters. The apparent residual CMC frequency offset (antenna versus shack) was still noticeable, but manageable.

I strapped the bottom segment of the mast to a 6-foot-long 2 × 6 board mounted in concrete, making the telescoping task fairly easy. I left on the smallest top segment of the fiberglass mast, although it does not get used. This prevents birds from landing on the mast.

Performance

I have tested this antenna on the air by trying to work DX and by using the Reverse Beacon Network (comparing with prior antenna results). It seems to work well on both bands, but its performance probably falls a bit short of my previous 160-meter antenna. That antenna was similar; its height was about the same, but it had an aluminum mast, three sloping top load wires, longer radials, and no trap. I used this 160/80-meter trap vertical with 500 W during the CW portion of an ARRL International DX Contest. I focused my efforts on 160 meters and worked 21 countries, and then I worked 30 countries on 80 meters with rather limited effort. It seems that while this antenna can be used competitively, it does not quite live up to the higher-end stations.

While this is not the simplest antenna to reproduce because you'll need to tune it depending on your local environment, it should be doable for those who have enough space and an antenna analyzer.

A Note from the Editor

This antenna is a proven design that can be built and used as described. The article does not address loss in the trap, which may be considerable on the low end of the 80-meter band. Experimenters are encouraged to explore the advantages of using a higher Q trap or a coaxial trap in the high-Z configuration. Experimenters can also move the trap resonant frequency a bit lower, especially if they plan to use the lowest frequencies on 80 meters. Such changes will require adjustment to some of the wire lengths. NEC simulations can give insight into these effects. Visit www.arrl.org/qst-in-depth for article updates, NEC files, additional photos, and ways to determine and reduce trap losses. — *John Stanley, K4ERO*

See QST in Depth for More!

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

- ✓ NEC files in both EZNEC and native NEC formats
- ✓ More photos of the 160/80-meter vertical
- ✓ Notes on traps

All photos provided by the author.

Bill Wortman, N6MW, is a physicist with a PhD from Texas A&M University and an undergraduate degree in engineering from The Ohio State University. He has spent most of his career in defense research and development. Bill, a continuous ARRL member, has been licensed since 1957, and he holds an Amateur Extra-class license. His radio interests include DXing, 6-meter propagation, contests, and antenna experimentation. He has made contributions to QST and the 25th edition of *The ARRL Antenna Book*. Bill can be reached at n6mw@arrl.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

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 July 2025 activity report of the VM Program.

- ◆ Technician operators in Florida and Georgia received advisories concerning 17-meter FT8 operation, a band on which Technicians have no privileges.
- ◆ Technician operators in Florida, California, and Oregon received advisory notices concerning 20-meter FT8 operation, a band on which Technicians have no privileges.

- ◆ A commendation was issued to an operator in Ohio for exceptional work with the April 29, 2025, SKYWARN® net on the Preble County 145.470 MHz repeater.

- ◆ There was one virtual club presentation about the Volunteer Monitor Program.

The totals for June 2025 monitoring were 1,208 hours on HF frequencies, and 1,668 hours on VHF frequencies and above, for a total of 2,876 hours.

— *Thanks to Volunteer Monitor Program Administrator Riley Hollingsworth, K4ZDH*

Product Review

Alinco DR-CS10HT 2-Meter FM Transceiver

Reviewed by Steve Ford, WB8IMY
ford_steven@sbcglobal.net

With the DR-CS10HT, Alinco appears to be taking a back-to-basics approach to single-band FM transceiver design. Selling for less than \$170 at the time of this writing, the DR-CS10HT is likely to draw attention from those who desire a radio that simply works, putting the emphasis on ease of use above everything else.

When you unpack the radio and examine the manual, it becomes obvious that the DR-CS10HT is essentially an amateur radio version of a commercial transceiver. The layout is utilitarian, and so is the feature set.

The front-panel knobs and buttons are minimal, with much of the control being accomplished from the multi-function microphone instead. The assumption is that you'll have little need to make adjustments once the radio is programmed. You simply turn it on, select the desired memory channel (there are 200 available), and talk.

At just $5.5 \times 1.375 \times 7.0$ inches, the DR-CS10HT is compact and able to fit within just about every mobile environment. The front-panel display is well lit and easy to read (the background color is adjustable). The top-firing speaker supplies plenty of audio, although there is also a rear-panel 3.5-millimeter mono jack if you wish to connect an external speaker (see Figure 1). The rear panel also offers a single SO-239 antenna connection and a USB port. The function of the USB port is not explained in the manual, other than referring to it as a "repeater" jack. Contrary to what you might assume, this is not a data port for programming, which takes place via the microphone jack.

Despite its small physical size, the DR-CS10HT packs a substantial RF punch. At the high-power setting, the rig produces 60 W output. The current drain while transmitting at 60 W was slightly more than 10 A. While this is a 2-meter-only transceiver, it offers receive coverage from 136 to 173.9975 MHz. See Table 1 for the manufacturer's specifications.

Getting Acquainted

The DR-CS10HT isn't a feature-rich radio, but for many amateurs that may be one of its strong points.



It includes the basic features you'd expect, such as programmable memories with alphanumeric tagging and a number of selective-calling options, which reveal its commercial pedigree. You have your choice of DTMF, tone burst, CTCSS, DCS, and more.

Among the "more," there is automatic number identification (ANI). Think of it as a kind of caller ID for analog transceivers. With ANI enabled, the DR-CS10HT will send a quick tone sequence with each transmission. If another (presumably Alinco) radio has been programmed to recognize the ANI code you are sending, your ID — such as your call sign — will appear on the display. The trick, though, is that everyone in your group must be using the same code set and have their radios programmed accordingly.

The manual doesn't describe the ANI function in detail, but it is primarily a "fleet management" feature. In the land mobile radio world, a *fleet* is a collection of radios

Bottom Line

The Alinco DR-CS10HT is a simple 2-meter analog transceiver. It provides plenty of power with up to 60 W output, and it's easy to operate because of its intuitive and user-friendly design.



Figure 1 — The Alinco DR-CS10HT rear panel.

grouped by function, department, or region (police, fire, EMS, public works, etc.), each with predefined communication channels, call groups, and access permissions.

Speaking of fleet management, the manual makes a brief reference to the DR-CS10HT having “stun, revive, kill” functionality. This line is an eyebrow raiser to say the least, but it is yet another commercial feature. It allows a fleet manager to remotely disable a designated transceiver — either temporarily or permanently — or reactivate a disabled radio. The manual doesn’t describe how to implement this function in the DR-CS10HT, which is probably just as well, because I suspect it is enabled only in commercial versions.

Programming

As I mentioned previously, a unique aspect of the DR-CS10HT is that most of the control is implemented through the multifunction microphone. There are no touchscreens or front-panel keypads. For example, if you want to enter a specific frequency directly, you must punch the corresponding digits into the microphone keypad. The four front-panel buttons labeled **P1** through **P4** provide a degree of menu access, but I found it was best to use the microphone to make selections in most instances.

You can even program the channel memories, along with their alphanumeric tags, through the microphone. This worked well during my review, as I needed to set up only a few memory slots for local repeaters.

RT Systems (www.rtsystemsinc.com) offers the *APK-CS10*, a complete software package for the DR-CS10HT that includes the microphone interface cable. I didn’t have an opportunity to test the RT Systems software, but I’m confident that it would be much easier to program the radio in that fashion.

Because you’re likely to rely on programmed memory selections when operating this transceiver, as opposed to random tweaks while in VFO mode, the RT Systems package would be a worthwhile investment.

Taking It on the Road

It is tempting to power the DR-CS10HT from a vehicle’s accessory power port, but you’re far better off going directly to the battery, especially considering the transmit current requirements. I used the direct battery connection and didn’t experience any issues. Even receive interference from my vehicle electronics was minimal.

I secured the rig within a handy slot in the center console, which provided just enough room to allow the speaker to be heard clearly. In a permanent installation I would have chosen a separate external speaker. The DR-CS10HT produced plenty of audio, more than enough to overwhelm the road noise.

After connecting the antenna feed line, I started by just placing the transceiver into its memory scanning mode. The scan was blindingly fast and lacked the annoying clicks or pops you sometimes hear with other radios. As with most scanning functions, you can select how you want the radio to respond when receiving a signal — stop the scan for a short time only, stop until the signal disappears, or stop completely.

Selecting the DR-CS10HT’s 10 W output mode, I was able to hit all my local repeaters without difficulty. While I could have stepped the power up to 25 or even 60 W, it really wasn’t necessary. According to reports, my transmit audio was clean and crisp.

I couldn’t do a mobile test, however, without sampling the 60 W experience, so I programmed several distant repeaters, along with 146.52 MHz simplex, into memory and drove to the nearest hilltop. The

Table 1 — Alinco DR-CS10HT 2-Meter Transceiver S/N A000585, FCC ID# PH3D-CS10HT

Manufacturer's Specifications

Frequency coverage: Receive, 136 – 173.9975 MHz. Transmit, 144 – 147.9975 MHz.

Power requirements: 13.8 V dc $\pm$ 15%; receive current 0.6 A max, transmit current 10 A max.

Mode of operation: FM (12, 20, 25 kHz BW).

Receiver

FM sensitivity: 12 dB SINAD: wide band: $\leq$ 0.25 μ V; narrow band: $\leq$ 0.35 μ V.

FM two-tone third-order IMD dynamic range:

Wide band $\geq$ 65 dB.

Narrow band $\geq$ 60 dB.

FM two-tone second-order IMD dynamic range: Not specified.

Adjacent channel rejection: Wide band, $\geq$ 70 dB; narrow band, $\geq$ 60 dB.

Squelch sensitivity: Not specified.

S-meter sensitivity: Not specified.

Audio output: $\geq$ 2 W (8 Ω , $\leq$ 10% THD).

Transmitter

Power output: 60W/25W/10W

Spurious signal and harmonic suppression: $\geq$ 60 dB.

Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.

Receive-transmit turnaround time: Not specified.

Size (height, width, depth, including protrusions): 1.375 $\times$ 5.5 $\times$ 7 inches.

Weight: 2.0 pounds.

¹ 25 kHz BW.

² 12 kHz BW.

³ Noise limited at the value shown.

Measured in the ARRL Lab

Receive and transmit as specified.

At 13.8 V dc: Receive, max brightness and volume, no signal, 300 mA, transmit, 8.2 A at 56 W RF output.

As specified.

Receiver Dynamic Testing

12 dB SINAD, 3 kHz deviation:

	FM-W ¹	FM-N ²	
146 MHz	-123/0.15	-124/0.14	dBm/ μ V
162 MHz	-122/0.17		dBm/ μ V

	FM-W	FM-N	
20 kHz offset	69	71	dB
10 MHz offset	97	100	dB
146 MHz, 84 dB			

	FM-W	FM-N	
146 MHz	75 ³	78 ³	dB
At threshold, 146 MHz, 0.1 μ V; 0.3 μ V (max).			
For five bars, 146 MHz, -100 dBm/2.18 μ V.			
As specified. THD 1.8% at 1 VRMS.			

Transmitter Dynamic Testing

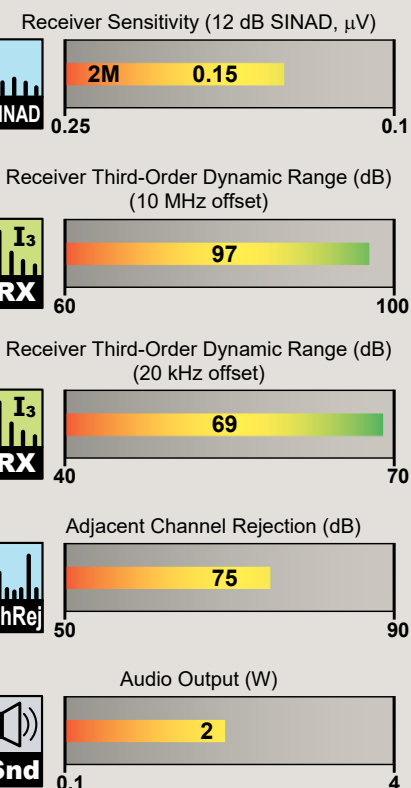
146 MHz @ 13.8 V dc, 56W/21W/9W.

146 MHz, $\geq$ 70 dB. Complies with FCC emissions standards.

180 ms (typical).

73 ms.

Alinco DR-CS10HT Key Measurements Summary



KEY: QS2510-PR180
Measurements made with 25 kHz bandwidth (FM-Wide). Bars off the graph indicate values over scale.

results were impressive, even with just a ¼-wave-length magnetic-mounted antenna. From my location in central Connecticut, I worked repeaters in Massachusetts to the north and Long Island to the south. I even managed to make a few simplex contacts, including one with a station about 100 miles away. The DR-CS10HT lacks a cooling fan, and the heatsink became quite warm during this exercise, but not excessively so. Still, you'd want to install the radio in a location where air can circulate freely.

At home, I connected the DR-CS10HT to a 2-meter ground plane antenna on the roof and enjoyed many contacts there as well. It was nice to have the ability to use high power when necessary, particularly when

working mobiles (and even some handhelds) on simplex.

Conclusion

The Alinco DR-CS10HT stands out for its intuitive operation and user-friendly design. When combined with considerable RF output, a competent receiver, and an economical price tag, the result is a transceiver worthy of any mobile station — and more than a few home stations as well.

Manufacturer: Alinco, Incorporated Electronics Division, Yodoyabashi Dai-Bldg 13F, 4-4-9 Koraibashi, Chuo-ku, Osaka 541-0043, Japan, www.alinco.com. Price: \$169.95.

Three 1500 VA UPS Units: Introduction

Reviewed by Paul Danzer, N1II
n1ii@arrl.net

Years ago, if asked if you needed an uninterruptable power supply (UPS), you would probably be tempted to answer “No” or “What for?” Older equipment with higher voltages and transformer-based power supplies were much less susceptible to power interruptions and improper voltages. Additionally, there were fewer firmware updates that could brick your device if there was a power outage during the upgrade. Today, most personal computers and microprocessor radios are based on designs that are often vulnerable to power interruption and corruption. You might not just lose your unsaved files, but also corrupt software in ways you may not notice. You can use a dc-only battery backup system, or another solution is the insertion of a UPS between the equipment and the ac line supplying power. This is especially useful if your equipment is running directly from an ac outlet.

In the following reviews, I compare three widely available consumer-grade UPS units to see what is available for a common station. All three are rated for 1500 volt-amperes (VA); the manufacturers usually use 900 W as an equivalent practical load.

A UPS supplies “keep alive power” to electronic equipment in case of a power outage or voltage drop. When the power line is lost, the reviewed UPS provides at a minimum:

- Switching to a storage battery system to replace the power previously supplied from an ac line
- Enough power to continue short tasks or to manually do an orderly shutdown, minimizing the possibility of loss of data before it is stored
- An automatic shutdown of your PC via software (USB connection needed)
- Between five and six battery-protected ac outputs
- Passive surge suppression on the incoming voltage (the UPS does not have to be turned on)
- Surge protection on both protected outlets and non-protected outputs
- Passive surge suppression on various other lines, such as analog telephone lines, coax data lines, and wired network data lines

- An LCD display with status monitoring, such as loads and remaining battery capacity
- Protection of your equipment by maintaining a stable voltage (in case of power variation)

In the past, when choosing a UPS, the primary considerations were how much surge suppression and how much backup time the UPS provided. Now, due to the common availability of other functions, there are many more things to compare. For this review, I examined three UPS units with some testing to get an idea of what is available. All three systems had “1500” in their model number, meaning the manufacturer rates their UPS at 1500 VA. With loads inducing a possible phase angle, this 1500 VA may translate to 900 W on average in a non-stressing (altitude, temperature) situation.

See Table 2 for a list of common features, capabilities, and limitations as supplied by each manufacturer. Each unit comes with manuals.

However, each manufacturer may provide specifications and performance numbers based on different assumptions and different design and test conditions. Therefore, even if the manufacturer’s name of a parameter is the same as that of other manufacturers, there is not total assurance that the two numbers measure the same thing under the same conditions.

Keep in mind that if a UPS is connected to a PC via a USB cable, they will usually be detected by the PC operating system (OS) as a battery backup, but with limited information (like showing the percentage of battery left in the Windows tray). On Windows and MacOS desktop computers, the UPS should be shown with a similar visual as an internal battery in a laptop using the same OS, without the need to install any extra software.

Many operators are reluctant to add a UPS unit to their amateur radio station because it may cause interference at some frequencies, so the ARRL Lab tested the three reviewed units; you will find the Lab Notes and three figures at the end of the three UPS reviews. In most cases, when adding a UPS in line with your radio equipment, interference is not an issue.

The ARRL Lab also did a load test on all three units; you will find the results on *QST* in Depth (see www.arrl.org/qst-in-depth).

APC Schneider Electric Pro BN1500M2 UPS

Reviewed by Paul Danzer, N11I
n1ii@arrl.net

If you turn on this UPS for the first time and it does not seem to work correctly, trying again won't help. It most probably means you skipped page 3 of the user manual. The unit is usually shipped with the battery not connected, and both page 3 and the large yellow sticker remind you to connect the battery before turning on the unit for the first time. In fact, it is a good idea to connect the battery and plug the UPS into the ac supply for a few hours to charge.

This model is a heavyweight, measuring slightly more than 25 pounds. The user manual comes in three languages: English, Spanish, and French. Small drawings plus a small amount of text provide brief explanations of the controls and the display. The manufacturer has several groups of UPS units. A single group may have identical backup capability — in the case of the unit reviewed here, the number 1500 represents the VA rating. However, often there are characters preceding and following the main number. Sometimes the additional characters are significant and there are important differences, and sometimes not.

Included in the package as shipped with the UPS unit is the user manual and a USB patch cord. At one end, the cord has an RJ-45 connector matching the data plug input on the back of the UPS (see Figure 2). The other end of the cord has a standard USB-A plug to match a computer. This cord allows connection with your computer and can also be used with downloadable software (to be described later). Note that this software is only for Windows PC.

Installation

Make sure the battery is plugged in; if it's not, go to page 3 of the user manual. There is also a battery connection demonstration video at <https://youtu.be/k3miAvgiQal?si=WECqaXnqbHY1ITGE>. Next, plug your rig or equipment into one of the 120 V sockets on the back of the UPS and turn it on. You may have to press the UPS front-panel power pushbutton for a fraction of a second. Wait until it's fully charged, and you are now backed up. At this point you can tweak the various settings to take advantage of the various features of the UPS (more on this later).



Primary Outputs

There are 10 ac outputs divided into two groups on the rear panel. Five are in line on the left side, each providing both backup power and surge suppression. In addition, one outlet with backup capability is located on the top of the right-hand column, giving a total of six outlets for backup and suppression. The remaining four outlets on the rear panel provide surge suppression only.

The UPS ac input (line cord) is located at the very bottom of the panel with a circuit breaker directly above the line cord almost halfway up the panel. This is the unit circuit breaker; it functions when the UPS is overloaded.

Bottom Line

The APC Schneider Electric Pro BN1500M2 does the job, but operating the buttons for settings can be tricky at times.

The five outlets providing surge suppression continue to provide this function even when the UPS is shut off. This is very useful for equipment such as printers, card readers, and scanners, which need surge protection. However, if they lose primary power, the probability of losing data or a file is negligible.

On the very top right is a socket labeled **DATA PORT**, which provides a connection to a computer for external control. Just below it is a ground screw connected to the UPS chassis and a third (ground wire green) of the ac input cord.

To the left of the ground screw are two coax screw connectors such as those used with cable TV. These ports are also passively protected. Passive surge suppression is also on the 2 Gb LAN ports (**IN** and **OUT**) on the left side opposite the **DATA PORT**.

Just below the ground screw is an LED labeled **BUILDING WIRING FAULT**. The only information on this red warning LED is an instruction to contact an electrician immediately. This capability was not tested for this review.

The Backup

A 2.75 × 2.75-inch LCD display on the top of the front panel gives a look into the various conditions and operations of the backup system. Below the LCD panel are three switches that are used to select the information on the display. The right-hand button has only one function: disabling the audible alarm. This allows you to quiet it when it has been energized by the system, and you do not have to suffer through the alarm sound until the condition causing the alarm has been changed. Almost in line with this button and about halfway up the display there is a loudspeaker symbol that has a crossline through it — to turn the alarm off.

All three pushbuttons require a physical click for feedback to assure you the button push has been accepted. The leftmost button and the center button select the mode display and the mode settings.

The user manual provides instructions on how to select objects on the display and make certain operation selections. Most symbols are indicative of the function they control. For example, on the top left of the display is a battery symbol with the lettering **ON BATT**. This indicates the system is generating ac from the UPS battery.

The top right triangular symbol has the label **LOAD**, and the number of boxes filled in the symbol indicates the amount of load. In the lead photo just one of five boxes is filled, thus reporting a light load. Below this

symbol is another drawing of the outline of a penlight battery that looks like an AA battery. The filled boxes show the amount of battery capacity at this time. Here, five out of five boxes are filled; roughly 100 percent of the battery is available, meaning that it's fully charged.

Finally, the symbol on the left is a clock defining a number of minutes to the right. This shows that there are approximately 120 minutes of battery capacity, assuming the load stays light.

Two More Buttons to Go

The center button, glowing brightly in green, is the **POWER** button. It has several functions, including turning the system on and off. The left-hand button, called **DISPLAY**, allows selecting certain displays in conjunction with the **POWER** button.

As an example, these two buttons following a sequence can adjust the sensitivity. Sensitivity is what the manufacturer calls the ac line input voltage range that will cause the UPS to switch to battery backup. Three ranges can be selected: Low means the input ac can be within the limits of 78 to 142 V ac before automatically switching to battery backup. Medium sensitivity is between 88 and 130 V ac before switching, and High is from 88 to 136 V ac. The manufacturer recommends medium for computer equipment.

Another selection called *automatic voltage regulation* (AVR) can be made with these two buttons. When selected, AVR shows a sine wave with a horizontal line through it. This mode is designed to compensate for low voltage input and appears to add internally generated voltage to the input voltage. Thus, it provides a higher output when needed but not low enough to require use of the backup battery alone. For more information on this feature, please visit <https://apc.com/us/en/faqs/FA158913>.



Figure 2 — The APC Pro BN1500M2 rear panel.

Finally, there is an amount of self-test; results are displayed on the LCD and through the alarm beeping pattern, assuming the alarm has not been turned off. The panel can also be set up to continuously monitor output voltage and frequency as well as input voltage.

Final Pieces

In the backup mode, the output voltage and frequency are specified but the waveform is not. Some other brands of UPS units specify that their output, during backup, is standard sine waves. Therefore, during this review, the output was isolated and measured using an oscilloscope, and the output was observed to be a modified sine wave output. A modified sine wave has a stepped, square wave-like output, and is good for running low-power devices, but can cause buzzing and audio noise in RF receivers and might make your lights flicker. It's not ideal to be running your radio equipment on the air; for that application, look into devices that specify that they have a "pure sine wave" output. This was also confirmed by the ARRL Lab load test (see www.arrl.org/qst-in-depth).

The total package as shipped consists of the main unit, the user manual, and a data cable that has a USB

connector on one end and a communications cable plug matching a UPS socket on the other end. This permits downloading software such as a package titled *PowerChute Personal Edition*, which can be found by searching on www.apc.com. It is compatible only with Windows, and you must specify the UPS model exactly, including any suffixes such as "Pro."

In Summary

Tests and exercises done in preparing this review did not find any performance problems. However, the use of just two pushbuttons (with a further requirement in some cases that the button be pushed for a certain amount of time — 0.2 second, 2.0 seconds, 6.0 seconds) might be a problem at times, but fortunately once it's set you won't use these frequently. The user manual did cover the operation but was not augmented with further information online. The online documentation consisted of only a downloadable copy of the user manual.

Manufacturer: Schneider Electric, sold under the APC brand. Available from many electronic retailers in the US. www.apc.com. Price: \$208.

CyberPower CP1500PFCLCD UPS

Reviewed by Paul Danzer, N1II
n1ii@arrl.net

Similar to other UPS models, this 1500 VA unit weighs approximately 25 pounds, and the front panel has a 2.5 × 3-inch LCD display and four pushbutton switches. When delivered, the carton contains the main unit and data cable similar to a standard USB printer cable (USB-A to USB-B). Also included in the carton is a multi-page user manual in foldout format — approximately the equivalent of 10 pages with some duplication.

The manual has a representative block diagram that serves to introduce the unit's AVR function. This works in conjunction with the setting that is selected to determine when the battery backup becomes active (more on that later).

The leftmost switch is both the on/off switch and the power indicator. Slightly different from some UPS models when the power switch turns the unit off, it also disconnects the UPS output from the ac line so no power is applied to the load.

Unpack and Plug It In

One page of the user manual provides a quick summary of the uses of the front-panel buttons. The unit is shipped with factory default settings and usually only requires connection to the ac line to plug in the load. The "basic operating" page gives a quick overview of the screen, displays, and button function. However, when the instruc-



tion on this page says “2 seconds,” you must hold the button down for a full 2 seconds or a bit more. As an example, suppose you were in an area where the ac line often makes wide swings and you want the backup to turn on in such conditions. Here are the steps:

1. Press **ENTER (SET UP)** for 2 seconds. This brings up the list of items that can be set (more on this later). Short press the up or down (triangle marked) button until it brings up the function you want to set. In this example, we want to set **SENSITIVITY** — in the voltage range, the backup switches on.
2. When **SENSITIVITY** comes up, short press **ENTER**.
3. Use the triangle buttons to select the value of sensitivity you want.
4. Pressing **ENTER** fixes the value to your selection.
5. Wait a few seconds; the display reverts back to its original picture.

There is no definition of the term “short press,” but it did not appear critical. Sensitivity is explained in the “Function Setup Guide,” which is part of the owner’s manual.

The Front Panel

The four front-panel buttons are defined in the “Basic Operation” section of the user manual. The leftmost button is used to turn the unit on and off, along with its indicating light. Many UPS units have such a button to turn the UPS on and off; in the off position, the ac line is fed directly (through surge protection) on the output sockets. In this model, however, turning the power off also shuts the line input power off.

The use of the two buttons marked with up and down triangles has been explained in the preceding example; these buttons also have other functions related to the button names on the panel. The **DISPLAY** button, used by itself, selects the content of the display when it is not being used for programming. Short pressing this button changes these selections; pressing it for 2 seconds will keep the display continuously off or on.

The **MUTE** button, pressed for more than 2 seconds, silences the alarm. When the alarm is shut off, a mute symbol appears on the display screen.

Bottom Line

The CyberPower CP1500PFCLCD is a full-featured UPS with a great deal of capability.

Remaining on the front panel, below the display, are two USB charging ports (type A and type C). It provides 5 V dc with 3.1 A power output even on battery backup.

Back-Panel Connections

All connections are through the back panel (see Figure 3). The row of six sockets on the left are both surge-suppressed and backup-connected. The six on the right are only surge-protected. Both sets have the top socket spaced away from the others. This is to permit plugging in a wall wart without interfering with the next adjacent socket. Along the center of the panel is the line cord on the bottom and a circuit breaker farther up.

At the top left is a cover for an optional Remote Management Card (RMCARD) that adds remote monitoring and management of the UPS.

According to the manufacturer’s website, this model is compatible with both the RMCARD205 and the RMCARD100. The RMCARD205 supports many network protocols like Simple Network Management Protocol (SNMP) traps, *Syslog*, and many other protocols, but its price is higher than the UPS unit itself (MSRP \$439). The RMCARD100 is less expensive (MSRP \$79) but provides only remote monitoring via the CyberPower mobile and web-based applications.

Just below this cover are two RJ-45 ports surge-protected for use with an ethernet line; these ports don’t communicate with the UPS. Just to the right are two USB ports that can be used with the cable supplied, to connect the UPS to a PC, and that allows communications. Various versions of the software are available on the manufacturer’s website. The serial port can also be used to communicate with the software. Finally, just below the serial port is a red LED. It is designed to go on if the UPS is connected to an ac line



Figure 3 — The CyberPower CP1500PFCLCD rear panel.

with a wiring fault such as reversal of neutral and hot wire or ground.

Other Functions and Capabilities

There is an ability to select when you want the backup to switch on due to a problem with the incoming ac. There are three selectable ranges and the ability to customize the trigger point range. This setting is called **SENSITIVITY** and is used with AVR.

The installation information defines AVR as a system that automatically increases low utility power to a consistent and safe output voltage while preserving battery power for outages. There is no apparent adjustment for this function; in the block diagram it is perma-

nently set to increase output voltage for short periods, leaving the battery for full power outages.

In Summary

This is a full-featured UPS with a great deal of capability; however, the available documentation and explanations are very limited. One small but very helpful diagram in the owner's manual is a composite picture of all applicable graphics allowing you to understand any item that shows up on the display.

Manufacturer: Cyber Power Systems (USA), Inc.
Available from electronic retailers in the US. **www.cyberpowersystems.com**. Price: \$275.

Tripp-Lite SMART1500PSGLCD UPS

Reviewed by Paul Danzer, N1II

n1ii@arrl.net

If you are used to a minimal UPS, this husky unit has a few surprises for you. First, the weight as shipped is approximately 29.3 pounds. This is primarily due to the battery size. The 1500 in the model number specifies a rating of 1500 VA. The next surprise may be the unit's ability to display the state of the battery and how much charge is left. The final surprise, for a UPS, is the ability to control it through either a remote LCD panel or a USB connection.

The owner's manual, which accompanies the hardware, is trilingual (English, French, and Spanish), but the first 23 pages are in English. The text and illustrations in the manual are actually large enough to read!

Simple Installation

The manufacturer suggests that you plug the unit into the 120 V supply for 5 hours to ensure a full-charge start. Next, plug the line cord into the wall socket — the unit specification lists a 12 A circuit. There are 10 ac sockets on the rear panel; as a start, use the one labeled **MASTER**. The on/off button is in the center of the front panel, just below the LCD display. Pressing it and holding it for 2 seconds will turn the unit on or off; a quick press turns the LCD light on or off. Multiple presses bring up various functions. If you accidentally press too short, too long, or several times, you can



always shut down the UPS and start over. Keep in mind that when a UPS is set up, you don't necessarily have to go in the menu very often.

Capabilities

Figure 4 shows the 10 ac sockets divided into two groups. The right-hand group of five provides surge suppression only and no backup function. The left-

Bottom Line

The Tripp-Lite SMART1500PSGLCD UPS offers a wireless remote head to control the unit and programmable LED lights to match any color in your shack.

hand group provides both surge suppression and power backup. The lowest of this group is labeled **MASTER** and has an additional capability called **ECO MODE**. When enabled by a setting in the menu, power drain is monitored. If the power drain from the **MASTER** drops to less than 20 W, the other four outlets in this group are disabled. As an example, suppose your rig draws more than 20 W when receiving. If it is plugged into the **MASTER** and you have plugged wall warts that power some accessories into the remaining four outlets, when you shut off your rig the wall warts will automatically lose power.

Across the top of the rear panel is a cover plate labeled **BATTERY**. To extend the storage capacity of the unit, an external battery can be connected to the enclosed terminals. It is recommended to use the Eaton external battery extension for this unit. Centered just below this cover plate is a USB connector for monitoring and control with a PC via external software. The software, called *PowerAlert*, can be downloaded from <https://tripplite.eaton.com/products/power-alert>.

Also centered are two modem/telephone jacks for surge protection. Finally, on the left side at the bottom is the input ac line cord, with the input circuit power breaker opposite it on the right.

Front-Panel Controls

There are three effective ways this UPS can be monitored and controlled. The first, mentioned earlier, uses software and an external computer. The other two are through the front panel.

The unit measures approximately 17 × 11 × 4 inches. This size, combined with the unit weight of approximately 30 pounds, may be a bit much for your installation. All controls and the display are on the front mounted on a removable sub-panel. By pressing the sub-

panel slightly in and directly up, you can remove the sub-panel.

A self-contained battery and wireless link allow remote control of the main unit. As an example, when writing some of this review, the main unit and test load sat on my workbench. My computer remained on my desk, where there was not enough room to install the UPS. I was able to change controls and menu item settings comfortably at my desk instead of having to run back and forth to my workbench. Thus, the remote control allows you to monitor UPS status while using your rig without being concerned about the main unit location.

Control

In addition to the pushbutton controls, status and commands are displayed on an LC readout behind a mount below the controls. The USB connector on the back panel is a data interface; the front-panel USB charging ports (type A and type C) provide 5 V dc with 3.1 A power output, and the unit also works on battery backup.

The left button is a great convenience when you lose power to shut off the alarm. If your UPS is not easy to find after 5 minutes of listening to the alarm, you will probably want to shut off the alarm. You don't want to be searching around, flashlight in hand, for a way to shut off the alarm noise. Just push and hold for 2 seconds to silence the alarm.

This button has a second function. A quick press will return the display to a standard display and shut off the menu function.

The center button has on it the standard power symbol, used on many electronic units. Press and hold for 2 seconds to turn the UPS on or off. If the UPS is in the **MENU MODE** (more on this later), the on/off button is used for function selection. There are several other functions for this button explained in the owner's manual. These are functions related to the wireless connection between the main unit and the front panel.

The Menu

The third button has a symbol that represents two arrowheads, back-to-back, and facing up and down. A press and 2-second hold bring up the menu display. There are 14 menu items, and quick presses cycle the LCD display through the list.

The top legend shows an input of 0 V when there is no line voltage. The system is running as a backup, and the legend in the lower left-hand corner shows **BATT MODE**. The slant bar on the left shows the battery



Figure 4 — The Tripp-Lite SMART1500PSGLCD rear panel.

voltage, and the slant bar with the legend **LOAD** on the right shows system output.

At the bottom, the set of filled-in squares represents the battery charge level for the small NiMH battery in the removable front panel. In the center of the screen are two symbols reminiscent of the Wi-Fi symbols on a personal computer. The two left-hand symbols show the wireless link of the front panel to the main unit is paired; the right-hand one on the line indicates the removable front panel is docked.

Finally, the center site wiring fault (SWF) symbol shows a fault; in this case, it shows because the UPS is not connected to an ac line. The owner's manual has drawings of the symbols as well as controls for color and other functions.

The menu item could be changed to show input voltage, output frequency, and many other operating parameters.

Other Information

This unit is listed as having a sine wave output. Putting an oscilloscope on the output shows a sine wave similar to the usual household ac waveform that's normally there.

This unit targets the gaming market. On the left and right of the case's edge, including the remote unit, there are programmable RGB LED banks that, according to the manufacturer, offer more than 16 million color combinations, which is more than enough to match any color in your shack.

In the manual there is a derating table. If you live at an altitude, any air-cooled equipment may have to be derated. A derating factor of 1 up to 100 meters was given (i.e., no derating). At almost 10,000 feet (3,000 meters), derating is 0.82. The manual also contains a 22-item specification table and a second table of fault codes and probable causes for the fault.

In Summary

The Tripp-Lite SMART1500PSGLCD UPS is a unit designed to be a permanent installation in your shack. The detailed fault information and ability to expand the battery capacity by using external batteries, and remote head capability, should make it a major counterpoint of your battery backup power systems.

Manufacturer: Tripp-Lite, 1111 W. 35th Street, Chicago, IL 60609. Available from electronic retailers in the US. <https://tripplite.eaton.com>. Price: \$285.

Table 2 — Three 1500 VA UPS Reviewed Units

Manufacturer's Advertised Specifications

Brand Model	APC Pro BN1500M2	CyberPower CP1500PFCLCD	Tripp-Lite SMART1500PSGLCD
Input voltage range	88 – 139 V	88 – 144 V	97 – 145 V
Output frequency	60 ± 3 Hz	60 Hz ± 1%	Range 45 – 63 Hz
Input frequency	60 Hz ± 3 Hz	57 – 63 Hz	Not specified
Output voltage	120 V	120 V ± 5%	120 V
Voltage accuracy	Not specified	± 5%	± 10%
Output power	900 W / 1500 VA	1000 W / 1500 VA	900 W / 1500 VA
Output waveform	Three level stepped	Sine wave	Sine wave
Max output current	12 A	Not specified	12 A
Full load on battery	3.07 minutes, full load	2.5 minutes, full load	3 minutes, full load
Battery recharge time	16 hours	8 hours	7 hours from 10% to 90%
Transfer time	8 ms typical, 10 ms max	4 ms typical	6 ms typical, 10 ms max
Backup and surge outlets	6	6	5
Surge-only outlets	4	6	5
PC data control via USB	Yes	Yes	Yes
Remote-control detachable panel	No	No	Yes
Programmable LED lights	No	No	Yes
Automatic voltage regulation	± 11.3%	± 11.5%	± 10.3% over, ± 11.5% under
USB charging port (5 V)	3.0 A	3.1 A	3.0 A
Building wiring fault indication	Yes	Yes	Yes
Battery type	Sealed lead-acid	Sealed lead-acid	Sealed lead-acid
Dimension (depth, width, height)	14.5 × 4 × 10.25 inches	14 × 3.9 × 11 inches	11 × 4.1 × 16.93 inches
Weight with batteries	25.1 pounds	24.9 pounds	29.3 pounds
Connected equipment guarantee	Lifetime, \$250,000	Lifetime, \$500,000	Lifetime, \$250,000
Hardware warranty	3 years	3 years	3 years

Lab Notes: Three UPS Units

The ARRL Lab assessed the emissions from three UPS units provided to the Lab prior to the full review of the units. Conducted emissions were measured — both the emissions going onto the ac mains when the unit is plugged in, and the emissions coming from the inverter when utility power is interrupted. The units were tested under the following conditions:

1. Plugged into ac mains at full load
2. Plugged into ac mains at full load and a USB device (a smartphone) connected to the USB power outlet
3. During a power outage (i.e., unplugged from the ac mains) at full load

The units tested were (1) APC Schneider Electric Pro BN1500M2, (2) CyberPower CP1500PFCLCD, and (3) Tripp-Lite SMART1500PSGLCD. The Tripp-Lite device arrived at ARRL with a screw and a piece of plastic broken and loose inside the unit, and it had to be returned to the vendor before testing. All the devices had an FCC label, indicating that the equipment is covered in an application for equipment authorization.

As might be expected, the worst-case condition for testing emissions was found to be plugged into the ac mains, operated at full load and with a USB device connected. As such, these notes are all relative to those conditions. As can be seen in Figure A, emissions from the units were passing in all areas except the lower portions of the HF spectrum, below the 630-meter ham band. The APC unit had the highest emissions and also had a rise in emissions between the 30- and 40-meter ham bands (peaking at about 9 MHz). Although compliant with FCC limits, those emissions were easily addressed with a 31-material common-mode choke on the power cord, located close to the UPS device. See Figure B for a chart showing the improvement with a choke, and Figure C showing the choke used on the unit, a 1-inch ID snap-on with about three turns of the power cord wrapped on it.

As a general rule, it's a good idea to keep some 31-material snap-ons as well as some cores (e.g., 2.4-inch outer-diameter cores) in your shack in case you suspect a noisy device and want to try a common-mode choke.

— Steve Anderson, W1EMI, Lab RFI Engineer

See QST in Depth for More!

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

- ✓ Additional ARRL Lab test results

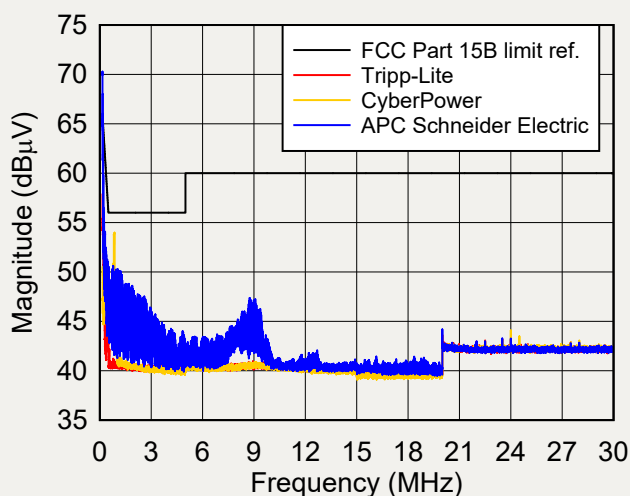


Figure A — Full-load quasi-peak emissions (ARRL Lab “pre-compliance” test result; pre-compliance refers to a result from an EMC lab that is not fully certified for demonstrating compliance with Part 15 emission limits, but does utilize the test equipment and setup for making measurements using ANSIC and other regulatory standards).

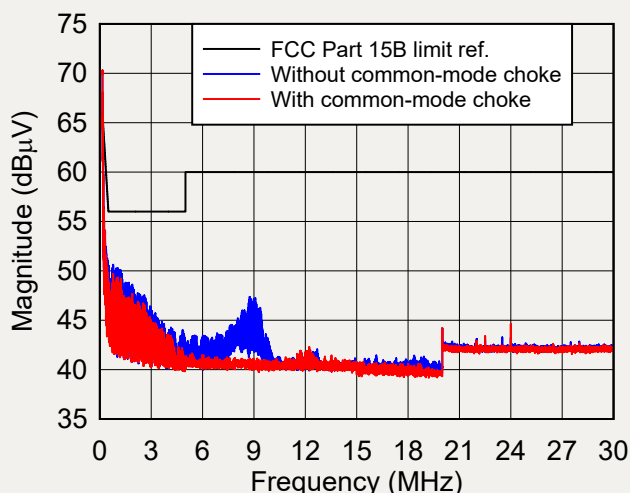


Figure B — APC unit choke comparison at full load conditions.



Figure C — Snap-on choke used for the APC unit.

Ask Dave

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

Antennas, RFI, and HOA Compromise

Comparing HF Antennas

Q Dave Lear, NN5DE, asks: Which software-defined radio (SDR) receiver do you use for your HF antenna comparisons?

A I’ve reviewed many antennas for my YouTube channel, including the excellent ARRL end-fed half-wave (EFHW) antenna kit available through the ARRL Store (<https://home.arrl.org/action/Store/Product-Details/productId/133267>). I found that by extending the wire about 60 feet, I could also operate on the low end of the 80-meter band, and 30, 17, and 12 meters came along for the ride. I use my SteppIR BigIR full-size ground-mounted vertical with more than 30 radials as a comparison.

The problem with directly comparing two antennas stems from highly variable HF conditions, which change from second to second. Switching between two antennas with an antenna switch such as the Alpha-Delta model Delta-4, even rapidly, simply shows that one antenna is better than the other on a random basis. So, I use the SDRplay RSPduo (see Figure 1), which has two separate SDRs in one compact box. Using their new *SDRconnect* software, I can display the waterfall for one radio directly above the other. The key is to make both radios’ settings identical, which can be a tedious process; there is no software setting that will do this for you. Once all settings are identical, I can see a real-time comparison of the two antennas. I tune both antennas to the same frequency, often the FT8 frequency because there are lots of signals. The software not only provides an entire-band waterfall for each radio but also offers signal strength and signal-to-noise ratios (SNRs) for strong signals. I take several screenshots so I can carefully search for differences in performance.

While comparing signal strength is important, I am more interested in comparing SNR measurements. Your radio can make up for weaker signals with more amplification, but the SNR determines how easy the signal is to demodulate.

This method compares antenna performance. Most common antennas used in ham radio have transmit performance that is identical to receiver performance,

a principle known as *reciprocity*. This is not true of all antennas, though. The classic example is the Beverage antenna, invented by Harold Beverage in 1921. It receives poorly but has great SNR — its rejection of noise is its selling point. But the Beverage is a truly mediocre transmitting antenna and takes up enormous space, so it is used only as a receiving antenna.

Attic Antennas and Coax Lengths

Q Gary Paulis, WA4ESE, asks: I am building two attic dipoles, one for 40 meters and one for 20 meters. What lengths of coaxial cable and ground wire should I use to avoid RF problems? It will take approximately 50 to 75 feet of coax to get from the attic down to my station.

A Assuming you’ve tuned the antennas for the lowest standing wave ratio (SWR) and are using a balun at the feed point of the antenna, the coax length doesn’t matter. Any SWR less than about 1.6:1 will work — your radio’s built-in antenna tuner can touch that up just fine. Without a balun, some coax lengths — which may differ depending on what is connected at the transmitter end — may allow common mode currents, sometimes called “RF in the shack.” To make things easier, consider a fan dipole so you need to run

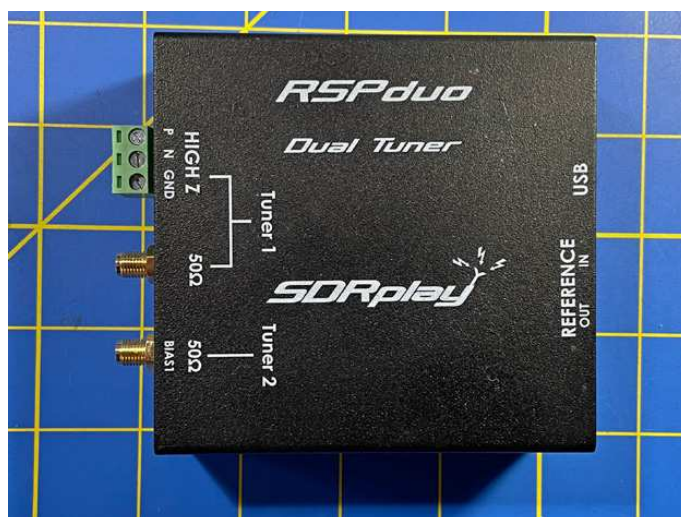


Figure 1 — The SDRplay RSPduo contains two identical receivers. With the use of the SDRplay’s *SDRconnect* software, two antennas can be analyzed at the same time for instant comparison. [Dave Casler, KEØOG, photo]

only one piece of coax. The 40-meter part will likely give you good results on 15 meters. Because you're making full-length dipoles, they should cover both full bands with acceptable results.

Be careful to note what kind of roof you have. Asphalt shingles or tiles are probably okay, but if the roof is metal your attic dipoles have little hope of working. Also take note of the insulation in the attic ceiling. If it is paper- or plastic-backed, you're okay, but if it's foil-backed (unusual these days) you will have problems. No matter what you do, attic antennas are compromise antennas, but many hams have done well with them.

A good ground system can help. You need a place in your station to connect all the grounding points from radios, power supplies, amplifiers, and so forth. This needs to be connected to your single-point ground rod outside your station, and you will need to bond this ground rod to the utility ground rod.

RFI in the Shack

Q Jim Lanigan, WA3ERQ (SK), asked: Can you explain why getting RFI in the shack would interfere with different devices at different times? For a while, my DYMO label maker was affected when I was operating on 20 meters. After a couple of weeks the label maker was fine, but the cordless phone charger had RFI. I know I can put ferrites on to help, but I don't understand why different devices are being affected at different times.

A Something moved. It could be anything, including metal objects not directly involved with the antenna and feed line or the items being interfered with.

While ferrite beads can help, it's important to get to the root of the problem, which is RFI in the shack. Look at the grounding system — there should be a single point (such as a 1-foot length of copper pipe) in the shack to which all chassis grounds are connected. This should in turn be connected via a thick wire (AWG 6 or larger — I use #2 stranded, insulated wire) to a station ground rod positioned right outside the station.

In turn, each coaxial cable coming to the station should terminate at a lightning arrestor attached to the ground rod. From there, cables can enter the house. This is the beginning of a good ground system. Best practices for station grounding can be found in *Grounding and Bonding for the Radio Amateur, 2nd Edition*, available from the ARRL Store (<https://home.arrl.org/action/Store/Product-Details/productId/133989>). Grounding the coax shield of each incoming antenna

lead will dissipate common-mode current flowing on the outside of the coax. If this is not removed, it will go right into the shack and cause hard-to-trace problems. Don't forget to connect the station ground rod to the electrical utility's ground rod.

Compromise Antenna May Please HOA

Q Bruce Daggett, WD4DSV, asks: I'm using a Comet vertical antenna that performs well. I am in an HOA environment, and with no trees, my options are limited. My yard is surrounded by a wooden fence. I'm wondering if anyone has had any luck running a wire suspended off their fence at a 6-foot level.

A I'm assuming the HOA is driving the removal of the Comet. That's a shame — it works well for you. Many have asked about using their fence to hold up an antenna. Will it work? The best way to find out is to try.

It is impossible to predict in advance what the feed-point impedance will be, and it can vary widely from band to band. You may need to use a remote tuner (one that works directly at the feed point to the wire antenna) to keep the SWR manageable. (Note: Turn off your rig's automatic antenna tuner when using an outboard tuner.) An antenna so close to the ground will radiate straight up at the middle of its main lobe, though you may get usable radiation out to ± 45 degrees from the vertical. The ground will absorb much of the signal.

HOA restrictions have been a thorn in the side of amateur radio operators for decades. There is a bill in Congress to address this, but getting it to a vote may take years. You may need to explore other options such as attic antennas or a small HF loop, often called a magnetic loop. I know a ham who mounted a remotely controlled magnetic loop antenna in his backyard, grew vines around it, and hung a birdcage from the center of the loop! No one ever bothered him.

The pending Federal legislation mentioned above is described more fully at <https://www.arrl.org/news/amateur-radio-emergency-preparedness-act-re-introduced>. I encourage everyone to read this article. You can go further by writing to your congressman and senator suggesting that this bipartisan legislation be enacted. To get addresses for your federal representatives, go to [congress.gov](https://www.congress.gov).

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.

Microwavelengths

Microwave Beacon Antennas

The April 2025 “Microwavelengths” column described microwave beacons and suggested a high and clear location for a greater range. An antenna in this type of location should radiate close to a full 360 degrees, omnidirectional in the azimuth plane, for maximum coverage. The elevation pattern is needed only near the horizon, so signals that might be radiated up or down can be concentrated near the horizon to provide some gain.

Waveguide Slot Antennas

A waveguide slot antenna is the best choice to provide this desired radiation pattern at microwave frequencies with horizontal polarization. Figure 1 shows several examples. I have seen slot antennas for bands from 1296 MHz to 24 GHz (at lower frequencies, aluminum extrusions may be used as waveguides).



Figure 1 — Various waveguide slot antennas from left to right: WR-137 antennas with 16 and eight slots for 5760 MHz. WR-90 antennas with 24, 16, and 12 slots for 10368 MHz. [Glenn Robb, KS4VA, photo]

A vertical slot roughly $\frac{1}{2} \lambda$ long radiates just like a $\frac{1}{2} \lambda$ horizontal dipole. If we vertically stack several dipoles or slots into an array, the gain is provided by narrowing the vertical pattern, as shown in Figure 2. A resonant slot appears as a resistive load in the waveguide. At the resonant frequency, slots spaced by an electrical half wavelength in the waveguide transmission line appear as parallel resistances and thus radiate equal power. With slots on both broad faces of the wave-

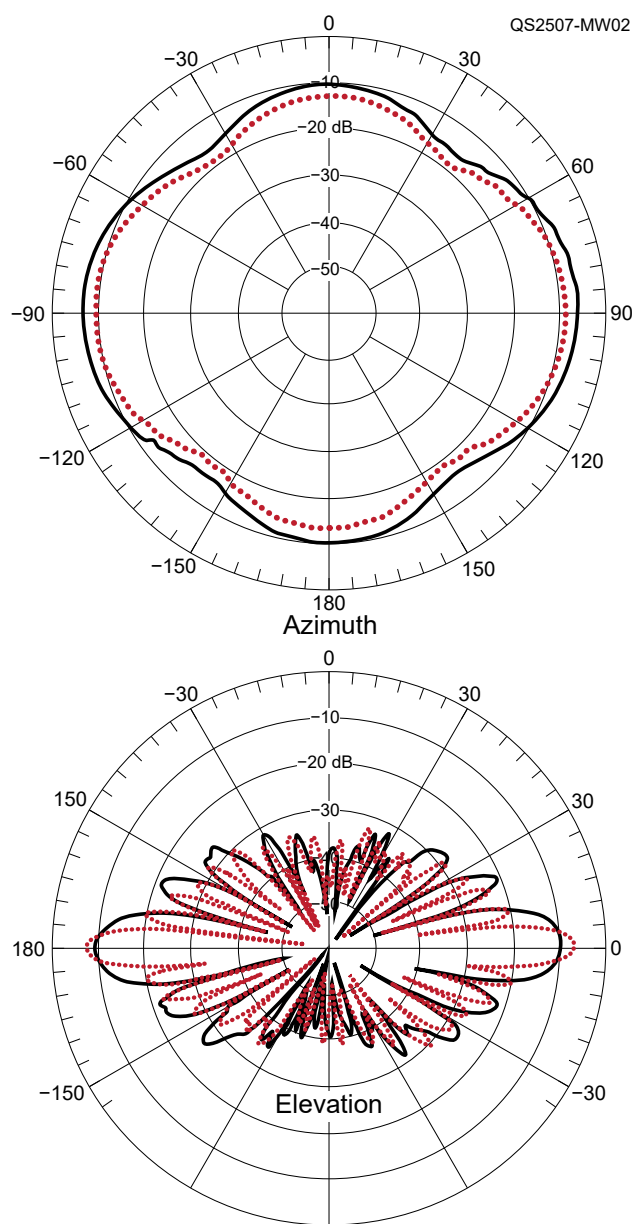


Figure 2 — Azimuth and elevation radiation patterns for 24 slots (solid line in azimuth) and 12 slots (solid line in elevation) in WR-90 waveguide slot antennas at 10368 MHz. [Dave McGee, W2KV, plot]

guide, the antenna radiates a broad pattern on both sides.

The slot dimensions are chosen so the slots are resonant and the parallel combination matches the waveguide's characteristic impedance. The calculations are complex but have been reduced to a spreadsheet that will provide proven dimensions at www.w1ghz.org/software/slotantenna.xls. The website www.w1ghz.org also provides a more detailed explanation of slot antenna operations.

In Figure 2, the 24-slot antenna has about 3 dB more gain than the 12-slot antenna, which is to be expected. Both antennas radiate over a full 360 degrees in azimuth with some variation operations. Random reflections tend to make this variation less evident. The variations around the azimuth can be reduced by adding wings to the narrow sides of the waveguide.

The elevation pattern of the 24-slot antenna has a narrower beam on the horizon than the 12-slot antenna. There are enough side lobes to provide an adequate signal for receivers close enough to a high beacon location that they are below the main beam.

Recently, there have been reports from antenna ranges at VHF conferences that slot antennas were exhibiting a downward tilt in elevation patterns. I have never seen this tilt in measurements or simulations. I sent seven slot antennas, including the five in Figure 1, to Glenn Robb, KS4VA, at Antenna Test Lab to investigate. He was kind enough to measure the elevation patterns of all the slot antennas. The results show no tilt, with elevation patterns that peak on the horizon at frequencies at or close to 5760 or 10368 MHz. The pattern tilts downward at lower frequencies and upward at higher frequencies with reduced gain, which is expected.

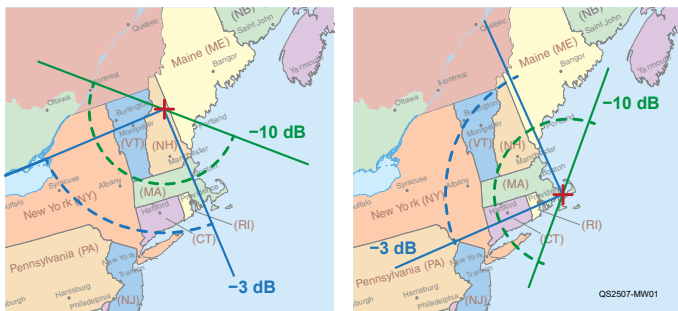


Figure 3 — Maps showing how sectoral horns can cover an area with no one on the back side. Two horns can cover the whole northeast US.



Figure 4 — A sectoral horn for 10368 MHz made of copper by John Swiniarski, K1OR. [John Swiniarski, K1OR, photo]

Other Beacon Antennas

In many places, geography limits microwave activity in some directions. For instance, in New England, the ocean is to the southeast, and sparsely populated forests are to the northeast. Since the beacon on Mount Washington was removed, finding a good central location has been difficult. However, choosing two locations that can cover the whole area with wide beams is another solution, as shown in Figure 3.

A horn antenna can be tailored to provide a range of radiation patterns. For example, a narrow aperture (opening) will have a wide pattern, while a wide aperture provides a narrow pattern for more gain. A sectoral horn with a narrow horizontal aperture only as wide as the waveguide and a tall vertical aperture will have a wide azimuth 3 dB beamwidth of roughly 90 degrees with a narrower elevation beamwidth to provide some gain. The 10 dB beamwidth is perhaps 180 degrees so that a sectoral horn can be comparable to a waveguide slot antenna over a semicircle. Figure 4 shows John Swiniarski's, K1OR, 10 GHz sectoral horn that he made from a copper sheet.

Weatherproofing

The open slots must be protected from rain and condensation. Putting Kapton tape over the slots can be a short-term solution. Housing the antenna in a tube of low-loss plastic is more permanent. Mount the antenna upside down, with the closed end at the bottom. Drill a hole through the closed end to allow any condensation to run out. The closed end is still a short circuit — the hole has little effect.

Microwave beacons are valuable even if an ideal location is not available. Get one on the air and you might be amazed at who can hear it.

SOTA and POTA Holidays

One ham's journey operating portable across Europe.

Andrea Borgnino, IW0HK

Recently, my family and I spent 2 weeks in Spain, in the EA3 call district area. I took the opportunity to hunt for new Summits on the Air (SOTA) and activate Parks on the Air (POTA). Before the journey to Spain, we stopped for a few days in my hometown of Turin, Italy, and I started my activations there.

Activations in Italy

I began at La Mandria Regional Park (POTA reference IT-0632), a huge green lung of more than 3,000 hectares (about 11.5 square miles) located northwest of Turin. It was extremely hot, so I tried to find a shaded area to set up. I was lucky to find a table between two huge trees. I erected my wire antenna using the classic stone-throwing method. The propagation wasn't optimal, but I made 13 contacts in the end, and thus the park was activated.

Excited by this first outing, I attempted a double activation by moving to the Stura di Lanzo river (POTA reference IT-0063) located in a Natura 2000 protected area a few kilometers from La Mandria. I quickly set up my loaded vertical antenna on the riverbed, but propagation didn't assist me, and I couldn't make the required

10 contacts. I've certainly learned that activating takes time, and you can't expect to start your operation at the end of the day.

After 2 days, my two sons and I decided to climb the mountain Rocciamelone (SOTA code I/PM-311), the highest peak in the Susa Valley at 3,538 meters (11,607 feet). The ascent took us more than 3 hours with a 1,480-meter (4,855-foot) elevation gain, and we were rewarded by the splendor at the summit. I activated this SOTA peak on HF, leaning my wire antenna against the tower at the summit. I made only 21 contacts, but the beauty of operating with a glacier view was worth it.

Activations in Spain

After these activations in Italy, the journey to Spain began. I tried to find SOTA summits close to cities and within parks to simultaneously activate for both POTA and SOTA. The first activation was the Cap de Creus Natural Park (POTA reference ES-0331), located on a promontory of Mediterranean vegetation near the town of Cadaqués. With limited time available, I activated from my car within the park boundaries. I strung my wire antenna between my vehicle and a small tree, aiming for maximum height. With this easy and fortunate setup, I managed to make 14 contacts on 20 meters to confirm the POTA activation.

The first SOTA summit was a 466-meter (1,528-foot) mountain south of Barcelona called La Coscollada (SOTA code EA3/BC-081). I hiked through a beautiful, large pine forest, and at the top was a tall fire tower lookout, which was very useful because it provided the necessary shade to operate comfortably as I made 27 contacts. During these days, temperatures never dropped below 33 degrees Celsius (91 degrees Fahrenheit).

The second summit was Turó de Can Pasqual (SOTA code EA3/BC-080) at 470 meters (1,542 feet), located in the Collserola Natural Park. I made 42 contacts with my end-fed half-wave (EFHW) wire antenna on 20 meters.

The third summit was Turó de l'Home (SOTA code EA3/BC-008), which was quite different from the Italian Apennine peaks I was used to. With an elevation of 1,705 meters (3,526 feet), the ascent took about an hour with a 500-meter (1,640-foot) elevation gain. De-



SOTA on Rocciamelone mountain in Italy.

spite the intense heat and limited shade at the summit, I managed to make 41 contacts while enjoying a beautiful view of the Montseny Nature Reserve and the sea.

The fourth summit was La Morella mountain (SOTA code EA3/BC-077) at 593 meters (1,945 feet). Thanks to the cement structure on the summit, I finally found shade and made 42 contacts.

The last summit was Montalt mountain (SOTA code EA3/BC-016) in the Montnegre and el Corredor Park at an altitude of 596 meters (1,955 feet). A beautiful 3-kilometer trail (almost 2 miles) through a pine forest led to the summit. There was very little space at the top to set up my antenna properly, but thanks to the dual POTA and SOTA reference, I still managed to make 40 contacts on 20 and 40 meters in CW and SSB.

Setup and Results

I performed 11 activations with five SOTA summits and six POTA parks in total. Overall, these were very enjoyable activations. I had the pleasure of connecting with many EA radio amateurs on the 40-meter band and linking up with several Italian friends on 20 meters. The sites that counted for both POTA and SOTA guaranteed an excellent pileup from all over Europe and allowed for many contacts, even with low power and improvised antennas. All together, I made 204 contacts conducted at low power using SSB and CW with my mobile setup of an Elecraft KX3 and an EFHW wire antenna on 20 meters. When space was limited, I used



The top of La Morella in Spain.

a 7-meter wire with a 9:1 balun held up by a 6-meter fishing rod. I powered my Elecraft with the XTPower XT-16000QC3 power bank, which is small and lightweight, and provided 12 V.

To find the summits, I used the website <https://sotl.as>, which offers a perfect map for finding SOTA locations easily and quickly, often providing the trails as well. For the parks, I used the map on <https://pota.app>, which conveniently marks all the references. For each activation, I also used the *SOTA Spotter* app to announce my activity from the summits. I recommend everyone take their radios on vacation and explore summits and parks. It's a wonderful way to get to know places outside of cities and immerse yourself in nature.

All photos by the author.

Andrea Borgnino, IW0HK, got his amateur radio license in 1989 with the call sign IW1CXZ. Since 2005, he has been active from Rome, Italy, with the call IW0HK. Andrea has always worked in the radio broadcasting field, first collaborating with the community broadcasters of Turin, Italy, and then for Radiotelevisione Italiana, Italy's national public broadcasting company, for more than 25 years. He is passionate about transmitting with low power and CW. Andrea always climbs mountains and visits parks for SOTA and POTA activities. He can be reached at a.borgnino@gmail.com.

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



Operating from Turó de l'Home with a beautiful view of the Montseny Nature Reserve and the sea.

A WAC Award 48 Years in the Making

Some paperwork sleuthing and a chance meeting with ARRL execs win the Pack Rats credit for their EME activation in South America.

**Phil Miguelez, WA3NUF,
and Walt Bohlman, K3BPP**

In the 1970s, long before the widespread availability of modern GaAsFET and pHEMT LNAs and digital communication modes for amateur operators, Earth-moon-Earth (EME) contacts required big antennas, high-power transmitters, and good ears to detect the CW signals at the noise floor of the receiver. Several dedicated amateur operators in a dozen countries assembled EME stations, racing to be the first to contact all six populated continents on the globe.

Members of the Mount Airy VHF Radio Club, W3CCX — better known as the Pack Rats — were early experimenters in EME communication, attempting to earn the Worked All Continents (WAC) award from a station in Revere, Pennsylvania. But there was one problem: there were no EME stations in South America.

Assembling a Moonbounce Station

In the early 1970s, a few members of the Pack Rats formed a moonbounce committee, pooling resources to set up a 432 MHz EME station. Around this time, EME pioneer Allen Katz, K2UYH (SK), donated a 20-foot stressed dish to the club. Bill Olson, W3HQT (now K1DY), suggested a station location on the farm where he was living in Revere, Pennsylvania, 45 miles north of Philadelphia.



Members of the Mount Airy VHF Radio Club assembling a dish at station W3CCX/3 in Revere, Pennsylvania, in February 1976. [Photo courtesy of Phil Miguelez, WA3NUF]

Realizing the EME geometry and Faraday rotation parameters on 432 MHz, Walt Bohlman, K3BPP, designed a dual-polarized feed patterned after the EIA dual-dipole gain reference that many were using at that time, consisting of four dipoles over a one-wavelength square ground plane. Bill and Tony Souza, W3HMU, constructed an 8938 cavity amplifier and power supply. Operation of W3CCX/3 was under way.

Activating South America on EME

Schedules were arranged and contacts were made, many by Dave Mascaro, WA3JUF (now W3KM). Reporting our successes at the monthly Pack Rat club meetings, we noted we had made contacts around most of the world, but there was no EME station in South America.

As luck would have it, Bolmar Aguilar, WB3AOP/HK1AMW, from Colombia, had moved next door to longtime Pack Rat El Weisman, K3JJZ, and recognized the antennas on El's tower as amateur radio VHF equipment. Bolmar and El began discussing the Pack Rats' EME activities and possible plans to build a 432 MHz station in South America. Later Bolmar and his brother-in-law Sam, WB3AFY/HK1CWB, attended a club meeting and volunteered a seaside cottage in Barranquilla, Colombia, for us to use.

This launched a 6-month effort to build a station we could transport to South America. We got our hands on a second 8938 and built a stripline amplifier. About 30 dBi gain was required for EME at that time, and computer analysis showed that 16 K2RIW 13-element Yagis at a 5-foot stacking distance would do the trick. The mount would allow for elevation, azimuth, and polarization adjustment. Bill came up with a way to use telescoping tubing to minimize the shipping volume.

In July 1976, six Pack Rats — El, K3JJZ; Walt, K3BPP; Tony, W3HMU; Bill, K1DY; Dan Mitten, WA3NFV, and Bolmar, WB3AOP/HK1AMW — headed to Barranquilla with the call sign HK1TL. In 1 week of operating, the HK1TL expedition made 16 contacts.

In Revere, Pennsylvania, the W3CCX/3 station, manned by Dave, W3KM, completed a contact with HK1TL on July 29, 1976, marking the final continent

needed to give the Mount Airy VHF Radio Club WAC on the 432 MHz band.

48 Years Later

In March 2024, Walt, K3BPP, contacted Phil, WA3NUF, about the upcoming 50-year anniversary of the HK1TL expedition and the fact that W3CCX/3 never received credit for WAC. After talking to the remaining HK1TL and W3CCX/3 operators, Phil learned that the club applied for the award 48 years ago but there had been an issue related to the application; however, no one remembered the details.

Tony, W3HMU, gave Phil a scrapbook of information on the W3CCX/3 EME station, including the QSL cards for all six continents that the station had contacted. Also included was a 1977 letter from the IARU requesting confirmation that all contacts made by W3CCX/3 were at the same location — four QSL cards confirmed W3CCX/3, but two of the cards were made out to W3CCX (not /3). A reply from Ron Whitsel, WA3AXV (now W3RJW), to the IARU office, dated June 6, 1977, explained that the W3CCX/3 station was the only location used for all EME contacts. The scrapbook had no more information, and the trail went cold.

Phil had planned to attend the North East Weak Signal Group conference in April 2024. Knowing that ARRL representatives sometimes attend, he brought the evidence and a blank WAC form to see if he could resubmit the application.

At the conference, Paul Wade, W1GHZ, informed him that Stan Laine, W1LE, an official card checker, was attending. Unfortunately, Stan was not authorized to approve cards for IARU applications. Feeling defeated, Phil headed to the bar before the evening banquet.

To his surprise, former ARRL CEO Dave Sumner, K1ZZ, was sitting at the bar! Phil told Dave about the Pack Rat WAC saga and his effort to resolve the issue. Dave said that current ARRL CEO David Minster, NA2AA, would be at the banquet, along with ARRL Radiosport & Regulatory Information Manager Bart Jahnke, W9JJ, who handles IARU interactions.

Fired up once more, Phil and Dave found David Minster, and after relating the story of the HK1TL expedition and the missing WAC application, David called Bart and asked him to restart the application process.

Bart approved the QSL cards and reviewed the 48-year-old IARU correspondence. Phil completed a new WAC application, Bart signed, and Phil asked David, NA2AA, and Dave, K1ZZ, if they would co-sign the form, which they were happy to do.



The Pack Rats club members receiving their WAC award certificate. Pictured: (front row, from left to right) Phil Miguelez, WA3NUF; ARRL Atlantic Division Director Bob Famiglio, K3RF; (middle row, from left to right) Paul Domanski, WA3QPX; Chris Cote, KE5NJ; Paul Sokoloff, WA3GFZ; Edward Finn, WA3DRC; (back row, from left to right) Rick Rosen, K1DS; Joseph Taylor, Jr., K1JT, and James Huebotter, KC3BVL.

The official award approval was completed in record time, and Phil received a message a few weeks later that the WAC certificate was on its way.

A Fitting Conclusion

ARRL Atlantic Division Director Bob Famiglio, K3RF, contacted Phil to arrange a day to formally present the WAC certificate to the club. We decided that the best time to meet was at the 2024 EME Conference in Ewing, New Jersey. The occasion seemed a fitting conclusion to our long quest.

The award certificate is dated June 6, 1977, when the initial application would have been approved and signed. We took a group photo (shown above) to commemorate the occasion — the Pack Rats' beaming faces as they received the long-awaited award say it all.

Phil Miguelez, WA3NUF, has been an active ham since 1969. He has been a member of the Mount Airy VHF Radio Club since 1976 and is current club president. Phil was employed in the RF semiconductor, cable, and wireless industries for more than 40 years. Recently retired, he has more time to devote to HF through 10 GHz homebrew construction and operating. Phil can be reached at philnuf@aol.com.

Walt Bohlman, K3BPP, was licensed in 1957 and has always been interested in VHF/UHF. Walt retired from the Defense Electronics industry after 44 years as an antenna engineer. He holds eight antenna-related patents.

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

Putting Rally Cars and Radios to the Test in Pennsylvania

Amateurs contend with poor weather and rough terrain during a rugged 2-day public service event on remote mountain roads.



DP Dunn, AB2NM, logs the time as an STPR car crosses the finish line.

DP Dunn, AB2NM

On June 28, 2024, I sat on the edge of a narrow, winding dirt road in the Tioga State Forest near Wellsboro, Pennsylvania, with my radio set up on a small table. This was my first time volunteering for the annual Susquehannock Trail Performance Rally (STPR), and I was waiting for road-legal production rally cars to pass me so I could log their completion times.

While having a front-row seat to watch rally cars race by at speeds in excess of 70 mph was a thrill, ham volunteers are needed at STPR for a variety of reasons. With most courses averaging around 7 miles in length, hams play a critical role in assisting with the safety of the drivers, crew, spectators, and other support personnel. If the unexpected happens (e.g., a car breaks down or crashes, large animals like deer or bear are on the course, etc.), hams are the first ones

to report the incident to race officials via net control. In the event of a medical emergency, we ride with EMS staff to assist with logistical communications and coordination of patient transport, allowing personnel to focus on patient care. Hams also help patrol each course for fallen trees, stray spectators, or any debris that might challenge drivers' safety before and after races. There were more than 200 volunteers at the 2024 event, nearly 70 of whom were hams.

The event runs for 2 days, and it's common for those to be 10-hour days. Multiple races are run simultaneously at several locations near Wellsboro. Each location, or stage (sections of closed public roads where races take place), typically hosts two races each day and has a dedicated team of volunteers, including hams. Each stage also has its own main and backup



The weather during the first day allowed DP Dunn, AB2NM, to set up outside of his vehicle. Volunteers could communicate via the repeater, but couldn't hear each other on simplex, even with 100 W, due to the rugged terrain. The atomic clock made logging times easy, and headphones helped attenuate noise from the loud cars.

2-meter repeaters, dedicated simplex frequency, and net control operator.

Each race can last about 2 hours, depending on the number of competitors. A pause between races, again lasting perhaps 2 hours, permits competitors (and their support crew) to travel to their next location, several miles away. Thankfully, STPR folks graciously allowed volunteers to camp overnight at the Tioga County Fairgrounds for free, as it was close by.

Primary and Spare Equipment

Communications were made via 2 meters, but due to the rugged topography of the area, a minimum output of 50 W was required. And, because of the event's location, having backups of everything (radios, cables, antennas, batteries, etc.) was critical.

My Kenwood TS-2000 transceiver and Cushcraft AR-2 Ringo antenna made up my primary station. I also had a Yaesu FT-7800 transceiver and a 2-meter $\frac{5}{8}$ -wave magnetic-mount antenna to use as a backup station if needed. The main power source was a lead-acid marine battery, with a lithium polymer (LiPo) battery on hand as a backup. I also brought fuses, equipment manuals, microphones, cables, connectors, and weatherproof tape. Checking the antennas and cables, programming the radios, and stowing the tools, meters, manuals, and fuses took time. I had to be methodical and organized and test everything prior to the rally.

STPR used seven repeaters, with five backup repeaters, and seven simplex frequencies. I

programmed my radios beforehand, and the AR-2 Ringo was supported by an unused rebounder frame, an 8-foot PVC mast, a cinder block, and a two-by-four, creating a remarkably versatile antenna support. While not aesthetically pleasing, it was stable, strong, and adjustable for the uneven terrain.

Meeting the Team and Setting Up

The first day of the event began at 6:30 AM with a safety briefing for all the volunteers at Wellsboro High School, where I met my team and captain. Our team was one of four covering the different race locations. Ideally, three radio operators are assigned per team, typically for operation at the start, midpoint, and finish areas. Other team personnel may include official time-keepers, start and stop controllers, medical personnel, and road marshals. After the briefing, our team was subdivided into three positions. I was assigned to operate at the finish line.



Rain on day two meant that AB2NM had to move his radios inside the car. A cinder block and wooden board anchored the base of his antenna.



Two wet volunteers congratulate a rally crew on their finish time during one of the stages.

Setting up the equipment went smoothly, but a 3:1 voltage standing wave ratio (VSWR) was a surprise. Once I readjusted two of the three telescoping connections, the VSWR was a mere 1.2:1, but I couldn't establish simplex communication with the start or midpoint positions. Even with 100 W, we were at each other's noise levels — such was the terrain in the area. I then checked in with net control and my teammates via the repeater.

Overcoming Challenges

On day two of the event, our team was dispatched to a different, more remote and mountainous stage. It rained for the entire day, leaving everyone muddy and soaked — thankfully, I could keep my electronics dry in my Subaru Outback. Sitting under the hatch allowed me to stay dry, while my radio was still easily accessible. I used a tarp for additional protection from the wind and rain.

Simplex was easily established, but, initially, I couldn't contact net control on the repeater. It turned out that the marine battery was weak, so I swapped it out for the LiPo battery and that solved the problem. One car became disabled on the course (with no injuries), and another racer had slid off the road. All racing was paused while support vehicles were dispatched to assess the situation. Despite all of this, the races went off safely and efficiently. Once the event was over, we met as a team for a quick debriefing before heading home.

Reflections

Volunteering for STPR is hard work, but it's a blast! I became more proficient at camping, with making detailed preparations, and with adapting to new circumstances and environments. My patience, problem-solving skills, creativity, and confidence were tested and improved upon from the challenges I encountered.

Rally events like STPR are opportunities for refining your radio skills and training new hams with operating at public service events with some difficult requirements. During breaks between races, new hams can explore HF, operate POTA, chase DX, or explore more diverse aspects of our hobby.

If you're interested in volunteering for STPR, visit www.stpr.org/volunteer-positions, or look for other rally events in your area. Thanks to STPR Chief of Communications Dave Moore, KB3IEC, for his contributions to this article.

All photos provided by the author.

DP Dunn, AB2NM, was first licensed in 1982. He retired from a career in commercial nuclear power and enjoys exploring and supporting the nexus of radio art and events like STPR. He can be reached at ab2nm@arri.net.

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

VOTE

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

POTA Hot-Air Ballooning over US-1015

A ground-breaking plan results in a successful activation from above 75 feet.

Ron Ochu, KOØZ

In late October 2023, a couple of radio buddies from the Macoupin County Amateur Radio Club, K9MCE — Dan Hough, WX9EM, and Mark Lewis, KD9EFO — notified me about an upcoming Parks on the Air® (POTA®) event that was set to take place at Pere Marquette State Park, US-1015, near Grafton, Illinois. Earlier, the event organizer, Dennis McGlasson, AD9WM, had invited a small group of POTA activators to participate in the upcoming event. This small, dedicated group of radio amateurs was hoping to make a park-to-park contact from a hot-air balloon.

As Dennis later wrote on his QRZ profile, “On November 1, 2023, five others and I POTA activated Pere Marquette State Park, US-1015, from a hot air balloon! Operators were AD9WM, N9VFR, KØOMD, KØKST, KD9LON, and KD9EFO. The pilots were Lynn Brownell and Floyd Thornton, and the balloon and crew were provided by Scott Wooge, representative of Lindstrand Balloons USA.”

Planning for POTA

First, Floyd and Dennis needed to check Federal Aviation Administration (FAA) requirements regarding radios and antennas on a balloon. If the equipment isn't permanently attached to the balloon, FAA certification isn't required. Scott reviewed the plan and gave his approval. We also learned that Scott is a ham! Scott provided the balloon, his piloting advice, and his sponsorship.

Next, our POTA team needed to obtain permission from the park. Pere Marquette State Park Superintendent Nate Goetten was all for the idea. He explained the online permit process, which required a signed waiver and a \$25.00 application fee. Three weeks later, both were approved.

The group needed the following equipment for the hot-air balloon POTA activation: an Icom 7300 transceiver with a dual microphone splitter, Heil headsets, a 20 Ah Bioenno LiFePo4 battery, a Pactenna 40-through 10-meter end-fed half-wave antenna with a tennis ball attached to its free end, and 25 feet of RG-8X coax.



The POTA balloon at 75 feet. The tether lines and the end-fed half-wave antenna draped straight down off the basket. [Ron Ochu, KOØZ, photo]

Day of Activation

The POTA operators and balloon crew arrived at the park around 6:00 AM. It was a chilly, sunny day, with very little wind. Early morning is a prime time to launch a balloon. Wind speeds of more than 10 knots can scuttle a hot-air balloon launch. The balloon's basket held the pilot, Lynn Brownell, and two POTA operators.

The balloon was tethered to three pickup trucks, approximately 120 degrees apart, in the field to keep it from drifting. Lynn took two POTA operators up to 75 feet, and each ham made at least 10 contacts to qualify for park activation. After both hams made their contacts, Lynn descended the balloon so the next team of two could go up; there was a total of three teams. The same rig and end-fed antenna were used for each team. Team members used headsets to



Pictured from left to right: Betty Switzer, KØKST; John Mountain, KJØMTN (balloon crew); Dan Hough, WX9EM; Lynn Brownell (pilot in command); Dennis McGlasson, AD9WM; Floyd Thornton (pilot); Nic Mezinis (balloon crew); Bill Switzer, KØOMD; Mark Lewis, KD9EFO; and David Duncan, N9VFR (seated). Not pictured are Aaron Cockrell (balloon crew); Scott Wooge, KBØZIP (balloon owner); Meagan McGlasson; Beth McGlasson, and ground crew volunteers. [John Nell, K9JDN, photo]

minimize noise and to facilitate contacts. While one operator made contacts, the other logged; then they switched positions.

Mark Lewis, KD9EFO, informed me that he made 12 POTA contacts on 40-meter LSB using an end-fed wire antenna draped from the balloon basket at an altitude of 75 feet. He made a two-way contact with Cordell Hull Birthplace State Park, US-2937, in Tennessee, Maine, Kentucky, Georgia, Iowa, and Arkansas — all from the balloon basket.

Dan Hough, KD9LON, made 13 contacts while aloft. I made a 2-meter FM simplex contact with the balloon. I was on the ground with my handheld transceiver, talking to the operators on the balloon via 2-meter

Strays

QST Congratulates...

Bart Hill, K7LTC, on the publication of *Stories of the Paranormal: For Radio Enthusiasts and Others*. This book is a compendium of more than 50 paranormal stories related to amateur radio. You can purchase it at Amazon.



▶ Dennis McGlasson, AD9WM, and David Duncan, N9VFR, aloft and on the air making POTA hot-air balloon contacts. To view more of the park activation on the hot-air balloon, which showcases an aerial view of both the balloon and the park, see the video created by John Nell, K9JDN, at <https://youtu.be/XUeVF-4Jjuo?feature=shared>. [John Nell, K9JDN, photo]

simplex. The balloon was tethered to the ground, hovering around 70 feet above the park.

November 1, 2023, turned out to be a perfect day for everyone. All of the planning and preparation proved to be worthwhile. After the POTA teams went aloft, they made a total of 106 contacts on 40 meters. To sum up the day, the entire POTA event went flawlessly!

First licensed in 1975 as a Novice, Ron Ochu, KOØZ, began his on-air activity with hollow state technology. He cut his ham radio teeth on a Johnson Viking II transmitter and a Hallicrafters SX-111 receiver. College and marriage occupied his time, and he let his Novice license lapse. Five years later, he became KAØDTI and a few years later KOØZ. He prefers solid-state radios and loves DXing on the HF bands and VHF-SHF frequencies. Ron can be reached at ronochu.sky@gmail.com.

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

A Mobile Station in a Jeep

This ham turned a used SUV into a radio-ready ride.

Alan D. Kline, KB1DJ

I live in southern Rhode Island, a state that is subject to not only hurricanes, but the infamous nor'easters. To get around in such conditions more easily, and to be ready to help local Amateur Radio Emergency Service®, Radio Amateur Civil Emergency Service, and SKYWARN® teams if they need me, I bought and modified a 2004 Jeep Wrangler TJ for mobile amateur radio operations.

Finding the Right Fixer-Upper

After browsing Craigslist for some time with no luck, I finally found a promising, low-mileage Wrangler TJ at a dealership on Long Island. After getting it inspected, fixing the driver's-side floor pan, replacing the tires, and adding various cosmetic aftermarket parts, it was time for me to get the Jeep ready to support a station.

To power the potential rigs, I swapped the vehicle's existing alternator for a high-output model and upgraded the battery. I knew I was going to add a 2-meter mobile radio and a Yaesu FT-891 all-mode, all-band mobile radio, so my first problem was figuring out how to run two fused dc power supply 12 V lines from the battery to the passenger's side of the center console. My neighbor, Aaron Fishman, K1BAF, helped me route the wires through a hard-to-access hole in the firewall under the steering column — a spot I would have never found without his help.

For potential security reasons, I wanted to mount the radios as close to the floor as possible (see Figure 1)



Figure 1 — Installing radios as close to the vehicle's floor as possible can help keep equipment out of sight.

and cover them with a small black towel. I therefore ruled out using the popular and versatile Lido Radio mounting solutions.

Most Jeeps that are used off road have CB radios, and they monitor channel 16, which is 4 × 4. Their antenna mounts are designed for ⅜-24 antenna bases. I enlarged only one of the rear antenna brackets to accept an SO-239 connector; this gave me more antenna options. Lately, I've noticed that the internal star washers are rusting, so I need to find stainless-steel replacements.

Mounting the Radios and Antennas

I started with the antenna mounts. I installed a 2-meter mobile antenna on the driver's-side cowl and routed the coax to the right side of the center console. I was careful to zip-tie it under the dash so it wouldn't sag. As 2-meter repeater coverage can be spotty in southern Rhode Island, I installed a Comet SBB-25 that has some gain over a quarter-wave whip (see Figure 2).

For the HF antennas, I mounted one bracket with an SO-239 connector over the passenger's-side taillight. On the driver's side, I installed a ⅜-24 mount and routed the coax under the floor mats to the right side of the center console. This gave me the option of using an Opek HVT-400B, a Yaesu ATAS-120A, hamsticks, or my collection of Hustler RMs, which far exceed other models, especially for Parks on the Air® (see Figures 3 and 4).

The first radio I mounted was the Icom IC-V3500 2-meter transceiver. I chose it for its high power rating of up to 65 W — it's also one of the smallest on the market. It took some creative hole drilling to mount it, as it is in a tight space. At first, I used CHIRP software to program it,



Figure 2 — The Comet SBB-25 installed on the driver's-side cowl.



Figure 3 — The rear passenger's-side antenna mount, with the SO-239 connector.

but now that I own three IC-V3500s, I use RT Systems software. I programmed the 2-meter transceiver to cover a 30-mile radius around my location.

I also found a used Yaesu FT-891 on QTH.com (www.swap.qth.com) and added a Powerpole® connector mod to it for the power cable. This was a mistake, as the tolerance of the part was too loose, and the dc line kept falling out.

Mounting the FT-891 to the side of the center console was another challenge because it is not a flat surface, so I couldn't use the stock mobile bracket that came with the radio. I needed to figure out how to mount it on the uneven center console hump. As you can see in Figure 5, I found inexpensive steel brackets at the hardware store that I bent into 90-degree angles, and I used them to securely mount it. To make it easier



Figure 4 — The rear driver's-side 5/8-24 antenna mount.



Figure 5 — One of the steel brackets used to mount the FT-891 to the side of the center console.

to remove the radio, I swapped the factory-supplied screws with thumb screws, which come with CB radios or scanners.

Hitting the Road

To test out the installation, I took a day trip to Montauk, Long Island, via the Cross Sound Ferry. Everything worked out well; I made multiple 2-meter simplex contacts and used the WZ2Y repeater all the way from my starting location in Charlestown, Rhode Island. The only problem was a high level of noise from the engine. In the near future, I am going to try some filtering methods to lessen the interference. I activated a few parks on the way and completed a contact with Tony, EA1CDV, of Cantabria, Spain. When I got home, I looked him up on www.QRZ.com and saw that he was a surfer like I am. After a few more contacts, we swapped local surf shop T-shirts — all in the interest of international ham radio goodwill!

All photos provided by the author.

Alan D. Kline, KB1DJ, has been licensed since the mid-1970s. He has held call signs WB1FOD and KQ1D before becoming KB1DJ. Alan was introduced to ham radio through Cub Scouts, and he was involved in Scouting for more than 45 years. He is semi-retired as the president of Lynn Ladder and Scaffolding, and he is a board member of the American Ladder Institute and the Scaffold and Access Industry Association. Alan has dedicated his career to writing, developing, and teaching both ladder and scaffolding safety standards. He can be reached at kb1dj@yahoo.com.

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

ARRL Board Reviews and Approves By-Law Changes, Establishes 2026 as Year of the Club, and Creates 10-Band DXCC

The ARRL Board of Directors met in Windsor, Connecticut, for its Second Meeting on July 18 – 19, 2025.

ARRL President Rick Roderick, K5UR, presided over the meeting, prior to which Board committees met on July 17, highlighting the following actions:

The Programs and Services Committee and ARRL staff from the Radiosport Department, on the heels of creating the DXCC Trident Award in January, are moving ahead with the creation of another new DXCC award — 10-Band DXCC — which will recognize those who achieve DXCC on all bands from 6 meters to 160 meters (excluding 60 meters). Higher achievement endorsements can be earned at the 200, 300, and Honor Roll levels, like the DXCC Trident Award. The 10-Band DXCC Award challenges participants to establish station capabilities and operator skills for dealing with myriad band conditions in pursuing DXCC across all 10 bands.

The Administration and Finance Committee discussed the status of ARRL's Washington, DC, advocacy. This includes continuing work to build congressional support for the passage of bills H.R.1094 and S.459 — the Amateur Radio Emergency Preparedness Act. The

committee recommended to the Board that the ARRL CEO take the lead in the efforts, including executing a campaign to involve members in reaching out to their congressional representatives later this year.

The Emergency Communications and Field Services Committee reviewed year-to-date activities, including a complete rewrite of the ARES® training modules and the recently executed Memorandum of Understanding between ARRL and Radio Relay International (RRI). The committee also discussed making 2026 the Year of the Club and proposed ideas for consideration by the Board.

The Historical Committee met to review the ARRL Heritage Museum's online collection, Radio Alpha, which currently features more than 3,000 images and documents. The repository is now online and can be found at www.arrl.org/radioalpha or www.arrl.org/museum.



The ARRL Board of Directors met for their Second Meeting on July 18 – 19, 2025, in Windsor, Connecticut. [Sierra Harrop, W5DX, photo]



ARRL Officers prepare to hold the meeting. Pictured: (from left to right) ARRL Treasurer John Sager, WJ7S; ARRL Second Vice President Mike Ritz, W7VO; ARRL First Vice President Kristen McIntyre, K6WX; ARRL President Rick Roderick, K5UR; ARRL CEO David Minster, NA2AA, and ARRL International Affairs Vice President Rod Stafford, W6ROD. [Sierra Harrop, W5DX, photo]

Highlights

Board members, after having an additional 6 months to review the Report and Recommendations of the Special Committee on By-Law 46 that was submitted during the annual Board Meeting in January, undertook a discussion and voted to approve the motion to adopt the report. The proposed updated language was reviewed by ARRL's Connecticut counsel, who was present for questions and discussion. The changes affect By-Law 46, the Board's Conflict of Interest Policy, and By-Law 42, the charter for the Ethics & Elections Committee (E&E). The most significant change is that this introduces an unbiased competent third party to provide the Board with the results of its own determination in an E&E matter before submitting it to the ARRL Board.

The Board also approved a year-long celebration of the semiquincentennial of the United States. This will include commemorative ARRL US250 Worked All States awards for contacts made during 2026, as well as other on-air activity.

The Board approved making 2026 the Year of the Club and passed other motions in support of the initiative, including:

- Creation of a book featuring high-performance clubs.
- Establishment of working with and recognizing outstanding club websites while helping clubs with ineffective websites.

- Recognizing ARRL Affiliated Clubs that maintain a higher-than-required ARRL membership level for affiliation. Clubs that achieve a 70% or a 90% ARRL membership level within their clubs will receive acknowledgment and special recognition.

The complete minutes of the 2025 Second Meeting of the ARRL Board of Directors are available on the ARRL website at www.arrl.org/board-meetings.

Honors and Awards

The ARRL Board of Directors bestowed the following awards:

- The 2025 ARRL Philip J. McGan Silver Antenna Award to Micah Martin, KN6VUT, for his work in public relations.
- The 2025 ARRL Bill Leonard Professional Media Award for Video Reporting to *NBC TODAY* Correspondent Harry Smith for his report, "Meet the students using radio waves to contact the ISS."
- The 2025 ARRL Bill Leonard Professional Media Award for Print Reporting to Makena Kelly and Dell Cameron of *WIRED*, for their article, "Through Hurricanes Helene and Milton, Amateur Radio Triumphs When All Else Fails."
- The 2025 ARRL Herb S. Brier Instructor of the Year Award to Dennis Simon, KB7UTV.
- The 2025 ARRL Hiram Percy Maxim Memorial Award to Alexia Snethen, KM6LGG.
- The 2025 ARRL Technical Innovation Award to Matthew Wishek, NBØX.
- The 2025 ARRL Technical Service Award to Bill Meara, N2CQR, and Dean Souleles, KK4DAS.
- A Resolution of Commendation to Jon Bloom for his dedication and expertise to upgrade the performance, security, and scalability of the ARRL Logbook of The World®.
- A Resolution of Commendation to Icom America Inc., and Ray Novak, N9JA, in appreciation for their generous support of the 2025 ARRL Membership Drive.
- A Resolution of Commendation to Chuck Penson, WA7ZZE, for his dedication and contributions to the development of the ARRL Museum and Research Library, "Radio Alpha."
- A Resolution of Commendation to Tom Brooks, KE1R, upon his retirement, for his many years of volunteering at ARRL Headquarters.

The next Annual Meeting of the ARRL Board of Directors is scheduled for January 16 – 17, 2026.

Upcoming Elections and How to Vote

From the ARRL Ethics and Elections Committee

Each year, elections are held for Directors and Vice Directors in five of the 15 ARRL Divisions, for terms of 3 years. Electronic or paper ballots are made available by October 1 to full members in Divisions with contested seats, and ballots are counted on the third Friday of November. In 2025, a Director and Vice Director will be declared elected in the following Divisions, for terms beginning January 1, 2026: Pacific, Rocky Mountain, Southeastern, Southwestern, and West Gulf.

Three years ago, the ARRL Ethics and Elections Committee informed members of improvements made to modernize Division elections (see “Modernizing the ARRL Division Director and Vice Director Elections” in the October 2022 issue of *QST*). That effort has involved transitioning members to the use of electronic ballots. The transition was designed to be more convenient and efficient, and reduce the increasing expense of printing and mailing ballots.

Election Services Co. (ESC) of Melville, New York, will conduct the elec-

tion. This is the same third party that has conducted the ARRL elections since 2022.

As ARRL continues its transition this year, eligible members will receive a printed postcard from ESC providing instructions on how to use their online voting site to access candidate statements, photos, and the electronic ballot, and to vote online. The postcard will also include instructions for requesting a paper ballot, if preferred. Members with an email address on file will receive the postcard and an email message from ESC. Members without an email address on file will receive only the postcard.

Whether you choose to vote online or by mail, the system will permit only one vote.

ESC provides the online voting website, collects and processes electronic and paper ballots, and computes the election results. Should members require assistance or have questions, ESC will provide help.

Based on member response, beginning in 2026, members will receive a printed postcard from ESC and, if an

email address is on file with ARRL, an email with instructions on how to vote. There will no longer be a printed ballot option.

If your Division has an election coming up, we encourage you to review the email address associated with your ARRL membership by reviewing your account at www.arrl.org/myARRL. You must be logged in to the ARRL website to view your account. If you need assistance reviewing or modifying your account information, contact ARRL Headquarters (see page 14).

If You Need Help Voting...

During an election, members can contact ESC for assistance:

Election Services Co.

Telephone: 866-720-4357

Email: ARRLElection@ElectionServicesCorp.com

Happenings

ARRL Files Comments to Protect 70-Centimeter Amateur Band

ARRL has filed comments with the FCC to oppose part of an application that would impact the 70-centimeter amateur band for telemetry, tracking, and command (TT&C) of satellites. The application, from AST & Science, LLC (AST), requests “unprecedented authorization to 430 – 440 MHz for a constellation totaling 248 satellites to communicate with five ground stations using up to five channels with up to 256 kHz bandwidth.” Read ARRL’s full comments at www.arrl.org/files/file/FCC%20Documents/ARRL-Partial-Opposition-25-201.pdf.

The formal opposition, filed by ARRL’s Washington Counsel, asserts that the permission AST seeks to use the 430 – 440 MHz band “should be denied because AST does not demonstrate need for TT&C spectrum beyond that available within existing allocations.” The filing goes on to highlight just how unprecedented the request is:

The Requested Spectrum Is Not Allocated for the Requested Purpose

The 430 – 440 MHz band is not allocated domestically or internationally for the requested space-to-Earth and Earth-to-space satellite TT&C operations. As others already have noted in this proceeding, signals in this band from AST’s current five-satellite constellation have been observed throughout the world, including in the US, notwithstanding that the satellites are authorized to communicate only with five ground stations well outside the US. From the

operations by the current five satellites, it appears that the satellites at times have transmitted continuously in the 430 – 440 MHz band throughout their orbit, not just when in communication with one of the authorized ground stations. This activity defeats the purpose of preventing interference in the US by limiting operations in this band to ground stations distant from the US. Authorizing an additional 243 satellites to use this band, which would result in multiple satellites over the US at all times, would effectively usurp this band’s allocated use.

The 70-centimeter band is also used in emergency communications. As recently as early July 2025, ARRL volunteers serving in the Amateur Radio Emergency Service® made headlines for providing critical communications in flood-ravaged areas of the Texas Hill Country. Allowing the 70-centimeter band to become overrun with TT&C operations could impact the ability for the Amateur Radio Service to be used in future disasters. “TT&C operations in the 430 – 440 MHz band are capable of causing harmful interference to radio amateur communications, including to amateur satellites operating in the 435 – 438 MHz subband,” the comments state.

The comments go on to outline why the application would be non-compliant with the International Telecommunication Union Radio Regulations Treaty.

Reply comments to the application were due by August 5, 2025. ARRL will continue to promote and protect amateur radio spectrum.

Amateur Radio Helps Locate Missing Mother and Son

Amateur radio had a crucial role in locating a mother and her 9-year-old son lost in California’s Stanislaus National Forest. On July 11, 2025, the pair was reported overdue from a day trip to Camp Wolfeboro, a popular Scout camp in the Sierra Nevada Mountains, according to a news release.

On July 12, the Calaveras County Volunteer Search and Rescue (CCSAR) team was conducting its monthly training exercise along the Stanislaus River, when members received a notification that Tami and her son, Stirling, had been reported missing since the afternoon on July 11, and they were not answering their cell phones.



The command post during the search for missing mother and son. [Calaveras County Sheriff’s Office photo]

The CCSAR team set up a command post at the Black Springs Off-Highway Vehicle Area and quickly began initiating a road-based search using four-wheel-drive vehicles and air support from the California Highway Patrol.

Joining the search was a Deputy and a Forest Service Law Enforcement Ranger who responded to 911 texts from campers in the area stating that a vehicle possibly matching the description of the pair's missing car had been found. The CCSAR team began to find handwritten notes posted near a remote Forest Service road, and then they found another note about a mile away that included a telephone number and the names of the missing individuals. Just before 6:00 PM, the car and the lost mother and son were found — but the rescue was not over.

ARRL Celebrates the Jeffrey B. Goldman, K3DUA, Teachers Institute Week

The ARRL Teachers Institute (TI) on Wireless Technology celebrates the generosity of Jeff Goldman, K3DUA. A gift from Goldman has underwritten an entire week of the program, allowing 13 educators from all over the US to attend.

Goldman took an interest in radio at the age of 12, when his father bought him a shortwave receiver. Hearing signals from around the world captivated his mind. "The most interesting thing is I got to listen to Sputnik when it went up back in the late 1950s," he said. In 1958, Goldman earned his Novice-class license and began a journey in amateur radio that he still enjoys today.

CCSAR team members were unable to communicate with their command post using conventional frequencies and cell phones from their location in the deep woods. So, they used an amateur radio frequency to report their emergency traffic. The call was immediately answered by a retired El Dorado County communications supervisor, who is also an amateur radio operator, monitoring from his home. He contacted the El Dorado 911 center, which provided the information to Calaveras County Dispatch. The CCSAR command post was notified, and the mother and son were transported to waiting family members.

Young Stirling also had a hand with the rescue. He used his Scout whistle to blow SOS, the internationally recognized Morse code distress signal, to give searchers a better chance of locating their position.

Early in life, his radio hobby started shaping his career. "I got into engineering school as a result of my interest in electronics," he said. "When I was drafted back in the late 1960s, I went to the recruiter and asked, 'What can you do to keep me from having to dig foxholes in Vietnam?'" His skills formed as a ham radio operator got him into the Army Signal Corps and a duty assignment in Germany. "I got into a very specialized unit," he said.

Goldman would go on to start an amateur radio-related small business in the 1970s. Now, he's hoping to use the success he found thanks to wireless technology to pave the way for future generations. "Because of the wonderfulness that ham radio has done for me and my whole life, I've been fairly successful, and I think it is an



Teachers who attended the Jeffrey B. Goldman, K3DUA, Teachers Institute Week expressed their gratitude to him during a lunch held outside ARRL Headquarters in Newington, Connecticut.



Jeff Goldman, K3DUA (left), visited with Raz Idan, KE2FEB (right), one of the teachers who attended the Jeffrey B. Goldman, K3DUA, Teachers Institute Week.

important hobby. It is an important national asset for the country,” he said.

The 13 teachers who attended the Jeffrey B. Goldman, K3DUA, TI Week will take what they’ve learned and incorporate hands-on approaches to radio and wireless technology into their science, technology, engineering, and mathematics lessons.

ARRL Director of Development Kevin Beal, K8EAL, admires Goldman’s leadership gift. He said, “By making this gift now, Jeff is setting the example for others to follow, and we are excited to recognize his generosity by naming this week in his honor.”

Goldman and his wife, Janis, visited with the teachers, who were excited to share what their attendance meant to them. Goldman is thrilled by the number of young people who will be impacted by his gift and the ripple effects it may have on amateur radio and electrical engineering’s future leaders. He’d tell the students they have a bright future in amateur radio. “It is a good hobby,” he said. “It can provide you an education — it can provide you a lifetime of earning if you have an engineering degree and you get into technology. It can lead to computer or hardware design. Technology is a good field.”

Learn more about the ARRL TI at www.arrl.org/ti.

Section Manager Nomination Notice

To all ARRL members in Eastern New York, Eastern Pennsylvania, Louisiana, North Carolina, Pacific, San Diego, South Dakota, and Virginia. You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 16 of this issue.

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

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

We suggest the following format:

(Place and Date)

Field Services Manager, ARRL

225 Main St.

Newington, CT 06111

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

(Signature _____ Call Sign _____ City _____ ZIP _____)

Any candidate for the office of Section Manager must be a resident of the Section, an amateur radio licensee of Technician class or higher, and a full member of ARRL for a continuous term of at least 2 years immediately preceding receipt of a nominating petition. Petitions must be received at Headquarters by 4:00 PM Eastern Time on December 5, 2025. If more than one member is nominated in a single Section, ballots will be mailed from Headquarters no later than January 2, 2026, to full members of record as of December 5, 2025, which is the closing date for nominations. Returns will be counted February 24, 2026. Section Managers elected as a result of the above procedure will take office April 1, 2026.

If only one valid petition is received from a Section, that nominee shall be declared elected without opposition for a 2-year term beginning April 1, 2026. If no petitions are received from a Section by the specified closing date, such Section will be resolicited in the April issue of QST. A Section Manager elected through the resolicitation will serve a term of 18 months. A Section Manager vacancy occurring between elections is filled through appointment by the Field Services Manager. — Mike Walters, W8ZY, Field Services Manager



Estonian Radio Amateurs' Summer Camp

The 2025 Estonian Radio Amateurs' Union (ERAÜ) summer camp was held at the Uuskalda Puhkeküla sports and recreation center in June. According to ERAÜ, attendance was larger than expected, with many staying throughout the weekend in tents and trailers.

This was a particularly auspicious event because 2025 marks the 90th anniversary of the founding of ERAÜ. The society first registered with the Estonian authorities in March 1935, and the first meetings were held in September of that same year. ERAÜ subsequently became a member of the International Amateur Radio Union in 1938. The activities of ERAÜ ceased in 1940 due to the Soviet occupation, and the organization wasn't restored until 1991, when Estonia regained its independence.



The 2025 ERAÜ summer camp was held at the Uuskalda Puhkeküla sports and recreation center. The event celebrated the 90th anniversary of the founding of ERAÜ. [ERAÜ photo]

Remote Receivers in Iceland



Icelandic Radio Amateurs (Íslenskir Radióamatörar) recently reported on the status of several new remote receivers that are freely accessible to anyone with an internet connection. The sites offer a unique glimpse of HF propagation conditions in the subarctic, as well as a window into VHF activity in the island nation.

The receivers were installed by Ari Þórólfur Jóhannesson, TF1A; Georg Kulp, TF3GZ; Árni Helgason, TF4AH; Karl Georg Karlsson, TF3CZ, and Kristján Gunnarsson, TF4WD.

They are set up at the following locations:

- Perlan (Reykjavík; VHF) sdr.ekkert.org
- Sauðárkrúkur (HF) krokur.utvarp.com
- Elliðaavatn (HF) kop.utvarp.com
- Örylgshöfn (HF) orlyghofn.utvarp.com:8080
- Reykjavík (VHF) vhf.utvarp.com

D-STAR for Almada

Rede dos Emissores Portugueses announced the installation of a 70-centimeter multi-mode D-STAR/

analog FM repeater in the Pragal district of Almada in Portugal. The new equipment replaces the previous analog-only repeater, offering digital resources and greater operational flexibility. The repeater call sign is CQ0UREP.

This is the first Portuguese D-STAR repeater to become part of the HAMNET global network. The repeater is currently connected to the REF095 world-wide reflector.



WIA's Response to the Australian Communications and Media Authority

The Wireless Institute of Australia (WIA) has submitted its formal response to the Australian Communications and Media Authority's (ACMA's) 5-year spectrum outlook.

Titled "Strengthening the Future of Amateur Radio in Australia," the document outlines WIA's commitment to supporting and advancing the Australian Amateur Radio Service and ensuring its alignment with contemporary spectrum planning.

Key recommendations include:



- Clarifying operator rights under the class license. WIA believes that, despite the benefits of the 2023 Radio-communications (Amateur Stations) Class License, gaps remain in the documentation that amateur operators use to verify their legal operating status.
- Fixing call sign administration in external territories. WIA is calling for clear policy and procedural updates to ensure that call sign allocation and oversight are consistent across all Australian regions.
- Planning for higher power access. WIA has asked ACMA to commit to beginning work in 2026 on a new framework that would provide broader access to higher transmitter power privileges.
- Enhancing exam administration. According to WIA, the administration of the amateur radio assessment system remains an area of concern. WIA has recommended improvements to transparency, including clearer processes for syllabus updates and question bank reviews.
- Streamlining repeater and beacon call sign allocations. WIA has requested that ACMA take steps to simplify and accelerate this process.
- Expanding and preserving critical spectrum. WIA has advocated for expanded access to the 51 – 52 MHz and 5351.5 – 5366.5 kHz bands, offering additional operating flexibility, especially for Foundation and regional operators. Additionally, WIA has reiterated the importance of preserving amateur access to the 2300 – 2302 MHz segment.

A New UHF Repeater Network for Mahé Island, Seychelles

The Seychelles Amateur Radio Association (SARA) announced the launch of a new 70-centimeter repeater network that marks a significant milestone in amateur radio operations in the Seychelles. According to SARA, the network is open to further ideas and developments, aiming to enhance connectivity and encourage innovation within the archipelago's amateur radio community.

In addition to RF coverage, the network is also linked to the internet via the AllStarLink network. The AllStarLink server is remotely hosted by Glenn Lyons, VK4PK, in Australia. Despite the considerable distance, a reliable fiber-optic connection ensures smooth operations between Australia and Mahé Island. The addition of an EchoLink gateway also provides a crucial bridge to the global amateur radio community, enabling operators worldwide to connect with users of the Mahé Island network. The EchoLink gateway operates under the call sign S78SARA.

ORARI Amateurs Aid in Search

The communication and rescue (CORE) team of the Rejang Lebong local group of Organisasi Amatir Radio Indonesia (ORARI) provided support during a search for three missing residents in the Bermani Ulu District.



An ORARI team providing communications support during a search for three missing residents in the Bermani Ulu District of Indonesia. [ORARI photo]

The CORE team, led by Jasmani Utomo, YC4MTZ, immediately went to the location closest to the point where the three individuals had disappeared. The ORARI team worked together with searchers to provide VHF communications throughout an extensive wilderness area that lacked cellular telephone coverage. A number of ORARI members in Curup, about 20 kilometers away, put their base stations to work as well.

Fortunately, the search was a success, and the missing persons were soon found in a hut in Kerinci Seblat National Park. They were exhausted, but physically healthy when found.

Public Service

Safety Stand-Down: Look Up and Live

In this month's column, ARRL Public Relations and Outreach Manager Sierra Harrop, W5DX, pulls from her experience working in television news to offer some electrical safety advice for hams operating in the field.

Disclaimer: The following electrical safety information is provided for general awareness and educational purposes only. It is not intended to be a comprehensive guide or a substitute for professional training or advice. Always consult with qualified professionals, and refer to official safety standards for specific electrical safety concerns.

Electricity is a killer. About 150 people die each year at work from contact with electricity, according to the Electrical Safety Foundation International. Nearly half of those are from contact with power lines. That data only includes workplace deaths, so recreational activities and public service volunteering are not accounted for.

In a recent article, ARRL New Mexico Section Manager Bill Mader, K8TE, shared safety concerns and processes that can be implemented at ARRL Field Day sites (<https://arrl.org/news/field-day-safety-tips-from-an-experienced-compliance-officer>). I'd like to share a simple phrase that may enhance your situational awareness: *Look up and live*.

Watch Out for Wires in the Field

"Look up and live" was drilled into me and every other television news employee who worked with electronic news-gathering vehicles that had a pneumatic mast or satellite dish. It was the title of an industry-standard safety video published by the National Press Photographers Association (<https://youtube.com/watch?v=gfloNa2C6mw>).

In television news, where I spent the first 2 decades of my professional career, there was always a deadline and often a tremendous sense of urgency at the scene of breaking news to get a live shot up first. Before the days of bonded cellular internet streaming, we used radio — microwave and satellite — to take viewers to the scene.

No matter the pressure from news managers, safety was paramount. When we approached a scene, we

made sure to park the live truck at least 10 feet away from overhead wires to comply with regulations (see OSHA 29 CFR § 1926.1408; <https://osha.gov/laws-regs/regulations/standardnumber/1926/1926.1408>). My personal minimum was two truck lengths from any lines, ideally a whole mast length; if I had a 58-foot mast, I'd try to park at least 58 feet away from the nearest power line.

Identifying overhead lines was ritualistic: When I arrived, I got out of the vehicle, walked 20 feet away, looked up, and circled the entire perimeter of the truck to search for overhead lines and obstructions. This additional 45-second process could feel like an eternity when news was unfolding for me to capture and report — but I couldn't go live if I was dead.

In pursuit of our amateur radio hobby, we should apply even more care. There is no pressure to get on for a ham radio activation. Take your time, walk around, and be diligent. Look up and live.

Portable masts, vertical antennas, wire antennas slung up into a tree — anything you put up can become energized if it contacts an overhead wire. Do not take chances. Even what appears to be a phone or fiber-optic line could be carrying lethal voltages. Do not become the path to ground.

Additional Electrical Safety Tips

Should a vehicle you're in become energized by a fallen line or a mast erected into power lines, do not



In this 2011 photo, photojournalist Colleen Welcher prepares the camera for Sierra Harrop, W5DX, to go live from a breaking news scene in Wichita Falls, Texas. Notice the van parked on the lawn of a church to keep the mast away from power lines that are just out of frame. [Sierra Harrop, W5DX, photo]

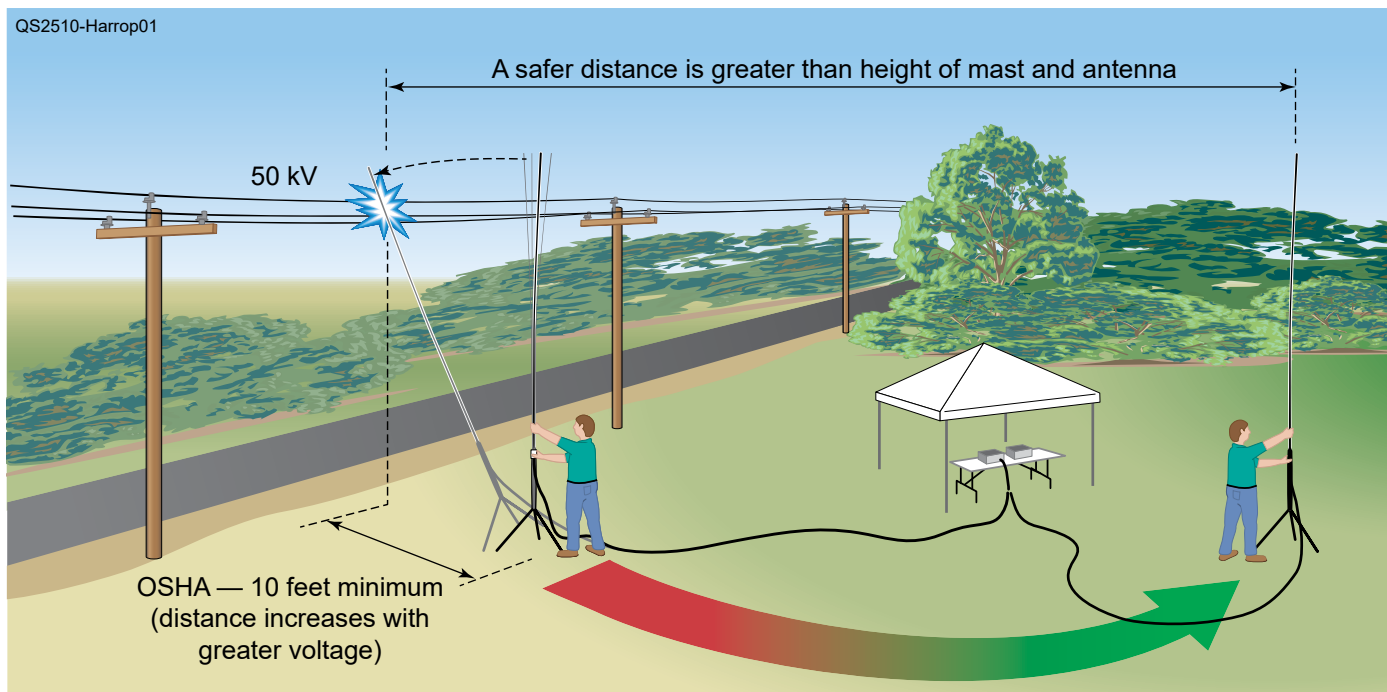


Figure 1 — OSHA regulations state that 10 feet is the minimum safe distance from any equipment, load line, or load to a power line carrying 50 kV or less (<https://osha.gov/laws-regs/regulations/standardnumber/1926/1926.1408>). That doesn't mean you can just set up your mast and antenna 10 feet away and be safe; you want to be at least far enough that, while raising or lowering your mast and antenna, or if your rig falls over, no part of your equipment comes within 10 feet of any lines. And remember that this is a *minimum* safe distance, and that the minimum safe distance increases as the voltage in the lines increases — farther away is always better!

leave it unless it is on fire; if you touch the exterior of your vehicle with your feet on the ground, the electricity will use your body as a path to ground.

The ground outside of your vehicle can be just as dangerous. When an electrified object, such as a downed power line or an energized vehicle or antenna, contacts the ground, the electrical current spreads out in concentric circles of decreasing voltage from the point of contact, known as a voltage gradient. Being in contact with different voltages is what will kill you — if you walk normally across a voltage gradient, or fall and catch yourself with your hands, one part of your body will contact a higher voltage than the other, and the electrical current will use your body as a path to equalize the voltage.

Instead, call for help via phone or ham radio. Warn bystanders not to approach your vehicle. If a fire requires you to exit, carefully jump clear of the vehicle with your feet together to avoid contacting the vehicle and ground simultaneously. Be mindful of your movements; “bunny hop” with your feet together or shuffle across the ground in small increments, keeping your feet in constant contact, to avoid providing a path between the different potentials.

Please be careful when erecting portable gear near overhead wires. Remember: *Look up and live*.

Look Up and Live!

No ham radio activation is worth your life. Be aware of potential electrical hazards when operating in the field:

- **Walk around and look up.** Circle the perimeter of the area and search for any overhead lines or obstructions. There is no pressure to get on the air — take your time.
- **Maintain a safe distance from any overhead power lines.** OSHA regulations state that 10 feet is the minimum safe distance from any equipment, load line, or load to any power line carrying 50 kV or less, and this minimum safe distance increases with higher voltage; see OSHA 29 CFR § 1926.1408, Table A, for a list of minimum clearance distances by voltage (<https://osha.gov/laws-regs/regulations/standardnumber/1926/1926.1408>). Note that this is a *minimum* safe distance — you want to be at least far enough that, should your mast topple over, none of your equipment comes within the minimum clearance distance of any lines. You're also not likely to know offhand the voltages of nearby power lines when operating in the field, so farther away is always better (see Figure 1).
- **Remember: any line could be energized.** Even what looks like a phone or fiber-optic line could be carrying lethal voltages. Don't take any chances.

Contest Corral

October 2025

Check for updates and a downloadable PDF version online at www.arrl.org/contest-calendar.

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

Start - Finish				Bands	Contest Name	Mode	Exchange	Sponsor's Website
Date-Time	Date-Time							
1	2000	1	2100	3.5	UKEICC 80m Contest	Ph	6-char grid square	www.ukeicc.com
2	0000	3	0300	7	Walk for the Bacon QRP Contest	CW	13 WPM max; RST, SPC, name, mbr/ pwr	qrpcontest.com/pigwalk40
2	1700	2	2000	3.5	SARL 80m QSO Party	Ph	RS, serial, grid or QTH	www.sarl.org.za
2	1800	2	2200	28	NRAU 10m Activity Contest	CW Ph Dig	RS(T), 6-char grid square	nrau.net
4	0000	5	2359	No WARC	Collegiate QSO Party	CW Ph Dig	School ID or SPC, RS(T)	collegiateqsoparty.com
4	0600	5	0559	3.5-28	Worked All Provinces of China DX Contest	CW	RST, 2-character BY province or serial	www.mulandxc.com
4	0600	5	0600	1.8-28	Oceania DX Contest, Phone	Ph	RS, serial	www.oceaniadxcontest.com
4	1200	5	1159	1.8-28	Russian WW Digital Contest	Dig	RST(Q), oblast code or serial	www.rdrclub.ru
4	1400	5	1400	See rules	IARU Region 1 UHF/Microwaves Contest	CW Ph Dig	RS(T), serial, 6-char grid square	www.iaru-r1.org
4	1600	5	1100	3.5,7	International HELL-Contest	Dig	RST, serial	www.darc.de
4	1600	5	2200	1.8-28	California QSO Party	CW Ph	Serial, CA county or SPC	www.cqp.org
4	2200	4	2359	3.5,7	IARU Region 2 Area G HF SSB Contest	Ph	RS, serial	concursoareag.lu4aa.org
5	0600	5	1000	3.5	UBA ON Contest, SSB	Ph	RS, serial, ON section (if ON)	www.uba.be
5	2200	5	2359	3.5-14	Peanut Power QRP Sprint	CW Ph	RS(T), SPC, peanut no. or pwr	www.nogaqrp.org
6	1900	6	2030	3.5	RSGB 80m Autumn Series, CW	CW	RST, serial	www.rsgbcc.org
8	2300	9	0600	432	432 MHz Fall Sprint	CW Ph Dig	4-char grid square	packratvhf.com
10	0001	10	2359	28	10-10 Int'l 10-10 Day Sprint	CW Ph Dig	Name, mbr or "0," SPC	www.ten-ten.org
11	0000	12	1559	3.5-28	Makrothen RTTY Contest	Dig	4-char grid square	www.pl259.org
11	0000	12	2359	50-1296	ARRL EME Contest	CW Ph Dig	4-char grid square	www.arrrl.org/eme-contest
11	0000	11	2359	1.8-28	QRP ARCI Fall QSO Party	CW	RST, SPC, mbr or pwr	qrparki.org
11	0300	12	2100	1.8-28,VHF/ UHF	Nevada QSO Party	CW Ph Dig	RS(T), NV county or ARRL/RAC Section/"DX"	nvqso.com
11	0600	12	0600	1.8-28	Oceania DX Contest, CW	CW	RST, serial	www.oceaniadxcontest.com
11	1200	12	1200	3.5-28	Scandinavian Activity Contest, SSB	Ph	RS, serial	www.sactest.net
11	1500	12	0500	1.8-28	Arizona QSO Party	CW Ph	RS(T), AZ county or SPC	www.azqp.org
11	1600	12	2200	No WARC	Pennsylvania QSO Party	CW Ph	Serial, PA county or ARRL/RAC Section	paqso.org
11	1800	12	1800	1.8-28,50,144	South Dakota QSO Party	CW Ph	RS(T), SD county or SPC	www.sdqsoparty.com
11	2000	12	2000	1.8	PODXS 070 Club 160m Great Pumpkin Sprint	Dig	RST, SPC	www.podxs070.com
12	0600	12	1000	3.5	UBA ON Contest, CW	CW	RST, serial, ON Section (if ON)	www.uba.be
14	1800	14	1929	3.5,7	DARC RTTY Sprint	Dig	RST, DOK/"NM," or serial	www.darc.de
15	1900	15	2030	3.5,7	AGCW Semi-Automatic Key Evening	CW	RST, serial, 2-digit year first used a bug	www.agcw.de
15	1900	15	2030	3.5	RSGB 80m Autumn Series, Data	Dig	RST, serial	www.rsgbcc.org
16	0000	17	0300	14	Walk for the Bacon QRP Contest	CW	13 WPM max; RST, SPC, name, mbr/ pwr	qrpcontest.com/pigwalk20
16	1900	16	2000	3.5-14	NTC QSO Party	CW	25 WPM max; RST, mbr, or "NM"	pi4ntc.nl
18	0000	19	2359	3.5-28	JARTS WW RTTY Contest	Dig	RST, age of operator	jarts.jp
18	0001	19	2359	28	10-10 Int'l Fall Contest, CW	CW	Name, mbr or "0," SPC	www.ten-ten.org
18	1400	19	0200	No WARC	New York QSO Party	CW Ph Dig	RS(T), NY county or SPC	www.nyqp.org
18	1400	20	0200	No WARC	YLRL DX/NA YL Anniversary Contest	CW Ph Dig	Serial, RS(T), ARRL Section or PC	ylrl.net/contests
18	1500	19	1459	3.5-28	Worked All Germany Contest	CW Ph	RS(T), DOK or "NM" or serial	www.darc.de
18	1500	19	1500	1.8	Stew Perry Topband Challenge	CW	4-char grid square	www.kkn.net/stew
18	2000	18	2359	1.8-28,50	Feld Hell Sprint	Dig	Mbr, SPC, grid square	sites.google.com/site/ feldhellclub
18	2130	18	2330	7	Argentina National 7 MHz Contest	Ph	RS, 2-digit year first licensed	www.lu4aa.org
19	0000	19	0200	14,21	Asia-Pacific Fall Sprint, CW	CW	RST, serial	jsfc.org
19	0700	19	1000	144	UBA ON Contest, 2m	CW Ph	RS(T), serial, ON Section (if ON)	www.uba.be
19	1700	20	0100	1.8-28,50,144	Illinois QSO Party	CW Ph Dig	RS(T), IL county or SPC	w9awe.org/ilqp
19	2300	20	0100	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or pwr	qrpcontest.com/pigrun
20	1300	24	2359	No WARC	ARRL School Club Roundup	CW Ph Dig	RS(T), class (I/C/S), SPC	www.arrrl.org/school-club- roundup
22	2000	22	2100	3.5	IRTS 80m Counties Contest	CW Ph	RS(T), serial, EI/GI county (if EI/GI)	www.irts.ie
23	1900	23	2030	3.5	RSGB 80m Autumn Series, SSB	Ph	RS, serial	www.rsgbcc.org
25	0000	26	2359	1.8-28	CQ Worldwide DX Contest, SSB	Ph	RS, CQ zone	www.cqww.com
25	0800	25	1400	902 and above	902 MHz and Up Fall Sprint	CW Ph Dig	6-char grid square	packratvhf.com
26	1300	29	0700	1.8-28,50,144	Classic Exchange, CW	CW	Name, RST, SPC, rcvr/xmtr model	www.classicexchange.org
27	1900	27	2100	3.5-28	RSGB FT4 Contest	Dig	Signal report	www.rsgbcc.org
29	2000	29	2100	3.5	UKEICC 80m Contest	CW	6-char grid square	www.ukeicc.com
31	1500	31	2359	3.5-28	Zombie Shuffle	CW	RS(T), SPC, Zombie no. or area code, name	www.zianet.com

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

2024 – 2025 School Club Roundup Results

The next two School Club Roundups will take place on
October 20 – 24, 2025, and February 9 – 13, 2026.

The main objective of School Club Roundup (SCR), sponsored by the Long Island Mobile Amateur Radio Club and ARRL, is to introduce students to the fun of operating amateur radio in a contest-style environment. Several stations have commented that SCR is a great way to get youth involved in ham radio. Look at who is attending your club's meetings — you might want to tap into your club membership for some new potential operators.

We'd like to take this opportunity to clarify some of the SCR rules. Some participants have been under the impression that only contacts made with schools count for SCR. While some individual entrants may choose to only work schools, all contacts count if the complete exchange — class, station location, and signal report — is sent and received by both stations. All clubs, whether affiliated with a school or not, are welcome to participate.

Participation Outcomes and Log Submission

Regardless of the number of contacts that you make during SCR, be sure to submit your logs. Some School Club Roundup participants have only a few operators and make many contacts while others may have more operators but make fewer contacts. For example, Sonora Elementary School, KJ5ANC, in Arizona, had 60 participants with 253 phone contacts. Scofield Middle School, N4SMS, in South Carolina, a perennial SCR leader, completed 859 contacts with only nine participants. Rambler Radio Club, W4MLS, in Georgia, had 18 participants joining in on the SCR fun!

Although the event had fewer entries than last year, the scores were higher this year. The most popular club category is College/University, with 45 entrants between the October and February SCR sessions. Individual participation remains popular as well, with 45 entries between both sessions. Individual participation is important, as this provides the opportunity for clubs to make additional contacts.

Participants from W7AHS, located at Alhambra High School in Arizona, switched to a loop antenna to



Johnny, KO6HQQ, operating from Heritage High School Amateur Radio Club, W6HHS, in Brentwood, California, contacts a station on 20 meters during the October 2024 School Club Roundup. [Spencer Holmes, KM6SJO, photo]

overcome the local noise they were receiving. The antenna experiment worked, as they were able to hear many more stations. The club is adding new members every day, and members stated that they can't wait for the next SCR session.

Submitting Soapbox Comments

We appreciate submissions of comments and pictures to the ARRL Contest Soapbox. These could include amusing anecdotes and pictures of kids operating during SCR. Soapbox comments and photos can be submitted at <https://contests.arrl.org/contest-soapbox.php>. Remember, photos of participants under the age of 18 require a release form signed by the student's parent or legal guardian. Contact the ARRL Contest Manager at contests@arrl.org to request a form.

We hope that you all had a good time operating in the event and look forward to seeing you on the air in our next sessions in October 2025 and February 2026!

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

The 2025 ARRL November Sweepstakes



CW: 2100 UTC Saturday, November 1 – 0259 UTC Monday, November 3

Phone: 2100 UTC Saturday, November 15 – 0259 UTC Monday, November 17

The ARRL November Sweepstakes is the premier domestic contest in the US and Canada. All levels of operators are welcome to join in the fun, from serious contesters to casual participants. Join thousands of operators as they attempt to beat personal records, win categories, and achieve the coveted Clean Sweep by working all 85 ARRL/RAC Sections in a single weekend.

Entrants may operate for a maximum of 24 of the 30 hours during the contest period. Off-times must be a minimum of 30 consecutive minutes without listening or transmitting. Exchange is serial number, precedence, your call sign, check, and ARRL/RAC Section.

Single Operator participants can choose to enter using the Limited Antennas or Youth Overlays. See the contest rules for more information on the overlay categories.

While Radio Amateurs of Canada recently announced the creation of a new Yukon Section, the current ARRL contest multipliers will continue to be used for this year's event. Refer to the Sweepstakes web page for any updates for 2026.

Logs are due 7 days after the conclusion of the event. Electronic logs must be uploaded to our web app at



Curtis Foote, WX4W; Glenn Petri, KE4KY, and Albert Tyler Barnett, N4TY, took first place in the Multioperator, Single Transmitter, Low Power category in the 2024 ARRL November SSB Sweepstakes. [Curtis Foote, WX4W, photo]

<https://contest-log-submission.arrl.org>. Send paper logs to ARRL November Sweepstakes, 225 Main St., Newington, CT 06111. Sweepstakes CW logs must be submitted or postmarked by 0259 UTC Monday, November 10. Phone logs must be submitted or postmarked by 0259 UTC Monday, November 24.

For more information, paper entry and logging forms, and complete rules, visit www.arrl.org/sweepstakes or contact contests@arrl.org.

Don't Envy the Book Author; Become One!

ARRL is the largest amateur radio book publisher in the world, and we're looking for new authors.

ARRL provides:

- ♦ Technical vetting by experienced engineers
- ♦ Professional editing
- ♦ Technical illustration
- ♦ Book design
- ♦ Marketing and publicity

Email your proposal to qst@arrl.org (no telephone calls, please). Send a short outline of your idea, including a list of chapter topics, and a sample of your writing.



Club Station

Embracing Youth-Group Partnerships with a Foxhunt

In the spring and summer of 2023, the South Jersey Radio Association (SJRA), K2AA, built 2-meter tape-measure Yagi antennas as a club project, and wanted to hold an event so they could operate with them. SJRA Vice President Ken Botterbrodt, K2WB, suggested coordinating a foxhunt for our local Cub Scout Fun Day at the Pine Hill Scout Reservation in Pine Hill, New Jersey. We thought exposing youth to ham radio would be a great way to use our homebrew equipment.

Cub Scout Fun Day is an annual one-day camping event for families that includes various activities, such as archery, games, and more. Our local Cub Scouts frequently ask SJRA to contribute a ham radio activity to their events. We began participating in various Scouting activities many years ago, when an SJRA member who was active in Scouting America cultivated a relationship with the local group. Since then, the club has tried to provide Scouts with one or two activities per year, including operating a station for Jamboree on the Air (JOTA).

Gathering Volunteers

Finding SJRA members to volunteer for the Cub Scout Fun Day event was harder than anticipated. Fortunately, Scott Dantis, AA2SD; Melissa Guenther, KE2BWZ; Glen Guenther, KE2BUO, and I signed up to help, and that seemed to be the critical mass we needed. Additionally, Pete Greene, N2LVI, was able to help later in the afternoon, which was appreciated.

At previous Cub Scout Fun Day events, we set up a 2-meter station for guests to make contacts using one of our repeaters with the help of club members. We thought this might be a fun addition to the foxhunt, as it gives the Scouts another opportunity to experience ham radio by getting on the microphone. Brian Gross, KD2FJX, and Alan Handley, K3WWT, volunteered to get on the air in Pennsylvania and make some contacts with the kids. Additionally, Jeffrey Bell, KZ2J, showed up on the repeater.



Rick Lawn, W2JAZ, leading one group of youngsters to hunt the hidden "fox" transmitter.

A Fun-Filled Day of Radio

When I left the house on the morning of the event, I had no idea if this venture would prove to be successful. I brought my own equipment, as well as foxhunting gear loaned to me by Mark Walters, KD2JPW, and Ray Golley, N3RG, who had the club's old fox. I knew that Scott and the Guenthers would also come equipped with handheld transceivers, antennas, and attenuators to knock down the signal as we got closer to the fox. Joe DeMarco, KC2SGV, provided the VHF go-box for the 2-meter station, and it worked perfectly.

I arrived at the Pine Hill Scout Reservation at noon, and Scott had already set up tables and printed 150 color certificates for each child who operated our 2-meter radio or participated in the foxhunt. He also printed three brightly colored signs to mark where we hid the foxes, which were programmed on different frequencies. With four of us available, we knew we could send at least two groups on a foxhunt in different locations, while simultaneously having member volunteers at our tables to help as many guests as possible.

One of us managed the 2-meter station for other interested Scouts, parents, and guardians. We also utilized the K2AA repeater for member-to-member and member-to-Scout contacts. (Some of the funny



A budding ham making a 2-meter contact with Alan Handley, K3WWT, in Pennsylvania.

comments from these youngsters bear repeating here: One Scout asked if the 2-meter radio was a real person. Another asked Jeffrey if he had ever handled animal poop, and he remarked that he just had!

The event was a huge success and very rewarding for all of us, including the adults who chaperoned the younger kids. Many more people know about SJRA and our hobby than before. More than 150 Scouts participated in the foxhunt or operated our 2-meter station — we ran out of certificates! Alan also reported that more than 50 Scouts had a chance at the microphone. In total, a modest estimate of approximately 200 youngsters participated in ham radio-related activities, and there was great interest from parents as well. The final event count indicated that nearly 1,400 people (including Scouts, their families, and Scout volunteers) were on site!

Harnessing a Successful Partnership

SJRA is fortunate to be based near a large Scout reservation, and one of our two repeaters happens to be located on a municipal water tower in the same area. Our activities for these events have been hit or miss, depending on SJRA member availability and weather. Our partnership with Scouting America has also led to SJRA being invited to provide instruction for achieving the Radio Merit Badge. Last year, 2 weeks after the Cub Scout Fun Day foxhunt, we operated during JOTA with four stations using our club call from the Scouting America Garden State Council. One Scout even enjoyed a contact with a JOTA station in Germany!



Member volunteers (from left to right): Pete Greene, N2LVI; Glen Guenther, KE2BUO; Rick Lawn, W2JAZ, and Melissa Guenther, KE2BWZ (Scott Dantis, AA2SD, is not shown).

While developing relationships with public schools has become increasingly difficult in recent years, connecting with Scouting America can be an excellent way to share the joys and potential that amateur radio offers youth. Interested clubs should visit www.scouting.org/about/local-council-locator to find a Scout council in their area.

All photos provided by the author.

ARRL Special Service Clubs



ARRL offers the Special Service Club (SSC) program for clubs that demonstrate that they're working to improve the amateur radio community by completing special projects, holding license classes, and working with local groups on events, among other activities. Visit www.arrl.org/ssc-application for more information about this program. Below is a list of new and renewing SSCs as of July 17, 2025.

Renewing SSCs

Mecklenburg ARS, W4BFB
Triple "A" ARA, WW3AAA
Theodore Roosevelt ARC, K0ND
Kitsap County ARC, KC7Z
Mike and Key ARC, K7LED
West Seattle ARC, W7AW

Charlotte, NC
Ambridge, PA
Dickinson, ND
Silverdale, WA
Renton, WA
Seattle, WA

Sign Up for ARRL Club News

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

Ham Media Playlist

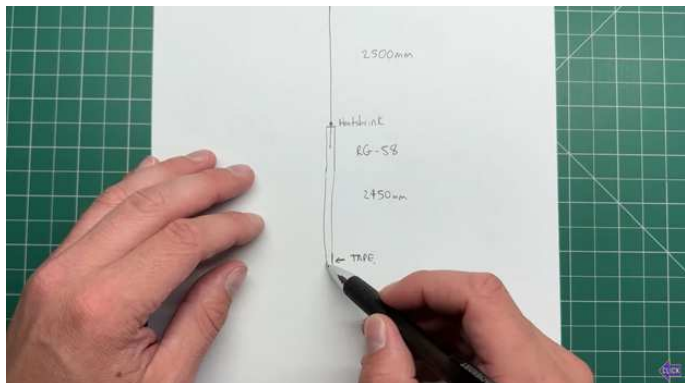
Antenna Builds

As the weather begins to cool off, projects in the shack tend to heat up. This month, we are looking at simple antenna-building projects that any ham can find success with. There is a certain bit of magic in making contacts with gear that you build yourself, so dig out your soldering irons and prepare to get on the air with some homebrew equipment.

A 10-Meter Vertical

First on the list is a video from Ham Radio DX (www.youtube.com/@HamRadioDX). Hayden Honeywood, VK7HH, has some great projects on this YouTube channel, including a quick 10-meter antenna build. In his video titled “Build an EASY 10 Meter (28 MHz) Vertical Antenna for DX!” (<https://tinyurl.com/10M-Vertical>), Hayden does a fantastic job of sketching and explaining the build; he makes sure to clarify smaller details, such as how many turns to make on a choke, specific measurements, and more. Hayden complements his explanations by sketching the project on paper, giving viewers an easy reference that they can screenshot and use for their own project.

After the sketch, Hayden proceeds to build the antenna in a sort of fast-forward style. There are a lot of videos on YouTube demonstrating antenna builds, and many of them are much longer than they need to be. Many creators feel the need to have the viewer witness every bit of the build, including wrapping a choke on PVC. Instead, Hayden shows the finished choke and briefly explains how and why he did it the way he did, thus cutting several minutes of extraneous video from the final product.



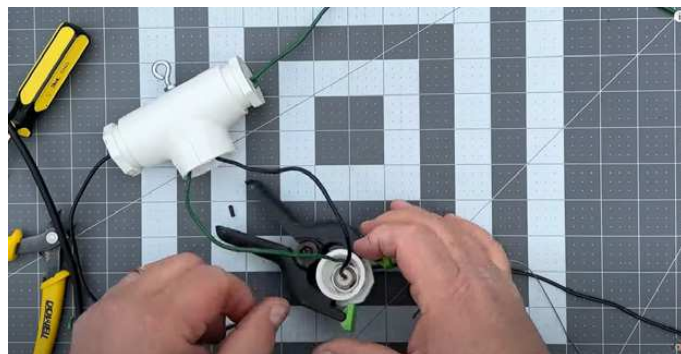
Hayden Honeywood, VK7HH, sketches his antenna build before beginning construction.

To wrap up the project, Hayden puts the antenna on an analyzer, sharing the results and discussing possible ways to improve performance. He then connects his homebrew antenna to an Icom IC-705 and demonstrates receiving FT8 signals. Overall, this is a quick build that does not require a lot of equipment or materials.

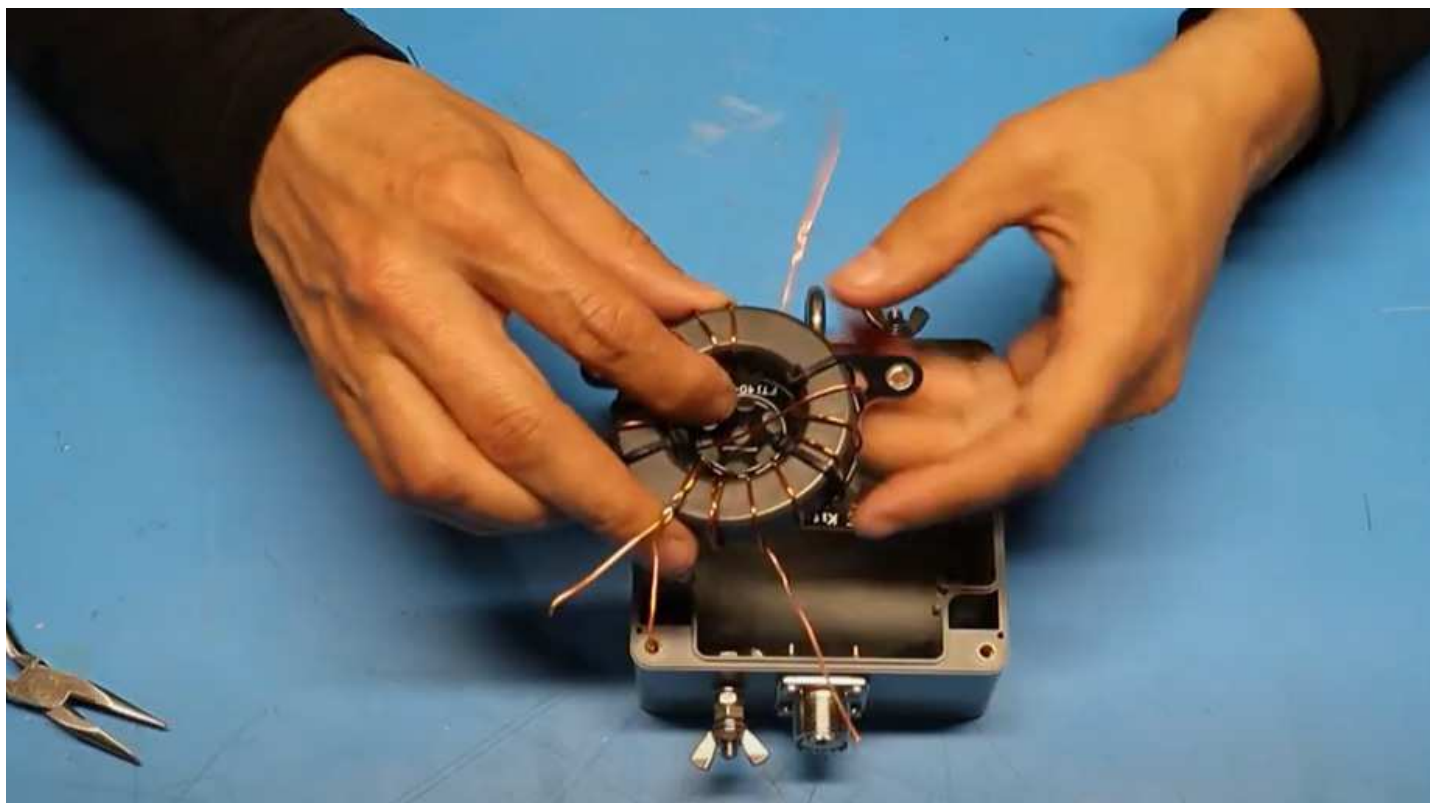
A 10-Meter Half-Wave Dipole

Next on the antenna build agenda is a video from a YouTube channel that I had not seen before, and a potential hidden gem: Otis Dyson (www.youtube.com/@OtisDyson). In a video titled “How To Build A 10 Meter Half Wave Dipole Antenna for 10 Meter Ham Radio” (<https://tinyurl.com/10M-HW-Dipole>), Otis, NØTIS, states up front that this is a great antenna for Technician-class licensees to get on the HF bands. He shows what materials are needed to build the antenna, making sure to point out that he is repurposing old materials for some components, such as the wire used for the antenna elements. Otis does a fantastic job of showing viewers how to use PVC plumbing components to construct a dipole. He even illustrates how to ensure a proper fit for all of the components.

The way Otis demonstrates each step is just the right balance — a verbal explanation of how and why he is performing each step, as well as a visual guide to help viewers succeed with their project. By leading viewers through each step of the process, including construction, deployment, testing, and trimming the antenna to get a nice standing wave ratio, he makes what often seems daunting for many hams feel attainable.



Otis Dyson, NØTIS, demonstrates how to build a 10-meter dipole.



Rob, N1NUG, walks viewers through the process of wrapping a toroid during the construction of an end-fed half-wave antenna.

An End-Fed Half-Wave Kit

Sometimes, getting an antenna in kit form is the way to go. The comfort of knowing that all of the necessary components are included in the package is often the deciding factor for whether someone wants to tackle a project. If you are looking for a project on a great antenna, check out ARRL's own channel (www.youtube.com/@ARRLHQ) and the ARRL End-Fed Half-Wave Antenna Kit. There is a short series of videos featuring Rob Zielfelder, N1NUG (www.tinyurl.com/EFHW-Antenna-Kit-Series). The antenna kit, available at the ARRL Store at <https://home.arrl.org/action/Store/Product-Details/productId/133267>, is an all-inclusive solution ideal for those interested in building a quality antenna.

The video series comprises three parts. Part One is the construction of the antenna — arguably, the

most important video for first-time builders. This is where Rob walks viewers step-by-step through the entire process. In Part Two, he tests and deploys the antenna, which is another critical step in the process, as testing and trimming are vital to antenna performance. Wrapping up the series is Part Three, where viewers have the opportunity to see the antenna on the air.

The antenna itself is a high-quality unit that performs well on 10, 15, 20, and 40 meters with up to 250 W. Everything you need, minus basic tools, is included in the kit.

No matter what projects you have in mind for these cooler months, consider building and experimenting with a new type of antenna. Working the world with an antenna you constructed yourself can be quite rewarding.

How's DX?

A New DXCC Award; Federated States of Micronesia and More On the Air

On July 18 – 19, 2025, the ARRL Board of Directors met in Windsor, Connecticut, and announced the introduction of the 10-Band DX Century Club (DXCC) Award. This award recognizes operators who achieve DXCC on all bands from 6 to 160 meters (excluding 60 meters). Higher endorsement levels will be available at the 200, 300, and Honor Roll levels, like the new DXCC Trident Award that was introduced at the Board's January 2025 meeting. Information about the DXCC Trident Award can be found at www.arrl.org/dxcc-trident-award. As of press time, more details about the 10-Band DXCC Award are expected to be available on the ARRL website.

V6 — Federated States of Micronesia

The Federated States of Micronesia (FSM), formerly known as the Eastern Caroline Islands for DXCC, includes four states: Yap, Chuuk, Pohnpei, and Kosrae. These four states comprise more than 600 islands, covering an expanse of some 2,700 kilometers (about 1,700 miles). The islands currently have a population of around 113,000 residents, and only two of them are active hams.

In mid-April of this year, a team from Germany that had conducted DXpeditions to El Salvador (HU1DL), Papua New Guinea (P29RO), Tuvalu (T2C), and most recently, Nauru (C21MM), announced their plans for a September 22 – October 6, 2025, DXpedition to FSM. They will be operating as V6D from Weno Island in Chuuk (Islands on the Air [IOTA] reference number OC-011).

The team will consist of nine operators: DG2RON, DJ7TO, DJ9KH, DK5WL, DL1KWK, DL2RNS, DL4SVA, DL7JOM, and DL7VEE. They will operate five stations around the clock on 160 – 6 meters (excluding 60 meters) on CW, SSB, FT8, and RTTY. To

see the V6D team's targeted transmit frequencies, visit https://v6d.mydx.de/?Operating_frequencies.

They will use Elecraft K3S and K4 transceivers, small amplifiers from various manufacturers, a two-element full-size wire beam from LZ Antenna with a pentaplexer for multi-band operations, fiberglass poles, a heavy-duty aluminum telescopic mast from Spiderbeam, and Highflexx 7 coaxial cable. Each piece of equipment is privately owned by a team member and has been carefully chosen to ensure reliability and minimize transport risks.

As of press time, FSM ranks number 89 worldwide on Club Log's DXCC Most Wanted List. By region, it's number 45 in the British Isles, 54 in Western Europe, 63 in Eastern North America, 77 in Eastern Europe and Africa, 86 in the Middle East, 92 in South America, 172 in Western North America, 179 in Oceania, and 232 in East Asia. By mode, it's number 84 on SSB, 95 on digital, and 97 on CW.

The beauty of having a multi-operator DXpedition such as this one is that each member can get on the air in shifts to prevent fatigue. Every V6D teammate will alternate between 4.5 hours of operating at a time and 9 hours of rest. When operating, they will be on multiple bands and modes simultaneously, and there will be one station per band at any given time. On FT8, they will be using *MSHV* with up to six slots. The team asks that callers do not transmit on their transmit frequencies. It should be noted that they will have all of the FT8 stations manned (not running on autopilot) per ARRL DXCC rules; this will also give weaker stations the opportunity to be selected. They'll log all contacts after they send the RR73 or 73 message. If you are in doubt about your contact, try to work them again. The V6D team plans to upload contacts daily to Club Log. There will be no log corrections during the DXpedition.

For more details, keep an eye on their website at www.v6d.mydx.de and watch your favorite DX outlet.

E5/N — Northern Cook Islands

A six-person team will activate E51MWA from Manihiki Atoll in the Northern Cook Islands on October 9 – 20,



2025. They will operate on CW, SSB, and FT8 on 160 – 10 meters. The operators include experienced DXers Rob, N7QT; Robin, WA7CPA; Jack, N7JP; James, KC7EFP; Brian, N9ADG, and Violetta Latham, KN2P, a young woman SSB contester and pilot who is the newest member of the team.

They will bring three upgraded K3S transceivers with DynoLab LDMOS amplifiers, ensuring clean signals and a consistent 100 W output, even under varying power conditions. For antennas, they'll use vertical dipole arrays for five bands and three CrankIRs, all operating from mains-powered bungalows with two FlexRadio PGXL amplifiers and one Elecraft KPA500. The team expressed that without the support of DX Engineering and SteppIR, this DXpedition would not be possible.

The E51MWA team will use FT8 in Fox and Hound mode, with *WSJT-X* and multiple streams for higher contact rates. Operators should call above 1000 Hz. They expect to have adequate internet and plan to utilize Club Log's livestream feature. Connectivity may be intermittent due to the remote location.

M0URX will be handling the QSL chores. More details, including their band plan, can be found on the E51MWA website at www.e51mwa.com.

Hope Island (AS-178NEW)

A team will conduct an IOTA DXpedition from Hope Island (AS-178NEW) between September 27 and October 2, 2025, using the special call sign AU2H. This will be the first time that this new IOTA counter will be on the air. The team includes Cezar, VE3LYC (VU3LPL); Sarath, VU2RS; Adersh, VU24DX, and Anil, VU3DXA. Operators plan to run three stations across multiple bands and modes, including 40 – 10-meter CW, SSB, and FT8, and possibly 6 meters. For more information, visit their website at www.au2h-as178.weebly.com.

KH9 – Wake Island

As many DXers know, Allen, KH7AL/KH9, is working on Wake Island on a rotating schedule (3 months on and 1 month off) for the foreseeable future. Also on the island is Richard, KR4CDI/KH9, a new licensee. In the middle of August, Jim, KH9/K9HEI, was stationed there for 2 weeks, and he plans to visit again. In May, Allen was interviewed by podcaster Marco Vig from "All Across America." You can hear the interview (episode #62, dated May 8) at www.allacrossamerica.com.

D2 – Angola

An international team will commemorate the 50th anniversary of Angola's independence by operating from Mussulo under the special call sign D2A. Angola achieved independence on November 11, 1975, and the team members will represent Angola, Portugal, and Spain. D2A will be active from approximately October 17 to



29. The event is meant to globally promote Angola's cultural and natural resources, and the team plans to operate around the clock.

The operators will include EC7R, CT1BOL, D2ACE, EC1T, EA1ACP, D2XX, CT2GFW, CT7APE, CT1FFU, and EA5EL. Six D2A stations are planned, and they will utilize four Icom IC-7300 transceivers, satellite equipment, and an Elecraft transceiver. For amplifiers, they'll use multiple SPE Expert 1.3 kW units and an HF-62. The team anticipates being on CW, SSB, RTTY, FT8, and QO-100, covering 160 – 6 meters.

The designated D2A target frequencies and modes will be as follows:

- CW: 1823.5, 3520, 7012, 10110, 14015, 18071, 21019, 24891, 28015, and 50095 KHz
- SSB: 3785, 7095, 14240, 18152, 21255, 24965, 28440, and 50115 KHz
- RTTY: 3585, 7044, 10144, 14088, 18102, 21085, 24918, and 28100 KHz
- FT8: 1843, 3567, 7071, 10133, 14090, 18090, 21080, 24920, 28095, 50313, and 50323 KHz
- QO-100: 10489.900 KHz

The team will primarily utilize split frequency operation. They will be listening on 1 – 5 kHz on CW, 5 – 15 kHz on SSB, and 3 – 10 kHz on RTTY. On FT8, they'll use *MSHV* (two to six slots). Direct QSL requests to EA7FTR. Keep an eye on www.qrz.com/db/D2A for more information.

The World Above 50 MHz

A Question of October F2; False 2-Meter Spots; Rare Grids; First-Timer Success

On October 8, 2024, Solar Cycle 25 roared to life on 50 MHz with a sunspot number of 162. Widespread F2 openings began for North America that morning, with strong signals from South American stations pouring into the Midwest. Strong aurora and a G4-class geomagnetic storm occurred on October 10; this led to hours of F2 to Africa, South America, and the South Pacific the next day. What will 2025 bring? Some solar observers, like F. K. Janda, OK1HH, feel that we “have passed the probable peak of the 25th 11-year cycle.” The sunspot numbers have been declining since January 2025 (see Figure 1). Most solar cycles have two peaks, each corresponding to sunspots appearing in one solar hemisphere, and then the other. So far, the sunspots for Solar Cycle 25 have been in the southern hemisphere. Some observers noted a possible early and tiny northern hemisphere peak. But Carl Luetzel-schwab, K9LA, commented, “Is this a peak? I don’t think so. It had no significant valley.” So, will the sun’s northern hemisphere come alive this month? Carl and Ken Neubeck, WB2AMU, noted an upward trend in solar activity in July. The sunspot number was 182 on July 14 — higher than on October 8, 2024. If that trend continues, it could be good news for 6-meter enthusiasts this fall.

Debunked 2-Meter Sporadic E

On July 21, 2-meter spots between New England and France appeared on DX Maps, which made some operators wonder if it was the result of sporadic E.

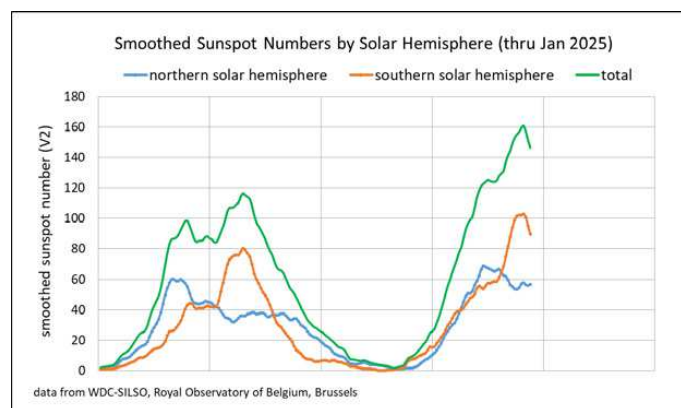


Figure 1 — A graph from the Royal Observatory of Belgium’s Solar Influences Data Analysis Center depicting the smoothed sunspot numbers through January 2025. [www.sidc.be/SILSO/home, Royal Observatory of Belgium image]

Unfortunately, the spots were not real. But, had they been real, some lucky stations may have earned the Brendan Shields for the first terrestrial 2-meter digital contacts between North America and Europe.

The Brendan Awards are presented by the Irish Radio Transmitters Society (IRTS) to encourage 2-meter transatlantic experimentation. For more information, visit the IRTS website at www.irts.ie/cgi/st.cgi?brendan.

Rare FFMA Grid Activations

Jim, K8JH, operated from Fred Fish Memorial Award (FFMA) grids FN45, FN56, and FN57 in mid-July. Dan, NA6MG, operated from DM14, and AL1VE was in DN05, followed by NØJK in EM18, NØLL in EN00, and AAØMZ in EN20 during the digital portion of the CQ World Wide VHF Contest. On July 19, I noted 6-meter E_s from EM18 to both coasts during the contest, and there were strong signals from NA6MG/P.

Barry, K7BWH, traveled to the “water grid” of CN78. Starting on July 22, he camped on a mountain in the Olympic Peninsula for 4 days and made 188 contacts across the western states. Barry had a 1-hour opening to Houston, Texas. He said, “This trip was — in every way — the opposite of N7PHY’s and my brutal desert expedition to DL88 this [past] May. After all, this was at an altitude among dense green trees in a temperate rainforest.” Glenn Johnson, WØGJ (EN43), worked K7BWH in CN78 and told him, “Being in the chair is so important. Your 1-minute opening here into EN43 was magic! It was 11:30 PM here. I had only three decodes the whole time: your CQ, your report, and your RRR — nada before or after.” Glenn’s comment is crucial if you want to work rare stations on VHF; you have to be on the radio at the right time. Jeff, WB8LYJ, reported on his extended rover trip, stating, “I started my rove on June 5 and made it home on July 15. Round-trip, it was a bit more than 5,000 miles. I activated 20 grids, and there are about 2,100 contacts in my log.”

A Ham’s First Day on 6 Meters

Randy Leedy, WS4C, sent me a note relating his first day of operating on 6 meters, which was July 9. He said:



A view of Ed Serzhon's, N7PHY, portable station during his July 4, 2025, expedition to grid DN16. [Ed Serzhon, N7PHY, photo]

I bought a new rig that — for the first time in my life — provides me with 6-meter capability. On the morning of July 9, using my four-band fan dipole (for 40, 30, 17, and 12 meters), I tuned to 50.313 MHz and found the band active here in South Carolina, with decodes from stations out to about 1,200 miles. My tuner matched that antenna, so I went to work [and started] calling.

By the time the band closed in late afternoon, I had made 24 contacts with nine US states (out as far as KD5XB in New Mexico), plus two XE3s and K6VHF/HR9, which was my best DX at about 1,300 miles. It seemed to me that [it was] a pretty good day to get acquainted with 6 meters! I quickly understood how it came to be called “the Magic Band.”

Randy is off to a great start, and K6VHF/HR9 is a rare one! Bill Thomas, WT0DX, noted, “Alex Nersesian, K6VHF/HR9 (EK66), uses a three-element 6-meter beam and runs an IC-7300 at 100 W. From the back of his house, he has a direct shot over water to the north. Alex made close to 200 6-meter contacts on July 9.” Bill added that K6VHF is working on full remote capability for his station. You can listen to a podcast interview with Alex at www.qsotoday.com/podcasts/k6vhf.

On the Bands

50 MHz. During his July 4 grid expedition to DN16, Ed Serzhon, N7PHY, noted that he logged Edfel, KP4AJ, and Dan, NP4EI. July 6 was a big day for W0MU (DM79) and K0PRT (DM88), who worked stations in China, South Korea, and Japan. K0PRT worked BA4SI and BA5DX, both near Shanghai. Rich, K1HTV, said 6 meters was sparse until July 15, when he made contacts with several stations across Europe. The next day was a banner day for Rich, starting at 1015 UTC. On FT8, he copied more than 550 different European



Sunrise over Ed Serzhon's, N7PHY, July 4, 2025, portable setup in grid DN16. [Ed Serzhon, N7PHY, photo]

stations in 40 DX Century Club countries; most of the stations he copied (105) were in Germany.

John Lutz, N9JL (EN51), with 50 W and a dipole elevated 10 feet, made his first 6-meter European contacts on July 20. He worked F8DBF and G8BCG at around 2240 UTC. The next day, Pierre, VE2GT (FN36), worked EA8TL (IL18) and CU2AP (HM77).

144 MHz. At 0132 UTC on July 5, Larry Lambert, N0LL (EM09), decoded VE6TA (DO33) five times on FT8 via E_s. On July 23, Ron, K3FR (FM18), used his indoor Yagi to work N9XG (EN60) via tropospheric propagation. K1HTV also worked N9XG. At 1515 UTC on July 26, Mike White, K7ULS, worked HA8CE via Earth-moon-Earth (EME) in 3 minutes. Mike was using an eight-element Yagi, and HA8CE was using a nine-element Yagi! A short 2-meter sporadic-E opening concluded the month. On July 31, Phil, N0PB (EM39), logged W4BLD (EL98) at 2105 UTC on FT8, with +15 dB signals. WZ9W copied, but did not work, W4BLD.

222 MHz. David Olean, K1WHS, noted strong tropospheric propagation over the Great Lakes on July 15, during 222 MHz Activity Night. He worked many stations, including 25 W VA3IKE (EN82) on Q65B.

Here and There

Rick, W5EME, earned FFMA #61. Ed, N7PHY, congratulated him, stating, “You are now and forever the holder of a very rare accomplishment.”

Eloy Ritter, W4ERP, said his 2304 MHz contact with W5LUA on May 15, 2025, qualified for the ARRL Distance Records.

Convention and Hamfest Calendar

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

Abbreviations

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

Alabama (Headland) — Oct. 25 **FTV**

8:30 AM. *Spr*: Wiregrass ARC. Headland Town Square, 100 Park St. *TI*: 145.43 (186.2 Hz). *Adm*: Free. Email: clwoodall2@gmail.com

Alabama (Montgomery) — Nov. 8 **FTV**

8:30 AM – 3 PM. *Spr*: Montgomery ARC. Alcazar Shrine Temple, 555 Eastern Blvd. *TI*: 146.84 (123 Hz). *Adm*: \$10. www.w4ap.org

Arizona (Marana) — Nov. 8 **DFHQRSTV**

7 AM – noon. *Spr*: Oro Valley ARC. Marana Middle School, 11285 W. Grier Rd. *TI*: 146.62 (156.7 Hz). *Adm*: \$5. www.tucsonhamradio.org

MICROWAVE UPDATE 2025

October 17 – 18, Tucson, Arizona

DFHRS

8 AM – 5 PM. *Spr*: Arizona Microwave Group. Casino del Sol, 5655 W. Valencia Rd. *TI*: 146.55. *Adm*: TBD. www.microwaveupdate.org

Arizona (Wickenburg) — Nov. 1 **HRT**

8 AM – noon. *Spr*: Hassayampa Amateur Radio Klub. Redeemer Lutheran Church Annex, 470 Rose Ln. *TI*: 146.62. *Adm*: Free. www.harkaz.org

ARRL ROCKY MOUNTAIN DIVISION CONVENTION

October 23 – 26, Grand Junction, Colorado

DFHRSV

8 AM – 8 PM. *Spr*: HamCon Colorado. Doubletree Hotel Grand Junction, 743 Horizon Dr. *TI*: Colorado Connection and DMR Wide. *Adm*: \$35 Advance, \$45 door. www.hamconcolorado.com

Connecticut (Gales Ferry) — Oct. 18 **AR**

8 AM – 3 PM. *Spr*: Southeastern Connecticut ARS. Our Lady of Lourdes Parish Hall, 1650 CT-12. *TI*: 146.73 (156.7 Hz). *Adm*: \$5. www.secars.org

ARRL CONNECTICUT STATE CONVENTION

October 12, Meriden, Connecticut

DFHRSV

8 AM – 1 PM. *Spr*: Meriden ARC and Nutmeg Hamfest Alliance. Francis T. Maloney High School, 121 Gravel St. *TI*: 147.36 (162.2 Hz). *Adm*: \$10. www.nutmeghamfest.com

Florida (Crestview) — Oct. 11 **DFHRTV**

8 AM – 1 PM. *Spr*: North Okaloosa ARC. Crestview Community Center, 1446 Commerce Dr. *TI*: 147.36 (100 Hz). *Adm*: \$8; Boy Scouts in uniform, free; over 90 years old, free. www.w4aaz.org/noarc/hamfest-2025

Florida (Pinellas Park) — Nov. 8 **FRV**

8 AM. *Spr*: St. Petersburg ARC. Freedom Lake Park, 9990 46th St. N. *TI*: 147.06. *Adm*: Free. www.sparc-club.org/sparcfest

ARRL GEORGIA SECTION CONVENTION

November 1 – 2, Lawrenceville, Georgia

DFHQRSTV

Sat. 8 AM – 4 PM, Sun. 8 AM – 2 PM. *Spr*: Alford Memorial Radio Club. Gwinnett Co. Fairgrounds, 2405 Sugarloaf Pkwy. *TI*: 147.075 (82.5 Hz). *Adm*: \$8 Advance; \$10 Sat.; \$5 Sun. only. www.stonemountainhamfest.com

Georgia (Savannah) — Oct. 18 **FT**

8 AM – 1 PM. *Spr*: Coastal ARS. Savannah Regional Airport Recreation Facility, Crossroads Pkwy. *TI*: 442.70. *Adm*: Free. Email: ny4dradio@gmail.com

Illinois (Westchester) — Oct. 18 **DFRV**

8 AM – noon. *Spr*: Chicago Suburban Radio Association. Westchester Community Church, 1840 Westchester Blvd. *TI*: 146.88 (107.2 Hz). *Adm*: \$8 Advance, \$10 door. www.csraham.com

Indiana (Bedford) — Nov. 8 **DFHIRSTV**

8 AM – 2 PM. *Spr*: Hoosier Hills Ham Club. Lawrence Co. 4H Fairgrounds, 11261 US-50 W. *TI*: 146.73 (107.2 Hz). *Adm*: \$5. www.hoosierhillshamfest.com

Indiana (Lynnville) — Oct. 18 **DFHRT**

7 AM – 1 PM. *Spr*: Tri-State ARS. Lynnville Community Center, 316 IN-68. *Adm*: Free; donations accepted. www.hamtoberfest.com

Iowa (Boone) — Oct. 18 **DFHQRSTV**

8 AM – noon. *Spr*: 3900 Club. Boone Co. Fair Commercial Exhibits building, 1601 Industrial Park Rd. *TI*: 146.850 (114.8 Hz). *Adm*: \$7; 14 and under, free with paid admission. Email: cgconard@globalccs.net

DX WORKSHOP

October 4, Bowling Green, Kentucky

HRS

9 AM – 4 PM. *Spr*: Western Kentucky DX Association. Warren Co. Public Library Bob Kirby Branch, 175 Iron Skillet Ct. *TI*: 444.30 (179.9 Hz). *Adm*: \$10 for 18 and under; \$15 advance for over 18; credit card only at door. www.wkdx.org/events

FRVA AMATEUR RADIO CHAPTER RALLY

October 6 – 10, Paducah, Kentucky

RS

8 AM – 5 PM. *Spr*: Family RV Association. Duck Creek Campground, 2540 John L. Puryear Dr. *TI*: 146.55. *Adm*: Free. www.frvaarc.com

Maryland (Hollywood) — Oct. 11 **DFHRTV**

8 AM – 1 PM. *Spr*: St. Mary's Co. ARA. Hollywood Volunteer Fire Dept., 24801 Three Notch Rd. *TI*: 147.195 (156.7 Hz). *Adm*: \$5. www.smcara.org

Michigan (Muskegon) — Oct. 11 **FRHV**

9 AM – noon. *Spr*: Muskegon Co. Emergency Communication Services, Inc. Fellowship Church, 4200 E. Apple Ave. *TI*: 146.82 (94.8 Hz). *Adm*: \$5. www.mcecs.net

Michigan (St. Clair Shores) — Oct. 19 **DFHRV**

8 AM – 1 PM. *Spr*: Utica Shelby Emergency Communications Association. VFW Post #1146 (Bruce Post), 28404 E. Jefferson Ave. *Adm*: \$5. www.usecaarc.org

ARRL MINNESOTA STATE CONVENTION

October 11, Brooklyn Park, Minnesota

D H F R S V

8 AM – 1 PM. *Spr:* Minnesota Amateur Radio Consortium. Hennepin Technical College, 9000 Brooklyn Blvd. *Tl:* 146.76 (114.8 Hz). *Adm:* \$30 Advance, \$40 door. www.northstarradio.org

Missouri (Kirkwood) — Oct. 25 F T V

7:30 AM – 1 PM. *Spr:* Saint Louis ARC. Kirkwood Community Center, 111 S. Geyer Rd. *Tl:* 147.75 (141.3 Hz). *Adm:* \$8 Advance, \$10 door. www.halloweenhamfest.org

Missouri (Nixa) — Nov. 8 D F H R S V

8 AM – 1 PM. *Spr:* Nixa ARC, Southwest Missouri Linked Repeater System. Victory Baptist Church, 252 N. Nicholas Rd. *Tl:* 147.015 (162.2 Hz). *Adm:* \$10. www.smlrs.info

North Carolina (Maysville) — Oct. 12 F H R T V

8 AM – 1 PM. *Spr:* Maysville Hamfest Association. Maysville Community Building, 703 8th St. *Tl:* 146.685 (88.5 Hz). *Adm:* Free. www.maysvillehamfest.org

Ohio (Montpelier) — Oct. 11 F H R T

10 AM – 1 PM. *Spr:* Williams Co. ARA. Williams Co. Fairgrounds, 619 E. Main St. *Tl:* 146.82 (107.2 Hz). *Adm:* \$7. Email: ke8zhs@gmail.com

Ohio (North Canton) — Nov. 2 D F H R V

8 AM – 1 PM. *Spr:* Massillon ARC. MAPS Air Museum, 2260 International Pkwy. *Tl:* 147.180 (110.9 Hz). *Adm:* \$5 Advance until Oct. 1, \$8 door. www.w8np.net

Oklahoma (Ardmore) — Oct. 11 D F H Q R S V

8 AM – 3 PM. *Spr:* Central Oklahoma Radio Amateurs. Ardmore Convention Center, 2401 N. Rockford Rd. *Tl:* 146.97 (131.8 Hz). *Adm:* \$10 Advance, \$12 door. www.hamarama.org

Oregon (Rickreall) — Oct. 18 D F H R V

9 AM – 3 PM. *Spr:* Mid-Valley ARES, Inc. Polk Co. Fairgrounds, 520 S. Pacific Hwy. W. *Adm:* \$10. www.swaptoberfest.com

Pennsylvania (Perkasie) — Oct. 19 D F H R T V

8 AM – 1 PM. *Spr:* RF Hill ARC. Upper Co. Campus Bucks Co. Community College, 313 Blooming Glenn Rd. *Tl:* 145.31 (131.8 Hz). *Adm:* \$10; non-hams, free. www.rfhillarc.club

South Carolina (Little Mountain) — Oct. 11 F T

8 AM – 1 PM. *Spr:* Dutch Fork Amateur Radio Group. Brady Park, 230 Depot St. *Tl:* 147.210 (156.7 Hz). *Adm:* Free. www.w4dfg.org

RV RADIO NETWORK FALL RALLY

October 12 – 15, Elmendorf, Texas

S

9 AM – 9 PM. *Spr:* RV Radio Network. Braunig Lake RV Resort, 13550 Donop Rd. *Tl:* 145.350 (simplex). *Adm:* By registration. www.rvradionetwork.com

Texas (El Paso) — Oct. 25 D F H R T

8 AM – 1 PM. *Spr:* El Paso ARC. El Paso ARC Clubhouse, 2100 San Diego Ave. *Tl:* 146.70. *Adm:* Free. www.w5es.org

PACIFIC NORTHWEST VHF SOCIETY CONFERENCE AND MEETING

October 11, Wenatchee, Washington

S

8 AM – 4 PM. *Spr:* Pacific NorthWest VHF Society. Red Lion Hotel Wenatchee City Center, 1225 N. Wenatchee Ave. *Adm:* \$30. www.pnwvhfs.org

West Virginia (Mineral Wells) — Oct. 11 F H R T V

8 AM – noon. *Spr:* Wood Co. Emergency Communications. Wood County 4-H Campground, 2203 Butchers Bend Rd. *Tl:* 147.255 (131.8 Hz). *Adm:* \$5. www.wc8ec.org

Wisconsin (Lancaster) — Oct. 18 F H R V

8 AM – 2 PM. *Spr:* Hidden Valleys ARC. Grant Co. Fairgrounds Youth and Ag. Building, 916 E. Elm St. (County Rd. A). *Tl:* 146.52. *Adm:* Free. www.kc9kq.net

Wisconsin (Oshkosh) — Nov. 2 D F H R S V

8 AM – 1 PM. *Spr:* Fox Cities ARC. Sunnyview Exposition Center, 500 E. County Rd. *Tl:* 146.76 (100 Hz). *Adm:* \$6 Advance, \$8 door. www.fcarc.club

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 **November 1** to be listed in the **January** 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@arrrl.org.

Special Event Stations

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

Sep. 19 – Sep. 21, 0000Z – 2359Z, K4MIA, Loxahatchee, FL. PBSE. **National POW MIA Recognition Day**. 7.195 14.265 18.150 28.400. QSL. Michael Bald, 6758 Hall Blvd., Loxahatchee, FL 33470. www.qrz.com/db/k4mia

Sep. 25 – Sep. 27, 1300Z – 2200Z daily, W4F, Woodruff, SC. Spartanburg Amateur Radio Club. **18th Annual Triple Tree Fly-In**. 14.285. QSL. Spartanburg Amateur Radio Club, 400 Glennwood Dr., Spartanburg, SC 29306. *Check spotting networks.* www.qrz.com/db/w4f

Oct. 2 – Oct. 5, 0000Z – 2359Z, WWØWWV, Fort Collins, CO. WWV Amateur Radio Club. **WWV 106th Anniversary SES**. 7.048 7.248 14.048 14.248. QSL. WWV ARC, P.O. Box 273226, Fort Collins, CO 80527. www.wwvarc.org

Oct. 3 – Oct. 5, 0000Z – 2359Z, W1E/W3E/W4E, Prospect, CT. KB1FGC. **Elmer Appreciation Day**. 7.040 14.040 21.040. QSL. Richard Guerrero, 19 Terry Rd., Prospect, CT 06712. www.qrz.com/db/kb1fgc

Oct. 4, 1300Z – 2000Z, WØCWP, Anamosa, IA. Jones County Amateur Radio Club. **2025 Pumpkin Fest**. 7.200 14.250 18.150 21.300. Certificate. Ron Hendricks, 828 W. 8th St., Monticello, IA 52310. www.facebook.com/groups/151772133772

Oct. 4 – Oct. 5, 1017Z – 1017Z, K4R, Piney Flats, TN. Kingsport Amateur Radio Club. **Rocky Mount Celebration**. 7.235 14.275 28.410. QSL. Michael Gallatin, 106 W. Ellis Ln., Mount Carmel, TN 37645. contact@w4trc.org or www.w4trc.org

Oct. 4 – Oct. 19, 1400Z – 2359Z, N16BB, San Pedro, CA. Battleship Iowa Amateur Radio Association. **US Navy's 250th Birthday**. See website for frequencies; modes will be at the discretion of the operator. QSL. See website for information. www.biara.org

Oct. 6 – Oct. 10, 1700Z – 1800Z, WE4RV, Paducah, KY. Family RV Association Amateur Radio Chapter. **FRVA-ARC Fall Rally**. 7.060 7.240 14.060 14.265. QSL. John Bechtoldt, 1418 S. Yale Dr., O'Fallon, IL 62269. *Check DX cluster for spotting.* www.frvaarc.com

Oct. 10 – Oct. 12, 2259Z – 2359Z, N2S, Cape May, NJ. United States Coast Guard Auxiliary. **Celebrating 86 Years of the United States Coast Guard Auxiliary Serving the Coast Guard and America**. 7.250 14.310 18.200 VHF. Certificate. Mike Slepian, WB2LKO, 12 Continental Ln., Marlton, NJ 08053. www.cgaux.org

Oct. 10 – Oct. 14, 1300Z – 0400Z, WM3PEN, Philadelphia, PA. Holmesburg Amateur Radio Club. **Continental Navy Birthday**. 7.250 14.276. QSL. Holmesburg Amateur Radio Club, 3341 Sheffield Ave., Philadelphia, PA 19136. www.wm3pen.org

Oct. 11, 1330Z – 2100Z, K3S, Port of Baltimore, MD. Nuclear Ship *Savannah* Amateur Radio Club. **Ike Eisenhower's Birthday**. 7 14 18 21 28. QSL. Ullis Fleming, 980 Patuxent Rd., Odenton, MD 21113. *Check spotting networks.* *Savannah Award available.* www.qrz.com/db/k3s

Oct. 11, 1400Z – 1700Z, WØCXX, Cedar Rapids, IA. Collins Amateur Radio Club. **Collins Radio 92nd Anniversary**. 14.263. QSL. Brice AntonJensen, 1110 Lyndhurst Dr., Hiawatha, IA 52233. www.qrz.com/db/w0cxx

Oct. 11, 1600Z – 2300Z, N16IW, San Diego, CA. USS *Midway* Museum Ship. **US Navy Birthday**. 7.250 14.320; 14.070 PSK31 D-STAR on PAPA System Repeaters. QSL. USS *Midway* Museum Ship COMEDTRA, 910 N. Harbor Dr., San Diego, CA 92101. www.qrz.com/db/n16iw

Oct. 11 – Oct. 13, 0000Z – 2359Z, NJ2KC, Bridgeton, NJ. New Jersey Knights of Columbus Amateur Radio Club. **234th Anniversary of Columbus Day**. 7.234 14.234 21.234 29.234. Certificate & QSL. NJ2KC c/o Thomas M. Perrotti, 785 Vineland Ave., Bridgeton, NJ 08302-4822. www.nj2kc.org

Oct. 13 – Oct. 14, 1000Z – 0300Z, K9NBH, Salem, WI. Great Lakes Radio Club. **US Navy Birthday**. 7.225 14.250. e-Certificate. See website for instructions. www.qrz.com/db/k9nbh

Oct. 18, 1400Z – 2000Z, K4RC, Williamsburg, VA. Williamsburg Area Amateur Radio Club. **Yorktown Special Event Station**. 7.265 14.265. Certificate. QSL Manager, WAARC, P.O. Box 1470, Williamsburg, VA 23187. *The Virginia Historic Triangle Certificate is available for working the Jamestown, Williamsburg, and Yorktown Special Event Stations.* www.k4rc.net

Oct. 18, 1500Z – 2200Z, W9P, Plover, WI. Central Sands Amateur Radio. **National Mashed Potato Day**. 14.320; 40 and 15 meters depending on band conditions. QSL. Phil Schobert, 300 Polk St., Stevens Point, WI 54481-5841. csarc2022@gmail.com

Oct. 31 – Nov. 1, 1300Z – 0500Z, WA4TRS, Fairview, NC. The Road Show Amateur Radio Club. **BOO!** 14.273. Certificate & QSL. The Road Show ARC, 57 Echo Lake Dr., Fairview, NC 28730.

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 **January QST** would have to be received by **November 1**. 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.

Congratulations

July 2025

QST Cover Plaque Award Winner

**Conrad Trautmann,
N2YCH**

In his article, "Operating WSPR QRPpp: It's All About the Noise," Conrad shares how he leveraged WSPR network data to find and silence local interference, optimize his antenna systems, improve reception, and climb the WSPR Top Spotters leaderboard.

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!

Operating WSPR QRPpp: It's All About the Noise

Quieting your local interference helps with receiving the weakest signals.

Conrad Trautmann, N2YCH

Weak Signal Propagation Reporter (WSPR) is a digital mode within WSJT-X (see Figure 1). The data that's generated by the WSPR network can be used to check your antenna's performance for transmitting and receiving, and to see what band paths are open at a particular time of day from your location. Recently, I've been using WSPR to improve my antenna systems and to help measure the effects of reducing local noise sources.

WSPR sends approximately 2-minute-long QRP digital transmissions containing the originating station's call sign, the Maidenhead grid locator, and the transmit power level being used. Stations typically use anywhere from a few milliwatts to 5 W when sending these signals for QRP (5 to 1 W), QRPp (less than 1 W to 100 mW), and QRPpp (less than 100 mW) operations. WSJT-X allows you to select how often you want to send the transmission and which bands to use. There's a schedule in WSJT-X that allows band hopping for stations using a multiband antenna

to transmit on different bands. When you're not transmitting, it listens for and decodes other transmitting stations and can post those station location spots to the WSPR network database.

When it's not transmitting, WSPR will receive and post the beacons it hears to www.wsprnet.org. Similar to the way www.pskreporter.info operates, www.wsprnet.org provides maps of where and when the aforementioned station spots are received, the relative received signal strength, the mode, and the frequency being used. After setting up my station to transmit and receive on WSPR, and looking on www.wsprnet.org at my spots reported by receiving stations the previous day, it was a thrill to see my 250 mW signal reaching all over the world.

Eliminating Local Noise

Tom Paratore, WA2TP, a friend I met in the WSPR community, explained how to use these beacons as a tool to improve my station's receiving capabilities. I have a decent HF transceiver, a dipole antenna, and a hexbeam antenna on a rotator — I was making contacts without any problems. However, Tom told me it was all about the noise and recommended using a KiwiSDR, which is a wideband software-defined radio (SDR) that shows the entire spectrum, from 0 Hz to 30 MHz, and, when set up just right, will show



Figure 1 — WSJT-X screens in WSPR mode.



Figure 2 — Some of the available WSPR transmitters, transceivers, and filters.

This Month in **QEX**

QEX magazine is a forum for the free exchange of ideas among communications experimenters. All ARRL members can access the digital edition of QEX as a member benefit (www.arrl.org/magazines). Print subscriptions are available and sold separately; see www.arrl.org/qex.

Coming up in the September/October 2025 issue of QEX:

- John Clark, K2AOP, presents a simple, cost-effective method for accurate measurements.
- Michelle Thompson, W5NYV, breaks down the math to explain what it means when we say we are going to transmit a complex baseband signal.
- Ted Dunning, K6BYT, shows how to harness automated, application-specific optimization to dramatically improve circuit performance.

■ Jim Willis, KG6TW, reviews factors that influence HF propagation using WSPR data.

■ In an article translated from the January 2025 issue of *Electron*, Michael M., PC7MM, and Richard J., PD3RFR, explore the little-known DD mode of the Icom IC-9700 that enables high-speed data over 23 centimeters.

Would you like to write for QEX? We pay \$50 per published page for full articles and QEX Technical Notes. Get more information and an Author Guide at www.arrl.org/qex-author-guide.



Certificate of Code Proficiency Recipients

Sponsored by



www.i2rtf.com

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.

February 2025

Michael R. Meadows, KE0FFT	10
James J. Werth, KD1AO	15
Barry G. Fluxe, W4LSV	20
Dominick F. Golino, NR2Z	20
Roger L. Burkhart, N3GE	25

March 2025

Richard L. Eilers, Jr., K4RLE	10
Horacio S. Falciglia, KA8TVY	10
Sherrick A. Slattery, KA6NZB	15
Brian A. Bayani, KT3X	20

April 2025

Scott A. Fronius, N1HQZ	10
Simpson A. Huston, N8UZF	10

Steven M. Johnson, WB4WBO	10
Clifford R. Cantrell, N5GWU	15
Steven M. Johnson, WB4WBO	15
Joseph L. Kelly, N9SV	15
Michael A. Kramer, N5XTH	30
Michael A. Kramer, N5XTH	35

May 2025

Bruce A. Smith, W4DPI	10
Jeremy L. Wallace, NR9I	10
Vincent L. DeCaprio, KD2VLQ	15
Kenneth F. Robinson, K8SCA	15
Thomas P. Stelmach, N0QBX	15
Barry G. Fluxe, W4LSV	25

June 2025

Glenn M. Davies, KO4NTA	10
Michael A. Krahenbuhl, K0ARA	25
Gary C. Tartanian, K3WK	25

July 2025

Thomas Duong, KR4DOT	10
William H. Rupert, KI5JWV	10
Mark A. Jessing, N4OJE	15
Daniel L. Schaible, KD8UZS	15

Congratulations to all of the recipients.

October 2025 W1AW Qualifying Runs

W1AW, the Hiram Percy Maxim Memorial Station at ARRL Headquarters in Newington, Connecticut, transmits Morse code Qualifying Runs to assist ham radio operators in increasing and perfecting their proficiency in Morse code. Amateur radio operators can earn a Certificate of Code Proficiency or endorsements by listening to W1AW Qualifying Runs.

October Qualifying Runs will be transmitted by W1AW in Newington, Connecticut, at the times shown on 1.8025, 3.5815, 7.0475, 14.0475, 18.0775, 21.0675, 28.0675, 50.350, and 147.555 MHz. The West Coast Qualifying Runs will be transmitted by K6KPH on Saturday, October 25, at 2 PM PDT (2100 UTC on October 25) on 3581.5, 7047.5, 14047.5, 18077.5, and 21067.5 kHz. Unless indicated otherwise, sending speeds are from 10 to 35 WPM.

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

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

Include \$10 (check or money order) if this is a submission for your initial Code Proficiency certificate; \$7.50 if you are applying for an endorsement (available for speeds up to 40 WPM). Your text will be checked against the actual transmissions to determine if you have qualified.

Members of the North Fulton (Georgia) Amateur Radio League (<https://nfarl.org>) are offering to

subsidize the total cost of a Code Proficiency certificate or endorsement submission for any individual age 21 years and younger, and who reside in either the US or Canada. Participants who wish to make use of this offer should indicate on their Qualifying Run submissions they are age 21 or younger, and certify as such via their signature. Eligible participants are not required to send any fee with their Code Proficiency submissions.

For more information about Qualifying Runs, please visit www.arrl.org/qualifying-run-schedule.

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



W1AW Qualifying Run Schedule – October 2025

(All times are in Eastern Daylight Time.)

Monday	Tuesday	Wednesday	Thursday	Friday
10/6 4 PM – 2000Z 35 – 10 WPM		10/8 7 PM – 2300Z 10 – 35 WPM	10/9 10 PM – 0200Z (10/10 – UTC) 10 – 40 WPM	10/10 9 AM – 1300Z 10 – 35 WPM
Columbus Day	10/14 4 PM – 2000Z 10 – 35 WPM	10/15 9 AM – 1300Z 35 – 10 WPM		10/17 10 PM – 0200Z (10/18 – UTC) 10 – 35 WPM
10/20 4 PM – 2000Z 10 – 40 WPM		10/22 9 AM – 1300Z 10 – 35 WPM	10/23 7 PM – 2300Z 10 – 35 WPM	
10/27 10 PM – 0200Z (10/28 – UTC) 10 – 40 WPM	10/28 4 PM – 2000Z 35 – 10 WPM	10/29 9 AM – 1300Z 10 – 35 WPM		

Field Organization Reports — July 2025

Public Service Honor Roll

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

518 N2CL	193 KE8DON	140 W4CMH AC0KQ WK4WC N3GE N8SY W8MAL KD8ZCM	125 W2PAX WA3QLW WB9WKO KB3YRU NW3X	109 K1CJV	92 WB4ZDU WW3S	80 KT5EM KR4ST KG5AOP KB4OLY NX9K KM4BRQ KC3SJ KD2TDG KA8BJA KC2THY
505 KE8BYC	185 ND8W	177 KE8CYC	120 WA4VGZ WC4FSU KD0HHN KD8UUB W2AH W2ZXN	107 W2ARP	103 N2DW K2PHD	79 W2QMI NI2W
415 AD8CM	175 WB8YYS	139 W9EEU	114 W8IM	102 KM4WXX	100 AD4DO KZ8Q WB4RJW W4PXE W1KX W4EDN KA5AZK KC8WH N8MRS WB8SIQ KB8GUN K2MTG K3YAK KB2QO KB8PGW KD2PQP	78 W5XX
350 KE8ANW	173 KC8T	137 K5OB	113 N5RH	100 AD4DO KZ8Q WB4RJW W4PXE W1KX W4EDN KA5AZK KC8WH N8MRS WB8SIQ KB8GUN K2MTG K3YAK KB2QO KB8PGW KD2PQP	89 W4TTO	76 KF7GC NT1N KE8HKA KE8SMN KB0DTI
315 W7EES	170 N4CNX W4DNA	135 W9BGJ KF5OMH W3YVQ	114 W8IM	100 AD4DO KZ8Q WB4RJW W4PXE W1KX W4EDN KA5AZK KC8WH N8MRS WB8SIQ KB8GUN K2MTG K3YAK KB2QO KB8PGW KD2PQP	88 WB8RGE	75 WB3FTQ
295 N9VC	161 KC9FXE	134 W8ROY	112 K3JL	97 KC8YVF	86 N3STP KT4WX	74 W3ZR NJ5R
285 W9GRG	156 W5WMC	133 WD8USA	110 WV5Q AE5MI K9SX KM4WHO KO4OL K1YBO AD3J K5ANP WB8TQZ K2VTT KD2PQQP	93 W5RFY N0JAR KA2HZP	84 KE4RS N0ET	73 K6RAU
270 W7PAT	151 K8RDN	132 KE5YTA	100 AD4DO KZ8Q WB4RJW W4PXE W1KX W4EDN KA5AZK KC8WH N8MRS WB8SIQ KB8GUN K2MTG K3YAK KB2QO KB8PGW KD2PQP	81 K1STM WB2VUF KB2YAA	85 N8OD	72 AA3N
250 W9FE WM5N	150 KA9IKK KR4PI	130 AG9G K9LGU KY2D K8MDA	100 AD4DO KZ8Q WB4RJW W4PXE W1KX W4EDN KA5AZK KC8WH N8MRS WB8SIQ KB8GUN K2MTG K3YAK KB2QO KB8PGW KD2PQP	97 KC8YVF	84 KE4RS N0ET	70 KN6HXP
230 W0PZD	145 KN4QJ KB5PGY K7OED	130 AG9G K9LGU KY2D K8MDA	100 AD4DO KZ8Q WB4RJW W4PXE W1KX W4EDN KA5AZK KC8WH N8MRS WB8SIQ KB8GUN K2MTG K3YAK KB2QO KB8PGW KD2PQP	97 KC8YVF	84 KE4RS N0ET	70 KN6HXP
216 W9RY	145 KN4QJ KB5PGY K7OED	130 AG9G K9LGU KY2D K8MDA	100 AD4DO KZ8Q WB4RJW W4PXE W1KX W4EDN KA5AZK KC8WH N8MRS WB8SIQ KB8GUN K2MTG K3YAK KB2QO KB8PGW KD2PQP	97 KC8YVF	84 KE4RS N0ET	70 KN6HXP

The following stations qualified for PSHR in previous months, but have not been recognized in this column yet: (June) KE8BYC 828, KC8YVF 363, KT2D 250, KV2J, WM2C, 190, ND8W 180, KE8DON 179, WO2H 170, KD2NMG 162, KD8ZCM, AE5MI 160, WD8USA 156, KE8CYC 146, N2JBA 130, KB3YRU 125, W8ROY 124, KO4OL, N2TSO 120, KD8RDN 117, KB8PGW 115, WB8TQZ, K2MJR, WV5Q 110, KE8HKA 102, K8ED 95, WX2DX 90, W2OOD 88, WW3S 87, WB8RGE 83, KE8SMN 82, KC3SJ, W5XX 78, KB0DTI 72, K8WU 70. (May) KA2HZP 100. (Dec. 2024) KA2HZP 97.

Section Traffic Manager Reports

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

Section Emergency Coordinator Reports

The following Sections submitted ARES Activity reports for June: CT, ENY, EPA, EWA, GA, IA, IL, IN, ME, MI, MN, MO, NC, NFL, NLI, NNJ, NNY, NTX, NV, OH, OK, SC, SNJ, STX, TN, VA, WCF, WI, WMA, WTX.

Brass Pounders League

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

KY2D 1,025, W2AH 907, KW1U 710, WA3QLW 692, KE5YTA 612.

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.

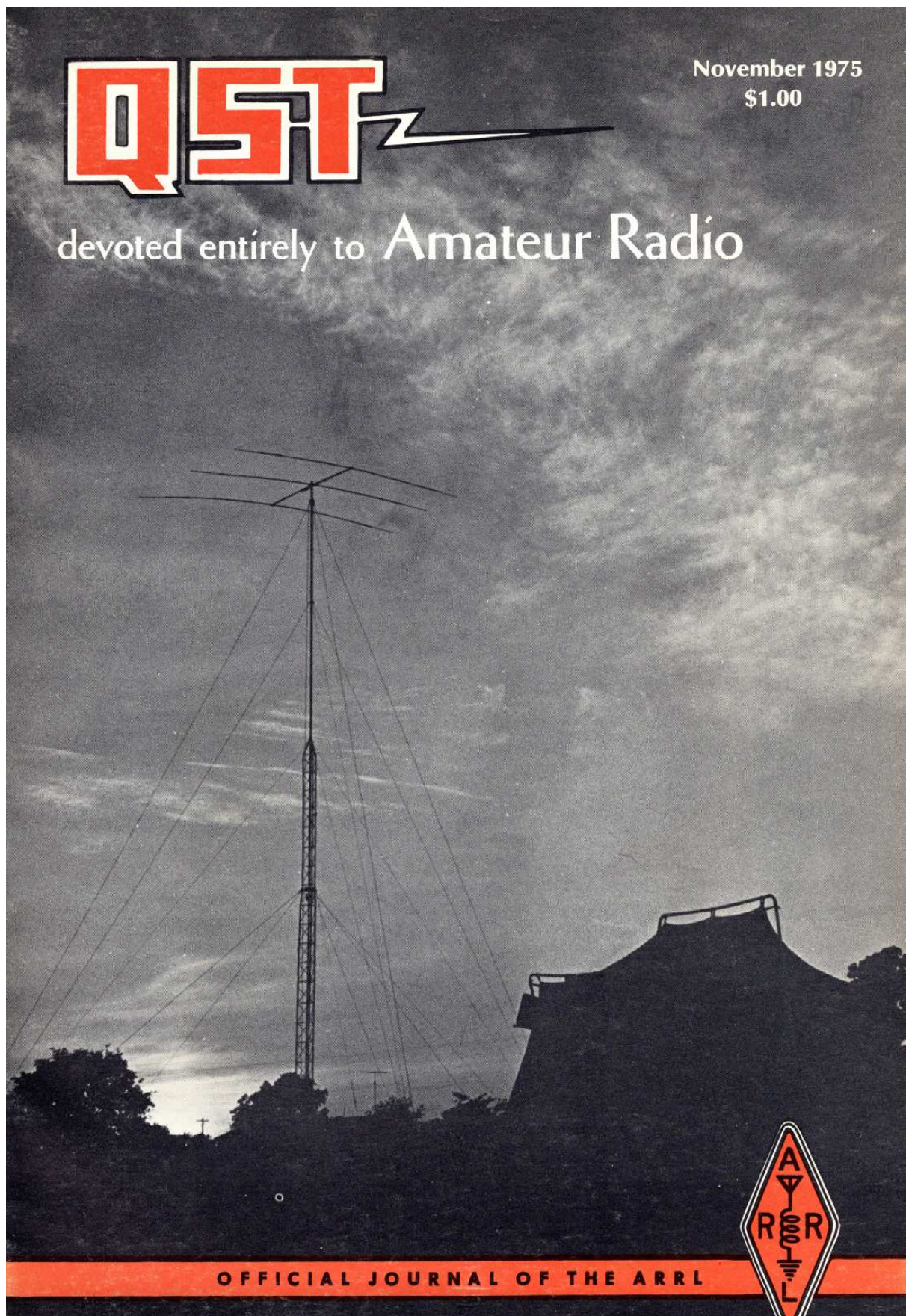
Technical articles outline a construction project or a technical concept. General interest articles are “everything else” that’s not technical: recaps of DXpeditions, grid expeditions, or public service activities, or personal accounts of trying a new mode or style of operating — anything relating to 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 manuscript with images to qst@arrrl.org.

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

A Look Back



A 5¢ TRANSISTOR TESTER

BY JAMES J. BROPHY*

DO YOU OWN A collection of unmarked, untested diodes and transistors? Plenty of semiconductor assortments are bought for bargain prices on today's market, but finding out which are the good or bad devices can be perplexing!

A conventional transistor tester can be used to grade out the defective units or to identify the leads of diodes and transistors, but the same process is possible by using a simple ohmmeter and a single resistor. Interested? Read on.

One 5-cent resistor and an ohmmeter are all that's needed to determine the base connections of unmarked transistors, tell npn from pnp types, distinguish between silicon and germanium devices, and even measure the current gain of junction transistors. For an additional 10 cents you also can measure the transconductance of FETs.

The ohmmeter function in either a VOM or VTVM involves an internal battery and a current-indicating meter. Almost any ohmmeter type is satisfactory if it has a range with a center scale reading of 500 or 1000 ohms. First, determine which test prod is positive when the VOM or VTVM is used as an ohmmeter. Measure the voltage between prods with another voltmeter or open the case and trace the circuit. Also, it's helpful to know the voltage of the internal battery, which is often either 1.5 or 3.0 volts.

Identifying Diode and Transistor Types

A semiconductor pn junction such as a diode rectifier or the emitter-base junction and base-collector junction in a transistor have a low resistance in the forward direction when the p-type side is positive with respect to the n-type side. Therefore, when you connect the positive test prod of the ohmmeter to the p-type side and the negative prod to the n-type side, the ohmmeter indicates a low resistance. Reversing the test prods

should result in a very high resistance reading. Thus, you can distinguish the anode and cathode terminals of unmarked semiconductor diodes and rectifiers. A convenient way to relate the anode and cathode terminals with n-type and p-type regions and with the polarity for forward bias is shown in Fig. 1.

In this way you can identify the leads of an unmarked junction transistor and tell whether it is a pnp type or an npn type. Find the common lead which shows low-resistance forward conduction with both other leads, and you have discovered the base terminal. The polarity of the test prod touching the base lead is negative for a pnp transistor and positive for an npn type. It is easiest to find this by connecting one ohmmeter test prod to any transistor lead and touching the other prod to each of the remaining two leads in turn. Repeat for the other leads, each time watching the ohmmeter reading. If none result in a low resistance between both of the other two leads, reverse the test prods and start over. There is only one successful combination (since there is only one base lead), unless the transistor is open or shorted.

In the process of identifying the base lead, an indication of whether or not the transistor is made of germanium or of silicon can be obtained also. This is often useful information in connection with transistor-bias design, particularly in direct-coupled circuits, and for operating-temperature considerations.

The properties of semiconductors are such that pn junctions of germanium usually have a lower forward resistance than the silicon type at the same forward voltage. The exact resistance reading noted on an ohmmeter depends somewhat upon the range scale and the internal battery voltage. Typical ohmmeter readings are about 200 ohms for germanium devices compared with 800 ohms for silicon units when using a 1000-ohm center scale (VTVM ohmmeter) with a 1.5-volt internal battery. The same units indicate about 100 ohms and 200 ohms respectively (VOM type of ohmmeter) with a 500-ohm center scale and a 3-volt internal battery. These differences in readings using the two meters are expected because of the nonlinear properties of pn junctions. Also, there is some variation between different devices of the same general type, such as would result from their internal design for maximum current-carrying capacity and other factors.



Fig. 1 — Diagram of a junction diode indicating n and p regions. If the ohmmeter probes are connected with the polarity shown, the diode will be forward biased and a low resistance reading will occur.

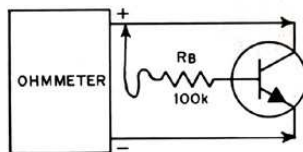


Fig. 2 — Testing a bipolar transistor with the ohmmeter.

Measuring the Current Gain

The next step is to determine the collector and emitter leads of the transistor and to get a general idea of its current gain. Excluding the base lead, clip one ohmmeter test prod to one transistor lead and the other test prod to the remaining lead of the unknown transistor. The ohmmeter will indicate a very large resistance since one of the junctions is under reverse bias. Now connect a resistor (an inexpensive 100-k Ω carbon type is quite satisfactory) from the base lead to the positive test prod if the transistor is an npn type. (See Fig. 2.) Connect the base lead to the negative test prod in the case of a pnp type. This biases the emitter junction in the forward direction, which results in collector current and a deflection on the ohmmeter. In effect, the transistor is now operating as a dc amplifier.

The transistor base-collector current gain is approximately the ratio of the base-bias resistor to the ohmmeter reading, R or:

$$\beta = \frac{R_b}{R} = \frac{100,000}{R}$$

The reading is now repeated after the ohmmeter test prods are reversed. The arrangement producing the greatest current gain determines which of the leads is the emitter lead and which is the collector lead. Highest gain occurs with the transistor connected as shown in Fig. 2 if it is an npn type. Conversely, the negative prod is at the collector terminal in the case of pnp units.

The exact value of current gain determined by this simple circuit depends somewhat on properties of the ohmmeter used. Consequently, the results should be viewed as indicative of transistor quality and gain, rather than as a precise measurement of

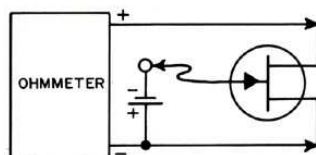


Fig. 3 — An ohmmeter and a battery can be used to test a junction FET.

transistor parameters. Actually, measurements of a selection of transistors in a typical assortment showed gains ranging from 20 to 400. All units that looked alike had approximately the same current gain, although there were occasional exceptions which produced significantly lower values. Good correlation between gains measured with the tester and tabulated values for several known transistors was observed also.

The scheme works best for small-signal transistors, although most power transistors can be tested as well. Power units do not seem to yield particularly reliable values for gain. However, the test does indicate clearly whether or not a device is operational. Incidentally, for convenience in testing different kinds of transistors with a variety of base and lead arrangements, it proves convenient to attach an alligator clip to each end of the resistor. Thus the ohmmeter prods and the resistor are simply clipped to the transistor leads and interchanging connections is easy.

Testing FETs

A technique similar to that used for bipolar transistors is applicable to junction FETs as well. First, identify the drain and source leads of the FET by finding the pair of leads that indicates the same resistance when the test prod connections are interchanged. The resistance between drain and source in an FET arises simply from the channel resistance, so it is the same for either direction of current flow. A typical value is 200 ohms. You can tell whether the FET is an n-channel or a p-channel type by noting the polarity of the test prods for forward conduction between the gate lead (the third lead) and either the drain or source lead. An n-channel FET shows a low resistance reading when the positive test prod is connected to the gate in conformity with previous tests.

The gain of an FET is measured by its transconductance, which is the change in drain current resulting from a change in gate voltage. Notice that an FET is a voltage-controlled amplifier in contrast to a junction transistor which is current controlled. Therefore, in order to test FETs, you need a small battery to use as a bias source.

Connect the ohmmeter between the source and drain leads as determined previously. Short the gate to the negative ohmmeter prod in the case of an n-channel unit, or to the positive prod for a p-channel FET. The reciprocal of the ohmmeter reading is the zero-bias channel conductance, G_0 . Now connect the gate as in Fig. 3 for an n-channel FET to the negative terminal of the penlight battery (the gate is connected to the positive battery terminal for a p-channel FET). The reverse bias at the gate in either case causes the channel resistance reading to increase, which shows that the FET is operating. The reciprocal of this reading is called G_b , and the transconductance, g_m , is proportional to the difference: $G_0 - G_b$. Here again, the actual value depends somewhat upon the ohmmeter properties, but the test is indicative enough for most experimental purposes. QST

Celebrating Our Legacy

My Father, the Passionate DXer

After my father, Harry Flasher, AC8G, became a Silent Key in 2023, I began cataloging records of his many years of ham radio activity. He had a handful of contesting certificates on his shack walls, but I discovered a folder loaded with even more contest awards. My dad, and the DXpeditions he coordinated, scored more than 171 million points with more than 132,000 contacts. Along with more than 100 other hams, I was lucky to join him on many of those DXpeditions.

He kept busy with QSL card requests, taking great pains to respond to every one (sometimes even decades after the contact). He'd dig up old logbooks so someone working toward DXCC could get credit for a contact made 20 or more years earlier. He had dozens of shoeboxes overflowing with QSL cards.

He operated DX from Alaska, Anguilla, Antigua, Bahamas, Canada, Costa Rica, Curaçao, Dominican Republic, Galápagos, Grenada, Jamaica, Puerto Rico (and Desecheo Island), St. Barthélemy, St. Lucia, St. Maarten, St. Vincent and the Grenadines, and US Virgin Islands. I enjoyed contacting him when he was away on trips. When I'd respond to his QRZ during a contest, he'd stop everything to tell me how the trip was going.

With 354 confirmed entities, my father earned ARRL DXCC and DXCC Honor Roll. I'm forever blessed to be the son of this most impressive man!

Eric Flasher, W8KKF
Dayton, Ohio
Life Member

Making Radio Dreams Come True

In 1960, a high school classmate introduced me to ham radio. I watched in awe as he talked to people around the country and beyond, all from his basement. I bought a study guide, and he showed me how to send and receive CW and let me borrow his code practice oscillator. A few months later, I took the Novice exam by mail, and he tested my code proficiency — I passed both! At first, I only made contacts with other classmates. Eventually, I found the courage to contact other US stations and dreamt of earning Worked All States (WAS) and DXCC.

After more than 60 years as a ham, I've earned WAS, Triple Play WAS, DXCC, Five-Band DXCC, DXCC Challenge, and more. It was thrilling to get each of them, but they don't compare to the excitement of my first contacts back in 1960.

John Majka, K9AAN
Louisville, Kentucky

A Rare One Comes Through

I was sending CQ on 15 meters via my 40-meter dipole 20 feet above

the deck one evening when the band appeared to be dead. Suddenly, I heard my call from a ham named Bruce operating from a VE station. His signal wasn't strong, and it was hard to copy (I assumed this was due to sporadic E from Ontario or Québec). I sent my RST, name, and address several times, but I couldn't tell from his replies whether he got my information.

Sometimes, when copy was rough, I wrote the dots and dashes on my desk blotter to try to make sense of what was coming through, which I did with Bruce. After a brief back-and-forth, something seemed untidy about the way he signed off. I kept rechecking my blotter and log when I realized Bruce's call began with VE8 — the then-rare Northwest Territories!

Months later, I got some QSL cards in the mail. One card had a Canadian stamp with a short note: "Sri we lost each other, Bob. Also regret delay with QSL, 73, Bruce." Bruce Bowers, VE8YM, and "c/o R.C.M.P. Rankin Inlet, N.W.T." was printed on the card.

Robert Alan Griffiths, NE3I
Collegeville, Pennsylvania

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.

Classic Radio

The Harvey-Wells Story

John Morse Wells and Clifford Akers Harvey started the Harvey-Wells Company in Southbridge, Massachusetts, around 1940. The company was well known for manufacturing large numbers of high-quality radio crystals and developing radar during World War II.

The Men Behind the Name

John Morse Wells (1903 – 1989) held the call sign W1ZD, which he obtained around 1926 when it was possible to choose your call sign. He was known for grinding his own crystals when few amateurs bothered to do so. Wells wrote numerous ham radio-related articles, including “A Multi-Stage Crystal-Controlled Transmitter,” in the June 1926 issue of *QST*. He was a lieutenant in the US Navy Reserve with the Atlantic Fleet from 1924 to 1941. Before amateur radio phone patches became popular in the 1960s, Wells developed a phone patch of his own design that allowed hams to connect distant people with local telephone lines via amateur radio.

Clifford Akers Harvey (1908 – 1987) held the call sign W1RF. In 1932, he started his first business venture, Hendricks & Harvey Co., which manufactured police radios, transceivers, transmitters, and crystals. It was followed by Harvey Radio Labs from 1933 to 1939, featuring HF, VHF, and UHF radios. He designed and built many of his devices from scratch, including his

family’s televisions. Harvey also designed the first radio-controlled residential garage door opener and a car telephone (so he could call his wife from the car). He even built a radio-controlled riding lawn mower. During his amateur radio career, he collected more than 10,000 QSL cards.

The Bandmaster Transmitter

Shortly after Harvey-Wells was formed, they produced the Bandmaster transmitter from the late 1940s to the mid-1950s. It was a very desirable radio that produced 50 W of AM and CW power on all amateur bands from 80 to 2 meters — an impressive achievement. It was their best-selling amateur radio product.

The Bandmaster looked different than other transmitters of its time. It was tall, rather than wide, and measured 13¼ × 9¼ inches. The black cabinet had a good-sized circular meter in its center and easy-to-read white labels on its buttons and switches. There was a paper chart on the front panel labeled **CHANNEL**, **BAND**, **MC.**, and **CRYSTAL RANGE** that specified transmitter tuning and range settings.

Harvey-Wells produced three models of the TBS-50 Bandmaster. All of them started with five tubes, including an 807-tube final amplifier. Bandmaster models included a CW-only Junior TBS-50B that cost \$87.50; later Junior models included break-in keying and a choice of a variable frequency oscillator (VFO)



The TBS-50 Bandmaster.



ARRL exhibit.



Harvey-Wells AR-2A and ATR-3 aircraft radios.

or crystal for frequency control. The Senior TBS-50C came with all the same features as the Junior but added AM capability using a carbon microphone.

The Deluxe TBS-50D used five vacuum tubes and cost \$137.50, roughly \$1,700 in today's dollars. It included a three-tube audio preamplifier for use with a crystal microphone. With the optional modulator installed, four more tubes were added, including two 6L6G plate-modulator tubes in a push-pull configuration that could provide 100% plate modulation to the 807 final. Bandmaster transmitters were crystal-controlled, but an optional VFO was available that attached to the bottom of the cabinet.

Other Bandmaster accessories included a 120 V ac vacuum-tube power supply for \$39.50, a DPS-50 dc-powered dynamotor power supply for either 6 or 12 V operation, and a 6 V vibrator-powered VPS-50 power supply. An optional AM modulation kit was available for the Junior transmitter that, according to Harvey-Wells, would "make a Bandmaster Senior out of your Junior."

Other Harvey-Wells Products

In addition to the Bandmaster transmitters, Harvey-Wells' amateur radio product line featured the AM/CW R-9 receiver, manufactured from 1954 to 1956. It covered 80 to 10 meters using a double-conversion design with three tuned RF circuits, nine tubes, and a built-in ac supply. Harvey-Wells also produced a matching transmitter, the T-90, that produced 90 W CW with break-in keying and 75 W AM phone on 80 to 10 meters. It required a separate power supply, and it was also available with a Bandmaster Z-Match auto-

matic antenna coupler that included a wattmeter and a dummy load.

From 1948 onward, Harvey-Wells created and sold amateur radio products and police, public safety, and aviation radios. They designed and manufactured a UHF aviation transponder to identify aircraft — this basic design is still used today. Their aircraft radios included the AR-2A and the ATR-3, and an aircraft receiver and transmitter combination that covered the 200 – 400 MHz band (which was the aircraft band at the time). The four-tube AR-2A receiver also included the 550 – 1600 kHz AM broadcast band and the 20 – 40 MHz band that was used for airport towers. The crystal-controlled eight-tube ATR-3 transmitter produced approximately 10 W on 3.106 MHz for aircraft-to-tower communications.

All Good Things Must Come to an End

In 1955, hurricanes Connie and Diane caused massive flooding and damage to the Harvey-Wells manufacturing facilities in Southbridge, Massachusetts, which ended their production of electronics equipment. The remains of the company were sold to Bay Pathe in 1955, and later to Whitin Machine Works in 1957. A portion of the company survived as Harvey Radio, which owned broadcast stations.

ARRL Exhibit

Hamilton Agnew, K4HKA, recently discovered that he was related to John Wells, W1ZD, and he has researched their family history. He has since generously donated radios and artifacts from Harvey-Wells to add to ARRL's Harvey-Wells radio collection. He, along with other Harvey-Wells family members, visited ARRL Headquarters in August 2023, where he gave an informative PowerPoint presentation about the history of Harvey-Wells Company. It is available for viewing on YouTube at www.youtube.com/watch?v=Rqm8oZ0QNAQ.

Related to Agnew's visit, ARRL staff assembled a display of Harvey-Wells amateur radio equipment in the lobby, which was enjoyed by visitors for more than a year. The display is now located in the ARRL Heritage Museum.

We want to extend our thanks to ARRL Volunteer Ray Thornton, W1YFF, who used Harvey-Wells radios when he was a young ham, for restoring many of them.

All photos provided by the authors.

100, 50, and 25 Years Ago

October 1925

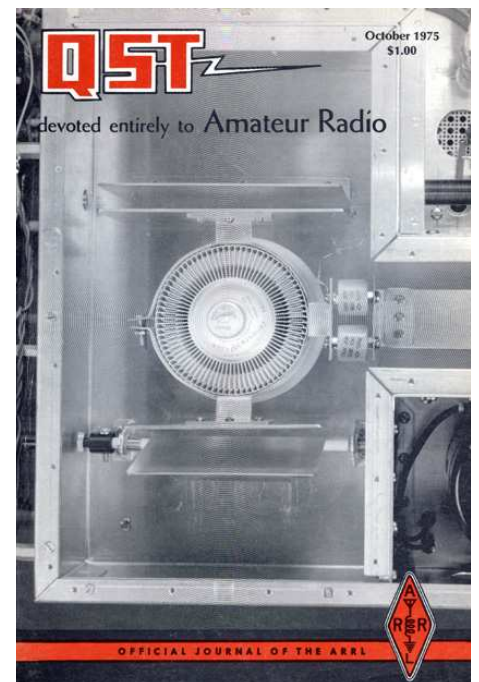
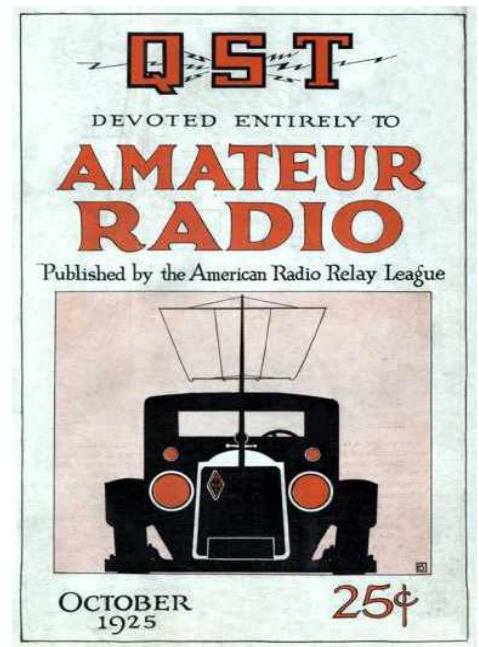
- The cover features a stylized drawing of a car with an early mobile radio setup — and an ARRL diamond on the grillwork.
- In “Editorials: Onward!” Kenneth Bryant Warner, 1BHW, mentions the outward appearance of the amateur art being readjusted due to the post-war years.
- Dr. A. Hoyt Taylor and Dr. E. O. Hulbert extend the theory of electromagnetic wave propagation to the region of high frequencies in “Wave Propagation at High Frequencies.”
- The drawback of high-frequency resistance measurements is that resistance units that are sufficiently accurate at high frequencies are hard to find and construct, John M. Clayton, 1DQ, records in “High Frequency Resistance Standards.”
- Geo Sturley, 7BJ, shares the story of operating with T.O.M. in his ham shack in “T.O.M. Heard From Again.”
- On July 13, NUQG, located in Chefoo, China, operated DX via a 50 W tube, as shared in “I.A.R.U. News.”
- The major portion of equipment used at 1ARE in Pittsfield, Massachusetts, was created by owner and op A. W. Everest, as noted in “Amateur Radio Stations.”

October 1975

- The cover features a close look at the business end of K1AGB's 50 MHz amplifier.
- In “It Seems to Us...Licensing Delays,” David Sumner, K1ZND, highlights the importance of navigating licensing delays after mail addressed to the FCC tripled in volume.
- Robert W. Edlund, W5DS, demonstrates how to make atmospheric noise more pleasant and how to increase completed QSO percentage when operating on 160, 80, and 40 meters in “The W5DS Hula-Hoop Loop.”
- Ronald C. Todd, VE2AXW/WA2JAM, has been involved in the design, testing, and application of CMOS; he offers guidelines for using logic circuit designs in “CMOS and the Ham.”
- In “MARS Milestone,” George P. Griffis, K7EIS/AFA7EIS, reports on a military and amateur radio collaboration that lasted for 50 years.
- In “IARU News,” the president of the International Amateur Radio Union, Noel B. Eaton, VE3CJ, has announced that a conference of the three Regional Divisions of the IARU has been scheduled for April 1976.
- Louise Ramsey Moreau, W3WRE, writes that YL, a term for women who are licensed amateurs, was adopted by YLRL in 1940 in “YL News and Views.”

October 2000

- The cover features the green mountains of Slovenia, which were home to the Olympics of Amateur Radio — the 2000 World Radiosport Team Championship.
- In “It Seems To Us...Camaraderie,” David Sumner, K1ZZ, mentions the common stigma attached to hams, which has since evolved as amateur radio has entered a new millennium.
- Roger Wines, W5WIA, spreads awareness of amateur radio by dispersing old QST magazines and including the Austin Amateur Radio Club's contact information in “Correspondence: Putting Old QSTs to Good Use.”
- Al Christman, K3LC, describes an unusual vertical antenna design that incorporates features that are attractive to hams in “The Parasol: A 160-Meter Vertical Antenna with a Difference.”
- Andrew S. Griffith, W4ULD, created a dual-band J-pole antenna that allows getting on 146 and 445 MHz; details can be found in “A 146- and 445-MHz J-Pole Antenna.”
- George Eldridge, N6RVC, visited Disneyland in Anaheim, California, and uncovered a hidden message using Morse code in “Decoding the Disneyland Telegraph.”
- David Sumner, K1ZZ, reports on the World Radiosport Team Championship being held by the Slovenia Contest Club in “WRTC-2000: A Test of Teamwork in ‘The Green Piece of Europe.’”



Silent Keys

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

N1CQC W1DAG W1ERV WA1MIK ▼N1NOC ▼N1REP ▼KA1VLF WA1VXM W1ZA ▼N1ZWA KC2AI •K2BOF ▼KA2HAN NG2J K2JHU KD2JUS ▼NA2M	Clark , Ann B., Milton, VT Gallo , Richard A., Cranston, RI Barlow , Bill, Bristol, RI Meister , Robert W., West Haven, CT Todd , Stacy S., Jr., Nashville, TN Page , Robert E., Milford, CT Wells , Jonathan F., South Hero, VT Kyles , John M., New Canaan, CT Brown , Duke, Jr., Manakin Sabot, VA Dombrowik , Bruce J., Lunenburg, MA Fisher , Lemar L., Warsaw, NY Trench , Walter H., Tucson, AZ Swenson , Gary G., Fairfax Station, VA Boddie , James R., Canton, GA Dorson , John J., Melbourne Beach, FL Lane , Thomas P., Fellsmere, FL Hellman , Gustav W., Mohegan Lake, NY Pedro , Neville, Uniondale, NY Wurmbach , Rolf D., Woodstown, NJ Astolos , John A., New Alexandria, PA Pettis , Hugh S., Staunton, VA McCutcheon , Robert K., Harrisburg, PA Morrow , Lester F., Jr., Easton, PA Leggat , William T., Jr., Dickson City, PA Greksa , Martin T., Cabot, PA Newberry , Ralph E., Delmar, DE Blankenhorn , Martin C., Ivyland, PA Frank , Walter W., Williamsburg, VA Owens , Mark, Del City, OK Sites , John C., Royersford, PA Tabor , Edward P., Red Lion, PA Roff , Margo H., Tryon, NC Martin , Edna J., Asheville, NC Covell , Leonard H., Venice, FL Flinn , Emery, Jr., Carrollton, GA Hall , Edward D., Fairdale, KY Guenther , Larry, Richmond, VA Freund , Michael C., Sharpsburg, GA Hinkins , Dave, Farnham, VA Wallace , William D., Sr., Washington, NC Elliott , Samuel R., Sr., Cottontown, TN Cofield , William L., Jr., Greenville, NC Scharbrough , Jon, Fort Myers, FL Froelich , Robert W., Myrtle Beach, SC Johnson , Earl N., Shalimar, FL Kunstbeck , Charles R., Tallahassee, FL Luman , Robert D., Georgiana, AL Titus , Theodore, IV, Tallahassee, FL Kassebaum , Lynn F., Mims, FL Owens , Ambrose L., III, "Tripp," Tarboro, NC Wingfield , Alan W., Goodwater, AL Barnes , Billy J., Burlington, NC Huffmaster , Donald J., Astor, FL Butler , Frank M., Jr., Fort Walton Beach, FL Mantooth , Winston D., Calhoun, TN Maddox , Spencer G., Archdale, NC Vaughan , James C., Louisville, KY	▼WA4VMF K4VZS N4ZDR W4ZTV ▼KW4ZZ ▼W5AQ ▼KA5ARU ▼W5BJ ▼K5FBS WD5FNB ▼KD5GTH KD5HTY ▼W5ITI K5MFD ▼W5MJM AE5ND •K5OIT KC5SFQ N5SV KC5SZU K5TSA ▼W5UJZ KJ6BVU W6BXE •KA6CPM ▼N6HYI NF6T ▼•KE6WEZ ▼AB6WI WO6Y ▼N7AZC WB7DUO KE7GIU ▼KL7IGB W7JHB ▼KJ7KP ▼NA7MT W7PCK •W7PFZ KB7PRN ▼N7TCE ▼KL7TR ▼KC8BTN •WB8CLX WV8DBM W8DKA N8EKG AA8FB N8GGE ▼K8GLR K8GZ WB8JCY WB8KIS ▼KB8MTB ▼W8PMS W8RAS ▼WA8RAZ ▼KC8RL ▼W8RLS	Walker , Wyatt M., Jr., Smyrna, GA Milner , John W., Pensacola, FL Sanspree , Ellis B., Winston-Salem, NC Glenn , Robert E., Maryville, TN Dobransky , Dennis L., Milton, FL Liles , Charlie H., College Station, TX Winkler , Kenneth W., Brenham, TX Jones , Robert G., Sachse, TX Taylor , Clifford A., London, KY Smith , Donald L., Adair, OK Hillsman , Matthew J., Portales, NM Sorri , Ronald A., Bellingham, WA Lukens , Jerry L., Alvin, TX Dean , Michael, Edmond, OK McGlynn , Michael J., Sr., Amarillo, TX Monsevalles , Rodolfo S., Harlingen, TX Payne , G. Douglas, Conroe, TX Cook , Denton V., Jr., Seymour, TX Verschoye , Stephen L., Sr., Boerne, TX Hughes , Phillip T., Caddo Valley, AR Johnston , Ronnie E., Petal, MS White , William T., Ortonville, MI French , Richard, North Chili, NY Lucido , Donald R., Martinez, CA Faust , Nicholas A., Tonopah, NV Marshall , Donald W., Seal Beach, CA Hunsaker , Byron N., Fontana, CA King , Stephen A., Simi Valley, CA Gustin , James A., Kailua Kona, HI Koch , Michael C., Benicia, CA Schirmacher , Bernard W., South Jordan, UT Newberry , Gregory, Hansen, ID Potter , David M., Spring Creek, NV Netzlöf , William H., Boise, ID Brown , James H., Orem, UT Sanders , Milton R., Orem, UT Magnan , Joseph A., Kalispell, MT Keefe , John F., Snohomish, WA Gendreau , Phillip R., Puyallup, WA Hudman , Kevin L., Menan, ID Mackay , Merlin C., Cedar City, UT Roberts , Tom, Fairbanks, AK Corban , Ron H., Mentor, OH Lee , John M., Casco, MI Mossor , David B., Harrisville, WV Albers , Douglas K., Lakewood, OH Smallwood , Roger D., Hamilton, OH Picchetti , Jimmy A., New Philadelphia, OH Taylor , Beverley A., Middletown, OH Ragland , Gerald L., Franklin, OH Supenski , David J., Phoenix, AZ Lewis , Allen R., Kalamazoo, MI Gilbert , Lee W., Edgerton, OH Williamson , Jessie R., Hillsboro, OH Brossman , Robert E., Wheeling, WV Stano , Randolph A., Spring Lake, MI Bates , Wayne D., Summerfield, OH Hammer , Daniel L., Vinemont, AL Seaman , Ronald L., Waterford, MI	▼WB8RXT ▼K8SKY N8TE ▼W8TYT N8VTT ▼N8WYE N8XIM ▼KE9AGW N9BYY ▼WA9ENA ♦♦♦W9GIG KB9GNI ♦WB9IHR KB9JPN ▼KB9KWP ♦N9LAB •K9MFJ KC9MUM ♦WA9OXY ▼WA9RDL ▼W9RGR ▼WS9T ▼WB9TLI •N9VEQ KA9VIS ▼WA9VIS AA9W WA9W N9XAM W0BIL W0BWW KB0CEM KA0DAH WJ0M ▼KQ0P ▼K0REO K0UBK KD0UST ▼W0XK ▼KE0ZNJ JA1DM JA2FGL ♦ARRL Life Member ♦Current Diamond Club ♦Maxim Society ▼Veteran •Former call sign	Norton , Lamonte W., St. Petersburg, FL Wittig , William S., Kaleva, MI McClure , Nathan D., III, Lynchburg, VA Taylor , Thomas H., Republic, OH Popp , Susan E., Piqua, OH West , Richard L., West Chester, OH Gordon , Roger D., Dowagiac, MI Artman , Ronald G., Mitchell, IN Riffel , Daniel T., Spencer, IN Svetanoff , Dale G., Monticello, IA Isley , George R., Saint Charles, IL Weil , Daniel B., Vincennes, IN Trowbridge , Thomas E., Sr., Kendallville, IN Anderson , Paul D., Kenosha, WI Hamilton , Herman R., Connersville, IN Buonaiuti , Leonard A., Sr., Loris, SC Jacobs , Michael F., Mason, OH Baradic , James E., Milwaukee, WI Sharp , Thomas A., Phoenix, AZ Short , Laurel J., Fort Wayne, IN Ross , Robert G., South Bend, IN Witt , Dave W., Williamsburg, MI Paquette , Don A., Bloomington, IN Higbie , Eric D., Indianapolis, IN Bantz , Gregory E., Sr., Hartford City, IN Coghlan , Charles Y., Bloomington, IN Rate , Edward T., Mequon, WI Winter , Gene, Mossville, IL Battin , Laurence G., Bloomington, IN Snell , Willard A., Jr., Evergreen, CO Riley , William T., Mauston, WI Swanson , Scott R., Oconomowoc, WI Owens , Richard E., Allerton, IA Maves , William J., Menomonie, WI Sohm , Marshall L., Danbury, IA Hernandez , Gilbert, Puebla, Mexico Reich , Herbert C., Saint Paul, MN Johnson , Charles E., Hot Springs, SD McLean , Perry D., Kansas City, MO Bragg , Chris J., Sr., Saint Paul, NE Ebisawa , Masayoshi, Tokyo, Japan Ikuma , Yasuo, Shizuoka, Japan
--	--	---	--	--	---

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 or death certificate, or a letter from the family lawyer or executor. Please be sure to include the amateur's name, address, and call sign. Allow several months for the listing to appear.

HAM RADIO OUTLET®

WWW.HAMRADIO.COM

Family owned and operated since 1971



IC-9700 | All Mode Tri-Band Transceiver

• VHF/UHF/1.2GHz • Direct Sampling Now Enters the VHF/UHF Arena • 4.3" Touch Screen Color TFT LCD • Real-Time, High-Speed Spectrum Scope & Waterfall Display • Smooth Satellite Operation



IC-PW2 | HF-50 MHz 1kW Linear Amplifier

• 1kW Output Full Duty Single Operator Two Radios (SO2R) • Built-in Automatic Antenna Tuner • Detachable Controller with Touch Screen Display • 2x6 Automatic Antenna Selector - 2 Radio Inputs & 6 Antenna Connections



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



LE version available!

IC-7760 | HF150MHz All Mode Transceiver

• New Design-Remote Control Head & Separate RF Deck • Dual Independent Receivers, Spectrum Scope & Waterfall • 200 Watts Output 100% Duty Cycle • Flexible Remote Operation Capabilities



IC-705 | HF/50/144/430 MHz All Mode Transceiver

• RF Direct Sampling • Real-Time Spectrum Scope and Waterfall Display • Large Color Touch Screen • Supports QRP/QRPP • Bluetooth® and Wireless LAN Built-in



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-7300 | HF/50MHz Transceiver

• RF Direct Sampling System • New "IP+" Function • Class Leading RMDR and Phase Noise Characteristics • 15 Discrete Band-Pass Filters • Built-In Automatic Antenna Tuner



IC-7100 | All Mode Transceiver

• 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-V86 | VHF 7W HT

• 7W Output Power Plus New Antenna Provides 1.5 Times More Coverage • More Audio, 1500 mW Audio Output • IP54 & MIL-STD 810G-Rugged Design Against Dust & Water • 19 Hours of Long Lasting Battery Life • 200 Memory Channels, 1 Call Channel & 6 Scan Edges



IC-7610 | HF/50 MHz All Mode Transceiver

• Large 7-inch color display with high resolution real-time spectrum scope and waterfall • Independent direct sampling receivers capable of receiving two bands/two modes simultaneously



IC-2730B version available!

IC-2730A | VHF/UHF Dual Band Transceiver

• VHF/VHF, UHF/UHF simultaneous receive • 50 watts of output on VHF and UHF • Optional VS-3 Bluetooth® headset • Easy-to-See large white backlight LCD • Controller attachment to the main Unit



IC-T10 | Rugged 144/430 MHz Dual Band

• Disaster Ready - Excellent Fit for Your Emergency Bag • Loud Audio - New Speaker Design • Long Battery Life - Up to 11 Hours • FM Broadcast & Weather Channels



IC-R8600 | Wideband SDR Receiver

10 kHz to 3 GHz Super Wideband Coverage • Real-time Spectrum Scope w/Waterfall Function • Remote Control Function through IP Network or USB Cable • Decodes Digital Incl P25, NXDN™, D-STAR • SD Card Slot for Receiver Recorder



ID-5100 AD VHF/UHF Dual Band Digital Transceiver

• Analog FM/D-Star DV Mode • SD Card Slot for Voice & Data Storage • 50W Output on VHF/UHF Bands • Integrated GPS Receiver • AM Airband Dualwatch

ID-52A Plus version available!

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



5 Ways to Shop!

• RETAIL LOCATIONS - Store hours 10:00AM - 5:30PM - Closed Sunday

• PHONE - Toll-free phone hours 9:30AM - 5:30PM

• ONLINE - WWW.HAMRADIO.COM

• FAX - All store locations

• MAIL - All store locations

ICOM®

FOLLOW HRO ON SOCIAL MEDIA



twitter.com/HamRadioOutlet
facebook.com/HROHamRadioOutlet
instagram.com/HamRadioOutlet
youtube.com/HamRadioOutlet

HAM RADIO OUTLET®

WWW.HAMRADIO.COM

***Free Shipping and Fast Delivery!**



FTDX101MP | 200W HF/50MHz Transceiver

- Hybrid SDR Configuration • Unparalleled 70 dB Max. Attenuation VC-Tune • New Generation Scope Display 3DSS • ABI (Active Band Indicator) & MPVD (Multi-Purpose VFO Outer Dial) • PC Remote Control Software to Expand the Operating Range • Includes External Power With Matching Front Speaker



FTDX10 | HF/50MHz 100 W SDR Transceiver

- Narrow Band and Direct Sampling SDR • Down Conversion, 9MHz IF Roofing Filters Produce Excellent Shape Factor • 5" Full-Color Touch Panel w/3D Spectrum Stream • High Speed Auto Antenna Tuner • Microphone Amplifier w/3-Stage Parametric Equalizer • Remote Operation w/optional LAN Unit (SCU-LAN10)



FT-991A | HF/VHF/UHF All Mode Transceiver

- Real-time Spectrum Scope with Automatic Scope Control • Multi-color waterfall display • State of the art 32-bit Digital Signal Processing System • 3kHz Roofing Filter for enhanced performance • 3.5 Inch Full Color TFT USB Capable • Internal Automatic Antenna Tuner • High Accuracy TCXO



FTDX101D | HF + 6M Transceiver

- Narrow Band SDR & Direct Sampling SDR • Crystal Roofing Filters Phenomenal Multi-Signal Receiving Characteristics • Unparalleled - 70dB Maximum Attenuation VC-Tune • 15 Separate (HAM 10 + GEN 5) Powerful Band Pass Filters • New Generation Scope Displays 3-Dimensional Spectrum Stream

FT-710 Field version also available!



FT-710 Aess | HF/50MHz 100W SDR Transceiver

- Unmatched SDR Receiving Performance • Band Pass Filters Dedicated for the Amateur Bands • High Res 4.3-inch TFT Color Touch Display • AESS: Acoustic Enhanced Speaker System with SP-40 For High-Fidelity Audio • Built-in High Speed Auto Antenna Tuner



FT-891 | HF+50 MHz All Mode Mobile Transceiver

- Stable 100 Watt Output • 32-Bit IF DSP • Large Dot Matrix LCD Display with Quick Spectrum Scope • USB Port Allows Connection to a PC with a Single Cable • CAT Control, PTT/RTTY Control



Two versions available!

FT-3185RASP | Heavy-Duty 85W 2M FM Transceiver

- Massive Heatsink Ensures Reliable 85W RF Power • Super-DX Function Increases Receiver Sensitivity & Weak Signal Reception • 221 Memory Channels • Large 6-Character Alpha-Numeric Display

Two versions available!



FTM-150RASP | 2M/430MHz FM True Dual Band Xcvr

- Dual Receivers Allowing (V+V, U+U, V+U, U+V) Operation • 55W VHF & 50W UHF • Heavy Duty Heat Sink w/Funnel Air Convection Conductor • Front & Main Body Speaker for 6W High Quality Audio



Two versions available!

FTM-510DRASP C4FM/FM 144/430MHz Dual Band Xcvr

- New Super-DX & ASP (Audio Digital Signal Processor Unit) • True Dual Bank Receive (V+V/U+U/V+U/U+V) • C4FM/C4FM Digital D-D Dual Receive • 2.4" High-Res Full-Color Touch-Panel Display • Wireless Operation Capability with Optional Bluetooth® Headset



FTX-1 Optima | HF/50/144/430MHz All Mode SDR Xcvr

- Detachable Field head For QRP SOTA/POTA Adventures • Attach Field Head to SPA-1 For 100 Watts (Base Operations) • SPA-1 Includes Internal HF Antenna Tuner • SSB, CW, AM, FM and C4FM Digital



FTX-1 Field | HF/50/144/430MHz All Mode SDR Xcvr

- Compact QRP SOTA/POTA Xcvr (8.4"W, 3.5"H, 2.2"D) • 6W (5W for QRP) • Includes 6400mAh High Capacity Li-ion Battery • SSB, CW, AM, FM and C4FM Digital • 10W of Power w/External Power Supply • Upgradable to 100W with Purchase of SPA-1



FT-70DR C4FM/FM 144/430MHz Xcvr

- System Fusion Compatible • Large Front Speaker delivers 700 mW of Loud Audio Output • Automatic Mode Select detects C4FM or Fm Analog and Switches Accordingly • Huge 1,105 Channel Memory Capacity • External DC Jack for DC Supply and Battery Charging

FT-5DR

C4FM/FM 144/430 MHz Dual Band

- High-Res Full-Color Touch Screen TFT LCD Display • Easy Hands-Free Operation w/Built-In Bluetooth® Unit • Built-In High Precision GPS Antenna • 1200/9600bps APRS Data Communications • Supports Simultaneous C4FM Digital • Micro SD Card Slot



VX-6R | VHF/UHF Dual Band Hand-Held

- Big-Radio Features in a Compact Package • Wide-band Receiver Coverage for Catching All the Action! • 900-Channel, 24-Banks Memory System • Outdoor-Ready Features including Waterproof Rating • Smart Search Automatic 31-Channel Scanning/Loading System



5 Ways to Shop!

• RETAIL LOCATIONS – Store hours 10:00AM - 5:30PM - Closed Sunday

• PHONE – Toll-free phone hours 9:30AM - 5:30PM

• ONLINE – WWW.HAMRADIO.COM

• FAX – All store locations

• MAIL – All store locations

YAESU
The radio

ANAHEIM, CA
(800) 854-6046

PORTLAND, OR
(800) 765-4267

PHOENIX, AZ
(800) 559-7388

MILWAUKEE, WI
(800) 558-0411

WOODBIDGE, VA
(800) 444-4799

WINTER SPRINGS, FL
(800) 327-1917

SACRAMENTO, CA
(877) 892-1745

DENVER, CO
(800) 444-9476

PLANO, TX
(877) 455-8750

NEW CASTLE, DE
(800) 644-4476

SALEM, NH
(800) 444-0047

ATLANTA, GA
(800) 444-7927



ARRL® **SWEEPSTAKES**

ICOM® **DREAM
STATION**

www.arrl.org/DreamStation

DREAM BIG! >>

Win this Dream Station with the **latest gear** from Icom.

See How to Earn Up to 6 Entries!



IC-7760
60th Anniversary Signature Edition
HF/50 MHz 200 W Transceiver



IC-PW2
1 kW Linear Amplifier



SM-50
Desktop Microphone



Seiko Watch
Icom 60th Anniversary
Limited Edition

>> **DREAM NOW!**

JOIN OR RENEW

SET UP AUTO-RENEW

DONATE TO DIAMOND CLUB

3 Ways to Enter*:

Members automatically earn ARRL Sweepstakes entries when they **join or renew** (earn 1 entry), **set up auto-renewal** (earn 2 entries), or **donate to Diamond Club** (earn 1 entry for every \$50 donated) any time from **January 3 through December 31, 2025**.

Limit of 6 entries per person.

* No Purchase Necessary. For **Official Rules** visit www.arrl.org/DreamStation/rules.

ARRL The National Association for Amateur Radio® is the sole sponsor of the ARRL Sweepstakes. Icom® is a registered trademark of Icom Inc.

3-Year Membership Offer!

Receive this limited-edition Gil cartoon coffee mug when you renew your ARRL membership for 3 years – the second in the series.

Use code GILQST



Gil Gildersleeve, W1CJD

www.arrl.org/membership

This offer applies to a 3-year standard membership.

Not valid for student, life, or international memberships.



ARRL

The National Association for Amateur Radio®

Looking for...
Customized cable assemblies?
Unique colors?
Personalized marker labeling?



We have everything you need.

713-492-2722
info@abrind.com
abrind.com



ABR
INDUSTRIES™

W5SWL Electronics Premium Quality RF Connectors Order Direct!

Wide Selection of Connectors

- UHF & N
- BNC & SMA
- Mini-UHF & FME
- TNC & C
- MC MCX & MMCX
- QMA SMB & SMC
- DIN & Low PIM
- Reverse Polarity
- RF Adapters
- Bulkheads

And Much More!

- Dave's Hobby Shop by W5SWL
- Ham Radio Gadgets
- RF & Technical Parts
- New & Surplus Materials

Order at www.W5SWL.com

Ships Fast From The Arkansas River Valley



**Dual Band
2M/440
and other
models**

EmComm,
Satellite work,
long distance
simplex and
repeater use.

Elk Antennas
Log-Periodic Antennas
for the Radio Amateur
jim@siemons.com
www.ElkAntennas.com



**Still Struggling With
Your 20-Year-Old
Repeater Controller?**



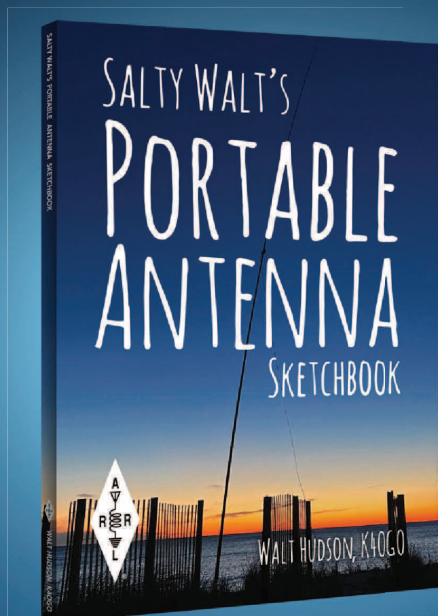
**More Power, More Features
Less Money**

**State-of-the-Art Repeater
Controllers and Accessories**

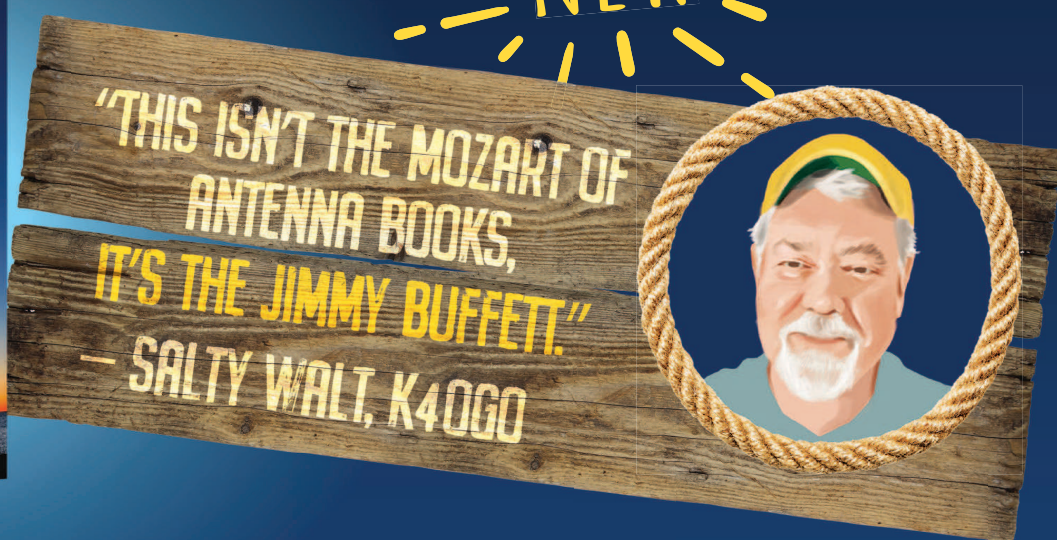
Arcom

Aurora, OR 97002 (503) 678-6182
www.arcomcontrollers.com

SALTY WALT'S PORTABLE ANTENNA SKETCHBOOK



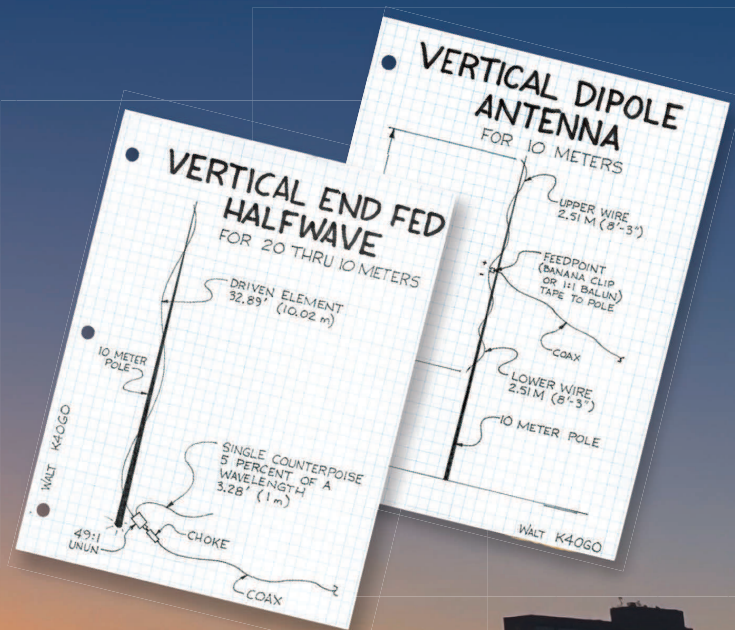
NEW



15 PORTABLE ANTENNAS, BEAUTIFULLY RENDERED!

Join Salty Walt, **K4OGO**, of the Coastal Waves & Wires YouTube channel, where all the action happens — right on the beach! Ham radio adventure awaits with these portable antenna designs. In addition to his sketches, Walt offers portable construction and operating tips, and just enough about counterpoise wires and ground to get you making contacts in no time.

Walt pairs each antenna with a dining spot you can try. He guides you to the best chowders, fish tacos, crab legs, and more, all while building antennas, making contacts, and soaking up some coastal rays.



Salty Walt's Portable Antenna Sketchbook

ARRL Item No. 2226 | Retail \$25.95 | Member Price \$22.95

Order online at www.arrl.org/shop | Call toll-free US 1-888-277-5289





Offering the Gold Standard in AMATEUR RADIO PRODUCTS

Desktop Tuners
Zero Power Tuners
Remotes
Baluns/ Ununs
Meters
Cables
Analog Audio Filters

LDGelectronics.com
Contact Us: 410-586-2177



ARRL
The BEST Ham
Radio Resources!

Shop online at
www.arrl.org/shop

**RF Connectors
& Gadgets**

Parts • Products • More
www.W5SWL.com

TUBES

- 100% Tested
- 1-year Warranty
- Matched Groups

800-421-4219 (ext 119)
www.PentaLabs.com

Air Boss Antenna Launcher
www.olahtechologies.com
See Video

For when you want your antenna on top

\$99.99
Free shipping to lower 48
olahtechologies@gmail.com

Fun and affordable kits from
Pacific Antenna

Tracer Injector
Tenna Dipper II
Micro Attenuator
Mini SWR Indicator

See our selection of quality
Kits starting at \$5
www.qrpkits.com

S'MR

VGA Cable
Car or Shack
Separation
up to 100'

The Only Separation Kit You'll Ever Need
\$89.95 Complete with 15' VGA Cable

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

* Also TYT TH-9800 † Tested with 15' VGA cable only

IC-7100 USB port can be extended up to 50'

NEW! UNIVERSAL KIT WITH 15' VGA CABLE \$89.99 COMPLETE
www.SwapMyRigs.com

CHATT RADIO

ChattRadio.com

CHATTANOOGA, TENNESSEE

1.833.456.4673

**We Are Your One Stop
Radio Shop**



Schulman Auction

ESTD 2006



Schulman Auction is the world's premier ham radio equipment auctioneer with over 150 years of combined staff experience in ham radio and 50 years in the auction industry. "By hams, for hams!"



We are your one-stop solution, dedicated to serving the amateur radio community around the world.



- Our proven online auction method effectively markets your equipment and consistently achieves market value in ways other list-it-yourself platforms cannot.
- Here's why: We test equipment thoroughly before offering it to the buying public, bringing buyers a sense of certainty and trust found nowhere else.
- Our process is designed to serve estates and individuals with large or specialty collections, Wills and Trusts, etc. We offer nationwide pickup services and other solutions for transportation to our facility.



For more information, call or email us today.

David Schulman, WDØERU
816-455-5520 or 913-568-3767
david@schulmanauction.com
www.schulmanauction.com



ARRLVEC

Volunteer Examiner
Coordinator

ARRL VE Teams Go Digital in 2025



Join Exam
Tools!



Have Fun!

Learn More



www.arrl.org/ve



HAMMOND®



MANUFACTURING FOR RADIO SINCE 1917

- Racks & Cabinets, Shelves, Panels, Drawers
- Small Cases & Project Boxes
- Transformers



Technical Data, Drawings,
List of Stocking Distributors:

hammondmfg.com

**RF Connectors
& Gadgets**

Parts • Products • More

www.W5SWL.com

**Buckmaster
OCF Dipoles**

Built to last from quality materials!

4-Band 68': 40, 20, 10, & 6 meters

7-Band 135': 80, 40, 20, 17, 12, 10, & 6m

8-Band 270': 160, 80, 40, 20, 17, 12, 10, 6m

BUCKMASTER
INTERNATIONAL

800-282-5628
540-894-0907

HamCall.net



Schulman Auction

ESTD 2006



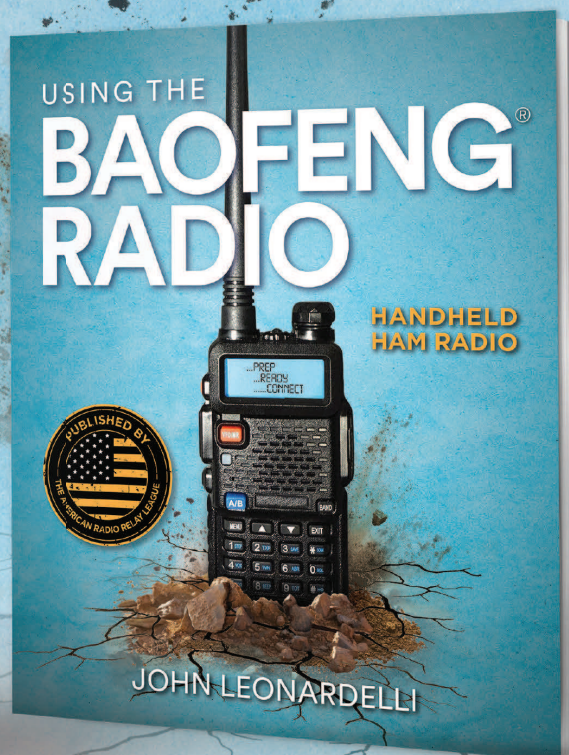
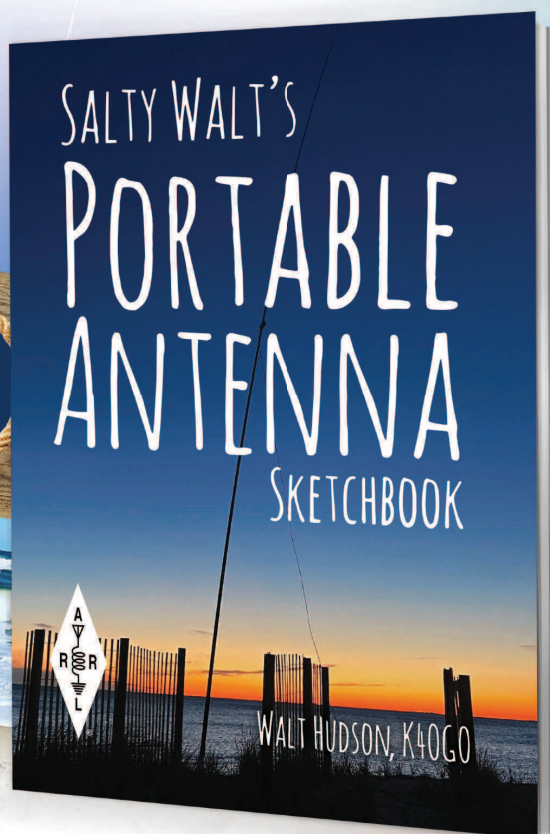
Schulman Auction is your one-stop solution for buying and selling amateur radio equipment.

Through targeted marketing of our carefully curated auctions, we consistently achieve market value (or more) for sellers - and reliable equipment packed and shipped professionally, for buyers.

"By hams, for hams" - and we can help you, too!

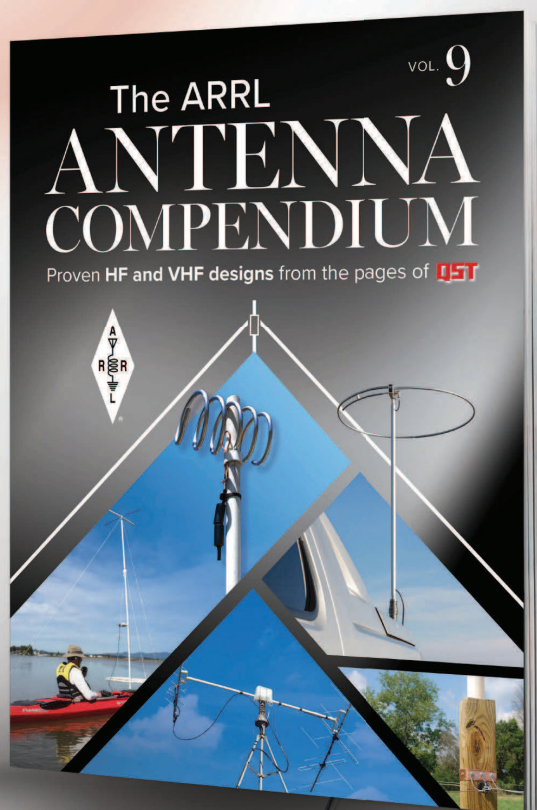
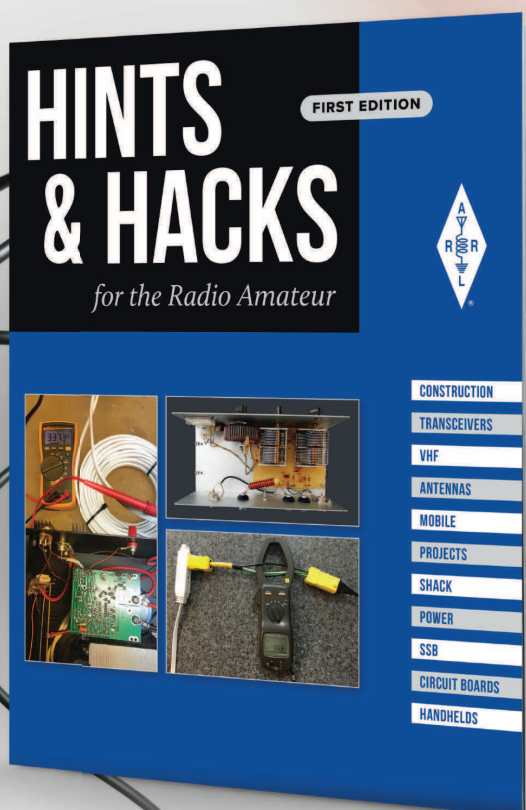
For more information, call or email us today.

David Schulman, WDØERU
816-455-5520 or 913-568-3767
david@schulmanauction.com

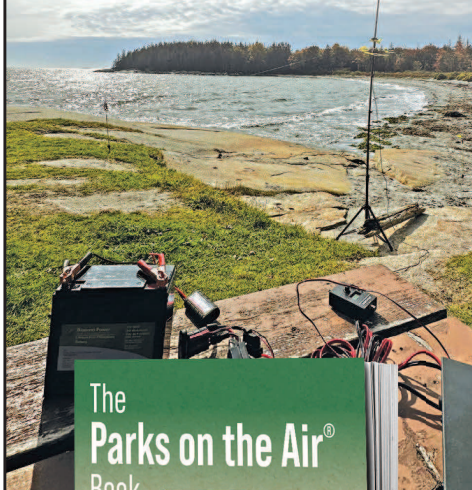


NEW BOOKS FROM ARRL!

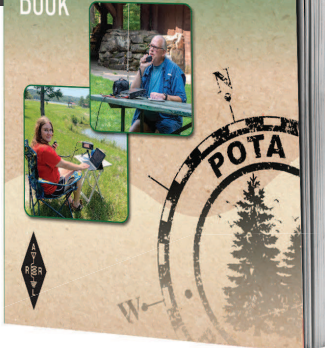
Order Online at www.arrl.org/shop



Get Started in POTA!



The Parks on the Air® Book



Think outside the shack!
You never know what exciting
adventure awaits. Fresh air,
beautiful scenery, wildlife, and
new friends are waiting for you.

Topics Include:

- Multi-park roves
- QRP operation
- Satellite operation
- Surefire wire antennas
- Activating urban parks
- CW and POTA

Parks on the Air® Book

Item No. 1748 | Retail \$22.95

Member Price \$19.95

www.arrrl.org/shop



ARRL

The National Association for
Amateur Radio®

W5SWL Electronics Premium Quality RF Connectors Order Direct!

Wide Selection of Connectors

- UHF & N
- MC MCX & MMCX
- Reverse Polarity
- BNC & SMA
- QMA SMB & SMC
- RF Adapters
- Mini-UHF & FME
- DIN & Low PIM
- Bulkheads
- TNC & C

And Much More!

- Dave's Hobby Shop by W5SWL
- RF & Technical Parts
- Ham Radio Gadgets
- New & Surplus Materials

Order at www.W5SWL.com

Ships Fast From The Arkansas River Valley

PROMOTING THE USE OF TEN METERS SINCE 1962

Ten-Ten International Net, Inc.

Awards - QSO Parties - Special Events - Paperchasing

NETS DAILY (except Sunday) on 28.380 and 28.800 at 1800z



CHECK US OUT ON THE WEB
www.ten-ten.org / www.10-10.org

1349 Vernon Ter San Mateo CA 94402-3331



Premium Telescopic
Antenna Masts
& Mounts

www.hitched4fun.com

We stock the rugged 1KW transistor
and parts for the 2M and 88-108MHz
amplifier designs. We also stock the
NXP MRF101 LDMOS transistors.

RF TRANSFORMERS 2—54MHz

COAX WIRE



RF400



RF600



RF800



RF1000



RF2000

FLEXIBLE

TC-12 - 10.7 ohm
TC-18 - 17.1 ohm
TC-20 - 18.6 ohm
TC-22 - 21.7 ohm
TC-24 - 26.8 ohm
SM250-50 50 ohm

SEMI-RIGID

UT-141C-25 25 ohm
260-4118-0000 25 ohm

CCI

Communication Concepts, Inc.

508 Millstone Drive, Beavercreek, OH 45434-5840

Email: cci.dayton@pobox.com

www.communication-concepts.com

Phone (937) 426-8600

Established in 1979



Type "U"
2 to 300MHz

Tigertronics Signalink™ USB

The *Signalink USB* has you covered with 15+ years of proven performance and reliability, radio cables for almost any radio, and compatibility with virtually any sound card digital or voice mode. Whether you're new to digital operation, or an experienced operator, the *Signalink USB's* built-in sound card, front panel controls, and simplified installation will get the job done right the first time. The *Signalink USB* is fully assembled (**made in the USA!**) and comes complete with printed manual and all cables. Don't miss the peak of the Solar Cycle 25! Visit our website today and see what the *Signalink USB* can do for you!

Operate FT8, JS8CALL, VARA HF, VARA FM, Packet, WinLink, PSK31, RTTY, SSTV, CW, EchoLink & more!

Sale Price
\$119.95



Easy Digital!

Complete with all cables
+ FREE SHIPPING!

www.tigertronics.com



(800) 822-9722
(541) 474-6700

154 Hillview Drive Grants Pass, Oregon 97527

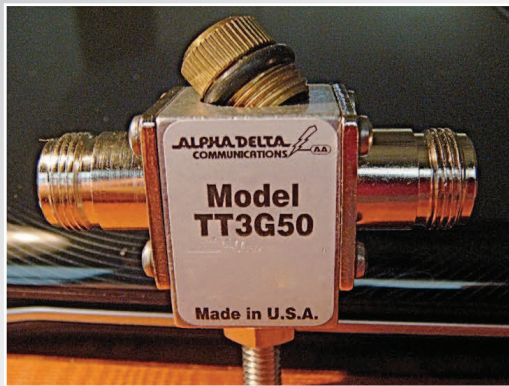
The **Alpha Delta TT3G50** Series Coax Surge Protector Design Concept

It was previously thought that lightning discharge energy was in the VLF, Very Low Frequency, spectrum and that a narrow band bandpass DC blocked surge protector in that range provided adequate protection.

However, in a study under the auspices of the U.S. Department of Energy utilizing the satellite FORTE carrying VHF lightning discharge sensors, it was determined that there can be damaging lightning energy emissions throughout the 30-300 MHz VHF spectrum. Therefore the damage threat can be anywhere from VLF through VHF.

Through careful design of the **Alpha Delta Model TT3G50 series broadband** precision constant impedance thru-line and ARC-PLUG™ module, allowing proper firing characteristics, this state of the art surge protector design allows effective protection throughout this entire spectrum.

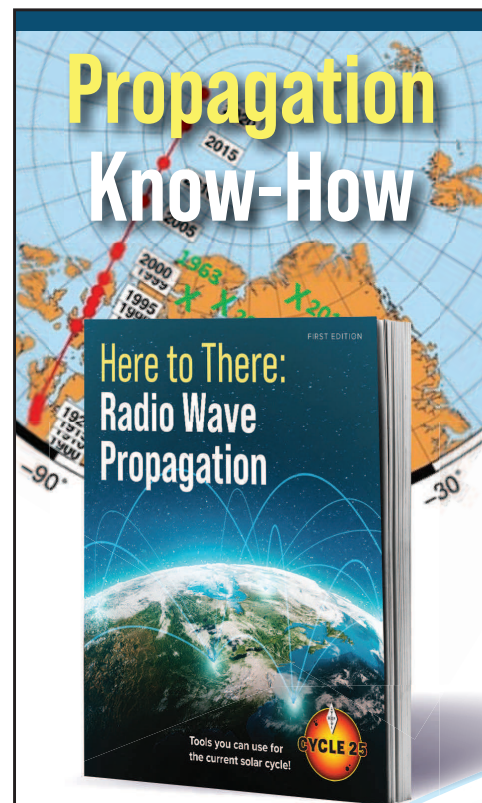
- **Depending** on the connector style we provide excellent broadband performance through **3 GHz**, compared to narrowband DC blocked designs.
- **The impedance** compensated thru-line cavity design allows control voltages to pass through the device, instead of the "wire around" requirement of DC blocked designs. Our design also allows in circuit cable sweeps.
- **The innovative** field replaceable gas tube ARC PLUG™ module can be removed and replaced in the field with no tools required and without removing the surge protector from the circuit. The knurled knob does the trick. Connectors and knob are O ring sealed for environmental protection.
- **DC blocked** designs require the entire unit to be removed and discarded if hit with a surge beyond its rating. They are not field repairable.
- **As a result** of extensive testing and approvals within the military agencies, the Defense Logistics Agency (DLA) has assigned NSN numbers to our devices. Cage Code 389A5. All of our products are manufactured in the U.S.A. in our ISO-9001 certified facility for highest quality. Various connector styles available.



Also available from **Alpha Delta** dealers.

www.alphadeltaradio.com

for product technical details, installation requirements,
pricing, dealers and contact information



Learn more about what's going on in the ionosphere and how it impacts operating. Understanding conditions and how to predict them will improve your time on the air.

Topics Include:

- Fundamentals of Radio Wave Propagation
- The Sun and Solar Activity
- Sky-Wave, or Ionospheric, Propagation
- VHF and UHF Non-ionospheric Propagation
- Propagation Predictions for HF Operation
- VHF and UHF Mobile Propagation

**Here to There:
Radio Wave Propagation**

Item No. 1731 | Retail \$22.95

Member Price \$19.95

www.arrrl.org/shop



ARRL

The National Association for
Amateur Radio®



Dust & Water-proof
compatible

ALINCO®

Quality. Style. Performance!



REMtronix



Whatever your favorite operating frequency and mode, Alinco has a radio that's perfect for making the most of your budget. With a wide selection of easy-to-operate, multi-band handheld and mobile radios, Alinco delivers maximum value for your ham radio enjoyment!



30-470MHz
MULTIMODE RECEIVER
DJ-X100T

REMtronix, Inc.

586 Commerce Ct. Manteca, CA 95336

Ph: (209) 900-1296 Website: <http://www.remtronix.com>

Email: alinco@remtronix.com Service: alincosupport@remtronix.com

Products intended for properly licensed operators. Required products are FCC part 15B certified. Specification subject to change without notice or obligation.



144MHz FM MOBILE/BASE
TRANSCIVER
DR-CS10HT



30A SWITCHING POWER SUPPLY
DM-530T



30A Peak SWITCHING
POWER SUPPLY
DM-30TR



144 / 440MHz FM DUAL BAND
HANDHELD TRANSCIVER
DJ-VX50HT



Dust & Water-proof
compatible

REMTRONIX

HEIL HAM RADIO

**"The most comfortable
headset I've ever used."**

Mark, WZ4I

**"The microphone gave our radios the
typical Heil crisp audio in controlling the
pileups."**

Don, N1DG
DXpedition co-leader KH1/KH7Z

**"In the heat of battle, the phase switch
was switched to 'out' to get a clean
copy. Nice feature!"**

David, W5XU, VP8RXU



HEILHAMRADIO.COM



90TH ANNIVERSARY

1935 • 2025

ARES[®]

READY • RESPONSIVE • RESILIENT

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 support in public service, and when all types of disasters strike.

Become part of your local ARES[®] group today and make a difference for tomorrow.



ARRL The National Association for
Amateur Radio[®]

Learn more at www.arrl.org/public-service

SUPPORT



ARISS STAR

Amateur Radio on the International Space Station

The ARISS *STAR* Keith Pugh Memoriam Project honors ARISS Technical Mentor Keith Pugh, W5IU (SK), and seeks to improve ARISS US STEM education via robotics — with telerobotics adding a wireless accent.

Middle and high school-aged students will discover the benefits and excitement of ham radio while learning radio technology and communication.

Your support of this program is needed, please give directly to ARISS at

<https://www.ariss.org/ariss-star.html>



GREEN HERON ENGINEERING LLC

RT-21 DIGITAL ROTATOR CONTROLLERS

Unmatched Performance for any Rotator



RT-21 Rotator Packages

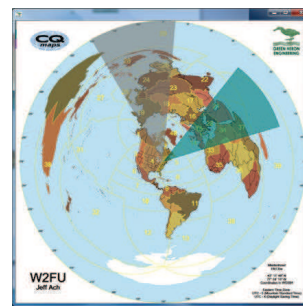
- RT-21 with Yaesu & M2 Orion Rotators

RT-21 internal Wi-Fi Option

- Control your rotator from ANYWHERE using a web browser

WIRELESS NETWORK CONTROLS

- Internet access for switches and rotators
- Eliminate cables and tethered control boxes
- Create customized on-screen controls
- Great circle maps



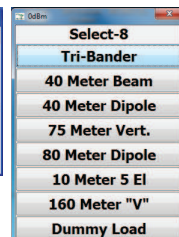
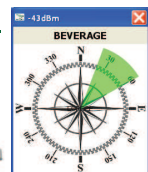
GH Everywhere Base and Remote



- USB and wireless relay controls
- Options: outdoor enclosures and external antennas

Select-8 Wireless Remote Coax Switch

- Built-in GHE Wireless
- Powered through the coax
- Tower leg Mount
- Amphenol RF connectors



www.greenheronengineering.com ♦ (585) 217-9093

BevFlex-4X Low Band RX Antenna System

Configure as a switchable, bi-directional Beverage, BOG, Flag, EWE, or VE3DO low noise receive antenna system. Build the optimal version to fit your location. Feed the Beverage and BOG configurations at the point closest to the shack, not just at the ends.

Also antenna switching, CW keys, PC-radio digital modes interface, and more!

www.unifiedmicro.com **UM** Unified Microsystems

ADVANCED SPECIALTIES INC.

YAESU
The radio

www.advancedspecialties.net

AMATEUR RADIO * SCANNERS



VX-6R
Triband
Submersible
Hand Held



FTM-510DR

AMATEUR RADIO EQUIPMENT &
ACCESSORIES • SCANNERS
ANLI • COMET • UNIDEN • YAESU

1-516-998-0370

880 West Beech St. • Long Beach, NY 11561

Closed Sunday & Monday

RF Connectors & Gadgets

Parts • Products • More

www.W5SWL.com

IT'S HERE...

MMX Nomad

Complete HF Radio Station

Out of
This World!



With Internal Battery,
SWR Bridge, Speaker,
3 bands, Tune, More...

Optional Solar Panel
in Mini GO Bag
with Accessories



PreppComm
Amateur Radio



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

Contact Your Local ARES Group or ARRL Affiliated Club

Join ARES® Today!



- Ham Radio Outlet www.hamradio.com
- R&L Electronics www.randl.com
- Japan Communication www.jacom.com
- Radio Parts Japan www.radio-part.com

***NEW!**

ANC-5 Antenna Noise Canceller

See a June 2024 preview at
www.timewave.com!

Shipping begins in July 2024

All the features of the ANC-4+:

- External TX/RX control - great for QRP operation
- Continuously Adjustable TX hang time
- Noise amp front end protection
- TX LED indicator
- SMT construction w/ gold-plated PCB
- Heavy extruded aluminum housing for precise tuning and mechanical stability - matches Navigator!

Kill Noise before it reaches your receiver!

Great for suppressing power line noise, plasma TV noise & many other local electrical noises.

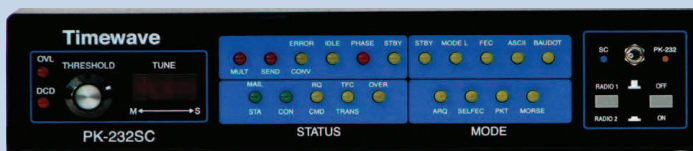


Navigator

The Premier Sound Card Modem!

See QST Short Takes Review - May 2014-P. 62

- Quiet - hear what others miss!
- Proven USB Sound Card built-in
- Precise FSK
- Genuine K1EL Winkeyer CW IC
- Complete - Six FTDI COM ports
- Universal Rig Control for every radio
- Works well with HRD, M110A, Fldigi, FT8 & many more software programs
- Front-Panel Audio & CW controls
- USB connected and powered
- Convenient - No annoying jumpers!



PK-232SC+

Multimode Data Controller*

- RTTY
- Packet
- Pactor
- CW
- PSK31 & all the Sound Card modes!

**Choose from a wide variety of upgrades & accessories for any PK-232*

Customize your PK-232 installation with our complete line of upgrades, accessories and cables.

100,000 sold - All-time top selling data controller!

- Single USB connection to computer
- USB Sound Card built-in
- 3-Way Rig Control built-in - logic level, RS-232 & USB!
- Computer isolated from radio
- Real FSK & AFSK
- keyboard CW - send and receive
- Dual Port - two radios at same time!

■ HamLinkUSB™ USB-to-RS-232 Adapter

Proven FTDI Chip. USB A & C, 9 and 25 pins for all radios, TNCs, Rotor Controllers & more!

■ HamLinkUSB™ Rig Control+

C-IV, CAT, RTS (PTT, FSK or CW) for sound card software
Perfect for HRD owners with simple sound card adapters



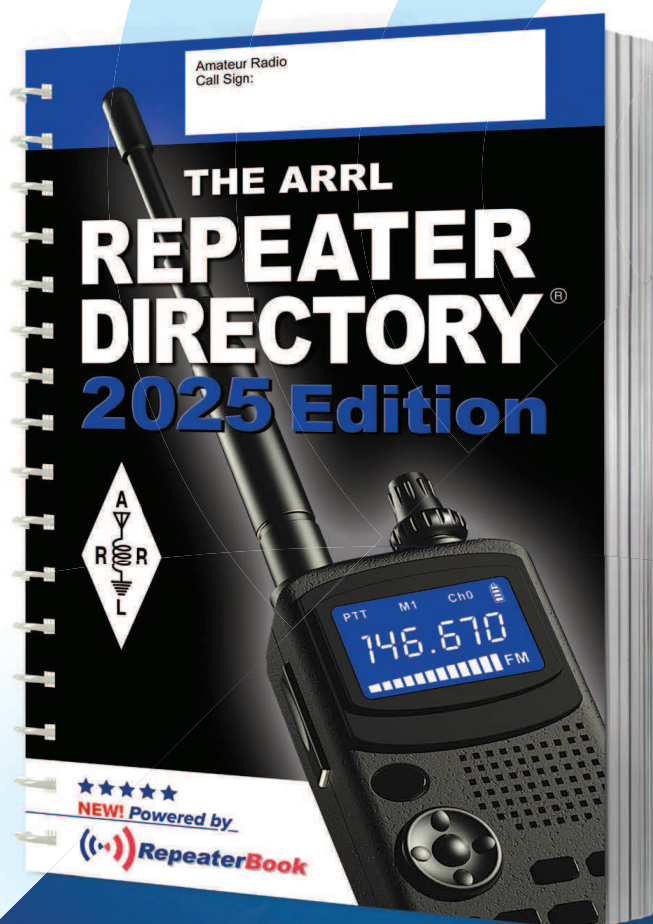
THE ARRL REPEATER DIRECTORY® 2025 Edition



NEW! Powered by  **RepeaterBook**

The ARRL Repeater Directory is now powered by RepeaterBook, amateur radio's comprehensive, worldwide, FREE repeater database – RepeaterBook.com.

The Repeater Directory is the best way to find repeaters in your area, when you're traveling, or when you're on the move!



- Listings for US and Canada, organized by state/province, county, and city/town.
- A location indicator for many repeaters in cities/towns.
- Additional information on ARES® and SKYWARN® affiliation, emergency power, and more.
- Digital repeaters including System Fusion, D-STAR®, DMR, NXDN, M17, Tetra, and P25 systems.
- HF, VHF/UHF, and microwave band plans.
- Information on Radiograms and updated ARL codes.

ARRL Item No. 2158 | Retail Price \$19.95

Order online at www.arrl.org/shop | Call toll-free US 1-888-277-5289

ON THE EDGE OF ADVENTURE

FALL SPECIALS AWAIT!

K-LINE

KX-LINE

KH-LINE

AMPLIFIERS



K4 & KPA1500 the Ultimate Combo

for DXpeditions, DXers, Contesters,
and Everyday Operators.



KX2 Transceiver

"Stealth" Transceiver can go wherever
your imagination takes you.



KX3 Transceiver

puts the world in the palm of your hand!



KH1 Hand-Held 5-Band CW Transceiver

Pocket-sized power. Operate from anywhere!

SHOP NOW & SAVE BIG!

ELECRAFT.COM 831.763.4211

 **ELECRAFT**



Ease your family's burden when you become a Silent Key

“I started Hamestate.com, a concept to offer a hassle free, subscription based service to hams leaving their loved ones with no burden when it comes to our hobby when we pass on.”

— Andre VanWyk, NJØF

Subscriber Benefits

- **HamEstate** travels to your station for the initial evaluation at NO cost to your family.
- We provide your family with a full evaluation, showing used retail value and **HamEstate** purchase values.
- Your family deals with one company instead of lots of buyers invading their privacy. **HamEstate** dismantles, packs, and removes all equipment and towers.
- We can also assist your family in disposing of other estate items, from movable assets to properties, utilizing our network of expertise.
- **HamEstate** will stand by your family until the entire estate is finalized, including license cancellations and other clean-up matters.

Leave your relatives with peace of mind,
knowing that someone will take care of your
radio station sales without them having to
deal with this cumbersome task

www.hamestate.com

Toll-Free 1-833-891-0073

info@hamestate.com



rt SYSTEMS
AMATEUR RADIO PROGRAMMING

and



Team up to give you
ROUTE SEARCHES
in the RT Systems Programmers

Why You'll Love It!

- Avoid manual data entry
- Quickly find repeaters along your travel path
- Get the most current frequency information available
- Perfect for road trips and new operating locations

RT Systems Programmer

Available through Help | Check for Updates

Version 5 (Win) programmers.

*Updates are always **FREE** in current version of RT Systems Programmers.*

RepeaterBook Plus

Subscription required.

Check repeaterbook.com to sign up.

With RT Systems and RepeaterBook Plus,
travel smarter, talk farther, and never miss a contact.

800-921-4834 • www.rtsystemsinc.com

*"The best preparation for tomorrow
is doing your best today."*

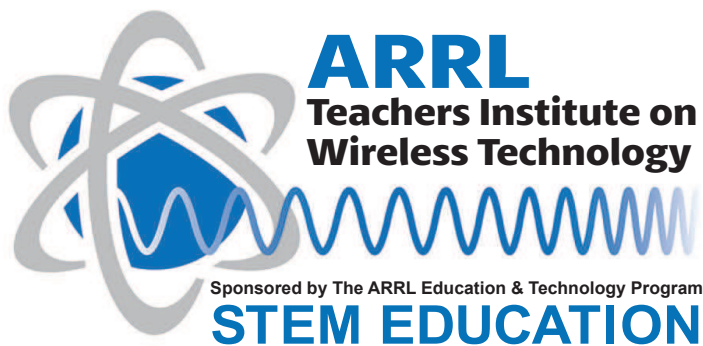
H. Jackson Brown, Jr.





→ Your Gift
Matters

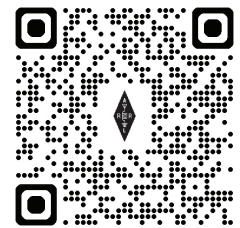
HIGHSCHOOL CLUB'S EPIC RADIO CALL



Sponsored by The ARRL Education & Technology Program

STEM EDUCATION

▶ Watch as these
students are inspired
by their teacher and
discover the **joy of radio.**



The future of amateur radio begins
with **your gift today.**

DONATE TODAY

Funded entirely by the generous support of ARRL donors.

These ARRL programs **help students discover a passion for amateur radio** through specialized science and technology lessons. Teachers are provided the knowledge, skills, and materials to deliver hands-on STEM experiences to their students.



Make your gift today — online or over the phone

Visit on the web **www.ARRL.org/donate**

Call the ARRL Development Office at **860-594-0228** or
E-mail **development@arrrl.org**

The Legend Continues



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.

Don't be fooled by big boxes, high price tags, complex operation and broken promises. As Kenwood continues to build outstanding products with unparalleled performance and great value, it's no surprise Kenwood is rated as one of the leading choices for HF radios.

It's not too late to own an HF legend because we still build them today.

KENWOOD

Customer Support: (310) 639-4200
Fax: (310) 537-8235


www.kenwood.com/usa



ADS#36419

Ham Ads

Please contact the Advertising Department at 860-594-0203 or hamads@arrrl.org for further information or to submit your ad.

**QST Ham Ads on the Web
Updated Monthly!**

www.arrrl.org/ham-ad-listing

Before considering a ham ad please read.

1. Advertising must pertain to products and services which are related to Amateur Radio.

2. The Ham-Ad rate for commercial firms offering products or services for sale is \$2.25 per word. Individuals selling or buying personal equipment: ARRL member 1.00 per word. Non-ARRL member \$1.50 per word. **Bolding** is available for \$2.50 a word. Prices subject to change without notice. You may pay by check payable to the ARRL and sent to: Ham-Ads, ARRL, 225 Main St., Newington, CT 06111. Or, you may pay by credit card sending the information by fax to 860-594-4285 or via e-mail to hamads@arrrl.org. Credit card information needed is: the type of credit card, the exact name that appears on the credit card, the credit card number, the expiration date and the credit card billing address.

3. **Closing date for Ham-Ads is the 15th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date.** Example: Ads received December 16th through January 15th will appear in March QST. If the 15th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day. Please contact the Advertising Department at 860-594-0255 or hamads@arrrl.org for further information or to submit your ad.

4. No Ham-Ad may use more than 200 words. No advertiser may use more than three ads in one issue. Mention of lotteries, prize drawings, games of chance etc is not permitted in QST advertising.

The publisher of QST will vouch for the integrity of advertisers who are obviously commercial in character and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The American Radio Relay League does not discriminate in its advertising on the basis of race, color, religion, age, sex, sexual orientation, marital status or national origin. ARRL reserves the right to decline or discontinue advertising for any other reason.

AN IMPORTANT NOTICE TO ALL HAM AD POSTERS AND RESPONDERS, FROM THE ARRL ADVERTISING DEPARTMENT: Greetings from ARRL HQ! Please note that we have received reports from many ARRL members who have placed classified ads in these listings, and have received responses from individuals proposing "creative" payment schemes. These particular instances involved offers of over-payments for goods by bank check, followed by instructions to deduct the cost of your item from the overpayment, and to transfer the overage back or to another individual. This is a well-known scam. Unfortunately, we have no control over this and other scams of this type. Once your email address is posted, you are vulnerable to those individuals seeking to provide you with questionable information.

Club/Hamfests/Nets

CW INSTRUCTION via internet video conference classes. VISIT longislandcwclub.org

Emergency Ham Net~Forming a new group, free membership. Have fun and push the frontiers of digital radio. www.emergencyham.net

Friend of BILL W meets Thur on 14.316 @ 12:30 ET. Daily Meeting on QSO NET on 21.350 @ 11:30 Eastern Time. More info please visit HAAM Group website www.qsl.net/haam.

SOCIETY OF WIRELESS PIONEERS - Professional brass pounders on land, sea, and air from the time of spark to solid state preserved photos, stories, schematics, letters, cartoons, catalogs, books, and manuals to keep radio history alive. Website showcases **early ham stations**, naval communications history, SOS events, and more, all free. www.sowp.org

Property/Vacation/Rentals

A CARIBBEAN SAINT KITTS "V4" DX RENTAL. See V47JA on QRZ.com and email: W5JON@sbcglobal.net for Ham Discount information. John W5JON/V47JA

A DX Apartment available in VP9 with rigs and antennas. Email: ed@vp9ge.com for details.

Beautiful outdoor Idaho! Spacious low populated areas. Abundant recreation opportunities. Moderate four season climate. Thinking of buying or selling? Contact Ron Bishop, W7IM, Keller Williams Realty Boise. 208-870-6075. Ron@BoiseBargains.com

COLORADO CHALET with ham gear for weekly rental, www.lostcreekcabin.com. WØLSD, Buena Vista, CO.

Hams Looking to purchase or sell real estate in Connecticut? Please contact Licensed Ham and Realtor, Claude Cousins, Sr. N1QAE, Berkshire Hathaway Home Services, claudecous@gmail.com, 860-989-2113

www.peidxlodge.com

Antique/Vintage/Classic

6 Meter legacy by K6EDX K6MIO. www.bobcooper.tv

ANTIQUE WIRELESS ASSOCIATION - the largest international organization for historic radio enthusiasts. Publishes the quarterly AWA Journal and annual AWA Review on all aspects of collecting and history of communications. AWA produces the famous annual AWA Convention and sponsors the world renowned Antique Wireless Museum. Only \$35/year USA, \$40/year elsewhere. Antique Wireless Association, PO Box 421, Bloomfield, NY 14469. Website: <http://www.antiquewireless.org>

Awesome Technology & Stem Museum - www.cyberengineer.info

Six Decades of Amateur Radio www.kk4ww.com

Vintage Radio, Ham Radio and Military Radio Repair. www.mcveyelectronics.com
845-561-8383

WANTED PRE-1980 MICROCOMPUTERS for historical Museum www.kk4ww.com

QSLCards/Call Sign Novelties

Airmail postage, envelopes. K3FN. Airmailpostage.com

Amateur Radio Active ID Card. Deputy Patch.com

Flaunt your call! www.HAMFLAGS.com

Get Top Quality Full Color UV Coated QSL Cards direct from the printer. Chester QSL Cards by Chester Press. Call 800-748-7089 for samples, email info@chesterpressinc.com or visit the chesterpressinc.com/QSL website.

www.QSLCONCEPT.com Custom designed QSL Cards. FREE Design, FREE Shipping, FREE Stock Photo.

General

RF CONNECTORS & GADGETS
Parts Products - More
www.W5SWL.com.

#1 AMATEUR CALLSIGN DVD! HamCall contains over 2,400,000 world-wide callsigns, 10,400,000 archive callsigns. Supported by most logging programs. Six FREE monthly internet updates and HamCall.net Gold online access included. Visa/MC/Discover 800-282-5628 <http://hamcall.net>

ATTENTION YAESU-FT 10218,000hrs, 30yrs, 800+ FT-102's Repaired. Have every part. AM-FM/board. \$25/hr. Parts@cost. Relays lifetime warranty. 954-961-2034 NC4L www.w8kvk.com/nc4l

Build your own Yagi! - W5EES.COM

For Sale: Alinco 430T, Kenwood TM840A, RF Concepts Amplifier RFC 2-317, SSB FM, Yaesu FT 890, MFJ Versa tuner 989B. Everything \$2000.00 plus shipping. AA1FC 860-913-6121

GAIN the EDGE with NARTE Certification - NARTE gives you the competitive edge with individual certification in Electromagnetic Compatibility, Electromagnetic Discharge Control and Telecommunications. Industry-recognized certification required or desired by more than 400 corporations nationwide. Call 1-800-89-NARTE or visit www.inarte.org. NARTE offers the premier EMC/EMI, ESD, Telecommunications and Wireless certification to professional technicians and engineers.

Get the F.C.C. "Commercial" Radiotelephone License: The highest-class Telecommunications Certification! Fast, inexpensive, Guaranteed Home-Study. Command Productions. Please visit: www.LicenseTraining.com (800) 932-4268

HAM KITS for sale at www.HeckKits.com L/C Meter, SWR Bridge, ESR Meter, 2-Tone Gen, FET DIP Meter.

ISOTRON ANTENNAS FOR 160 - 6 METERS! Efficient, rugged and resonant. Please visit WWW.ISOTRONANTENNAS.COM. wd0eja@isotronantennas.com 719/687-0650.

KB6NU'S "NO NONSENSE" LICENSE STUDY GUIDES have helped 1000's get their first license and upgrade to General or Extra. They can help you, too. KB6NU.COM/STUDY-GUIDES/

Kenwood HF Radio TS-440S plus power supply PS50. \$300.00 or B/O. 904-607-8076, N4CSD

MicroLog-By-WA0H .. Easy to use logging program .. Free download .. www.wa0h.com

Radio Shack HTX-100 Repair. Free Estimates. KA1HVR - www.HTX-100.com

RF SUPERSTORE

Connectors, Adapters, Antennas, Coaxial Cable and more!

High Quality, Low Cost, Ham Friendly
WWW.RFSUPERSTORE.COM

Rohn Tower, telescoping poles, tripods and antenna parts delivered to your door. www.antennapartsoutlet.com

Science Hall of Fame Dedicated to promoting Ham Radio in classrooms. www.SciHall.com AB5L

Tactical Portable Accessories for Yaesu 450D, DX-10, 817ND, 857D, 897D, 891, 991A, ICOM 7300, 7200, 7000, 706/703 and 9700. WOMSN www.portablezero.com

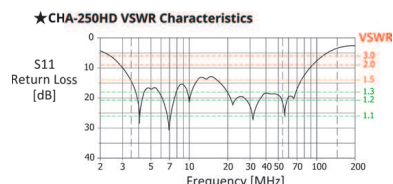
Universal Aluminum push up towers. Same day shipping. www.antennapartsoutlet.com

Xcellent **Amateur** and **Monitor Logging** from **DXtreme!** Click www.dxtreme.com

WIND TUNNEL TALES Looking for a great career? See what it can be like. Great gift for your child. Amazon and bookstores. W3BZR



Life is a JOURNEY. Enjoy the ride!



CHA-250HD - No Antenna Tuner Needed!

The Comet CHA-250HD is the updated version CHA-250B. The top aluminum section has been replaced with a solid whip for greater flexibility and less strain on the lower 4 aluminum sections in high winds.

1

2

3

4

5

6

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

7

Base Antennas

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

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

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

Wavelength: 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Gain-146 MHz: 4.5dBi / 446 MHz: 7.2dBi • Max Pwr: 200W • Length: 5'11" • Weight: 2lbs. 9ozs. • Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

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

Wavelength: 146MHz 5/8 wave x 2 • 446MHz 5/8 wave x 5 • Gain-146 MHz: 6.5dBi / 446 MHz: 9dBi • Max Pwr: 200W • Length: 10'2" • Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

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

Wavelength: 146MHz 5/8 wave x 3 • 446MHz 5/8 wave x 8 • Gain-146 MHz: 8.5dBi / 446 MHz: 11.9dBi • Max Pwr: 200W • Length: 16' 9" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated SO-239 • GP-9N Gold-plated N-type female • Construction: Fiberglass, 3 Sections

5 **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

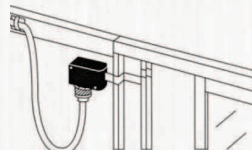
6 **COMET GP-15 TRI-BAND 52/146/446MHZ BASE REPEATER ANTENNA**

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. 1oz. • Conn: Gold-plated SO-239 • 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass

7 **COMET CTC-50M WINDOW GAP JUMPER**

Avoid drilling holes or leaving windows open/unlocked. Flat coax easily forms to window frame. Low loss SO-239 on each end, 15 inch length.

• Max Pwr: HF 100W PEP / VHF 60W FM / UHF 40W FM / 900-1300 MHz 10W FM



CAA-500MarkII

1.8-500MHz Antenna analyzer

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

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

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

CAA-5SC

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

Shoulder strap included.



Call or visit your local dealer today!
www.cometantenna.com | 800-962-2611



LICENSE PREP BOOKS

By Gordon West,
WB6NOA

- Fully illustrated text
- Questions organized for logical easy learning
- Highlighted key words in answer explanations
- Fun, educational approach teaches ham radio



Technician Class
10th Edition 2022-2026
ARRL Item No. 1908 | Retail \$29.95

General Class
11th Edition 2023-2027
ARRL Item No. 1915 | Retail \$32.95

Extra Class
9th Edition 2024-2028
ARRL Item No. 1953 | Retail \$32.95

www.arrl.org/shop



Advertising Department

Janet Rocco, W1JLR, Advertising Relationship Manager
Toll Free: 800-243-7768
Fax: 860-594-4285
E-mail: ads@arrl.org
Web: www.arrl.org/ads



QST Index of Advertisers

12 Volt Power – www.12voltpower.com	22, 125, Cover 3
ABR Industries™ – www.abrind.com	105
Advanced Specialties – www.advancedspecialties.net	115
Air Boss Antenna Launcher – www.olaotechnologies.com	107
Alinco – www.remtronix.com	113
Arcom Communications – www.arcomcontrollers.com	105
ARRL – www.arrl.org	.6, 7, 12, 26, 104, 105, 106, 107, 109, 110, 111, 112, 114, 118, 122, 126, 128
Begali Keys – www.i2rtf.com	126
bhi Ltd – www.bhi-ltd.com	10
Bioenno Power – www.bioennopower.com	126
Buckmaster Publishing – hamcall.net	109
Buddipole – www.buddipole.com	18
California Peripherals & Components, Inc. – www.Californiapc.com	126
ChattRadio – www.chattradio.com	107
Communication Concepts – www.communication-concepts.com	111
Diamond Antenna – www.diamondantenna.net	8
Elecraft – www.elecraft.com	19, 119
Elk Antennas – www.ElkAntennas.com	105
ExpertAmps USA – www.expertamps.com	17

Begali Keys
Where Art &
Engineering meet

Made in Italy by Begali Keys ©

www.i2rtf.com
begali@i2rtf.com / bbegali@gmail.com
Phone: 0039 (0)30 32 2203

Foldable Solar Panels

PowerFilm.
Made in the USA SOLAR

5 to 220 Watts

sales@californiapc.com
(877) 487-1213

CaliforniaPC.com

LiFePO4 Batteries

Bioenno Power®

sale@bioennopower.com
(888) 336-7864
www.bioennopower.com

Member Services Contact Information:

Toll Free: 888-277-5289
 Fax: 860-594-0303
 E-mail: circulation@arrl.org
 Web: www.arrl.org

FlexRadio Systems – www.flex-radio.com	21
Green Heron Engineering – www.greenheronengineering.com	115
Ham Ads – www.arrl.org/ham-ad-listing	124
Ham Estate – www.hamestate.com	120
Ham Radio Outlet – www.hamradio.com	102, 103
Hammond Mfg. Co. – www.hammondmfg.com	109
Heil Ham Radio – www.heilsound.com	113
Icom America – www.icomamerica.com/amateur	23
Kenwood Communications – www.kenwoodusa.com	29, Cover 4
LDG Electronics – 410-586-2177	2, 107
Main Trading Company – www.mtcradio.com	25
Mosley Electronics – www.mosley-electronics.com	127
Pacific Antenna – www.qrpkits.com	107
Penta Laboratories – www.pentalabs.com	107
PreciseRF – http://preciserf.com	11
PreppComm – www.preppcomm.com	115
RF Parts Company – www.rfparts.com	127
RT Systems – www.rtsystems.com	26, 121
Schulman Auction – www.schulmanauktion.com	108, 109
Starlink® RV Pole Kits – www.hitched4fun.com	111
SwapMyRigs – www.swapmyrigs.com	107
Ten-Ten International Net, Inc. – www.ten-ten.org	111
Tigertronics – www.tigertronics.com	111
Timewave Technology, Inc. – www.timewave.com	117
Unified Microsystems – www.unifiedmicro.com	127
W5SWL – www.w5swl.com	105, 107, 109, 115
West Mountain Radio – www.westmountainradio.com	3
Yaesu USA – www.yaesu.com	1, Cover 2

From **MILLIWATTS**
 To **KILOWATTS** SM

In Stock Now!

Semiconductors for Manufacturing and Servicing Communications Equipment

Visit
 Our
 Website

- **RF Modules**
- **Semiconductors**
- **Transmitter Tubes**

Se Habla Español • We Export

Phone: **760-744-0700**
 Toll-Free: **800-737-2787**
 (Orders only) **800-RF PARTS**
 Website: **www.rfparts.com**
 Fax: **760-744-1943**
888-744-1943
 Email: **rfp@rfparts.com**



RF PARTS
 COMPANY

Mosley
 ...a better Antenna!

AIRCRAFT GRADE ALUMINUM
 ELEMENTS & BOOMS and
 STAINLESS STEEL HARDWARE

STRONG!
 Snow, ice or rain
 are no match for
 Mosley Quality!

...built to last!

Mosley antennas are
 * **pre-tuned,**
 * **pre-drilled,**
 * **and color-coded**
for ease of assembly
which means...
 * **NO MEASURING!**

REQUEST A CATALOG
Call 800-325-4016

In Business Since 1946! Mosley... "a better Antenna!"
www.mosley-electronics.com

We Are Near The Sunspot Peak And The High HF Bands Are Hot! That is why you *must* upgrade your low band antennas now!

Low-band QSOs are tougher now, but DXpeditions to rare locations favor sunspot peaks to maximize their QSO totals. You might not get a chance to work those rare DXCC entities when the low bands improve. Get an edge with a BevFlex-4X. The BevFlex-4X is a switchable, bi-directional, low noise RX antenna that can be built to fit your yard as a Beverage, BOG, or loop. Select four directions with a BevFlex-4X/Q. See the March 2025 QST Review! Unified Microsystems also produces antenna switching, CW Keyer, and other products.

www.unifiedmicro.com

UM Unified
 Microsystems



ARRL SPECTRUM DEFENSE FUND

THE STRONGEST VOICE FOR AMATEUR RADIO

Your Donation to Spectrum Defense supports our efforts for a strong and vibrant Amateur Radio Service.

Your ARRL has taken the lead from the very beginning to **defend our access to radio spectrum**. Our work continues to this day with technologies such as solar power, wireless power transfer charging, and a proliferation of new lighting devices as present-day challenges. **Amateur Radio's future depends on our free access to radio spectrum** so that we can continue to practice our skill, and pass along to future generations. Amateur Radio continues to serve our communities When All Else Fails® and contributes in meaningful ways to the development of wireless technology.

We **need you** to help us **protect your spectrum**.



Make your gift **online TODAY** at www.arrl.org/Spectrum-Defense-Fund or contact the ARRL Development Office via email at development@arrl.org or by telephone at **(860) 594-0200**

DONATE NOW

Right Now:

Through ARRL's work, amateur radio provides the broadest and most powerful wireless communications capability available to any private citizen anywhere in the world. ARRL's advocacy efforts extend to lawmakers on Capitol Hill, to state legislatures, and even the international stage.



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



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



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

Vigilant of Existing and New Threats

Promoting & Protecting Amateur Radio

ARRL works with many partners to develop mutually agreeable solutions to sharing spectrum and resolve inevitable incompatibilities that arise from radio noise in the modern environment.

Your Donation to Spectrum Defense supports our efforts for a strong and vibrant Amateur Radio Service.



COMMUNICATIONS AND DC POWER PRODUCTS

NEW! ANYTONE AT-D168UV

Dual-band DMR/Analog Handheld
140-174/400-480 MHz, FCC Part 90 Commercial
Dual Mode (Digital DMR + Analog)



NEW! WATTMETER-TVP

DC Power Meter with Bright LCD Display
Anderson Connectors
Simple operation, no buttons or switches

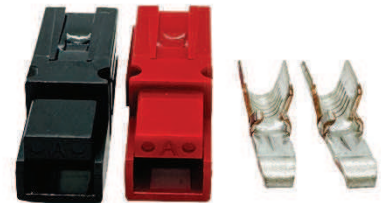


POWERPOLE TO 4 PIN HF CONNECTOR

25A ATO/ATC Inline Fused Adaptor Cable 12AWG
Compatible with, but not limited to models
from Icom, Kenwood and Yaesu

POWERPOLE 15, 30, 45 AMP SERIES CRIMP TOOL

The perfect tool for 15, 30, and 45 amp series Powerpoles. With a ratcheting mechanism and built in contact positioner to guarantee a perfect crimp every time.



POWERPOLE CONNECTOR KITS

Available as permanently bonded or unassembled kits,
in 15A, 30A, or 45A varieties.
Bundled in 10 kit packs or 25 kit packs



ANYTONE AT-D878UV II PLUS

DMR Dual-Band Amateur Handheld Radio
2G memory capacity with 500,000 digital contacts
Built in Bluetooth, GPS, and APRS capable

ANYTONE AT-D578UV III PLUS

DMR Tri-Band Amateur Mobile Radio
Airband Rx on 108-136 MHz, 144-148 MHz Tx, 222-225
MHz Tx, 420-450 MHz Tx and wide band receive.



For More Information visit www.12VoltPower.com

KENWOOD

3rd IMDR 110 dB*

RMDR 122 dB*

BDR 150 dB*

Performance Exceeding Expectations.

The most happy and sublime encounters happen in the worst circumstances and under the harshest conditions.

There are enthusiasts who know this all too well because of their love of HF radio.

Results born of certainty and not circumstance. Delivered through impeccable performance. This is our offering to you.



"The Kenwood TS-890S has the highest RMDR of any radio I have ever measured."

- Rob Sherwood - NC0B - December 2018

HF/50MHz TRANSCEIVER TS-890S

Top-class receiving performance

3 kinds of dynamic range make for top-class performance.

- ▶ Third order intermodulation Dynamic Range (3rd IMDR) 110dB*
- ▶ Reciprocal Mixing Dynamic Range (RMDR) 122dB*
- ▶ Blocking Dynamic Range (BDR) 150dB*

*Values are measured examples. (2kHz spacing:14.1 MHz, CW, BW 500 Hz, Pre Amp OFF)

- ▶ Full Down Conversion RX
- ▶ High Carrier to Noise Ratio 1st LO
- ▶ H-mode mixer

4 kinds of built-in roofing filters

500Hz / 2.7kHz / 6kHz / 15kHz (270Hz Option)

7 inch Color TFT Display

- ▶ Roofing frequency sampling band scope
- ▶ Band scope auto-scroll mode
- ▶ Multi-information display including filter scope

Clean and tough 100W output

Built-in high-speed automatic antenna tuner

32-bit floating-point DSP for RX / TX and Bandscope

*: 2 kHz spacing measurement standard - Receiver frequency 14.2 MHz, MODE CW, BW 500 Hz, PRE AMP OFF

Customer Support: (310) 639-4200



www.kenwood.com/usa



ADS#16221