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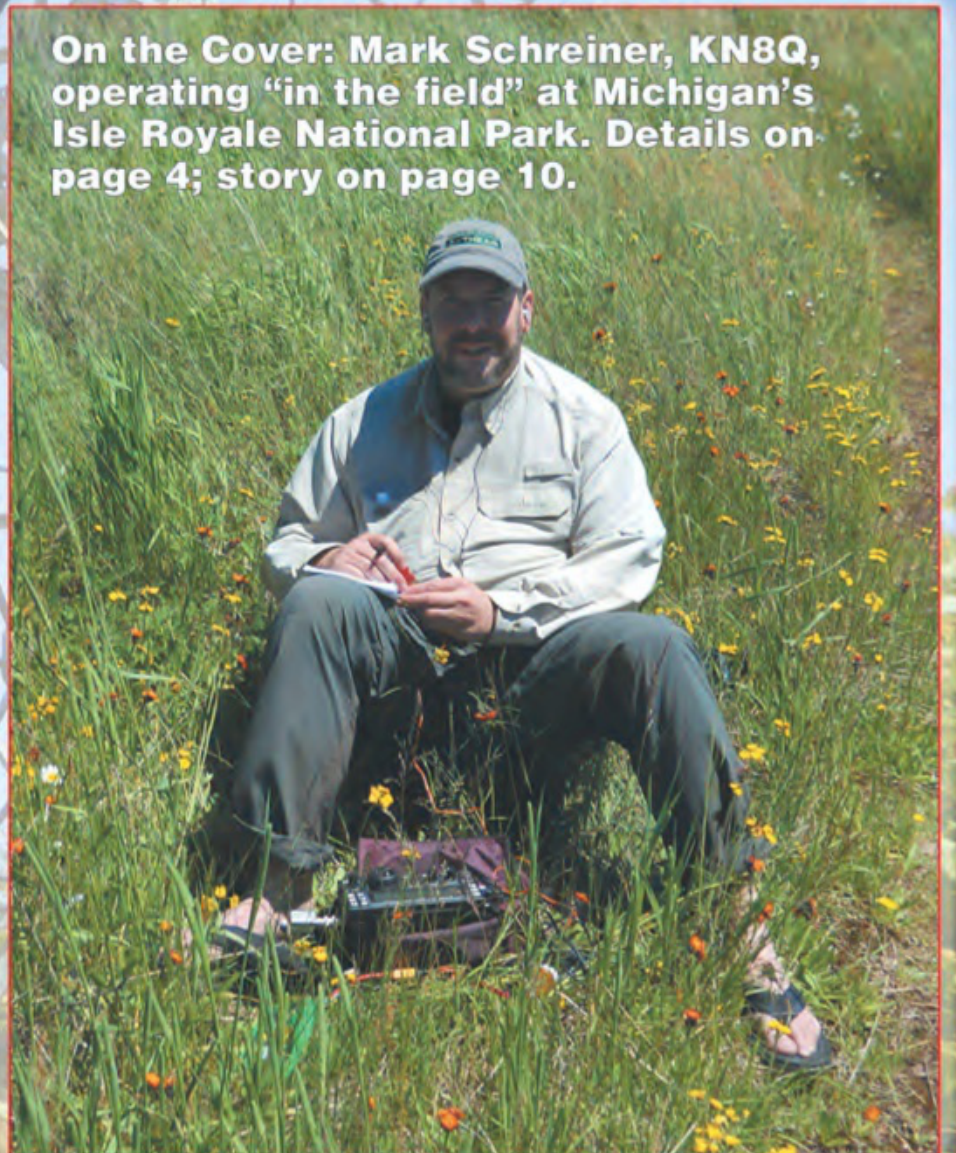
# Amateur <sup>75<sup>th</sup></sup> Radio

COMMUNICATIONS & TECHNOLOGY  
JUNE 2019

# CQ

## Take It To The Field Special

On the Cover: Mark Schreiner, KN8Q, operating "in the field" at Michigan's Isle Royale National Park. Details on page 4; story on page 10.





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- ▶ Multi-information display including filter scope

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  - Dual Antenna
  - 1000W SSB / 350W Digital

- AT-600PROII**  
600 Watts to Mid Size Amps
- Dual Bargraph
  - 1.8 to 54MHz
  - 600W SSB / 200W Digital



- AT-200PROII**  
200 Watts Desktop
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  - 2 Year Warranty
  - 250W SSB / 100W Digital



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  - Auto / Semi-Auto Mode
  - 125W SSB / 30W Digital

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- RBA 4:1 BALUN
- RBA 1:1 BALUN
- 200W SSB

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Tuner dedicated to Icom radios with seamless integration.



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  - 20W SSB/5W Digital

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  - 10:1 SWR
  - 125W SSB/30W Digital



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- 2000 Memories
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# ANNOUNCEMENTS

## JUNE

**BOONE, IOWA** — The **3900 Club** will hold **Hamboree 2019** from 8 a.m. to 1 p.m., Saturday, June 1 at the Boone County Fairgrounds-Community Building, 1601 Industrial Park Road. Contact: Clay Conard, WØFS, (515) 838-2285. Email: <hamboree@3900club.com>. Website: <www.3900club.com>. Talk-in 146.850-. VE exams, DXCC card checking.

**HILTON, NEW YORK** — The **Rochester Amateur Radio Association** will hold the **92<sup>nd</sup> Rochester Hamfest** from 8 a.m. to 2 p.m., Saturday, June 1 at the Hilton Exempt Club, 137 South Avenue. Email: <hfproducer@rochesterham.org>. Website: <https://rochesterham.org>. VE exams, WAS / WAC / DXCC / VUCC card checking.

**HUDSONVILLE, MICHIGAN** — The **Independent Repeater Association** will hold the **2019 Hudsonville IRA Hamfest** from 8 a.m. to noon, Saturday, June 1 at the Hudsonville Fairgrounds, 5235 Park Avenue. Contact: Kathy, KB8KZH, (616) 541-4090. Email: <hamfest@w8ira.org>. Website: <www.w8ira.org>. Talk-in 147.16. VE exams.

**MARIETTA, GEORGIA** — The **Atlanta Radio Club** and **Kennehoochee Amateur Radio Club** will hold the **Atlanta Hamfest** from 8 a.m. to 3 p.m., Saturday, June 1 at Jim Miller Park, 2245 Calloway Road. Contact: John Talipsky, N3ACK, <n3ack@atlantaradioclub.org>. Website: <www.altantahamfest.org>. VE exams.

**PLYMOUTH, MINNESOTA** — The **Twin City FM Club** will hold its **Spring Tailgate Swapfest** beginning 8 a.m., Saturday, June 1 at the West Medicine Lake Community Center, 1705 Forestview Lane North. Contact: Mike (612) 718-4718. Email: <trustee.tcfmc@gmail.com>. Talk-in 146.76 (PL 114.8).

**PRINCETON, KENTUCKY** — The **Princeton KY Ham Radio Club** will hold the **8<sup>th</sup> Annual Princeton, KY Hamfest** from 8 a.m. to 1 p.m., Saturday, June 1 at the Princeton Fire Training Center, 2001 Training Center Drive. Phone: (270) 963-5350. Email: <n4mht@mchsi.com>. Website: <www.w4kbl.org>. Talk-in 145.230 (PL 179.9). VE exams.

**PROSPECT, PENNSYLVANIA** — The **Breezeshooter Amateur Radio Club** will hold its **65<sup>th</sup> Annual Hamfest** and **2019 ARRL Western Pennsylvania Section Convention** from 8 a.m. to 5 p.m., Saturday, June 1 and from 8 a.m. to 2 p.m., Sunday, June 2 at the Big Butler Fairgrounds, 1127 New Castle Road (Rt. 422). Phone: (412) 389-1739. Email: <hamfest@breezeshooters.org>. Website: <www.breezeshooters.org>. VE exams, DXCC card checking.

**TEDROE, OHIO** — The **Fulton County Amateur Radio Club** will hold its **Summer Hamfest 2019** from 8 a.m. to 1 p.m., Saturday, June 1 at The Roth Family Woodlot, 105 Hill Avenue. Contact: Bryan Patterson, KB8ELG, (419) 822-5038 or (419) 250-6694. Email: <kb8elg@hotmail.com>. Website: <http://k8bxq.org>. Talk-in 147.195+. VE exams.

**QUEENS, NEW YORK** — The **Hall of Science Amateur Radio Club** will hold **Hamfest 2019 & Electronics Bazaar** from 9 a.m. to 2 p.m., Sunday, June 2 at the New York Hall of Science, 47-01 111<sup>th</sup> Street, Flushing Meadows Corona Park. Contact: Steve Greenbaum, WB2KDG, (718) 898-5599 (evenings only). Email: <wb2kdg@arrl.net>. Website: <http://hosarc.org>. Talk-in 444.200+ (PL 136.5). VE exams.

**DRYDEN, WASHINGTON** — The **Apple City Amateur Radio Club** will hold the **51<sup>st</sup> Annual ACARC Hamfest** from noon to 7 p.m., Friday, June 7; 6:30 a.m. to 7 p.m., Saturday, June 8; and 7-10:30 a.m., Sunday at the Dryden Gun Club. Email: <applecityarc@gmail.com>. Website: <http://applecityarc.com>. Talk-in 146.68- (PL 156.7). VE exams, T-hunt.

**PLANO, TEXAS** — **Ham-Com 2019** and the **2019 ARRL Western Gulf Division Convention** will be held from noon to 5 p.m., Friday, June 7 and from 8 a.m. to 5 p.m., Saturday, June 8 at the Plano Event Center, 2000 East Spring Creek Parkway. Contact: HamCom, P.O. Box 260721, Plano, TX 75026. Email: <info@hamcom.org>. Website: <www.hamcom.org>. Talk-in 147.18 (PL 107.2). VE exams.

**CORTLAND, NEW YORK** — The **Skyline Amateur Radio Club** will hold the **36<sup>th</sup> Annual Cortland Hamfest and Technology Fair** from 7 a.m. to noon, Saturday, June 8 at the Cortland County Fairgrounds, 4301 Fairgrounds Drive. Email: <kc2bqz@gmail.com>. Website: <www.skylineradioclub.org>. Talk-in 147.180+ (PL 71.9). VE exams.

**LIME RIDGE, PENNSYLVANIA** — The **Columbia-Montour Amateur Radio Club** will hold the **29<sup>th</sup> Annual Bloomsburg Hamfest** from 7 a.m. to 1 p.m., Saturday, June 8 at the Lime Ridge Community Center, 6405 4<sup>th</sup> Street. Contact: Dave, WC3A, (570) 951-9694. Email: <ten\_speed\_99@yahoo.com>. Website: <www.qsl.net/cm-arc>. Talk-in 147.225+ (PL 85.4). VE exams.

**MARYSVILLE, OHIO** — The **Union County Amateur Radio Club** will hold its **3<sup>rd</sup> Annual Ham Radio TailGate & TrunkFest** from 9 a.m. to 2 p.m., Saturday, June 8 at the New Horizons Baptist Church, 17939 Paver Barnes Road. Contact: Ken, W8KWH, <w8kwh@yahoo.com>. Website: <www.ohiohams.net>. Talk-in 145.350 (PL 127.3) or 443.450.

**PORT LUDLOW, WASHINGTON** — The **Port Ludlow Amateur Radio Club** will hold the **12<sup>th</sup> Annual Old Fashion – Tailgater Swap Meet** from 8 a.m. to noon, Saturday, June 8 at the Grace Christian Center Parking Lot, 200 Olympic Place. Website: <www.n7pl.org>. Talk-in 146.52.

**BETHPAGE, NEW YORK** — The **Long Island Mobile Amateur Radio Club** will hold the **LIMARC Outdoor Hamfest** beginning 9 a.m., Sunday, June 9 at the former Briarcliffe College, 1055 Stewart Avenue. Contact: Richie, K2KNB, (516) 694-4937. Email: <hamfest@limarc.org>. Website: <http://limarc.org>. Talk-in 146.85 (PL 136.5). VE exams, DXCC / WAS card checking.

**GRANITE CITY, ILLINOIS** — The **Egyptian Radio Club** will hold **EgyptianFest 2019** from 7 a.m. to noon, Sunday, June 9 at the Holy Family Catholic Church Community Center, 2600 Washington Avenue. Contact: Jason, <kb9lbc@gmail.com>. Website: <www.w9aiu.org>. Talk-in 146.76 (PL 141.3) or 146.79 (PL 127.3). VE exams.

**HELENA, ALABAMA** — The **Shelby County Amateur Radio Club** will hold the **Helena Hamfest 2019** from 4-7 p.m., Friday, June 14 and from 8:30 a.m. to 3 p.m., Saturday, June 15 at the Helena Community Center, 100 Sports Complex Drive. Contact: William Shores, KM4SKC, (205) 365-1053. Email: <km4skc@gmail.com>. Website: <www.w4shl.com>. VE exams.

**KNOXVILLE, TENNESSEE** — The **Radio Amateur Club of Knoxville** will hold its **53<sup>rd</sup> Annual Hamfest & Electronics Exposition** from 8:30 a.m. to 2 p.m., Saturday, June 15 at the Kerbala Temple, 315 Mimosa Avenue. Contact: Lou Dreinhoefer, WB3JKQ, (865) 995-1588. Email: <wb3jkq@arrl.net>. Website: <www.w4bbb.org>. Talk-in 147.300 (PL 100). VE exams.

**MANASSAS PARK, VIRGINIA** — The **Ole Virginia Hams Amateur Radio Club** will hold the **45<sup>th</sup> Annual Manassas Hamfest** beginning 6:30 a.m., Saturday, June 15 at the Manassas Park Community Center, 99 Adams Street. Contact: Don, WA2SWX, <chairman@manassashamfest.org>. Website: <http://manassashamfest.org> or <http://w4ovh.net>. Talk-in 146.97-. VE exams, DXCC card checking.

**MIDLAND, MICHIGAN** — The **Midland Amateur Radio Club** will hold the **Midland Hamfest** from 8-11 a.m., Saturday, June 15 at the Salvation Army Building, 330 Waldo Avenue. Contact: Keith Johnson, KB8SOE, (989) 488-4337. Email: <kb8soe@arrl.net>. Talk-in 147.00. VE exams.

**OWENSVILLE, OHIO** — The **Milford Amateur Radio Club** and **Southwest Ohio DX Association** will hold the **2019 Milford Hamfest** in conjunction with **W8DXCC** from 8 a.m. to 6 p.m., Saturday, June 15 at the Clermont County Fairgrounds-Multipurpose Building, 1000 Locust Street. Contact: Dave, K8DV, <president@w8mrc.com>. Website: <www.w8mrc.com>. DXCC & CQ award card checking. Special Event Stations: K8S, K8W, K8O, and K8H.

**PISCATAWAY, NEW JERSEY** — The **Raritan Valley Radio Club** will hold the **W2QW – Hamfest** from 8 a.m. to noon, Saturday, June 15 at Piscataway High School, 110 Behmer Road. Contact: Drew, W2OU, (732) 801-4654 (before 9 p.m.) Email: <w3oudrew@gmail.com>. Website: <www.w2qw.org>. Talk-in 146.625- (PL 103.5) or 442.250+ (PL 141.3). VE exams, DXCC / VUCC / WAS card checking.

**MONROE, MICHIGAN** — The **Monroe County Radio Communications Association** will hold the **Monroe Hamfest and Computer Show** from 7:30 a.m. to 1 p.m., Sunday, June 16 at the Monroe County Fairgrounds, M-50 at Raisinville Road. Contact: Fred VanDaele, KA8EBI, 4 Carl Drive, Monroe, MI 48162. Email: <ka8ebi@yahoo.com>. Website: <www.mcrc.org>. Card checking.

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## Honda Recalls Several Generator Models

Heads-up before you head out for Field Day ... American Honda has recalled several models of its portable generators. The U.S. Consumer Product Safety Commission says the recall affects models EU2200i, EU2200i Companion, and EB2200i, colored red or camouflage. It says the generators can develop leaks from the fuel valve, posing fire and burn hazards, and advises purchasers to take them to an authorized Honda Power Equipment dealer for a free repair. Some 200,000 generators are involved in the recall. More information is available on the CPSC website at <<https://tinyurl.com/y3vol9n2>>.

## ARRL to FCC: Ignore the QRM on Tech Enhancement

The ARRL has called on the FCC to disregard off-topic comments received in response to its 2018 proposal for enhanced HF privileges for Technician Class hams. In reply comments filed in late April, the *ARRL Letter* reports that the League noted that several comments related to other pending rule-making proposals or dealt with privileges for other license classes. The “sole subject and intent” of its proposal, said the ARRL, is updating HF privileges for Technician Class licensees. The League’s petition calls for limited voice privileges as well as RTTY/digital privileges for Techs on the 80, 40, and 15-meter bands, where Technicians already have CW privileges.

The reply comments also dismissed concerns expressed in some comments about increased interference potential due to an influx of Techs on HF digital modes, noting that “(i)t is improbable that all, or even a majority, of Technician licensees suddenly would develop a passion for the same digital technology.” It also notes that many newer digital modes, such as FT8, are very spectrum-efficient and unlikely to result in broad-based interference.

## ARRL and FCC Move Forward on Volunteer Monitor Program

The FCC and the ARRL have signed a Memorandum of Understanding that will provide for the basic structure of the new Volunteer Monitor program. This new effort to enhance amateur self-regulation will replace the decades-old Official Observer program and more-recently developed FCC Amateur Auxiliary program. According to the *ARRL Letter*, the program’s goal is to “re-energize enforcement efforts” on the ham bands, noting that it was proposed by the FCC itself in the wake of budget cuts that resulted in closing several field offices and reducing the size of the field staff.

The principal difference between the old OO program and the new VM program is that the OO program was administered as part of the ARRL Field Organization, with OOs appointed by Section Managers and/or section OO Coordinators, while the new program will be administered by ARRL headquarters, which will be responsible for vetting and appointing all VM members. In addition, VM notices will be mailed from Newington and will not include the name or call of the reporting volunteer monitor. The ARRL has contracted with retired FCC Special Counsel Riley Hollingsworth, K4ZDH, to administer the program. It is estimated that the VM program will be up and running later this year.

## Former CQ DX Editor K4IIF; Monk Apollo, SV2ASP, Among Silent Keys

Former CQ DX Editor John Attaway, K4IIF, who first proposed establishing the CQ DX Hall of Fame, became a Silent Key in April at age 88. A chemist whose father owned orange groves in Florida, Attaway devoted his career to improving the quality of Florida orange juice and spent 26 years as Director of Scientific Research for the Florida Department of Citrus. He served on a variety of industry panels and was named to the Florida Citrus Hall of Fame in 2001. John was CQ’s DX Editor from 1967 through 1988.

An ocean away, Monk Apollo, SV2ASP, became a Silent Key in early May. Monk Apollo brought amateur radio to the monastery at Mount Athos — a separate DX entity from Greece — in the early 1990s and was active as a DXer. According to the *ARRL Letter*, one other monk at Mount Athos is also licensed and active on the air. Monk Apollo passed away from complications of cancer at age 64.

Also joining the ranks of Silent Keys recently were former astronaut and first ham in space Owen Garriott, W5LFL (see “News Bytes,” elsewhere in this issue), and TV engineer Eric Spiegel, KE2EJ. Eric was a key member of the technical staff at PBS flagship station WNET in New York City. He was 68.

## Mass Shootings Strike (Too) Close to Home for Hams

There are indirect ham radio connections to two recent mass shootings. Peggy Veal, KDØISN, the mother of 2015 Newsline Young Ham of the Year Anna Veal, WØANT, is a teacher at the Highlands Ranch STEM School outside of Denver where two students allegedly killed one other student and injured several more in early May. Peggy’s husband, Paul, NØAH, told *Newsline*’s Don Wilbanks, AE5DW, that her classroom is directly across from the room where the shooting took place and has bullet holes in it. Anna herself is a recent graduate of the school and her dad said she rushed home from college to be with her friends at memorials.

In addition, the father of the accused San Diego synagogue shooter is a ham who is also a high school teacher and advisor to his school’s amateur radio club. It was reported that the accused shooter had been a member of that club while in high school but it does not appear that he ever became a ham himself.

## Listen for NA1WR and W8J from This Summer’s World Scout Jamboree

The World Scout Jamboree returns to North America for the first time in 36 years this summer, and the *ARRL Letter* says ham radio expects to play a major role. Scouts and leaders from some 200 countries will gather in at the Summit Bechtel Preserve in West Virginia between July 22 and August 2. Amateur radio testing will begin as early as July 14.

Ham radio activities planned for the jamboree include a special event station on HF, handheld coverage of the entire site courtesy of three repeaters installed for previous U.S. national jamborees, amateur radio direction finding (ARDF), amateur satellite contacts, one or more balloon launches carrying amateur radio payloads and a scheduled contact with an astronaut aboard the International Space Station. More information is available at <<https://k2bsa.net/world-jamboree-na1wj/>>.

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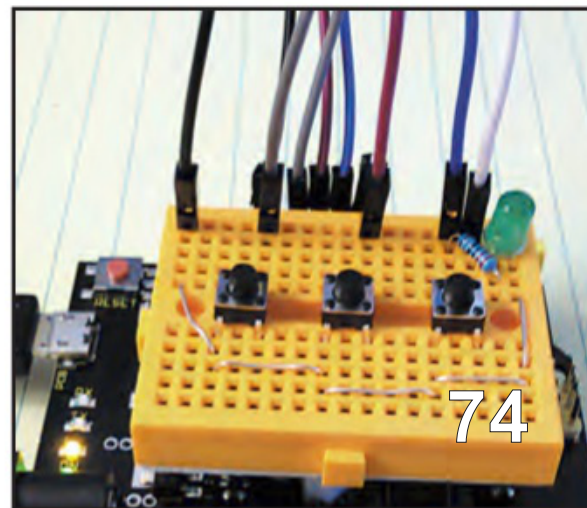


## 10 COVER: FINDING MY TRUE NORTH:

NK8Q Searches in Isle Royale National Park in Michigan

By Mark J. Schreiner, NK8Q

Mark Schreiner, KN8Q, reports that he found his “true north” on a field expedition to Isle Royale National Park, in Lake Superior off the Upper Peninsula of Michigan. In our cover photos, he is operating at the Feldtmann Ridge look-out tower, his first Summits on the Air (SOTA) activation of the trip. Mark’s story is on page 10. [Lookout tower photo by Mark Schreiner; inset photo by a random hiker (!)]



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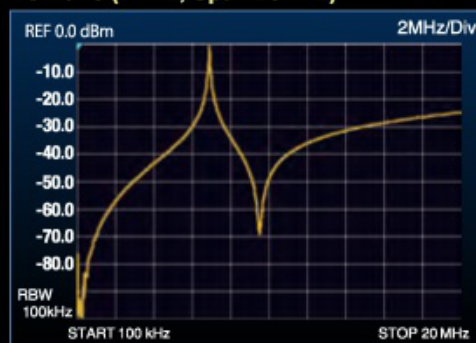
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# ZERO BIAS: A CQ Editorial

BY RICH MOSESON,\* W2VU

## A Peek Behind the Curtain

This is being written a week before this year's Dayton Hamvention®, where Advertising Manager and Production Director Dottie Kehrlieder; Managing Editor Jason Feldman, KD2IWM; and I, along with several columnists, award managers and contest directors, will staff the CQ booth, visit with manufacturers and dealers, and lead or take part in various forums and other events. Collectively, this group of staff members, contributing editors and award/contest managers are the “public face” of our magazine, representing us to the amateur radio community and industry. But there's another group of people behind the scenes whose work is at least equally important to CQ's success, but who are rarely recognized. This seems like a good time to do that, and to say “thank you.”

Art Director Liz Ryan and Production Manager/Sales Coordinator Emily Leary in our art department physically create the product you are holding in your hands (or viewing on your screen) each month, along with Dottie K. in her Production Director hat. They bring our authors' words and pictures together on the pages of each issue to create visually appealing article layouts, and work with our advertisers to make sure their messages are presented in an informative and eye-catching way. Illustrator Hal Keith brings many of our schematic diagrams and other illustrations to the page in a clear and easy-to-follow manner.

If you've ever called our office to ask a question about your subscription or to order a book, you've probably talked with Customer Service Manager Cheryl DiLorenzo, who cheerfully answers questions and bends over backwards to resolve any problems that may crop up. Doris Watts in our accounting department keeps track of the financial side of the business, and of course, Publisher Dick Ross, K2MGA, stays on top of the entire operation, works with book authors and coordinates the daily juggling act commonly known as running a small business. In addition, Dick's wife, Cathy Ross, does a million and one things behind the scenes, including the beautiful calligraphy on our award certificates and compiling our monthly contest calendar. Plus, my wife, Susan, is our Editorial Consultant, which means she reads and comments on these editorials before they go to press, offers sage advice on a variety of subjects and is generally my “Chief Softening Officer,” as in, “if you want this person to ever talk to you again, you'll soften the tone of this email.”

Finally, there wouldn't be a magazine in your hands without our printer, or on your screen without our partners at Zinio. It takes a village to raise a child, but it takes a city to publish a magazine! Thank you to each of the people mentioned above — I hope I didn't miss anyone — and of course, to the most important people of all, you, our loyal readers!

### Speaking of People...

I am pleased to announce that we have a new USA Counties Award (USA-CA) custodian — Brian Bird, NXØX, takes over

**Take advantage of the summer weather, get out into nature and take your radio with you, and then write up your adventures for our next “Take it to the Field Special”!**

administration of this most challenging award as of this issue. You can read more about Brian, as well as some updates to the USA-CA rules, in this issue's Awards column on page 93. Thanks again to Ted Melinosky, K1BV, for his stewardship of both USA-CA and our Awards column for more than 20 years. As of this writing, we are still in need of a new Awards Editor, to fill Ted's “other shoe.” If you love chasing wallpaper, and want to share your enthusiasm and tips for success with our readers every month — or know someone who might be — please drop me an email.

### Taking it to the Field...

This is our annual Take it to the Field Special, and our portable operating articles this year span the globe from the Arctic to Africa, and many places in between. Legendary DXpeditioner Martti Laine, OH2BH, writes about a mini-expedition to activate a “new one” for IOTA — the Islands on the Air program — in the Arctic in the middle of winter! Zvika Segal, 4Z1ZV, takes us on a hamming trip to Ghana; NK8Q describes “Finding My True North” at Michigan's Isle Royale National Park in our cover story; W4YBV writes about hamming while hunting ... making contacts from his deer blind in Georgia while waiting for dinner to appear; and W6YQ takes us to a different kind of field — a Civil War battlefield — in his fascinating article about Army telegrapher and future key manufacturer Jesse Bunnell. Finally, Kit-Building Editor Joe Eisenberg, KØNEB, takes it to the set rather than the field, reporting on his recent visit to and operation from KA6LMS, the fully-functional ham station on the set of the “Last Man Standing” TV show in Hollywood.

Finally, I'd be remiss if I didn't mention two articles that fall into a new category that John Price, WA2FZW, calls “computerizing stuff that was never meant to be computerized.” Microcontrollers Editor Anthony Luscre, K8ZT, writes in his column this month about John's “Yet Another Audio Interface for the Digital Modes (But With CAT Control),” which uses an Arduino-based circuit to put his vintage Swan 250C transceiver on digital modes; and Mike Herr, WA6ARA, describes his “Straight Key CQer,” a project which uses a PICAXE microcontroller to automatically send pre-programmed messages via his miniature J38 telegraph key! The creativity and resourcefulness of hams never ceases to amaze me, especially when it comes to melding old and new technology and “computerizing stuff that was never meant to be computerized.”

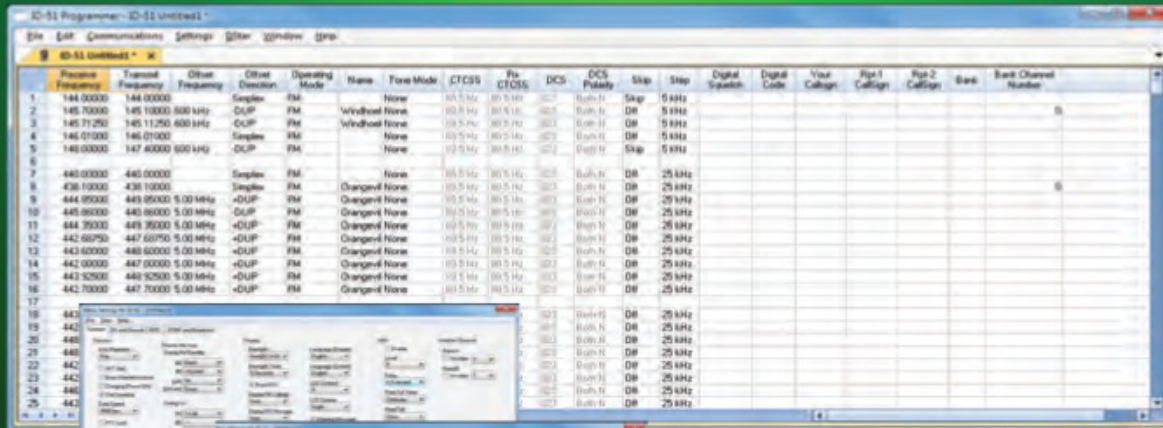
Take advantage of the summer weather, get out into nature and take your radio with you, and then write up your adventures for our next “Take it to the Field Special”!

\*Email: <w2vu@cq-amateur-radio.com>

– 73, Rich, W2VU



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## NEWS BYTES

### W5LFL, First Ham in Space, SK

Former astronaut Owen Garriott, W5LFL, the first person to operate an amateur radio station from space, has become a Silent Key at age 88. He died April 15<sup>th</sup> at his home in Huntsville, Alabama.

Garriott held a Ph.D. in electrical engineering from Stanford University, where he also taught before joining NASA in 1965 as a scientist-astronaut. According to NASA, he authored or co-authored more than 40 scientific papers and one book on ionospheric physics.

Garriott's first trip to space was aboard Skylab 3 in 1973, where he and crewmates Alan Bean and Jack Lousma spent nearly two months, at that point the longest single-mission spaceflight on record. He returned to space in 1983 aboard the shuttle Columbia, a 10-day science mission known as STS-9/Spacelab-1. During this flight, Garriott thrilled hams around the world by operating a 2-meter handheld and making contacts during his free time. (This writer recalls hearing him calling "CQ North America, this is W5LFL on the Space Shuttle Columbia calling CQ and listening.") Garriott's operation paved the way for ongoing amateur operations from orbit, including the long-running Amateur Radio on the International Space Station (ARISS) program. He was inducted into the inaugural class of the CQ Amateur Radio Hall of Fame in 2001.

### Woodpecker-Chernobyl Connection?

Just about any ham who was active on the HF bands in the 1970s and '80s will remember the "Russian woodpecker," a Soviet over-the-horizon radar system that swept across the



shortwave spectrum, transmitting signals that sounded like a woodpecker hammering on a tree. The source of the signals was actually in the Chernobyl region of Ukraine, and according to a report on CNN Travel, the massive receive site antennas are now a major tourist attraction.

The report says the Duga radar receive antenna system is 150 meters (nearly 500 feet) high and 700 meters (2,300 feet) long and had been labeled on maps of the time as a children's camp. The radar system's function was to try to detect incoming nuclear missiles within minutes of launch, but the article says it never really worked because the people running it didn't know enough about radio wave propagation. The site was abandoned after the meltdown at the Chernobyl nuclear power plant in 1986 and has since been part of the Chernobyl Exclusion Zone. Some areas within that zone have recently been reopened for guided tours, and since 2013, the Duga site has become a major tourist attraction. There is speculation that the primary function of the Chernobyl nuclear plant was to provide power for running the woodpecker radar. The full CNN Travel story, including lots of photos, is online at <http://tinyurl.com/y6zu4l99>.





Photo A. The author at the Isle Royale National Park Windigo Visitor Center at the beginning of his hike. (All photos courtesy of the author)

*It's hard to beat this "taking it to the field" experience. Join us as NK8Q shares his adventure of solo-hiking, and hamming, from one of the least-visited national parks in the United States, Isle Royale National Park in Lake Superior.*

## Finding My True North

**BY MARK J. SCHREINER,\* NK8Q**

**T**he title of this article might sound like a way to align your beam antenna correctly when installing it on a tower. As appropriate as such an article would be in this publication, this one is more about finding myself, doing something outside of my comfort zone that would end up being one of the best experiences of my life, how I accomplished it and how you could, too.

Rewind to May 1990. I had just graduated from Michigan Technological University in Houghton, Michigan with a degree in electrical engineering and was ready to start my career. A couple of my buddies who graduated with me took the time to visit nearby Isle Royale National Park (ISRO),

located in Lake Superior, for several days after graduation. While I was invited to go along with them, I was absolutely broke, so I opted out of the trip, a decision I would long regret ... until the summer of 2016.

Fast-forward to late 2015, when my sister-in-law asked me for some ideas for vacationing in the upper peninsula of Michigan, especially since I'd gone to college in that area. We often vacation together and they were thinking about the Pictured Rocks National Lakeshore. While that would be lovely by itself, I knew that the ARRL's NPOTA (National Parks on the Air) program would be occurring all year so there could be some good opportunities to do some NPOTA activations and, if I planned it right, some SOTA (Summits on the Air) activations as well. I quickly suggested that she should check out a more unique park, one that is known as

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\* email: <mark.j.schreiner@gmail.com>



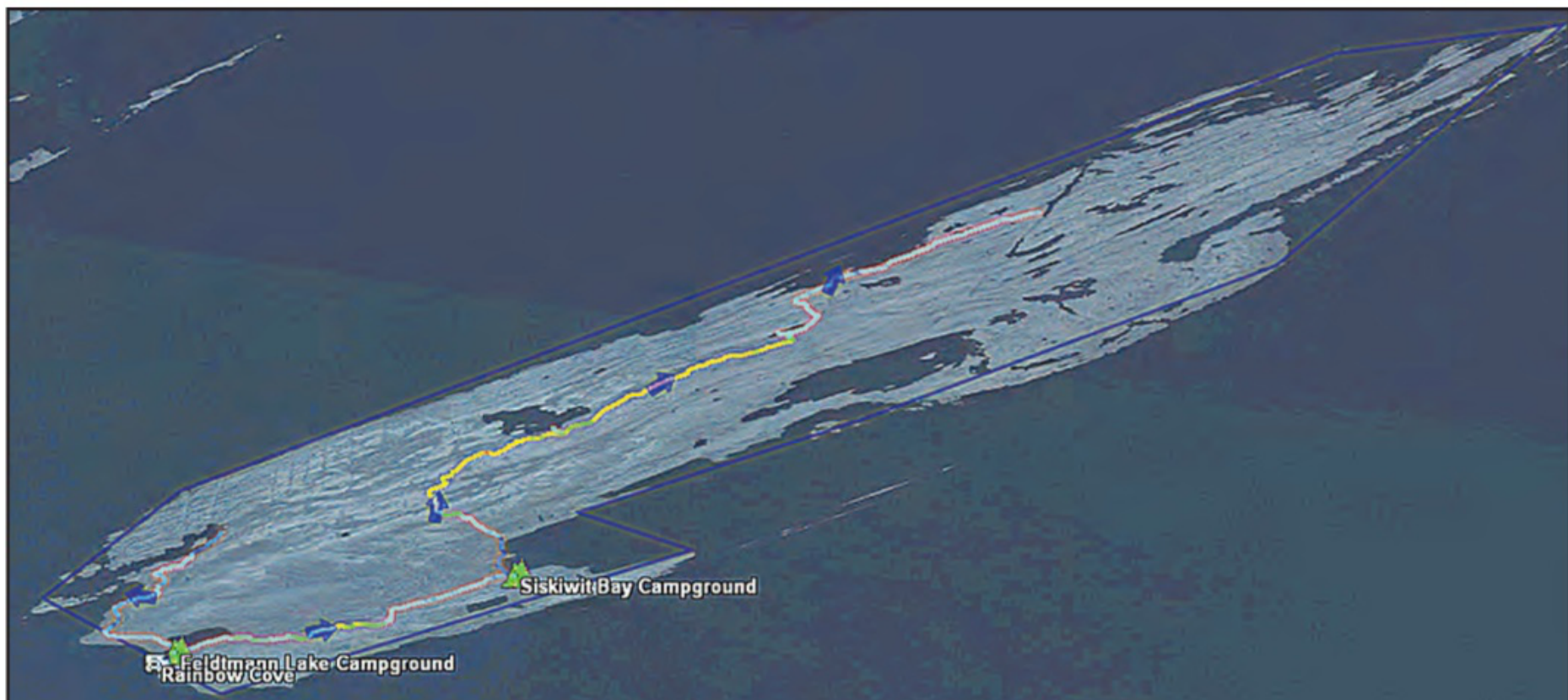


Photo B. Map of Isle Royale, with KN8Q's planned route marked.

one of the least-visited national parks but the most *revisited*, Isle Royale National Park. After a bit of research into this, she thought that would work as moose, wolves and solitude all sounded quite intriguing. We discussed it in more detail at Christmas and it was decided that was where we would vacation in the summer of 2016, although it seemed like too much adventure for my XYL, who opted out of the trip. That was when my planning and preparations had to begin in earnest.

My investigations showed that many people hike from one end of Isle Royale to the other in about a week. I further learned that there were four SOTA summits that had direct trail access, yet only one of them had been previously activated. While I enjoy hiking and had recently discovered SOTA activities, years of having a desk job and not being as active as I should be meant that I had slowly put on more weight and was not really in good shape for making a week-long backpacking trip. I had only done a couple of overnight hikes, always with others, but this was a hike I was planning to do on my own. I knew I would have to work hard to lose weight to get in shape for a backpacking trip of a lifetime, especially carrying the extra gear required for radio activity, and that preparation wouldn't happen overnight. I learned quickly that having a good goal provides good motivation to achieve that goal, along with good planning of how to achieve it.

These were a few of my goals:

- I weighed about 245 pounds at the end of 2015 and figured that an ideal hiking weight would be about 185 to 195, a minimum of 50 pounds to lose within about five months. This would involve major changes to my eating/drinking habits such as:

- No more fried food, eating healthier salads instead
- Minimize carbs (breads, pastas, candy bars as snacks and other sugars), instead eating fresh fruit or fiber snacks
- No more soda (or beer, that was tough!), instead water or diet green tea
- Become a better hiker over longer distances with a backpack for things needed for a week on my own, including radio gear
- Become a more regular hiker with a backpack

- Train the way I will participate in the actual activity
- Hike during the weekdays after work but take longer hikes on the weekends
- Collect and learn how to use the gear needed for the backpacking trip for a week on my own
- Plan the actual hiking path along with alternatives and contingencies
- Anywhere from ISRO was valid for NPOTA, so that was easy
- How to get to some of ISRO's SOTA summits
- Upgrade from an Elecraft KX1 to KX3 with zero budget

During January and February I lost 10 pounds each month by making those simple changes, and I hadn't started to exercise yet. While that was easier than I thought, I needed to continue for the next few months to hit my goal. In time, with a lot of diligence with my new lifestyle and lots of exercise, my weight was hovering at just over 200 pounds.

I started my regular hiking on the last Sunday of February, as the weather forecast was 60°F with sun so I didn't want to let such an unseasonable day go to waste without hitting the trail. I did an 8-mile hike along a ridge not far from home here in central Pennsylvania. It was fun to see a few bits of snow along the trail while hiking in a T-shirt. It was a good stretch of my legs to kick off my new exercise routine to help lose more weight along with the diet (which I referred to as a "lifestyle change" as that sounds more positive and encouraging). Given that I work during weekdays until 4:30 or 5 p.m., though, I had not thought of how to do much hiking while it is dark when I get out of work and just hiking on the weekends was not going to be enough to achieve my goal. I was pretty familiar with some trails near my home, so I decided that I would start hiking immediately after work wearing a headlamp so that the darkness was not an issue. It is interesting what wildlife might be seen when doing some night hiking. More importantly, it added the number of days that I could hike in a week instead of just the weekends. Of course, individual results may vary, and I might be much more wary in places where there is dangerous wildlife, but that's not a big worry here in central Pennsylvania.





Photo C. Feldtmann Ridge lookout tower.

My home area has quite a few nice hills to hike as well, with elevation changes close to and exceeding those at ISRO. I gradually added more miles and more hills as my heart and lungs got used to the increased activity. My legs never seemed to be much of a problem as I had residual tone from my years of bicycling through the 1990s. Also, my hiking included using the same backpack I planned to use at ISRO, to which I gradually added weight as I got in better shape. As I was limited to a backpack weight of 50 pounds for my week-long backpacking trip at ISRO, I figured every pound of weight I carried on my back was equal to the weight that I was no longer carrying around my waist, so it was — at least psychologically — a net zero and the backpack weight was “free” (in retrospect, with real physical issues, I realize that I should learn how to further reduce pack weight).

As far as what radio to take and how to power it, I was grateful that my friend John, NØEVH, convinced me to get an Elecraft KX3, which I financed by selling my KX1 and a Yaesu FT-100 mobile rig with accessories that I hadn't used in several years. This resulted in a net-zero dollar upgrade to a slightly used KX3, which was a much more capable radio for my trip. I also got some LiPo batteries to power the radio for the week of hiking. I already had a good supply of antennas for temporary portable use and decided on an end-fed, half-wave antenna (PAR EndFedz 40/20/10m Trail Friendly

EFHWA) as an easily deployed option along with a couple of other pieces of wire tuned for other bands, such as 30 and 17 meters. Of course, while doing my weekend hikes, I had the opportunity to learn how to use the KX3 by getting in a few other SOTA activations near home on some longer trails, including a few that were pioneer efforts (first-time activations) along some longer trails. My longest day hikes were up to 16 miles, as compared to about 8 or 9 miles for an evening hike after work. As the campsites at ISRO were evenly spaced at about 10 miles apart, these seemed like good distances for training.

## Heading to ISRO

One of the reasons that ISRO is one of the least visited national parks is the difficulty of getting there. It is located in Lake Superior and, while closer to the Arrowhead Region of Minnesota and northwestern Ontario near Thunder Bay, it is actually part of Michigan's Keweenaw Peninsula, which juts out into Lake Superior. Three ferry services offer access to ISRO as well as a float plane that leaves from the airport at Calumet, Michigan and can land at either Windigo or Rock Harbor. I chose to take the float plane to Windigo (*Photo A*), hike across most of the island during my week there (*Photo B*), and meet my sister-in-law and her family at Rock Harbor where we could all take the National Park Service ferry back to Houghton.

The morning I departed was beautiful and sunny at sunrise; however, upon arrival at Windigo, all the other hikers were hunkered down due to a thunderstorm that was heading in that direction. I chose to hike as soon as I finished with the mandatory orientation at the ranger station and made a quick stop at the store to purchase a canister of fuel for my camp stove as I was not allowed to take fuel with me on the float plane. During my first two hours of hiking, I heard thunder off in the distance and getting closer. Of course, at about the time I was at the top of the first ridge, you can guess what happened. Not the best place to be with lightning so I only stayed there long enough to put on my rain jacket, catch a glimpse of my SOTA goal for the following day, Feldtmann Ridge Lookout Tower (*Photo C*), located about 5 miles across the island (but a 12-mile hike to get there) and then I continued down the trail to get to lower ground. The torrential downpour caused what would have been a minor stream crossing across some rocks to become a fast-water crossing. I used my hiking poles to probe the depth of the stream and to carefully find the proper places to step as the rushing water was about up to my knees. Along the normal well-worn trail I could tell if I was hiking up or downhill based on the direction of the water flow along the trail, either toward me going uphill or running away from me going downhill. In between going up and coming down, the water would puddle in the saddles so that much of my hike for the next few hours was through water that was over my boots in many places. I wasn't going to let a little bit of rain and puddling water dampen my spirits, though. It was all just part of the overall experience and makes for a good story. Oh, all of my planning and preparations did not prepare me for this as I never did get out to hike during rain, but here I was at ISRO, in a downpour, doing my bucket-list hike of a lifetime.

Finally arriving at the Feldtmann Lake Campground, it wasn't raining so I was able to get the tent set up and get settled in a bit, then have my first meal out on the trail. Problem: The fuel canister I purchased at the park store that morning did not thread onto my Jetboil stove. It was an “Easy Clic” canister while I needed the similar screw-on variety. This was like having a BNC connector when I needed to have a PL-



259 and no adapter. Oh no. A moment of panic set in, but as an engineer I started to consider my options and alternatives to solve the problem. However, the solution that presented itself was not one of the options that I was considering. I found the right sort of fuel canister, rusty but with a sufficient quantity of fuel in it for the week, at the outhouse near my campsite. Believe me, I was very grateful to the unknown hiker who had left it behind. I considered this a minor miracle that the good Lord had my back and wanted me to continue on my adventure. Due to the continued threat of lightning storms, I did not set up an antenna to operate from the campsite that evening. Major thunderstorms passed through from 11 p.m. to 2 a.m. and I found out that my tent was indeed a good rainproof shelter.

### SOTA Summit #1

Day two was the Sunday of Field Day weekend and I enthusiastically headed for Feldtmann Ridge to activate my first SOTA summit (*Photo D*), the only ISRO summit that had previously been activated (but only once). The thunderstorms from the previous day were gone and after I arrived at the ridge, I found it was very windy at about 575 feet above Lake Superior. The top of the tower was locked, but I was able to support the EFHWA from a good distance up the tower where I was hanging on tightly due to the ~50 MPH winds. Because it was the same weekend as ARRL Field Day, I decided to operate on 30 meters and I managed to make 13 QSOs. The first QSO on this and every activation from ISRO was with my good friend Ron, WB3AAL (now SK) in Reading, Pennsylvania (see sidebar). Several of the rest of the QSOs for the half hour that I was operating from the summit were familiar SOTA chasers such as Gary & Martha Auchard, WØMNA & WØERI, in Missouri; Scotty, KG3W, in



*Photo D. First SOTA/NPOTA activation at Feldtmann Ridge.*

## A Tribute to Ron, WB3AAL (SK)

While hiking at Isle Royale National Park during the summer of 2016 my goal was to activate all four of the island's Summits on the Air (SOTA) peaks. Only one had previously been activated. I was very pleased that the very first log entry each time I got on the air was with my good friend, Ron Polityka, WB3AAL, who is now a Silent Key (SK). Ron was the person who got me into the combination of hiking and ham radio. We hiked various places along the Appalachian Trail together, enjoying things like the FYBO (Freeze Your Butt Off) event sponsored by the AZSQRPs and other fun QRP events, or just getting out for a stretch of the legs and a bit of radio operating. I had given Ron a schedule of my proposed operations for the hike with the approximate windows of when I would operate. This was a remote location with very limited communications options (i.e., cellphones did not work from there) so Ron would send out emails to other friends who also were keen to work me. It put a huge smile on my face when I was able to log many of those familiar calls. Ron also spotted me on the standard QRP notifications as well. Ron also needed Keweenaw County as his last county in Michigan so wanted to contact me while I was at Isle Royale as well.

Two particular times that I worked, Ron, though are really special in my memory. The first was as I was setting up to operate from Mount Desor. As I was just getting my antenna wire placed into a tree branch, four other hikers appeared, two couples who were about 30 years old. I mused as one of them turned on her cellphone and happily announced to the others that they had cellphone service as she tapped out a text message to let their friends know that they are okay. She was even happier when she finished and the phone reported back a message saying "SENDING." Five minutes later, I had just completed my first QSO from the summit with my friend Ron. It was about the same time that the woman told her friends that the phone still said "SENDING" and that probably meant that the message wouldn't go through. Overhearing this, I had to chime in and told them that I had just gotten my message through to a friend back in eastern Pennsylvania. Interested, they asked me what service I was using (obviously assuming that I meant that I had used a cellphone as well). Before I answered them, having a bit of fun, I asked what service they had and they quickly replied "AT&T!" I just nodded and then told them that was interesting because I was using "the last T of AT&T," which got curious looks from all of them as they didn't really understand. I further explained to them that as AT&T stands for American Telephone and Telegraph, I was simply using telegraph, or Morse code, and was able to contact my friend Ron in Pennsylvania directly without the help of any cell sites to relay the message. The look I got from them was priceless.

The second time that I was very happy to get Ron in my logbook was the morning that I was at McCargoe Cove after deciding to cancel the rest of my hike and take a water taxi back to Rock Harbor after a couple of days of R&R for my knee. It was quite emotional for me because I realized that, despite all of my planning, my knee was not going to allow for completion of my goal as I would miss the fourth and final summit, Mount Ojibway. Ron was able to let my XYL know of my situation as well as sending out an email to everyone else that was on his list so that everyone knew I would not be on the radio from Mount Ojibway later that day.

Ron passed away suddenly while at work in March 2018. There is not a day that goes by that I don't think of him and feel grateful for all the good times he and I had together both while hiking and operating. I usually hike alone, but since Ron has passed, I often feel like there is somebody hiking with me and I often wonder if it isn't Ron tagging along on some of the trails he didn't get a chance to experience! 73, Ron. DI-DIT.



Pennsylvania; Gary, K4MF, in Florida; and Bob, NA2X, in New York. Having previously set up alerts for this and the other SOTA activations and trying to stay on schedule for those alerts was key to having the RBN pick me up and have chasers ready to work me. The overnight stay at Siskiwit Bay campground was delightfully refreshing and I realized that twilight occurs that far north and in the far western part of the Eastern Time Zone until nearly 11 p.m. Each campsite is located about 9 to 11 miles apart, making for relatively easy hikes each day, and resulting in the ability to take an hour or so lunch break to do some SOTA activity as well. I was not a seasoned long-trail backpacker, so I was learning how to set up camp every day and getting better at it along the way, but found that the “house-keeping” items did take a bit of time away from the time that I had hoped to operate from the campgrounds.

### Taking a Walk on the Wild Side...

On day three, I left camp heading along the approximately 5-mile-long Island Mine Trail, following the rocky shores of the western part of Siskiwit Bay where I saw several moose prints ... but still had not seen any of the ~1,300 moose known to populate ISRO. I did come across another hiker who had seen one that I must have barely missed on the first day. I also noted a large dog-like paw print along the wet trail which was even more exciting as it was left recently by one of the island's only two remaining wolves. I also passed an area that had water overflowing onto the trail from a beaver dam that couldn't contain the rain from a couple of days before. Shortly after getting onto the Greenstone Trail, the main trail that goes along the “spine” of ISRO from west to east, I spotted a red fox. It approached me begging for some food but I continued to shoo it away until it got the idea.

Another three miles east along the Greenstone Trail brought me to my second SOTA summit, Mount Desor, at 1,394 feet above sea level, but not very notable had I not had set a waypoint on my GPS. Nobody had previously operated from this location for SOTA, so my operation was a pioneer effort. Trees supported my end-fed wire where I made another 17 QSOs, this time on 20 meters, and again with WB3AAL getting into my log first again. Woody, WD9F, who had been to ISRO previously but had not yet operated radio from there, made it into my log from Illinois as did



Photo E. NPOTA activation from inside tent at South Lake Desor Campground.

several other chasers. A couple of miles down the trail brought me to the South Lake Desor Campground. This place is interesting because the glaciers carved things out a long time ago and left small islands on Lake Desor, which is located on Isle Royale, which is located in Lake Superior. So, there is an island on a lake on an island in a lake. I was also able to set up to operate for NPOTA from the campground this evening (Photo E) and logged several dozen stations in addition to the handful of SOTA QSOs from earlier in the day.

On day four, I continued hiking along the Greenstone Trail toward the east for about 4 miles before reaching Ishpeming Point at 1,377 feet above sea level for another pioneer effort for SOTA. There was a short tower there but the trees surrounding it were taller than the tower. I was able to log another 25 stations during a 45-minute activation on 20-meter CW. I also had my longest-distance QSO of the trip overall with Phil, G4OBK, in Pickering, England. Not bad for 5 watts and a wire.

My boots were getting dried out better this day of hiking, but I should have addressed the feeling that I was getting a blister while I was taking a break at this summit. Shortly after leaving the campsite I finally spotted my first

moose, a cow with two calves, about 75 to 100 yards ahead of me on the trail. I stopped in my tracks and didn't want to alert it but it had seen me and kept watching me as it slowly moved the calves off the side of the trail and disappeared into the thick vegetation. I waited for several minutes before continuing down the trail as I really didn't want to have a closer encounter with a protective mother moose. I kept hiking another four miles to the next campsite at Hatchet Lake, where I found that ISRO really does have a lot of mosquitoes. I'm pretty sure I didn't set up an antenna that evening due to the blood suckers in that area, but it gave me time to look at my blistered foot, which I treated with some mole skin which worked great for the rest of the hike.

### A Side Trip ... and a Change in Plans

The next day, rather than continuing along the Greenstone Trail, I thought it would be interesting to take a side trail to the Minong Ridge Trail. This trail goes along the northern length of ISRO, past Todd Harbor (which was beautiful and a great place for a lunch stop) and on to McCargo Cove, which was also absolutely peaceful and beautiful



(Photo F). There were no SOTA summits along this portion of the trip so it was just a great day of hiking with some different views of ISRO including another old mine site, beautiful views of Lake Superior, boreal forest, streams, huge glacial-carved rock formations, and just raw nature. Unfortunately, during this part of my hike, my left knee really started to give me a lot of pain, probably from twisting it in a slip and fall on the first day, along with the heavy backpack I was carrying. I was very glad when I arrived at McCargoe Cove and found that I didn't have to set up the tent but could stay in a shelter instead. Further, it started to rain moments after I arrived. I literally collapsed onto the wooden floor of the enclosed shelter (Photo G), grateful that I could take some pressure off of my knee, but worried about what I would be doing the following day as I had two more days of hiking planned to get to Rock Harbor to meet my family. I also had planned to active the one last summit that had not yet been activated, Ojibway Point, on day six. The next morning, I needed to make a decision depending on my condition and what my options may be.

On day six, I woke up with quite a bit of pain and a swollen knee and knew that continuing to hike on it could injure it further. I met a couple of other hikers that morning, a father and son, with whom I discussed my situation. They said they were taking a water taxi back to Rock Harbor from there the following day and that it would be best if I could join them. Like the problem with the fuel canister earlier in my hike, I felt that the good Lord was guiding me to the option that was best for me at that time, so I put up a wire antenna to have fun making NPOTA QSOs that day from the picnic table just outside the shelter, both on phone and CW on 40 and 20 meters. Again, Ron, WB3AAL, was my first QSO in the log and I asked him to QSY to phone so that I could advise him of my situation and not being able to do my last SOTA activation. While on voice, I also asked him to give my XYL a phone call to let her know that in general I was doing well also but had a knee problem which ended my hike and would instead be taking a boat the following day to get to Rock Harbor. Ron also sent out an email with that info to the many followers I had for this trip. I spent the rest of the day enjoying the beautiful and serene setting, relaxing and using up some battery power making many NPOTA QSOs. While sitting at the picnic bench operating another red fox came running through the area

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## NEWS BYTES

### Hams to the Rescue in Ohio Key Fob Mystery

When people's key fobs and garage door openers stopped working in a particular neighborhood in the suburbs of Cleveland in late April, neither city officials, utility workers, or phone company technicians could figure out what was happening. So who do you call? The hams, of course!



Several local amateurs with direction-finding experience joined the hunt in North Olmsted, Ohio for the source of what they correctly presumed was a strong signal in the vicinity of 315 MHz, the frequency most commonly used for car key fobs and wireless garage door openers.

As reported in *The New York Times* and elsewhere, Don Dalessandro, WB8ZQH, and Bill Hertzell, N8HUQ, used direction-finding techniques and equipment to track the interfering signal to a particular house. When approached, the resident showed officials a homebrew motion detector that would alert him to the presence of anyone upstairs in the house when he was in the basement. Whenever it was activated, it put out a strong signal on 315 MHz. The battery was removed from the device and the interference stopped. City officials said the resident had no idea that his device was causing a problem for neighbors and agreed to stop using it. No action was being taken against the resident, said the local city councilman, who noted that there "was no malicious intent."

When all else fails ... call in the hams!





*Photo F. McCargoe Cove.*

and later, I saw a snow hare hopping through. Lucky for the hare the fox wasn't around anymore. Northern pike were having fun following lures of the father and son who were fishing on the dock at the cove. I was deeply saddened that I was not going to realize my overall goal of getting a "clean sweep" of all four SOTA summits on ISRO, but I know I made the right choice. That evening, I heard a huge splash in McCargoe Cove

and I saw a bull moose cooling off in the water in the twilight of evening. Wow, what a magical place and how lucky I was to be experiencing it.

The following morning, my knee still hurt a bit as I carried my backpack down to the dock to meet the boat that would take the three of us to Rock Harbor. The boat ride gave me some views of ISRO that I wouldn't have otherwise seen as it traveled around

Amygdaloid Island and Belle Isle, past Canoe Rocks and around the northeastern tip of ISRO between Passage Island and Blake Point before entering Tobin Harbor to dock at Rock Harbor. Shortly after arrival, I found my brother-in-law, sister-in-law, and their two young daughters, who had spent a few days exploring that end of ISRO and had many wonderful photos and videos of their own to share. I was very pleased to see them and enjoyed a wonderful meal at the lodge that evening after getting my first shower of the week in their room. The next day, we departed Rock Harbor on a large National Park Service ferry, which took us back to NPS headquarters.

### **Looking Back**

While disappointed that I missed that last summit and some of the hiking that I had planned, I know I did the right thing and was grateful that I was able to get some word out about my plans to Ron who relayed to others. Overall, I had more success than failure on my trip. I don't think I could have planned any better for the adventure and I would definitely do something like that again.

I would like to thank my wife, Ede, for being so supportive of my adventure and all the training that led up to it, her brother Greg and his family, and the many hams who provided advice, assistance and, of course, contacts during this adventure.



*Photo G. Shelter at McCargoe Cove.*



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Photo A. The author's "station in the stand" keeps him occupied while waiting for a deer sighting. (Photos courtesy of the author)

*It's always great when you can combine two hobbies, especially when they can get you out into the great outdoors. W4YBV tells us how he's put a portable ham station to good use during deer-hunting season.*

## Hamming and Hunting

**BY TERRY JOYNER,\* W4YBV**

I have been a ham for 56 years and a deer hunter for over 40. As any good deer hunter will tell you, you will spend many hours — sometimes days — just sitting alone in a deer stand. Deer season in Monroe County, Georgia, runs from September 15 through January 7 each year, and most weekends and holidays will find me in my deer stand. This has left me out of some of the best times for hamming. Over

the past 45 years, I guess I've missed out on a lot of contacts with special event stations, DX stations, contests, and just plain radio fun with friends.

Most deer stands are very small and have room for only one person. But this past summer, I bought a new and larger 18-foot metal tripod deer stand. The new stand is 4 feet wide, 4 feet deep, 5-1/2 feet high inside, with a 4-foot bench and roof. It's big enough for my wife or the grandkids to be up there with me. After hunting in it a few times, I realized that when I'm up there alone, there's plenty of space avail-

\* email: <w4ybv@yahoo.com>





Photo B. W4YBV's new deer stand is big enough to accommodate family members ... or a portable ham station, which he's carrying up in that orange case!

able ... enough space, in fact, for a (CW) ham station. The question was whether I could set up and operate the station without interfering with my deer hunting.

The first thing I did was put together my station. I started with my old Yaesu FT-857D radio that I'd used on my boat for years, adding an LDG Electronics YT100 tuner, Bencher key, RadioWavz 40-meter dipole, a 12-volt AC Delco Voyager marine RV battery in a camouflage-painted plastic battery box, an ARRL Minilog, and an old wooden fold-up TV table (Photo A). I packed all the gear into a waterproof orange case and headed off to set it up in my new stand (Photo B).

Hunting on my tree farm made it easy to find tall trees in which to put up the

dipole. I wanted to ensure the antenna was high enough to stay out of my range of rifle fire. The next challenge was to find a good location on the ground for the battery box. I placed it next to some small trees, covered it with some sticks and sprayed on a lot of Dead Down Wind (Photo C) to cover my scent and the battery smell. I used 25 feet of #12 wire to run the power up to my station in the stand. Being on my own property, I could set up my station in the morning and leave it up all day. Then at night, I could put the radio into the waterproof case and leave it in the stand for easy and quiet setup the next morning.

### Hunting for QSOs

My first hunt while hamming started off slowly ... I made only four CW QSOs

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(Photo D) and saw only six deer, but it was a great thrill to do both hobbies at the same time and give out my SKCC (Straight Key Century Club) number to people I contacted. My first

QSO was with Bruce, WA4ZLK, in Raleigh, North Carolina (Photo E). My next contact was with Robert, AI4UL, in Clinton, North Carolina, followed by a QSO with Mark, KJ4YM,

a friend and fellow member of the North Fulton Amateur Radio League. The last contact of the day was with John, NJØJ, in Monument, Colorado. All were very surprised to learn that



Photo C. A hefty dose of Dead Down Wind covers both Terry's scent and the smell of the battery.



Photo D. W4YBV on the air from the deer stand. Terry made four CW contacts on his first day of operating in the trees!



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I was up in a deer stand, hunting and hamming at the same time.

Sometimes, I like to just listen to special event stations, nets, and DX stations. But it makes the time go by faster when the deer are not around. One thing I've noticed from my stand is the low noise level in the woods away from all the power lines and other noise sources. Also, the presence

of the station has not changed the deer patterns. I still get a lot of deer around my stand all season, even when I'm transmitting. But I still need to be quiet and not move around a lot.

The best thing is the view from my station (*Photo F*). I guess I am a very lucky ham to be able to watch deer, turkey, rabbits, squirrels, coyotes, fox, armadillos, and all types of birds while operating. Truly the best of both hobbies!

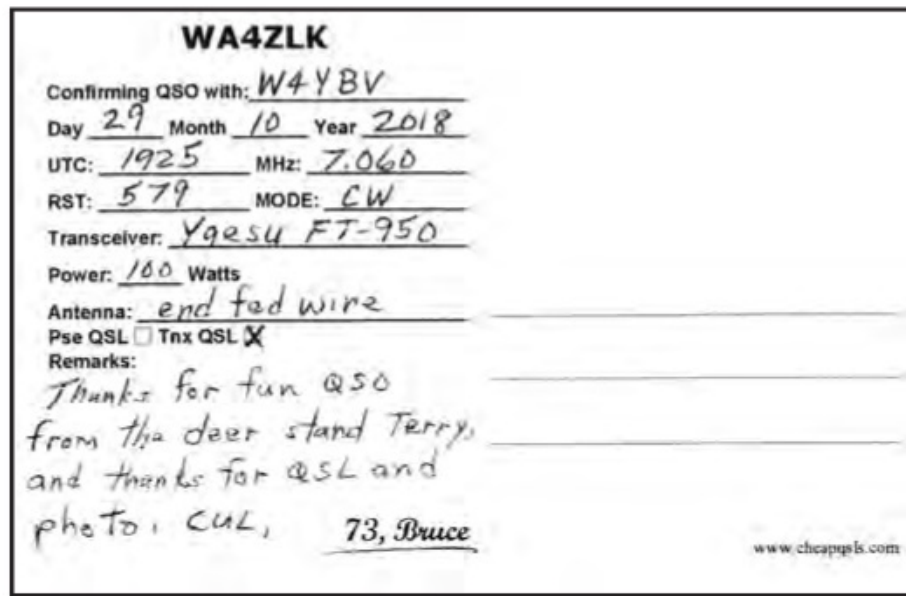
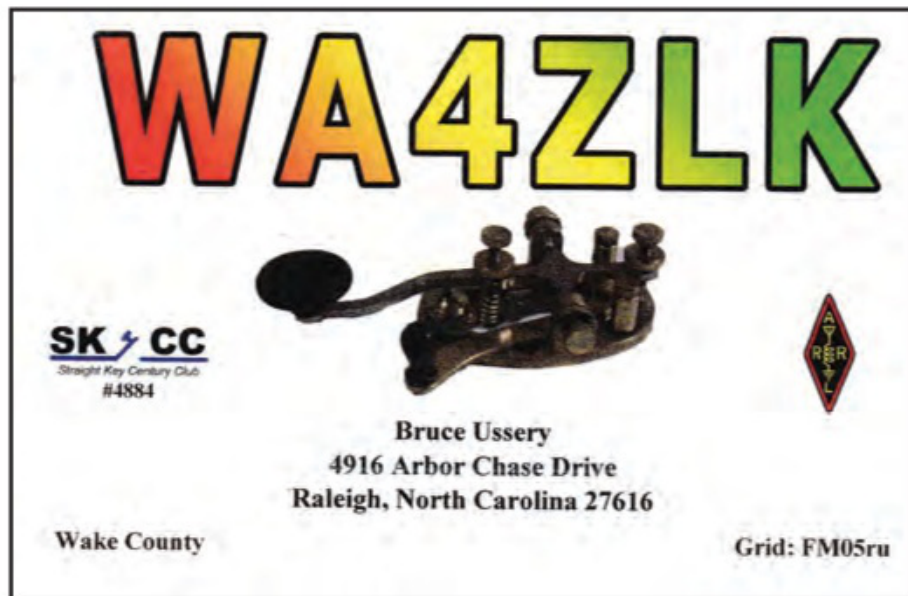


Photo E. Front and back of QSL card from WA4ZLK, Terry's first contact from the deer stand.



Photo F. Terry says the view from his deer stand station makes all the effort worthwhile.



## Take It To The Field Special

Sometimes, you go to an island to operate “in the field,” but once in a while, the island comes to you! That’s what happened earlier this year when a newly-designated entity for the Islands on the Air program, or IOTA, was activated for the first time by an international group of hams. And the “field” in this case was sea ice!

# OH1ØX: A New IOTA Counter Right on Our Doorstep



## Inakari Island EU-192 in the Tornio River Delta

BY MARTTI LAINE, \* OH2BH

One can only dream about a new DXCC or IOTA counter suddenly being born one morning right on your doorstep. As Godfather to some 12 new DXCC entities, I have seen that strange situation more than once before. However, on this occasion, we suddenly learned that a new IOTA counter had been born right within our own homeland, Finland. Inakari Island (the Finnish section) and Kataja Island (the Swedish part) had been designated by IOTA management as EU-192.

Preparation work needed to be done for the first-ever operation from this new IOTA, even though we were still in the depths of winter. This preparation work was done in close collaboration with Gerben Menting, PG5M, who, a decade earlier, had first highlighted the possibility of this new counter

\* <martti.laine@kolumbus.fi>

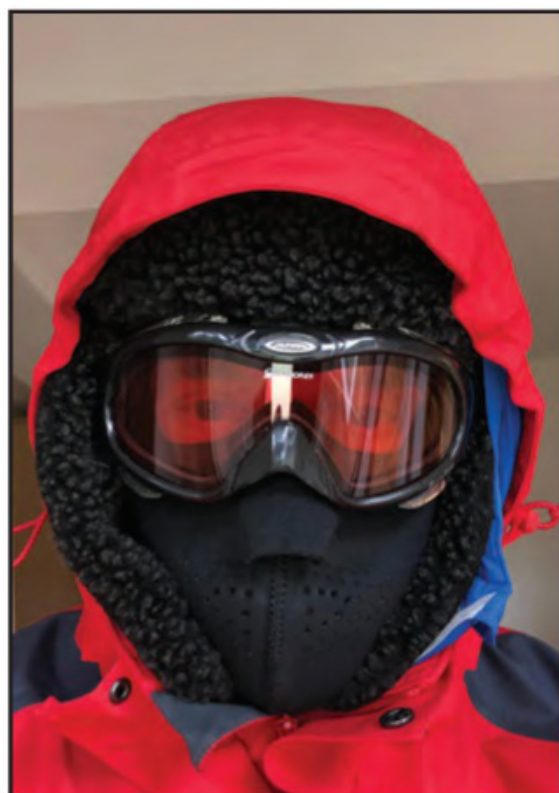


Photo A. It was definitely cold in the sub-Arctic winter, but G3TXF may have been a bit overdressed. (Photos courtesy of the OH1ØX team)

Photo B. Gerben, PG5M, made different vertical antennas for each of the bands used. Here, the 40-meter vertical is being put up. Although we used 1 kW (K3S + SPE 1.3-FA), the cross-band interference was at a minimum thanks to the excellent band-pass filters. →





*Photo C. Nigel, G3TXF, made this detour to north of the Arctic Circle before exchanging his Arctic sleeping bag for his swimming trunks prior to heading to Mauritius as 3B8XF. Here, Nigel dug deeper and pushed to get those deserving IOTA chasers in the USA and JA into the OH1ØX log, despite the bad weather.*



to IOTA General Manager Roger Balister, G3KMA. Meanwhile, a group of Swedish hams was also planning an initial activation, but only for later in the year, after the sun had risen well above the horizon and the winter's sea-ice had melted.

During the 19<sup>th</sup> century, Kataja and Inakari were originally two closely-separated islands in the Gulf of Bothnia, and the border between Sweden and Finland ran right between them. Over time, the land between the islands rose two meters above sea-level and had formed into a single island. The international border now split the island and the two segments retained their separate identities as Kataja (part of Sweden) and Inkari (governed by Finland). It was the fact that a single island was now in effect sliced by an international border that made it count, under IOTA rules, as a possible new island group.

The addition of this new IOTA counter (EU-192) was first announced by Roger, G3KMA, in October 2018. This was during the run-up to winter and there was much speculation that there would be an initial activation of this new IOTA, which lies close to the Arctic Circle, in the spring of 2019, once the sea-ice had melted and it was possible to sail comfortably and easily to the island. But as in serious hunting, IOTA folks recognize that a shot can only be fired when the target is right in the

sights. Not earlier — not later! So it was with the first activation of EU-192.

### **Making it Official**

To make the accreditation easier, our group invited well-known DXpeditioner and CQ DX Hall of Famer Nigel Cawthorne, G3TXF, to witness the proceedings and to join the party at the new IOTA (and to be suitably attired for the icy occasion!). We were indeed delight-

ed to have Nigel come along, even if he may have been over-dressed (*Photo A*), he survived and witnessed the frozen folks in action. Temperatures hit a low of -27°C (-16°F). Chilly indeed. Here is the OH1ØX story.

### **The Journey Begins**

Our group of four consisted of Gerben, PG5M (*Photo B*); Nigel, G3TXF (*Photo C*); Niko Halminen, OH2GEK (*Photo*



*Photo D. Niko, OH2GEK, is a younger generation whiz who mastered all the sectors that the OH1ØX DXpedition required. Niko surprised the veterans of the trip with his skills and excellent team spirit in the challenging circumstances. Niko is a calm pilot and wild musician who captures his spirit from OH2K and OHØ/Brändö groups.*





*Photo E. For safety reasons, the snowmobiles always drove in pairs. The Finnish “artificial intelligence creature,” which was reminiscent of a space-capsule, seated four people and became a symbol for the whole trip. Travelers were kept warm inside a heated compartment but a true “lifeline” on the sea-ice crossing was the noggin of strong local rum.*

D), and this writer, Martti Laine, OH2BH. Our team decided to defy the freezing Arctic weather and to activate Inakari as soon as the sea-ice was judged to be thick enough to make the crossing safely. This year, the ice thickened slowly. Many safety arrangements were set in place and many ice measurements were needed to ensure that the trip would be safe. We started checking the sea-ice in January, but it was still too thin. A long period of cold weather during late January and early February then made it possible for us to start our journey. The port of Puotikari was chosen as the base and



*Photo F. From left: Captain of the port and veteran of sea rescue Arto Ponkala; Gerben, PG5M; local DXer Aaro, OH9RJ, who can almost see EU-192 from his living room window; and Martti, OH2BH, who made the arrangements for this undertaking in Finland.*



*Photo G. My home is my castle — in the midst of a snow-storm. We had a fire burning in the fireplace from the beginning to the end of the trip to keep us warm. Niko taught the foreigners how to set a “flame” onto a birchwood log. A stub of a candle inside a disposable paper plate was a new recipe for the rest of us, too!*





Photo H. A shower was most welcome after the trip! Here the spic-and-span operators are getting ready for a post-expedition press conference. The local radio station produced reports about our visit to Inakari before, during and after the trip. A crew from Finnish national TV (YLE) visited the island as well, and produced news items for both local and nationwide coverage.



Photo I. The picture in the QSL card is of the courtyard of the fisherman's derelict base. To the left of the main building (red snowmobile in front) is the partially wrecked sauna and a group of storage buildings that are still full of fishing equipment. The line visible beyond the island is the passageway in the sea-ice that the icebreakers keep open throughout the winter. The QRM and the sea of lights were impressive when the icebreakers rumbled by, while accompanying ships through the passageway to Tornio and Kemi. A significant amount of cultured steel is shipped to the world from those two ports.





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as the starting point of the trip. The journey across the sea-ice (*Photo E*) would be much shorter on this route compared to other options.

The captain of the Puotikari port, Arto Ponkala (*Photo F*), was personally responsible for the safety of the trip. There needed to be particular attention because the route to the island across the ice went right next to a passageway through the ice constantly kept open by an icebreaker. We also had to be prepared to move in the dark and for heavy snow squalls. Both of these scenarios happened.

Everything went perfectly. The four day/night long trip on the icy island succeeded without any problems. The arrangements included a daily maintenance visit by snowmobile from the nearby city of Tornio. We lived and worked in an abandoned fisherman's base that had seen much better days (*Photo G*). This is the only building on the Finnish side of the island.

### Radio Operations and the Cold Weather

The two stations kept the bands hot with pile-ups and 8,090 contacts were made during the three days of operation (*Photo I*). The pileups were boisterous, and we really noticed how popular the IOTA program is. The USA and JA openings were limited but many madcap IOTA hunters found their way into the OH1ØX log. Being so far north, the lower bands were also closed at night. Even on 40 meters, only noise could be heard for most of the night.

The Elecraft K3S radios worked immaculately and two Honda EU20i generators were in operation continuously from the beginning of the trip right to the end. The cottage was warmed with gas and wood. Local DXer Aaro Hyvarinen, OH9RJ, came across by snowmobile to greet us on the island. Mike Styrefors, SM2OAN, also tried to make his way across the ice to greet us from the Swedish side of the bor-

der, but traveling through a heavy snow squall wasn't so easy. The sea is unpredictable and particularly the ice — especially in the winter. The motor of the snow sled must not be allowed stop while crossing the sea-ice.

### Summary

The Bothnian Bay archipelago, which lies off the towns of Tornio and Kemi, is comparable in beauty to the many other Finnish and Swedish archipelagos. During the summer, it is expected that both Finnish and foreign travelers will be heading for the island of Inakari with its new status as IOTA EU-192.

Inakari is part of the Bothnian National Park, which results in there being some practical restrictions, but negotiations are in progress to make transportation and staying on the island as smooth as possible for visiting IOTA expeditions as well for casual visitors.

You can already start planning your summer travel program and book a place in IOTA history. Märket Reef (OJØ), another IOTA counter (EU-053), turns 50 this year and has now a new and exotic sister attraction, Inakari EU-192. You can contact the transportation provider, Arto Ponkala, directly at <[arto.ponkala@gmail.com](mailto:arto.ponkala@gmail.com)>. The password to this holy island is — New IOTA.

How did the life on the island go along when there were four men and only three beds? How did different cultures get along or were there any problems? Was there bacon and eggs or just sausages for breakfast? These delicate issues will be revealed only during the wee hours of the next IOTA convention.

*NOTE: A version of this article is being published simultaneously in Radcom, the journal of the Radio Society of Great Britain*





*This group of Israeli hams “took it to the field” in Africa, with a DXpedition to Ghana that included operating from a still-under-construction beach resort and from tents in two national parks.*

## 9G2DX – 4X DXpedition to Ghana

**BY ZVIKA SEGAL,\* 4Z1ZV**

**L**ike many ham radio DXpeditions, this amazing adventure began about two years ago. Innocently enough, I took the challenge to handle the importation and installation of DMR repeaters being donated by an “unknown” radio ham in Africa. The donor turned out to be Haim Lewy, 9G5AF, a ham from Israel, now based in Accra, Ghana, and the owner of SkyLinks, a communication company doing business in Africa.

My close friend, Dov Gavish, 4Z4DX, immediately recognized the opportunity to operate in a rare QTH. An additional plus was to include locations in the WWFF (World Wide Flora and Fauna program), and to be the first ones worldwide to operate from Ghana on 30, 60, and 80 meters. It looked like a weird vision initially, but fortunately, Haim took the challenge to arrange this DXpedition.

It turns out that getting to Ghana, as well as importing radio equipment, is not a trivial task. Haim arranged for us



*Photo A. The group’s equipment and antennas filled up two off-road pickup trucks. (All photos by and courtesy of Haim Lewy, 9G5AF, and Zvika Segal, 4Z1ZV)*

\* email: <zvisegal@yahoo.com>





Photo B. A “mobile supermarket” on the streets of Accra.

to get the visas and purchased most of the heavy and costly equipment, such as an IC-7300 transceiver, ALS-500 solid-state amplifier, Spider Beam antennas, poles, cables, ropes, tools, etc.

Getting a visa for entry into Ghana is a challenge. You must have a local invitation as well as the yellow International Certificate of Vaccination with at least proof of recent Yellow

Fever vaccination, eight photographs and a substantial fee in cash.

Haim worked with the NCA (the local communication authority) to get approval and a special callsign — 9G2DX — for our operation. As a point of reference, you can count more fingers on your hand than the number of local hams in Ghana. Actually, we met 100% of them ... two.



Photo C. Setting up the Spider Beam on the beach.





Photo D. Operating from the seaside resort.

Dealing with the difficulties in setting dates for the DXpedition, a heterogeneous and well-balanced group was formed that consisted of people who were willing to invest their free time, efforts, and money.

Among the group was Dov Gavish, 4Z4DX, a well-known figure in the Israeli ham community with over 50 years of seasoning. 4Z4DX has ham radio experience on all modes, and has participated in delegations to the Himalayas and meeting with King Hussein (JY1, SK) in Jordan. Joining 4Z4DX was Simon Heger, 4Z1SH, a mature ham with a personal passion for rag-chewing on SSB; Zeev Stadler, 4X5ZS, “the youngster” in the group and a man with fire in his eyes and the determination to be dedicated and to perfect his tasks; and Zvika Segal, 4Z1ZV (that’s me), acting as problem creator and problem solver. I was also charged with managing communications issues, especially at the personal level (which is one of the challenges with such a unique group).

### Arriving in Ghana

On the start date, we landed at Accra’s new and modern international airport. A VIP service was offered as part of our welcome mat. Once we collected our luggage, we were ushered through friendly immigration and customs and loaded up two 4X4 vehicles that were waiting for us and our belongings.

The first evening we spent in Accra, the capital, in a high-class hotel and had a top-notch dinner with Haim and his family at a well-known sushi restaurant.



Photo E. Dov, 4Z4DX, at the entrance to Kakum National Park, one of two parks activated by the DXpedition team.

Early the next morning, we moved to Haim’s facility to pack and load the equipment. With the help of the local drivers, we moved two fully-loaded off road cars (Photo A) to the first operating site; a new beach resort, still under construction, that was opened especially for us. We got a whole section facing the Atlantic Ocean and few local guys to take care of us, as well as having a dedicated driver and car 24/7.

The drive to the beach was an adventure. We were introduced to an interesting trade system, “the mobile supermarket.” Local people, mostly women, carry whatever you can imagine on their heads (Photo B). This ranges from

bread, ice, and drinks to sewing machines or gas containers. They approach and offer their merchandise (a process through which you can try to improve your negotiating skills). Fifty-percent off “list price” is the usual result.

At the beach resort, we started installing our gear. We set up three radio stations: IC-7300 with the SS Linear, IC-7000 with the LDG IT-100 antenna tuner, and the IC-718, which operated as the FT8 station. Most of the QSOs on FT8 were made by the Zeev — “the youngster” (over 1,000), which through his IT skills and dedication, perfectly met the requirements of such computer-to-computer digital communication technology.



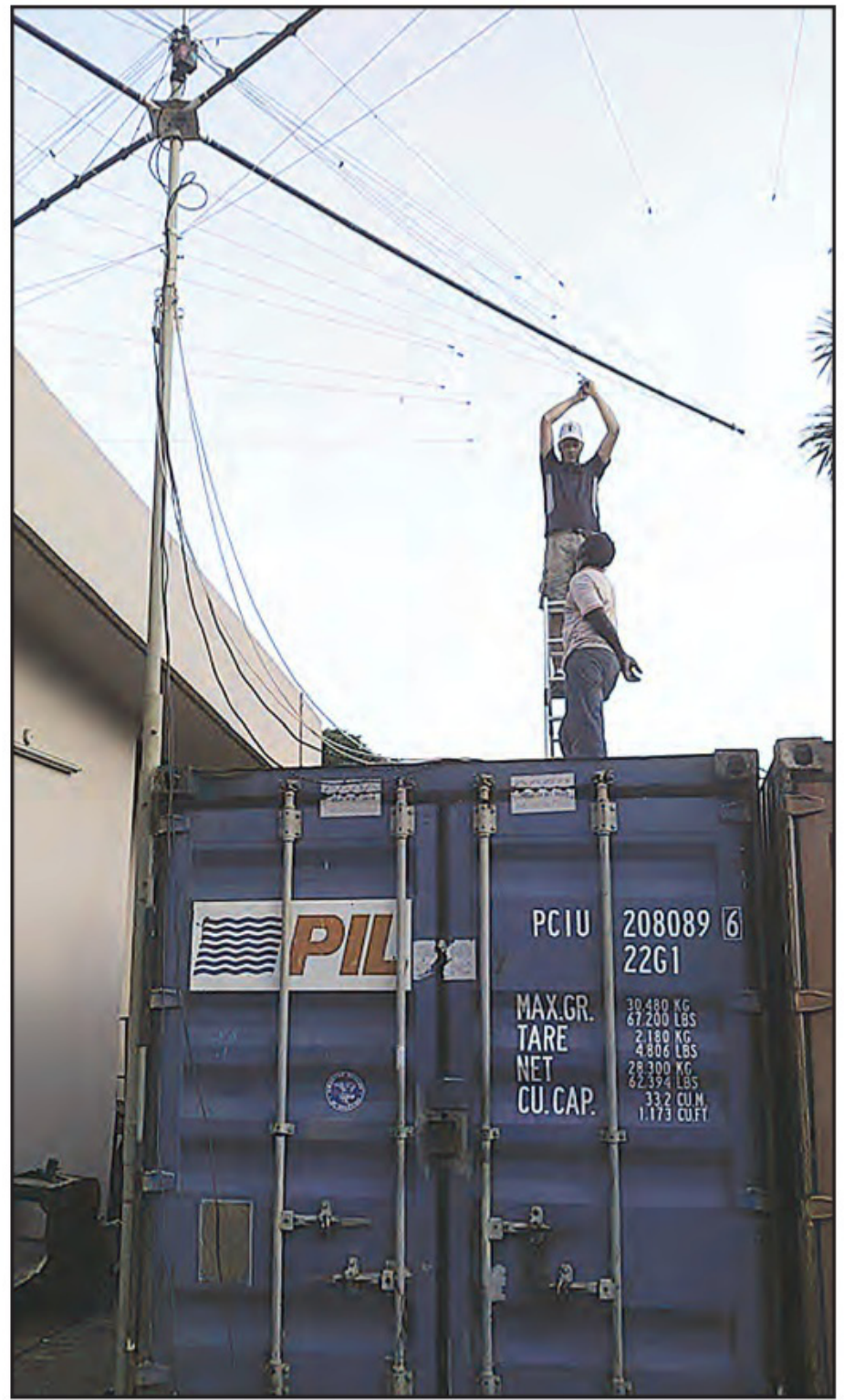


*Photo F. Local residents helped with setting up antennas, including climbing trees as needed.*

Outside, every electrical and lighting pole was turned into an antenna tower. With the gracious help of the local people, we secured a block and line as the basic mechanism to raise and lower wire antennas.

The first installed antenna was a simple end-fed with a 9:1 balun and 22 meters (72 feet) of wire with no radials. Performance of this basic antenna was impressive. We achieved a reasonable VSWR down to 60 meters and were rewarded with QSOs from all over the globe. This helped us get Dov operating CW, and simultaneously removed him from hounding us so we could continue to install other antennas without “supervision.” The first station used an IC-7300 transceiver, an ALS-500 (about 400-watt, solid-state linear), an MFJ manual antenna tuner, and Dov’s favorite logging software — the old and stable version of MIXW.

Our plan was to install the “compact and portable” Spider Beam antenna (*Photo C*). I must say that other than the name and stated performance (up to 9 dBi gain), there is nothing there to justify the phrase “Designed for DXpeditions.” Once you open the box, you realize that the manual was correctly titled — “Fabrication Instructions.” Actually, you get a *kit*,



*Photo G. The Spider Beam found a new, permanent, home outside Haim Lewy’s office in Accra.*

with a bill of materials (i.e. poles, screws, rolls of ropes and wires, epoxy glue, uncut Velcro® strips, etc.).

Even the 1:1 balun is a kit that needed to be “fabricated.” A good knowledge of reading complex instructions, as well as the ability to measure and to cut wires to specific lengths, and good soldering skills are all needed.

It required very gentle handling to avoid breaking the carbon support poles and tangling the wires (which were everywhere). However, once the antenna was set up and running (at least for that one day), the performance was beyond our expectations. Unlike some other similar antennas, this is a real 5-band, 3-element Yagi (with 4 elements on 10 meters).

Once we understood the complexity of building the Spider antenna, we started to install other wire antennas, including a multi-band commercial antenna by ICOM, a 40-meter dipole and, last but not least, the 80/160-meter inverted-V antenna recommended by Pop, YU7EF. This antenna was constructed of 30 meters of copper wire and an 8.5-meter vertical on an African bamboo pole. The loading coil for 160 meters was fabricated using an empty mineral water plastic bottle and a tuning capacitor for 80 meters was a piece of





## AOR Updates its AR-DV10 Handheld Receiver

AOR has updated the firmware for its popular AR-DV10 digital receiver which gives it the ability to decode trunked TETRA signals. It is now the only handheld receiver that can decode these signals.

In addition to TETRA signals, the AR-DV10 100 kHz to 1300 MHz wide-band receiver can decode numerous digital modes including DMR, D-STAR, NXDN, dPMR, P25, D-CR, Yaesu C4FM, Alinco EJ47U. Optional codec decoders include: COSPAS-SARSAT beacon. Its FPGA technology allows auto-detection of digital modes while scanning, and audio, discriminator, I/Q recording on SD, and playback with SDR# on PC.

The firmware update is available now. For more information, contact: AOR USA, Inc., 20655 W. Western Avenue, Suite 112, Torrance, CA 90501. Phone: (310) 787-8615.

Email: <info@aorusa.com>.

Website: <www.aorusa.com>.

open-ended RG58 coax. Performance of the antenna made Dov very happy as well as about 80 hams who were rewarded with their first Ghana QSOs. Thank you, Pop.

Later on, we tested a short version of a 20-meter wire dipole with loading coils built by Shimon. The center was supported by an African pole (i.e., a piece of a tree). We were surprised and delighted as this setup yielded many QSOs to North America and Japan.

Operating conditions from the beach resort were excellent (*Photo D*). The bands were widely open to South America, and provided good conditions to the USA, especially on 20 meters during evening and night time. We also had good conditions to Europe and Japan, and even made a few QSO with Antarctica.

The ongoing challenge was pacifying Dov, who was very upset with Shimon's SSB operating style. Shimon transmitted to each ham his name as well as the weather conditions in Ghana. This drove Dov crazy, whose focus was to serve the global community with as many QSOs as possible.

We also sacrificed time during some of our meals in that we had to drive an hour to get to a western-style restaurant. Dov kept calculating the hundreds of "lost QSOs" due to eating and driving. In response, we decided to change the culinary process by leaving Dov to have fun with the rig while the rest of the team headed out for a meal. Even the pizza that was ordered for Dov was a waste of time and food, as Dov apparently needs only one apple per 8 hours of continuous operation.

One thing that made me extremely happy was once, when Haim was starting at the radio station, we encouraged him to step in and operate. In a few seconds, he started to manage the pileup in a most professional way. Haim was a member of the well-known "4X4HQ" club in Tel Aviv for over 30 years. For him, it was like riding a bicycle after a long period of time. Just like that...

Part of operating in Africa is the time domain and constant. Everything takes longer than planned, looks different than expected, and is subject to weird electrical stability. One evening, there was a sudden power outage whereby all the nearby village lights started blinking like a hazard signal. When the village power came back and ours was still down, we learned the magic of the "pre-paid" electricity meter, which sometimes resets itself after a power failure. Our host needed to drive to the nearby office, pay the bill, and hope that it would propagate

through the slow network. We continued to operate on batteries until they were also exhausted. Unfortunately, nobody was able to operate the generator since it was mysteriously not onsite.

## National Park Operations

Our next two destination were national parks: Kakum National Park (WFFØØ4) (*Photo E*), about 3 hours drive west of Accra, and Shai Hills Resources National Park (WFFØØ7) about a one-hour drive north of Accra.

At both parks the hospitality was warm and the park management, rangers, and local people went above and beyond the call of duty to support us in any way they could. This included helping us to turn every tree into an antenna support (*Photo F*), carrying our equipment, and providing the best locations for operating. No need to explain that "best" is a relative term.

General lodging conditions in the parks do not meet western standards. There is a lack of hot water and low pressure to no water flow at all. Some of us slept on inflatable mattresses, either in a tent or on the ground, and had to shower using a bucket and a bottle like in the olden days.

During one of the nights we stayed in Shai Hills Park, a thunderstorm began, so the team had to rush and pack the radio equipment into the cars. We also learned the hard way that wet trees are like a Faraday Cage. They effectively block propagation and radio conditions were just dead.

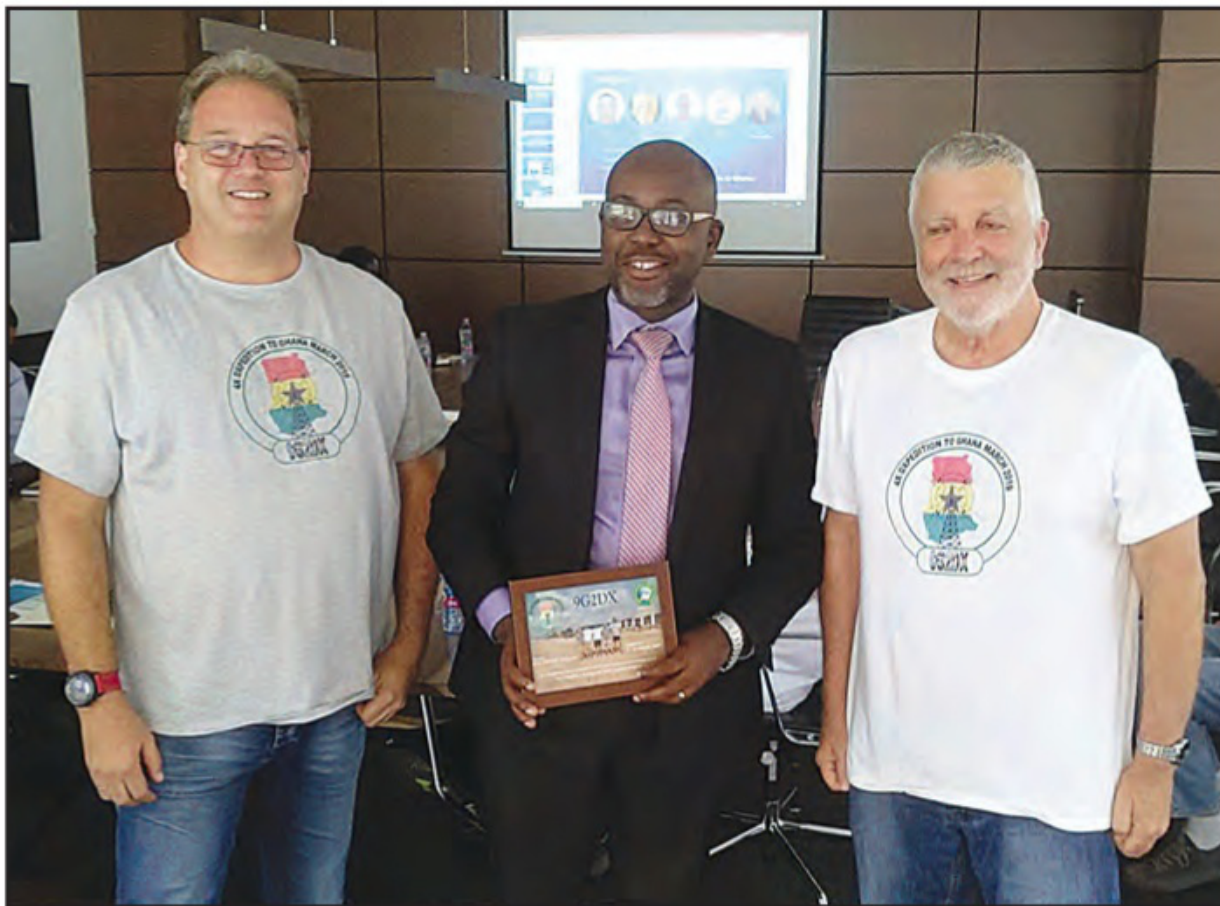
Following the adventure in the parks, we went back to "civilization" — a high-class hotel in Accra, which meant clean rooms, hot water, and breakfast.

The last few days we went back to the beach resort and set up all the stations and antennas for the fourth time. With the good seashore conditions, the "harvest" was above 1,000 QSOs per day.

Early the next morning, the driver knocked on my door and was happy to share with me that he took down and repacked all the antennas other than the Spider Beam. It turns out that he misunderstood the request to take down *only* the Spider Beam, which was going to be relocated near Haim's office. Hence, we had to set up all the antennas for a fifth time.

One of our tasks was to leave Haim with a well-installed radio station. Part of the challenge was to take apart the Spider Beam, transfer it, and re-install it on two containers at Haim's office (*Photo G*). Zeev did a fantastic job of marking each and every piece of the spider parts and elements using color-





*Photo H. Before heading home, the DXpedition team met with the management of the Ghana Communications Authority, the NCA, and made a presentation about amateur radio. Several of the authority's engineers had taken part in the operation.*

masking technology. As suspected, the re-setup of the antenna took a while due to its huge size (over 10 x 10 meters) and limited available space.

The local metal shop owner who was hired by Haim to supply multi-pipe telescopic poles gave us some additional insight to the way things work in Africa. There needed to be at least one dedicated Western guy attached to him, otherwise he would go to sleep. The welding machine was a real museum piece, complete with a rusted transformer that was probably older than we were. In addition, there was a magnificent extension cord that came equipped with neither plugs nor sockets. I will leave it to your imagination to guess how it worked.

Before departing Ghana, we had a meeting with NCA, the Ghana Communication Authority (*Photo H*). A professional presentation was delivered by Haim to the manager and his 20 engineers, some of whom had taken part in our operation.

Ghana was also a great place to celebrate the birthdays of three team members — Dov, Haim, and I. On our last night in Ghana, at a Chinese restaurant, we were exposed to the African version of the “happy birthday song” along with fireworks and ice-cream cake.

### Wrapping Up

Overall, in five net days of operation (three locations and four setup and

take-down jobs), all combined with a lot of fun and adventures, we made over 5,200 QSOs. Over 50% of them were on CW by Dov, and the balance were divided between SSB and FT8. We worked over 80 countries, including Antarctica, as well as more than 30 QSOs with 4X stations back at our home in Israel.

All QSOs were logged into digital log software, uploaded to eQSL at least once per day and then screened for duplicates and errors. A corrected ADIF file was sent once a day to Mark Rosenberg, 4X1KS, who supported us in setting up QRZ.COM, LoTW (Logbook of the World), and clublog.com. He also acted as our focal point for all issues and each day, reviewed and uploaded the QSOs to clublog.com. This helped to maintain very low level of errors (probably two complaints out of over 5,200), and looked quite professional.

I would like to take this opportunity to thank the dedicated team — to Dov for his vision; to Mark for his support as well as reviewing and editing this article; to Charles Wilmott, MØOXO, who is still acting as our QSL manager; to NCA management; to all of the local people who helped us succeed and did their best to give us warm hospitality, and last but not least, to Haim Lewy, 9G5AF, who made our dream come true with a lot of effort and investment.

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# Results of the 2018 CQ DX Marathon

BY JOHN SWEENEY,\* K9EL/VA3CDX

**W**hether you are a supporter of FT8 or want nothing to do with it, this new mode had a major impact on the 2018 CQ DX Marathon. With truly bad band conditions in 2018, we expected a significant drop in total QSOs and lower overall scores. We did see lower total scores but total QSOs were essentially flat from 2017 and actually higher than 2016. More than half of all QSOs in 2018 were made using digital modes, with the majority of those being FT8. In 2016, digital QSOs made up just 20% of the overall QSO total.

FT8 did bring some new hams to the DX Marathon, but their FT8 QSOs clearly came at the expense of phone QSOs, which were 40% of all QSOs in 2015, yet just 16% in 2018. Perhaps the weak-signal capabilities of FT8 allowed stations with smaller antennas and lower power to work more countries. North America appeared to jump on the FT8 mode very quickly as NA was the only continent to record an increase in overall participants in 2018. Although fewer participants submitted logs in 2018, as expected, the people who did submit were very active. The average number of QSOs per person was up 20% over 2017 and identical to the level in 2015, when sunspot activity was very good. Digital-only submissions saw a big increase from just 5% of the total in 2015 to 15% in 2018. Phone-only submissions dropped to just 6% of the total, while CW-only submissions remained steady.

The maximum possible score in 2018 was 333, a slight increase over 2017. Although signals may be weak, there is still plenty of DX activity. Not surprisingly, fewer high score records were broken in 2018, but 22 new records is still very impressive, considering the band conditions. One of the new records was a new 6-meter high score set by I4EAT — 147 — more than the highest 10- or 12-meter scores. The majority of his QSOs were digital, presumably FT8. The 10-, 12-, and 15-meter bands accounted for only 17% of total DX Marathon QSOs in 2018, reflecting the poor conditions on our higher HF bands. Twenty, 30, and 40 meters accounted for 64% of all QSOs,



*Jim, K2JL, had the top worldwide Formula Class score in 2018 — very impressive considering he had three major operations in 2018. Jim felt the DX Marathon was very therapeutic — we agree. Jim was licensed in 1978 and has never run more than 100 watts. Jim uses a TS590 plus various wires and a 43-foot vertical antenna.*

with 30 meters recording the largest increase — 175%. The majority of the 30-meter QSOs were digital.

## And the Winners Are...

Winning the DX Marathon takes a lot of patience and time in front of the rig, especially during periods of low sunspots. Bill, K2TQC, seems to have the right formula for winning — once again Bill came out on top, making three years in a row as top worldwide DX Marathon scorer. Bill had a total score of 326 — very impressive considering the conditions. Confirming the broader trend we saw in 2018, the majority of Bill's QSOs were on CW and digital. In second place, and a former Marathon top place finisher, was Eduard, OM3EY, who finished with a total score of 323. Oms, PY5EG, finished third at 322. Rounding out the top five were Serge, R6YY, in fourth place with a score of 321; and Marvin, VE3VEE, with a score of 318 in the fifth position. Serge has placed in the top 5 for the last four years. Marvin was also once again the number-one finisher in the 20-meter only category. Newcomers to the over-

all Top Ten worldwide include John, K2ZJ (6<sup>th</sup>), Graham, VK3GA (7<sup>th</sup>) and Shin-ichi, JAØDAI (10<sup>th</sup>).

In the Limited Class category, congratulations to Alex, EW7A, who jumped from 14<sup>th</sup> place in 2017 to first in 2018. His score of 274 was very impressive in light of the current conditions. Alex uses a hex beam for the higher bands. Second and third place positions went to newcomers to the top three: W9RF at 265 points and PY2SPW at 255 points, respectively. In Formula Class, 100-watt option, the winner is James, K2JL, with a very impressive score of 293 points. James uses a 43-foot vertical and wires for his antenna system. TA4RC finished second with 273 points and HA7LJ finished third with 261. Istvan (HA7LJ) has consistently placed in the top three in Formula Class. Working the Marathon with wire antennas is a difficult challenge with no sunspots.

Even more difficult working DX are those brave hams who do so with QRP power. This year we saw another decline in 5-watt submissions and average scores were also lower than in pre-

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vious years. Congratulations to Karel, OK2FD, for winning the QRP category with score of 262 points. Fulvio, IV3AOL, repeated his second-place finish of last year with an impressive 234 points, which was identical to his 2017 score.

Each year, about 25% of the DX Marathon participants choose to submit scores for a single mode, and 2018 was no exception. As noted above, phone submissions dropped significantly while digital-only submissions almost doubled. CW-only submissions were down slightly, but very close to the annual average.

One person who seems to really enjoy CW is Lada, OK2PAY, who, for the fourth year in a row, had the highest overall CW-only score. The top North America CW score went to John, K3MA, who finished just 5 points behind Lada. Both Lada and John will soon hold beautiful DX Marathon plaques for their efforts. Ken, W1NG, was 2 points behind K3MA and continues his string of top CW finishes.

On phone, Bruno, PY6BA, in his first attempt at winning, made a very strong effort and came in first with a score of 300. Gert, PA2LO, repeated his second-place finish from last year with a very respectable score of 269.

Digital-only submissions were up 30% from 2018 and represented over half of the single-mode submissions. This is a major change — in 2015 digital submission were only 5% of the total entries. The digital-only category also saw the only increase in high scores. The ability of FT8 to work weak signals clearly was responsible for the score increases. The top digital-only score was the same as phone and only a few points behind the top CW score at 300. The winner of the digital category once again is Jan, OM5XX, who increased his 2017 score by 10 points to win the digital plaque. Coming in second at 270 points was Piero, IK5FKF — always a top contender in the digital category. Vlad, RZ1OA, came in third with 260 points.

In addition to the overall and mode plaques, each year we award plaques to the top score on each continent plus the highest score on each of the 10- through 80-meter bands. Top honors for Africa once again went to EA8AXT with his 307 points, just one point less than his 2017 score and higher than his 2016 winning score. In Asia, JAØDAI has never finished lower than 4<sup>th</sup> in the last 5 years, but in 2018 had the high score with 311, which is also his highest score in

## TOP SCORES

**BOLD** = Plaque Winners  
\* = Certificate Winners  
Callsign is followed by Score

<p><b>Unlimited Class</b></p> <p><b>K2TQC</b> ..... <b>326</b></p> <p>OM3EY ..... 323</p> <p>PY5EG ..... 322</p> <p>R6YY ..... 321</p> <p>VE3VEE ..... 318</p> <p>K2ZJ ..... 318</p>	<p><b>Africa</b></p> <p><b>EA8AXT</b> ..... <b>307</b></p> <p>CT3MD ..... 261</p> <p>ZS2EZ ..... 228</p> <p>ZS6C ..... 224</p> <p>ZS6AI ..... 220</p>	<p><b>10 Meters</b></p> <p><b>PY2CP</b> ..... <b>131</b></p> <p>PY2TMV ..... 65</p> <p>ZY2G ..... 47</p> <p>PU2LEW ..... 45</p> <p>PU2XMY ..... 19</p>	<p>K7ZV ..... 161</p> <p>K4IQJ ..... 127</p>
<p><b>Limited Class</b></p> <p><b>EW7A</b> ..... <b>274</b></p> <p>W9RF ..... 265</p> <p>PY2SPW ..... 255</p> <p>HA0IV ..... 254</p> <p>PY1SX ..... 252</p>	<p><b>Asia</b></p> <p><b>JAØDAI</b> ..... <b>311</b></p> <p>TA4RC ..... 273</p> <p>A92GE ..... 270</p> <p>TA2LG ..... 261</p> <p>R9AB ..... 253</p>	<p><b>12 Meters</b></p> <p><b>WK3N</b> ..... <b>112</b></p>	<p><b>CW-Europe</b></p> <p>OK2PAY ..... 307</p> <p>DL6DH ..... 277</p> <p>PAØINA ..... 246</p>
<p><b>Formula Class - 100w</b></p> <p><b>K2JL</b> ..... <b>293</b></p> <p>TA4RC ..... 273</p> <p>HA7LJ ..... 261</p> <p>YV5OIE ..... 260</p> <p>TA1CM ..... 259</p>	<p><b>Europe</b></p> <p><b>OM3EY</b> ..... <b>323</b></p> <p>R6YY ..... 321</p> <p>PA3FQA ..... 312</p> <p>DL5AN ..... 310</p> <p>9A2AJ ..... 310</p>	<p><b>15 Meters</b></p> <p><b>PU2WSQ</b> ..... <b>226</b></p> <p>PU2WDF ..... 225</p> <p>PY2CX ..... 219</p> <p>PU5YSV ..... 176</p> <p>ZS6HON ..... 156</p>	<p><b>CW-North America</b></p> <p><b>K3MA</b> ..... <b>302</b></p> <p>W1NG ..... 300</p> <p>W4QN ..... 286</p> <p>W4JS ..... 268</p> <p>K6XT ..... 266</p>
<p><b>Formula Class - 5w</b></p> <p><b>OK2FD</b> ..... <b>262</b></p> <p>IV3AOL ..... 234</p> <p>K8ZT ..... 222</p> <p>W8QZA ..... 208</p> <p>KZ3I ..... 87</p>	<p><b>North America</b></p> <p>K2TQC ..... 326</p> <p>VE3VEE ..... 318</p> <p>K2ZJ ..... 318</p> <p>K9NU ..... 313</p> <p>W9ILY ..... 309</p>	<p><b>17 Meters</b></p> <p><b>EA1DR</b> ..... <b>287</b></p> <p>LY5M ..... 213</p>	<p><b>Zones</b></p> <p>KL7KK* ..... 228</p> <p>WO7R* ..... 302</p> <p>VE3VEE ..... 318</p> <p>K2TQC ..... 326</p> <p>CO2QU* ..... 190</p> <p>HK3W* ..... 268</p> <p>HC5VF* ..... 157</p> <p>PY5EG ..... 322</p> <p>CE7KF* ..... 160</p> <p>LU5HA* ..... 222</p> <p>PA3FQA* ..... 312</p> <p>OM3EY ..... 323</p> <p>R6YY* ..... 321</p> <p>R9AB* ..... 253</p> <p>YO3APJ* ..... 273</p> <p>A92GE* ..... 270</p> <p>VU2IBI ..... 211</p> <p>BV1EK* ..... 235</p> <p>JAØDAI ..... 311</p> <p>4F3OM* ..... 190</p> <p>YB5QZ* ..... 303</p> <p>VK6DW* ..... 192</p> <p>VK3GA ..... 313</p> <p>ZL2IFB* ..... 300</p> <p>EA8AXT ..... 307</p> <p>ZS2EZ* ..... 228</p> <p>TF3DC* ..... 194</p>
<p><b>CW</b></p> <p><b>OK2PAY</b> ..... <b>307</b></p> <p>K3MA ..... 302</p> <p>W1NG ..... 300</p> <p>W4QN ..... 286</p> <p>DL6DH ..... 277</p>	<p><b>Oceania</b></p> <p><b>VK3GA</b> ..... <b>313</b></p> <p>YB5QZ ..... 303</p> <p>ZL2IFB ..... 300</p> <p>VK3BDX ..... 271</p> <p>VK3SIM ..... 267</p>	<p><b>20 Meters</b></p> <p><b>VE3VEE</b> ..... <b>318</b></p> <p>CX3AL ..... 217</p> <p>K3HW ..... 169</p> <p>PP7DX ..... 152</p> <p>K2RK ..... 141</p>	<p><b>30 Meters</b></p> <p><b>PY2ADR</b> ..... <b>252</b></p> <p>PY2XO ..... 220</p> <p>PY2LCD ..... 214</p> <p>W1JR ..... 206</p> <p>K6FW ..... 122</p>
<p><b>Phone</b></p> <p><b>IPY6BA</b> ..... <b>300</b></p> <p>PA2LO ..... 269</p> <p>EA5HRV ..... 246</p> <p>W4HY ..... 246</p> <p>KL7KK ..... 228</p>	<p><b>South America</b></p> <p><b>PY5EG</b> ..... <b>322</b></p> <p>PY6BA ..... 300</p> <p>PR8ZX ..... 298</p> <p>PY5DK ..... 298</p> <p>PY7DJ ..... 293</p>	<p><b>40 Meters</b></p> <p><b>W9KNI</b> ..... <b>297</b></p> <p>9A2EU ..... 268</p> <p>PP5JR ..... 228</p> <p>K9CJ ..... 216</p> <p>CM2RSV ..... 163</p>	<p><b>80 Meters</b></p> <p><b>N3QE</b> ..... <b>188</b></p> <p>PY5XH ..... 76</p>
<p><b>Digital</b></p> <p><b>OM5XX</b> ..... <b>300</b></p> <p>IK5FKF ..... 270</p>	<p><b>6 Meters</b></p> <p>I4EAT* ..... 147</p> <p>IW2CAM ..... 92</p>	<p><b>160 Meters</b></p> <p>W1TC* ..... 182</p>	<p>Note: Top scorers in some zones received Plaques or Country Certificates.</p>



the last 5 years. The battle for the Europe's top score is always close but, once again, OM3EY came out on top with a score of 323 followed closely by R6YY with 321. Their scores are almost identical to last year's and we congratulate both on their continued excellent results in the DX Marathon. In Oceania, VK3GA managed to improve on his 2017 winning score to once take top honors with a score of 313. YB5QZ and ZL2IFB were close behind in 2<sup>nd</sup> and 3<sup>rd</sup>, respectively. No North America plaque is awarded as Bill, K2TQC, already took overall worldwide honors. Oms, PY5EG, one of the top winners since the beginning of the DX Marathon, took home top South America honors with a score of 322.

About 10% of DX Marathon participants submit single-band scores each year and 2018 was no different. For the 2018 single-band competitions, there were only six entries for 10-meters, all from Brazil. The 10-meter plaque was won by PY2CP with an amazing top score of 131 points — higher than 2017's 10-meter winning score. WK3N once again took top honors for 12 meters with a score of 112. We had some



*John, OM5XX, has been very active since he retired and is a DX Marathon multiple plaque winner. He is shown here with his 2015 Limited Class plaque and his 2017 Digital plaque. Very soon he will add the 2018 Digital plaque to his collection.*



*Shin-ichi, JAØDAI, is a retired engineer and an active DX Marathon participant who credits the Marathon with keeping him active on the air every day. He has a large array of antennas — clearly helping him to win the 2018 plaque for top Asia score.*

## CLUB SCORES

Club	Score
CDR GROUP	14,609
Rio DX Group	4,564
Northern Illinois DX Association	4,425
Araucaria DX Group	3,819
Mother Lode DX/Contest Club	2,831
Carolina DX Association	2,811
Willamette Valley DX Club	2,086
East Tennessee DX Association	1,985
Metro DX Club	1,826
YB Land DX Club	1,645
Yankee Clipper Contest Club	1,534
Salt City DX Association	1,315
Radio Club Venezolano	1,044
NERG	979
Society of Midwest Contesters	901
Bahia Dx Group	875
CMDXGroup	864
Potomac Valley Radio Club	844
Lone Star DX Association	791
Central Arizona DX Association	763
ARI	652
Florida Contest Group	632
VU Contest Group	608
Croatian Contest Club	578
Southern California DX Club	573
Bavarian Contest Club	566
Arizona Outlaws Contest Club	528
Vytautas Magnus Univ Radio Club	492
Rhein Ruhr DX Association	435
GITRAD	429
Frankford Radio Club	421
LUCG	390
CABREUVA DX	375
Regionalis Radios Sportklub Puspokladany	363
GDXC	353
North Eastern Radio Group	337
Belarus Contest Club	309
CWOPS	307
GPDx	301
CDXC	300
São Paulo Contest Group	297
Northeast Wisconsin DX Association	292
INDIO'S DX TEAM	287
USKA	286
REDXA	282
599 DX Group	275
DDXG	275
TEAMPAPA	273
YO DX Club	273
Grand Mesa Contesters of Colorado	266
HA-DX-CLUB	264
Secunda Amateur Radio Club	264
Panhandle DX and Contest Club	257
Central California DX Club	251
Western WA DX Club	251
Maritime Contest Club	249
Cantareira DX Group	248
599 DX Association	243
GADx	237
Ham Society Of the Philippines	231
Chilean Pacific DX Group	226
Mile High DX Association	222
Milford Ohio Amateur Radio Club	222
North Coast Contest Club	222
EA CONTEST CLUB	216
CDXA	213
Southern California Contest Club	208
Nixa Amateur Radio Club	206
NCCC	205
Southwest OH DX Association	202
Sunday Creek Amateur Radio Federation	202
RL Luxembourg	198
RZS Amateur Radio Club	196
DX3H	190
Utah DX Association	189
CAPE FEAR AM RADIO SOC	187
WACOM	182
lu7dzl rc miramar	172
CARL, Inc	168
Shude High School Amateur Radio Club	168
USA	164
Kentucky Contest Group	159
AZUAY RADIO CLUB	157
Magalies Radio Amateur Klub	156
SPDXA	145
Clark County Amateur Radio Club	139
Tennessee Contest Group	130
ACG	127
Federacion de Radioaficionados de Cuba	116
Harwell ARS	116
Northern California Contest Club	112
RadioSport Manitoba	104
First State Amateur Radio Club	71



very intense competition on the 15-meter band, but PU2WSQ came out on top with an impressive 226 points and PU2WDF followed in second place with 225 points. Seventeen meters proved to be a good DX band with Oscar, EA1DR, winning the top spot with an amazing score of 287. VE3VEE was once again the king of 20 meters with the very good score of 318. Twenty meters was definitely the hot band of 2018, as Marvin's 20-meter only score put him in a tie for 5<sup>th</sup> place overall worldwide. PY2ADR took top honors on 30 meters with a high score of 252. It was nice to see so many 30-meter submissions in 2018. Bob, W9KNI, continued his winning ways with the high 40-meter score of 297, slightly below 2017's winning score, but all his QSOs were phone or CW — no FT8. The 80-meter plaque was won by N3QE with a score of 188. Congratulations to all of the single-band plaque winners. The top 160-meter score of 182 will earn W1TC a nice certificate for taking top honors on the top band. Once again, I4EAT was king of 6 meters with his score of 147, which is higher than the top 10- and 12-meter scores and 9 points higher than his 2017 winning 6-meter score.

In 2017, we awarded 106 DX Marathon certificates in various categories, including the top continental score for each of the three modes, top score in each country, top score in each CQ zone, top score in each Canadian call district plus the top score in each U.S. call area for each of the four DX Marathon classes. For 2018, we added certificates for the top single-mode score in the U.S. The detailed listings showing all certificate winners are available on the DX Marathon and CQ websites. Congratulations to all the 2018 certificate winners.

Although propagation was down in 2018, there were 22 new DX Marathon records set by participants. New records

## TOP SCORES: CONTINENTAL MODE, USA & CANADA AREA

Phone				
TC5OCK*	65	W4	K4IE*	127
PA2LO*	269	W5	K5DC*	209
W4HY*	246	W6	N5YJZ*	83
YB1AR*	177	W7	N7RD*	155
PY6BA	300	W8	WT8E*	170
		W9	W9RF*	227

CW	
EA8KC*	216
ZL1BBW*	199
PY4HO*	265

Digital	
ZS6AI*	220
VU2IBI*	211
OM5XX	300
K7MTR*	248
YBØEIN*	220
PY2APK*	240

USA Unlimited		
W1	W1NG*	300
W2	K2TQC	326
W3	K3RA*	305
W4	K5EK*	308
W5	W5IF*	299
W6	N6JV*	300
W7	WO7R	302
W8	K8AJS*	275
W9	K9NU*	313
WØ	K6XT*	266

USA Limited		
W1	KI1U*	141
W3	WA3WZR*	152

USA Formula 100W		
W1	K1RI*	219
W2	K2JL	253
W3	K2RK*	115
W4	N4KW*	153
W5	G5THG*	170
W6	K6LE*	112
W7	N7UVH*	110
W9	N9LJX*	158
WØ	AD1C*	184

USA Formula 5W		
W3	KZ3I*	87
W4	K4AR*	44
W6	W8QZA*	208
W8	K8ZT*	222

Canada		
VE1	VE1OP*	249
VE2	VE2BR*	271
VE3	VE3VEE	318
VE4	VE4HAZ*	104
VE5	VE5UA*	253
VA7	VA7CRZ*	214
VE9	VE9VIC*	164

\* Certificate Winners

## what's new

### PreciseRF's New Loop Antenna System

In the spirit of our Take it to the Field special edition, preciseRF has introduced a new loop antenna system for your outdoor radio adventures or for your home QTH. Consisting of a new all-weather version of its HG-1 loop antenna for the 80- to 10-meter amateur bands, a new AR-1 antenna rotor, and a new HG-1 WR weather-resistant remote tuner controlled by a new HG-2 controller, the new all-weather magnetic loop antenna system was designed with field work in mind.

PreciseRF's new HG-1 WR PreciseLOOP antenna works on the 80- to 10-meter bands with a maximum output of 45 watts PEP (10 watts PEP for 80 meters) and is a low-loss design featuring a low-ESR capacitor.

The new AR-1 rotator is intended to work with the full line of preciseRF antennas, Buddipole™, and similar lightweight directional antennas. It can be mounted using a camera-type tripod or regular antenna tripods such as the Buddipole™ tripod. It will work from 9- to 12-volts DC or an internal battery.

Tuning the HG-1 WR PreciseLOOP is the HG-1 WR weather-resistant tuner, which is intended for permanent outdoor deployment of a magnetic loop antenna. It uses the LMR600 radiation loop which is identical to that in the company's HG-1 magnetic loop antennas. It will tune the 40- through 10-meter



ham bands at 45 watts PEP max and optionally, 80-60 meter ham bands at 10 watts PEP.

The new HG-2 remote controller remotely controls the tuner and sends commands to the AR-1 rotor. It also replaces the existing HG-1 remote tuner controller. It will work from an internal battery or 9- to 12-volts DC.

At presstime, preciseRF had not yet announced a release date or pricing. For more information, contact, preciseRF, 13690 Wisteria Drive, NE, Aurora, OR 97002. Phone: (503) 915-2490. Website: <www.preciserf.com>.



included 11 new country records, six new continental mode records, two Formula Class 5-watt option records plus new records for highest 6-meter, club competition, and Zone 10. Even with reduced conditions, breaking records is still very possible.

In the popular club competition, the CDR Group in Brazil again took top honors while setting a new club score record. The battle for second place was very close, with the Rio DX Group beating the Northern Illinois DX Association by only 130 points. NIDXA is the sponsor of the top three DX Marathon plaques. Don't forget to include your club name on your 2019 DX Marathon submission.

### Error Rates Drop

Each year the DX Marathon website publishes a large amount of information to help participants minimize errors in their submissions. The Helpful Hints page can be accessed from the DX Marathon home page. In 2018, we published approximately 1,500 callsign exceptions and notes to help every participant reduce the number of errors in their submissions. We also recommend that you regularly update your logging program callsign database if it has one. Unusual callsign prefixes seem to multiply every year, so updating your program's database is critical to properly determining the DX location and/or Zone.

In 2018, the number of participants with no errors was about the same as 2017 — 22%, but we did see a significant drop in the overall QSO error rate to 1.7% — the lowest ever recorded in the DX Marathon since electronic scoring was initiated. Perhaps more participants are using the information we provide on the DX Marathon website, plus there is less chance of callsign errors when operating on FT8. The highest error category in 2018 was wrong coun-

try, which accounted for nearly 29% of all score reductions. There were many unique callsigns used in 2018, so it is critical to review your DX Marathon submission carefully.

The second highest error category was wrong zone at 27%. Confusion with U.S. zones is one of the biggest sources of zone errors. It is very important to note that U.S. callsign numbers are no longer required to match their QTH. A W6 could be in New York, or a KL7 could

### COUNTRY WINNERS

Callsign is followed by score		GI4DOH*.....240	PJ7AA*.....120
* = Certificate Winners		GUØSUP*.....155	PYØFW*.....96
4F3OM.....190	GW4EVX*.....139	PY5EG.....322	R6YY.....321
7Z1SJ*.....207	HAØHW*.....264	R9AB.....253	SQ8N*.....306
9A2AJ*.....310	HB9BYQ*.....286	SV9COL*.....161	TA1CM*.....259
9H3HZ*.....116	HC5VF.....157	TA4RC*.....273	TF3DC.....194
A92GE.....270	HK3W.....268	VE3VEE.....318	VK3GA.....313
BI8CKU*.....168	IZ5CML*.....288	VU2IBI.....211	YB5QZ.....303
BV1EK.....235	JAØDAI.....311	YO3APJ.....273	YU1WAT*.....169
CE7KF.....160	K2TQC.....326	YV5OIE*.....260	Z68HZ*.....160
CO2QU.....190	KL7KK.....228	ZL2IFB.....300	ZS2EZ.....228
CT1IUA*.....301	LU5HA.....222		
CT3MD*.....261	LX1NO*.....223		
CX3AL*.....217	LY2MM*.....258		
DL5AN*.....310	MØNKR*.....306		
DP1POL*.....148	OD5YA*.....248		
EA1DR.....287	OE1SGU*.....289		
EA8AXT.....307	OH2BLD*.....303		
EI7CC*.....237	OK2PAY.....307		
ES4RLH*.....210	OM3EY.....323		
EV1R*.....309	ON6SAT*.....242		
F4ESV*.....303	OZ7YY*.....275		
FS/W9MK*.....116	PA3FQA.....312		
	PJ2/W9VA*.....72		

Note: Top scorers in some countries received plaques.

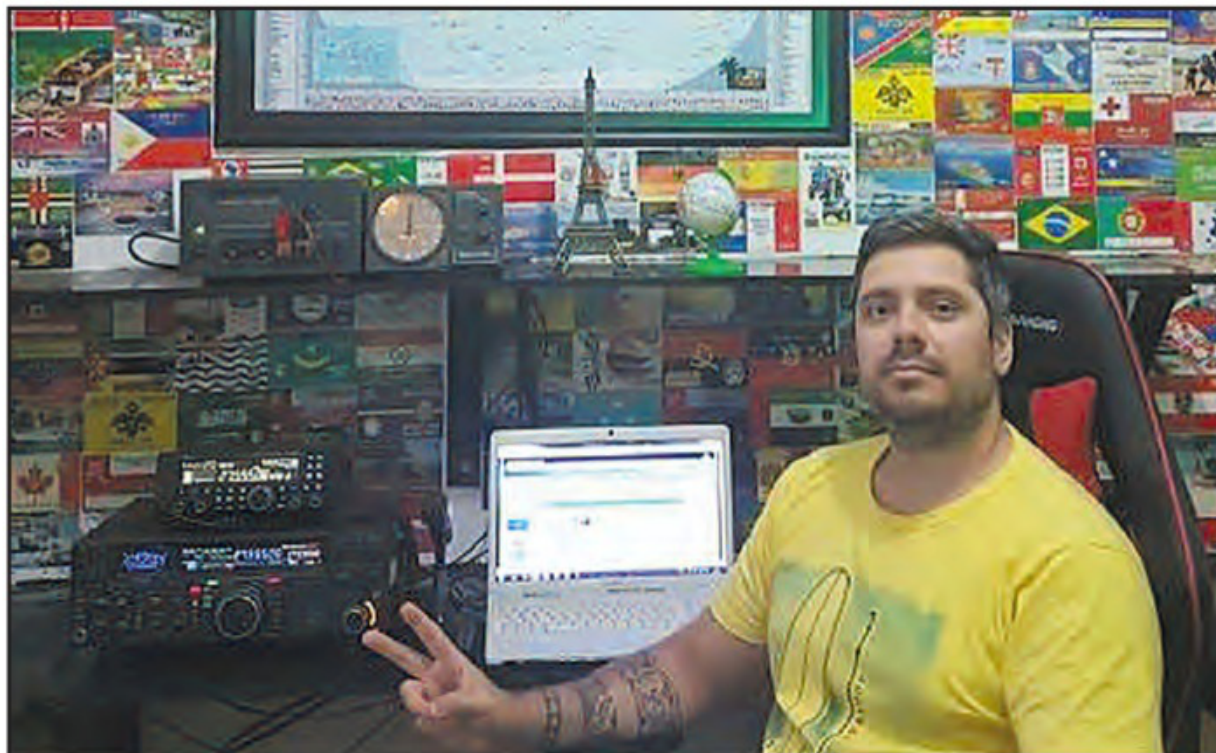


Fabricio, PU2WSQ, is active on all modes and primarily operates the 10-, 12-, 15-meter bands from his QTH in Sao Paulo, Brazil. He is shown holding the plaque for top 15-meter score in 2017.



Vassilis, SV1CNS, is shown here holding his 2017 plaque for winning Formula Class, 100-watt option. Vassilis has been a very active DXer for many years with a multitude of DX awards.





Bruno, PY6BA, has been an active ham since 1994, primarily chasing DX with some nice antennas. He clearly worked hard in 2018 as he had the top phone score and will soon have a DX Marathon plaque in his shack.

be in Puerto Rico. In addition to the U.S., there are many special call signs in Russia that do not follow the traditional call sign mapping, thus creating many errors in zones 16, 17, 18, and 19. Zone 2 also continues to be a problem. Very few VE2 stations are actually located in Zone 2 — most are in Zone 5. The DX Marathon website does list the most active Zone 2 stations.

Invalid call signs and Busted Calls were the next highest error categories. Unfortunately, the number of bad and incorrect DX Spots seems to be on the increase. We also saw an increase in the number of pirates active on the bands. When logging a QSO from a DX spot, listen carefully to the DX station to make sure the call sign is logged correctly, 40% of all point subtractions

were due to busted or incorrect call signs. Some invalid call signs may have been busted calls that were so bad that we could not determine the real call sign. Once again, there were many mix-ups between “0” (Zero) and “O” (Oh). The computer is not forgiving, so check your log carefully.

There are also mix-ups in dates, with different parts of the world using different date formats. The database that is used for scoring the DX Marathon includes start and end dates for all major expeditions, so please ensure that dates and times are properly logged along with the call sign, country, and zone for each QSO. Not-in-log reductions dropped significantly from 2017. With more logs being posted online, it is easy to check if you are in the log before entering that QSO in the DX Marathon. We do publish a lot of helpful information on the DX Marathon website, but there is nothing we can do to make sure you are in the log.

As part of this issue you will find a complete listing of all scores plus a listing of the top scores in all available categories. The DX Marathon website will include additional information and details on the 2018 results plus photos of plaque winners as they become available. For any questions or comments about the DX Marathon, please contact the author. Thank you for your participation in 2018 and best of luck in 2019!

## Results 2018 CQ DX Marathon

UNLIMITED CLASS															
Call sign	Countries	Zones	Score												
K2TQC	286	40	326	OM5XX	260	40	300	AA4SC	233	40	273	PY2AE	213	40	253
OM3EY	283	40	323	ZL2IFB	261	39	300	YO3APJ	235	38	273	KZ2I	214	38	252
PY5EG	282	40	322	W5IF	259	40	299	VE3UTT	234	39	273	W90A/9	213	39	252
R6YY	281	40	321	PR8ZX	258	40	298	VE2BR	232	39	271	PY2ADR	212	40	252
VE3VEE	278	40	318	PY5DK	262	36	298	VK3BDX	232	39	271	W7YAQ	212	39	251
K2ZJ	278	40	318	W9KNI	257	40	297	A92GE	231	39	270	WA5VGI	212	39	251
VK3GA	273	40	313	OH4UI	259	38	297	IK5FKF	231	39	270	W7CD	213	38	251
K9NU	273	40	313	K5BG	255	40	295	PA2LO	231	38	269	VE10P	210	39	249
PA3FQA	272	40	312	K9NB	255	40	295	9A2EU	228	40	268	W9ZCL	212	37	249
JA0DAI	271	40	311	N6WT	254	40	294	W4JS	229	39	268	K9MK	209	40	249
DL5AN	270	40	310	PY7DJ	254	39	293	HK3W	231	37	268	KA6BIM	209	39	248
9A2AJ	270	40	310	AA9A	253	39	292	VK3SIM	227	40	267	OD5YA	208	40	248
EV1R	269	40	309	DL1NKS	252	37	289	OZ2ABI	227	39	266	K7MTR	208	40	248
W9ILY	269	40	309	OE1SGU	249	40	289	K6XT	227	39	266	EA5HRV	211	35	246
K5EK	268	40	308	IZ5CML	250	38	288	PY4HO	225	40	265	W4HY	207	39	246
OK2PAY	267	40	307	DJ9ZB	247	40	287	K6YK	226	38	264	PA0INA	209	37	246
EA8AXT	268	39	307	EA1DR	247	40	287	HA0HW	225	39	264	PY4OY	206	39	245
M0NKR	267	39	306	W6OU	248	39	287	OZ1HX	223	40	263	CT1ILT	204	39	243
SQ8N	266	40	306	W4QN	246	40	286	OE4VIE	223	39	262	W6XK	204	39	243
K3RA	265	40	305	HB9BYQ	248	38	286	CT3MD	224	37	261	WS1L	205	38	243
OK2SG	263	40	303	W0RIC	245	38	283	TA2LG	238	23	261	ON6SAT	206	36	242
N2BJ	264	39	303	KC6AWX	242	40	282	RZ10A	221	39	260	K9RR	204	37	241
OH2BLD	263	40	303	K1PTF	241	40	281	LY2MM	219	39	258	VE3ZZ	205	36	241
YB5QZ	263	40	303	PY2COY	241	39	280	VK3VT	218	39	257	VK3AWG	202	39	241
F4ESV	263	40	303	N4EFS	242	38	280	N5ZC	217	40	257	SQ3MZM	205	36	241
K3MA	262	40	302	N6RV	240	39	279	ND9G	216	40	256	GI4DOH	201	39	240
W07R	262	40	302	NI3P	238	40	278	WS7L	216	39	255	PY2APK	200	40	240
CT1IUA	261	40	301	W9MK	238	40	278	YF9CDL	220	35	255	N4MIK	201	38	239
N6JV	261	39	300	DL6DH	237	40	277	VK2CA	215	39	254	K9ARZ	208	31	239
PY6BA	262	38	300	PY6TS	238	38	276	WX6V	215	39	254	W1AJT	201	38	239
W1NG	260	40	300	OZ7YY	235	40	275	W7WM	214	40	254	WA4JQS	200	38	238
				K8AJS	235	40	275	VE5UA	214	39	253	NJ6G	199	39	238
				NU8Z	234	40	274	R9AB	215	38	253	EI7CC	198	39	237



PY2KP	199	38	237	W5ZO	151	35	186	PY2MP	106	29	135	PY4JW	40	19	59
PY2DMZ	199	37	236	VU2DED	153	33	186	PU2NAX	106	27	133	PR2IL	39	19	58
K2UF	203	33	236	PY2ZZ	153	32	185	PY5II	102	31	133	PY2ZA	41	17	58
BV1EK	196	39	235	W1HS	153	29	182	PP2CC	106	26	132	PY8ABH	41	16	57
LY2FN	195	39	234	W1TC	149	33	182	PY2CP	109	22	131	PP8FA	41	16	57
K9KE	193	39	232	PY2CAT	145	37	182	K9UQN	104	27	131	PY5BK	34	22	56
KY7M	194	38	232	PY2GTA	149	32	181	PU4GOD	105	26	131	W6LP	36	20	56
K8YC	197	34	231	PY2UD	146	35	181	PY2TWI	101	30	131	W7SLS	35	20	55
WD9DZV	195	36	231	PY2GZ	146	35	181	WB5WAJ	103	27	130	PU5BOY	40	15	55
W4HG	192	38	230	VK4CC	146	34	180	PY2XZ	99	31	130	KU4NY	39	15	54
W6OAT	190	39	229	N9AKR	143	37	180	AE4WG	105	25	130	PS1S	37	15	52
KL7KK	189	39	228	N7US	142	35	177	W9VA	100	28	128	PY2VOA	35	17	52
ZS2EZ	189	39	228	YB1AR	143	34	177	K6SZQ	95	32	127	ZY2G	31	16	47
PP5JR	189	39	228	K6UM	142	35	177	K4IQJ	99	28	127	PY1SGT	33	13	46
N4PQX	190	38	228	AF6SA	143	34	177	PY1FI	98	28	126	PU2LEW	33	12	45
W3GQ	189	37	226	PS8MT	141	36	177	W6DCC	96	29	125	PU8RJI	29	14	43
KC1BB	188	38	226	KT7E	141	35	176	W9XS	99	26	125	PY2UGO	27	16	43
ZS6C	185	39	224	PU2KNM	144	32	176	CT1AHU	96	27	123	ZV4SL	25	15	40
OD5ZZ	187	36	223	PU8RFL	144	31	175	K6FW	92	30	122	PY2ANY	19	13	32
LX1NO	185	38	223	PR8MET	142	33	175	DL7JAN	94	28	122	K8EJ	16	12	28
NC6R	184	39	223	CT3HF	137	38	175	N9MS	93	28	121	PY2LCM	18	10	28
K8PK	190	32	222	N9LAH	140	35	175	PY2CM	90	30	120	PY2BK	20	7	27
ZS6AI	181	39	220	YE1AR	141	34	175	PU2UAF	99	20	119	PR2CI	12	10	22
YBØEIN	181	39	220	WA3DQS	143	32	175	K9RHY	88	30	118	PU8MGB	13	8	21
PY2CX	183	36	219	PY2RTB	141	33	174	PY2KG	89	28	117	KE4OJI	13	7	20
W8AV	181	37	218	W9JJB	143	31	174	PY2CN	88	29	117	PQ2HX	12	8	20
WXØZ	183	35	218	PY2GIG	137	37	174	N9JV	87	29	116	KI6YYT	5	6	11
PS2T	177	40	217	IK2HTY	135	35	170	FS/W9MK	90	26	116	PU1LMN	5	5	10
EA8KC	182	34	216	YU1WAT	138	31	169	PY9MT	86	29	115	ZW1F	4	3	7
K9CJ	179	37	216	LU6UBM	133	35	168	PT2ARR	87	27	114	PY2XDX	3	3	6
K9QVB	177	38	215	PY2LPM	134	33	167	TA4MA	88	25	113				
VA7CRZ	178	36	214	NE8P	136	31	167	PU2UGO	85	27	112				
WA9LEY	180	34	214	W3MR	133	32	165	WK3N	91	21	112				
PY2LCD	175	39	214	WC3W	132	32	164	W4UW	87	24	111				
VK3GK	176	38	214	CT7AKW	132	32	164	PU8MRS	86	24	110				
PY2TUA	178	35	213	PY5HT	131	33	164	N9EP	83	27	110				
W4AG	184	29	213	PU2YFR	132	32	164	PY2TTE	81	28	109				
LY5M	177	36	213	PY1GB	128	35	163	PY1CDR	76	30	106				
PC3T	174	38	212	PY2NFT	132	31	163	PY2CAZ	79	25	104				
PY2XV	176	36	212	PQ5B	126	35	161	K9ANN	82	21	103				
PY1ZV	177	35	212	SV9COL	130	31	161	PP5BZ	78	24	102				
VU2IBI	173	38	211	K7ZV	127	34	161	PY2EMI	76	26	102				
PY2NF	174	34	208	Z68HZ	128	32	160	AF4T	75	26	101				
7Z1SJ	168	39	207	W7RM	123	37	160	PT9IR	74	27	101				
PY2WND	172	35	207	PY2RF	128	32	160	PY2VH	75	25	100				
W9OA	171	36	207	CE7KF	130	30	160	FS/K9EL	75	23	98				
WAØJZK	171	35	206	NUØC	126	34	160	K7EMI	70	28	98				
W1JR	171	35	206	NV4A	132	28	160	PYØFW	70	26	96				
K1ESE	174	32	206	PY4AZ	130	29	159	PY2SEI	74	19	93				
PR7AB	171	35	206	K1SND	127	31	158	PY5FB	69	23	92				
N3RC	167	38	205	K2PO	121	36	157	IW2CAM	77	15	92				
K9MM	165	40	205	ZS6HON	125	31	156	PU2MBO	67	25	92				
PP1WW	171	34	205	W1RH	123	32	155	PY2ABN	64	25	89				
PY2OKB	170	35	205	LU1DLA	117	38	155	FS/K9NU	68	21	89				
PY2VA	171	33	204	W6RKC	121	33	154	PU2WDX	69	20	89				
NIØC	165	38	203	PY2XL	124	30	154	PY1NS	68	21	89				
AJ8B	168	34	202	PY7BR	124	28	152	PU1KDX	64	23	87				
W6UB	165	37	202	W6RC	122	30	152	FS/W9ILY	66	18	84				
K9JU	168	34	202	PY4ARS	124	27	151	PU9ATH	61	22	83				
ZW5B	161	39	200	N3CDA	123	26	149	PT8CW	61	20	81				
ZL1BBW	162	37	199	KU1CW	115	34	149	PR8KW	64	17	81				
W1NK	166	33	199	DP1POL	111	37	148	PY2AP	60	19	79				
AK6A	163	36	199	I4EAT	121	26	147	PU1MIL	54	23	77				
W4CU	166	31	197	PY2VM	112	34	146	PY5XH	55	21	76				
PY2XC	162	35	197	K7VIT	112	34	146	W4TO	56	20	76				
PY4EP	159	37	196	PY3TX	113	31	144	PY4ME	57	19	76				
WB2NVR	161	35	196	ON6NA	113	30	143	PU9QJZ	53	22	75				
W1EBI	161	34	195	K6DN	116	27	143	PY2OAL	56	19	75				
TF3DC	163	31	194	PY2SR	109	34	143	TC630MECCA	60	14	74				
JN3SAC	156	38	194	PT4B	112	30	142	PJ2/W9VA	53	19	72				
W3OA	158	35	193	AJ4HW	132	10	142	PV2B	54	18	72				
PY2BEK	187	6	193	PY4LH	118	24	142	PT9BM	53	15	68				
VK6DW	159	33	192	PU2MVE	111	31	142	PY2KEY	49	19	68				
PR2D	155	36	191	TA4ABG	111	29	140	ZW2MT	47	20	67				
PP1CZ	155	35	190	WE6Z	108	32	140	VK3BNR	47	19	66				
4F3OM	153	37	190	PY2ZEA	108	31	139	CE3JRI	47	19	66				
WT2P	155	34	189	GW4EVX	114	25	139	TC5OCK	53	12	65				
AK7O	153	36	189	K1GU	107	31	138	PY2TMV	49	16	65				
PY2DPM	152	36	188	PY2RKG	109	28	137	WB6BET	44	21	65				
N3QE	156	32	188	KK7PR	105	31	136	PU9DCB	51	13	64				
N4ANV	158	29	187	WM4AA	111	25	136	ZW2F	44	20	64				
PY1FR	150	37	187	PR2CDR	105	30	135	PY2KS	38	22	60				

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Callsign	Countries	Zones	Score
EW7A	235	39	274
W9RF	227	38	265
PY2SPW	220	35	255
HAØIV	217	37	254
PY1SX	213	39	252
IK2RPE	208	40	248
PY2RJ	212	36	248
K5DC	209	38	247
TA4SO	208	38	246
PY2MSR	197	39	236
PP5XA	197	39	236
PP5AM	197	37	234
PU2WSQ	192	34	226
PU2WDF	194	31	225
LU5HA	187	35	222
YV6BXN	187	34	221
PY2XO	183	37	220
YV5EN	182	37	219
N9TF	181	37	218
CT7AQS	174	37	211
VU2AE	175	36	211
SP3AM	175	35	210
TA2LP	169	38	207
TA5FA	165	37	202
WT8E	170	32	202
PU2RTO	167	34	201
LX1TI	161	37	198
G4AYU	160	32	192
N7RD	155	35	190
K9QVB/9	150	35	185
PY4ZO	149	35	184
PY1AX	149	34	183
WA3WZR	152	30	182
PU5KGB	144	36	180
PY5IP	147	31	178
LW5DR	138	34	172
KI1U	141	30	171
SP5CGN	138	32	170
K3HW	138	31	169
PP5TG	139	30	169
PT7ZT	136	31	167
YC6JRT	129	37	166
PU2STZ	134	31	165
YDØSDD	131	33	164
SP3BGD	124	38	162
AF5CC	130	30	160
K4IE	127	32	159
TA3AER	123	35	158
HC5VF	127	30	157







Back in the 1860s, “taking it to the field” to provide communications had a whole different meaning than it does today. But it’s an important part of telecommunications history and besides, if you’re a key collector, you just might own one of this Civil War telegrapher’s products!

## Jesse Bunnell – Civil War Telegrapher

BY MICHAEL HUDGENS,\* W6YQ

Soon after Confederate forces fired the first shots of the Civil War in April 1861, when they attacked Fort Sumter, 17-year-old Jesse H. Bunnell joined up with the Union Military Telegraph Service. He and his young counterparts were civilians, underpaid at \$60 a month and constantly in harm’s way, dodging, in Union Army parlance, “doses of hot lead.” Even so, peril came with the job: Getting the message through, sometimes from the Commander-in-Chief himself to his generals on the battlefield.

Jesse was born in Ohio a year before Samuel F. B. Morse in 1843 successfully sent the first telegraph message from the Supreme Court chambers in Washington, DC, to his assistant in Baltimore, Maryland. “*What Hath God Wrought*,” it read — words that could apply to Jesse’s life and what he had seen.

At age 11 he was delivering telegraph messages and two years later had become a skilled telegraph operator (Photo A), working at offices in Ohio, Pennsylvania, and West Virginia. At age 17, he was copying American Morse at 32 words a minute, and two of his finest hours came when he received and forwarded President James Buchanan’s final message to Congress.

In the Union Military Telegraph Service, Jesse and his fellow telegraphers were on the ground rather than on the back of a horse, and the ground they trod was treacherous, strewn with land mines that soldiers called “torpedoes.” Everywhere “brackish water” flowed, and “flyblown meat” was an even greater threat. Rotting meat in the early stages was not always identifiable, and when cooked up, the smell of it could be tempting. But eating the stuff could lead to food poisoning and, at worst, a painful death.

Jesse’s best hope? A kindhearted “old hand” who would share a scrap of “salt horse” (beef) or “salt junk” (pork). Much of the time, Jesse and his fellow telegraphers lived on morsels.

Nevertheless, they were proud to be working for the President himself, a dedicated user of the telegraph. Abraham Lincoln had followed the progress of the new invention since the first experiments of the 1830s, and from his earlier vantage as a railroad lawyer, he had seen the power of the telegraph as its lines were raised to link up the growing nation. New technology and the latest inventions had always held a fascination for Lincoln, and he is the only American president to hold a patent, a device to assist river-



Photo A. Jesse Bunnell, about age 13, at right. The woman and dog are not identified. (All photos courtesy J. H. Bunnell & Co., used by permission)



Photo B. “Under canvas.” Over the din of battle, the unidentified telegrapher, at right, could hear the clickety-clack of the sounder inside the wooden transit case at his feet.

\*5875 Timberline Road  
Rapid City, SD 57702



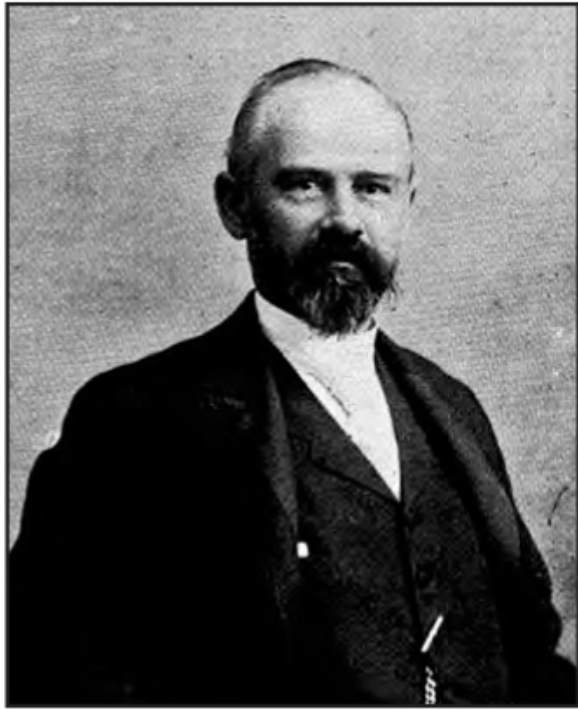


Photo C. J.H.  
"Jesse" Bunnell,  
about 1879.



Photo D. When Bunnell opened his own business, the company name was stamped onto his telegraph keys and sounders.

boats in crossing sandbars. Much of his background in technology is described in the book, *Lincoln in the Telegraph Office*, by David Homer Bates, one of four young employees of the Pennsylvania Railroad who, like Jesse, joined government service as a telegrapher after the attack on Fort Sumter.

The President had an exceptional teacher, Charles Tinker, who happened to be one of his own telegraphers. From Tinker, Lincoln learned the workings of the entire apparatus, from its electrical coils and batteries to the sounder, which could dominate a room with its clickety-clacking, and finally to the key itself, with a horizontal lever at the base to switch open the line and an arched arm above with a knob at one end, manipulated by thumb and third finger to create the signals, impacts of long and short duration that closed the circuit to make letters and words. Hearing these sounds as often as he did, Lincoln must have recognized certain letters — a long dash for the *L*, a short dash for *T*. Hearing words was not likely, though, because the texts he wrote and handed to the operator would have been scrambled before being sent to their destination at high speeds.

American Morse code was in widespread use by landline companies. Years later, when the new International (also called Continental) Morse appeared, telegraphers correctly claimed that American Morse was faster (slightly). After the sinking of the *Titanic* resulted in the wireless mandate for oceangoing vessels, many shipboard radio operators had to use both versions because American Morse was still standard on the U.S. coasts and the Great Lakes.

Today, American Morse has almost gone silent. Railroads, the last users, now rely on voice communication, and about the only time the old code can be heard is in Civil War reenactments. A few practitioners are still around, and they consider American Morse "a thing of beauty, a work of art." For them, the "tune sung out" on the sounder beside them "outranks the most precisely tuned aircraft engine in terms of sheer beauty."<sup>1</sup>

After his election as president, Lincoln liked spending time in a War Department telegraph office near the White House. Besides the solitude the place gave him, he could communicate with his generals on the battlefields. It was the first time the nation's commander had this ability, and it changed Lincoln's style of command and ultimately the face of the war.

Many of his telegrams can be found today in the National Archives.<sup>2</sup> The terse style is usually recognizable:

*Executive Mansion Washington, March 19, 1865*

*Major General Pope, St. Louis, Mo.*

*Understanding that the plan of action for Missouri contained in your letter to the governor of that State, and your other letter to me, is concurred in by the governor, it is approved by me, and you will be sustained in proceeding upon it. \_A. Lincoln*

Some messages are routine, while many others are intended to save lives:

- Lincoln begs Sherman to try to help the people of Nashville and north
- Lincoln inquired to see if a POW was executed, and if he wasn't, to suspend execution at Ft. Monroe, Va.
- Lincoln inquires about another man, Cummings, who is supposed to be sentenced to death for desertion, and asks to suspend it
- Lincoln suspends the death [sentence] of Henry Sack and imprisons him for the rest of the war
- Lincoln orders the suspension of the execution of John S. Young
- Lincoln suspends the execution of Patrick Jones
- Lincoln suspends the execution of four men
- The President asking if a prisoner of war should be released, seems in favor of this man, Phileman B. Price being released

His presence in the telegraph office led to a bond with the operators, those close at hand and others up and down the line, including Jesse Bunnell. By late spring of 1862, he and Lincoln would have crossed paths several times, due to circumstances connected to Jesse's assignment to the Army of the Potomac under General George McClellan. Jesse was McClellan's personal telegrapher and used the sign *MC*.

The general was known to be difficult, and, imprudently, less than forthcoming with the President. McClellan had misdirected the Union Army in the Virginia Peninsula Campaign, and Lincoln knew the extent of it. Making matters worse, McClellan would mischaracterize events or eliminate all men-



tion of them. It occurred again during and after the bloodiest clash of the Civil War, the Battle of Antietam. McClellan had been given intelligence on General Robert E. Lee's movements and strategy, and for reasons unknown, took no action.

The President began isolating McClellan, and, in the middle was Jesse, receiving and unscrambling messages between the two, and aware of the inconsistencies in the general's reporting.

By 1864, after McClellan was effectively contained, Jesse was assigned to General William T. Sherman's Army of the Cumberland and joined the harrowing march through Tennessee and on to Atlanta. For some, it was too much. By winter, Jesse and many soldiers were suffering from exhaustion and starvation. Someone, likely a medic, rescued Jesse by hospitalizing him. Full recovery took time, and when finally released, Jesse resigned. The Union Military Telegraph Service reported losing one of its "ablest and bravest operators."

Jesse and his brother telegraphers had succeeded in their mission to replace the vaunted messengers of old, the couriers on horseback. Comparatively, the couriers had an easier time of it: They did not haul wire and equipment by donkey over terrible terrain, did

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Photo E. Bunnell's patented solid trunnion key was a new product in 1881.

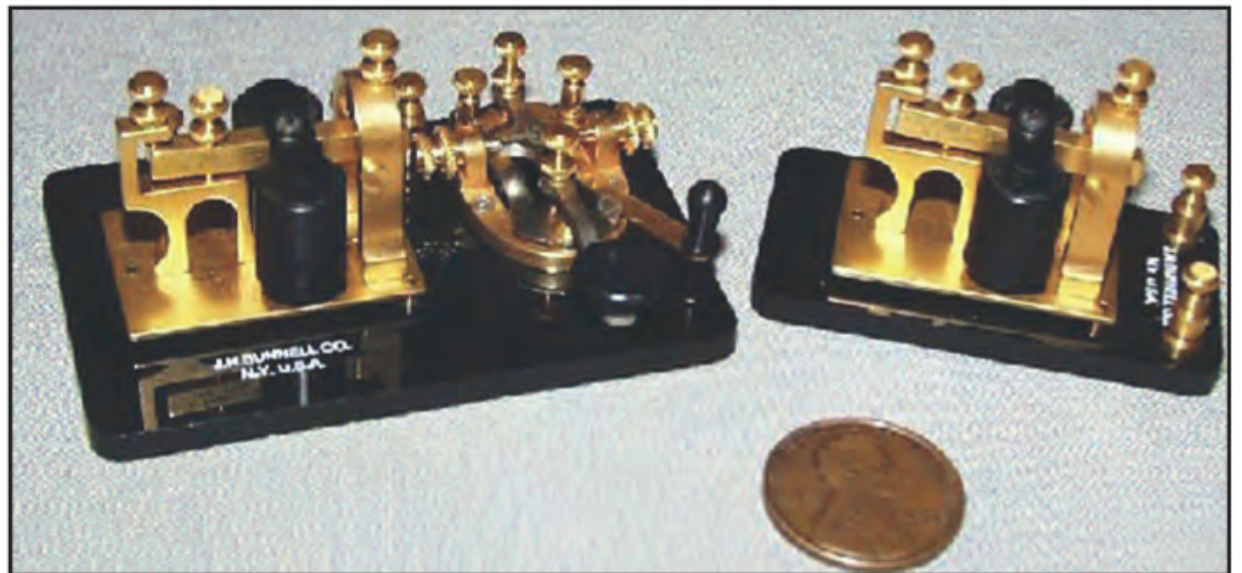


Photo F. Miniature sounder and key, and standalone sounder. These were sold to collectors and sometimes presented as special awards.



Photo G. In 1891, Bunnell and partner Charles McLaughlin published this instruction manual for aspiring telegraphers.



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not have to climb poles to hook up in the midst of battle, and did not have to hunker down over the wooden transit case containing the sounder and key. The best place for Jesse would be “under canvas” — in a tent (*Photo B*). There at least, he wouldn’t see the bullet with his name on it.

As for the President, the telegraph contributed to his crowning achievements, the first being the Emancipation Proclamation, which he wrote in 1862 at a desk in the telegraph office. David Homer Bates reports that the seclusion of the space gave him the needed solitude to draft one of the most historic documents of his presidency.

In excerpts from the J. H. Bunnell website, the story continues — truly a success story:

“Jesse’s return to non-army work from 1864 to 1872 led him to Philadelphia and a partnership with James Partrick, a successor to Chester, Partrick and Co. Later, from 1875 to 1878, he worked for L. G. Tillotson and Co.

“In 1878, Jesse created J. H. Bunnell and Co. (*Photos C and D*), and in 1879 he hired Charles McLaughlin as a partner in charge of sales and administration, while Jesse concentrated on manufacturing and innovations. Bunnell received a patent on the 15<sup>th</sup> of February 1881 for his steel lever key (*Photo E*).

“Stamped from one piece of steel, with minor machining required, this key was Bunnell’s answer to the loosening of the steel trunnion inserted in the brass lever. So successful, the steel lever continues to this day in keys.”

Today, J. H. Bunnell creations are valued collectibles (*Photo F*) as a quick glance at eBay will reveal. Most are reasonably priced:

- Straight keys, a few J-38s and others advertised as

antique — one is labeled “Antique New York Telegraph.” Some are designated for spark gap.

- A collection of bugs, resembling early Vibroplex
- Combos of key and sounder
- Numerous sounders — a “20 Ohm Circa Early 1900’s”, an “1895 Bunnell ‘A1’ Sounder,” and a “Mainline sounder 15c 100 ohms, GN Railway.”
- A “Mainline telegraph relay.”
- Antique tape rewinders.
- A “Very early JH Bunnell Telegraph Recorder Brass and Glass.”
- An intriguing “Antique J. H. Bunnell & Co Telegraph PEN REGISTER New York USA 500 ohms Vintage.”
- Books and manuals.
- And this book (*Photo G*), in paperback, takes the grand prize — a first edition of *Students’ Manual for the Practical Instruction of Learners of Telegraphy*, by Bunnell and McLaughlin, 1891.

**Notes:**

1. “Learning the American Morse Code – Part 2,” found at <https://tinyurl.com/yyeqhw6h>
2. IBID

**References:**

- Bates, David Homer. *Lincoln in the Telegraph Office: Recollections of the United States Military Corps*. Palala Press (May 18, 2016)
- Unless otherwise specified, factual material and images are from the J. H. Bunnell & Co. website, <http://jhbunnell.com/index.html>, and are used by permission.





*The author operating pedestrian mobile in St. Elmo, Colorado. Unbeknownst to him at the time, a nearby building housed a box of old and potentially unstable blasting caps that could have been set off by a strong radio signal. (WØRW photo)*

*A note of caution from WØRW when “taking it to the field” ... be aware of your surroundings and any potential hazards — especially those that can be made downright dangerous with enough RF in the air...*

## Danger at St. Elmo

**BY PAUL SIGNORELLI,\* WØRW**

**Y**ou may recall my June 2016 CQ article titled, “WØRW’s Top Ten List for Portable QRP Success.” The photos I used to illustrate that article came from one of my pedestrian-mobile operations in St. Elmo, Colorado, one of the state’s best-preserved ghost towns. Number 10 on my Top Ten list was “safety,” with a focus on being prepared for adverse weather and other surprises. Well, here’s number 11, or maybe a subset of #10: Know your surroundings and whether it’s safe to operate your rig from a given location.

Just a couple of years after the visit in my photos, members of Historic St. Elmo and Chalk Creek Canyon, Inc., found a potentially explosive surprise while cleaning out the out-

house behind the Home Comfort Hotel in St. Elmo ... a box of old blasting caps (mercury fulminate/KClO<sub>3</sub> mix)!

On the floor of the outhouse, they found what they believed to be dynamite, said Walter Roth, a member of the historical group. Later in the day, a bomb squad found that the box contained blasting caps rather than dynamite. But they can still be very dangerous.

I had operated my PRC319 pedestrian mobile right in front of that hotel several times before. While the electric caps are usually shorted and would not be affected by a QRP radio, my 50-watt radio is at a dangerously high level to be near a blasting cap. It would be a smart idea to avoid operating in any old mining areas where unexploded ordnance may exist, and always be aware of potential hazards that may be near you.

\* email: <w0rw1@msn.com>

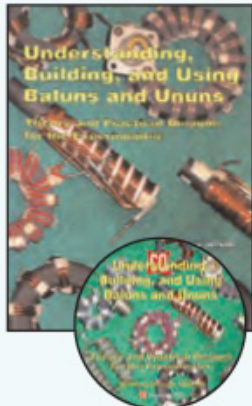


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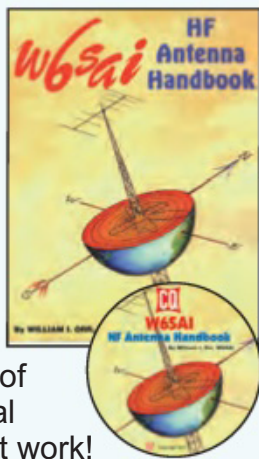


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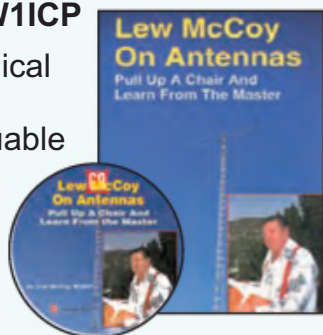


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*CQ Kit-Building Editor Joe Eisenberg, KØNEB, recently had the opportunity to visit the set of the TV show “Last Man Standing” and to operate from its on-set station, KA6LMS. Bonus — while he was there, one of the stars and his dad passed their ham license exams!*

## A Visit to “Last Man Standing,” or “The Cat In The Hat Goes To Hollywood”

**BY JOE EISENBERG,\* KØNEB**

**F**or seven seasons, six of which were on ABC and the most recent one on Fox, the TV series “Last Man Standing” has been a hit. We hams noticed right away that the lead character of Mike Baxter, played by Tim Allen, always had amateur radio gear on display in the background. A few episodes even have involved the use of amateur radio as part of the episode. Unlike other shows, amateur radio is portrayed accurately on “Last Man Standing,” thanks to the hams responsible for its production.

### Real Station, Real Hams

Tim Allen is actually a licensed ham (KK6OTD), as are many members of the production staff. What many hams do not realize is that the gear you see on display in the show is real



*KØNEB in front of the studio at CBS Studio City. The show “Seinfeld” was also recorded in this studio for many years.*

\*7133 Yosemite Drive, Lincoln, NE 68507  
e-mail: <k0neb@cq-amateur-radio.com>



*The Sets for “Last Man Standing” are lined up in a row so the cameras simply move from side to side to change sets. The studio audience is seated on the right in the photo. The show is mostly taped in front of a live audience.*



and fully functional. The gear has changed a bit over the years, with the main HF radio this year being an ICOM IC-7610. The antennas are dipoles on the roof of the studio building. I was very graciously hosted on a recent visit by co-Executive Producer John Amodeo, NN6JA, as well as Rob Antonacci, AA6RA, and treated to an incredible experience, getting to not only see up close how an episode of this hit series is taped, but to operate the KA6LMS station on the set. The show is taped in the same studio at CBS Studio City

where the hit show "Seinfeld" was shot over many years. KA6LMS is the call-sign of the Last Man Standing Amateur Radio Club, formed for those involved in the production of the show as cast and crew and to make contacts worldwide from the studio set. The station is not in operation at other times when the show is not in production.

### Putting KA6LMS on FT8

To allow as many hams to work the station as possible in the very limited time available, different modes have been

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KØNEB operating FT8 from on-set station KA6LMS. The farthest contact was in Russia!



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utilized each week, including SSB, CW, FM, DMR, D-Star, and for my visit, FT8. I was the first to operate FT8 from KA6LMS, and so to greatly ease the complex process of setting up the station to operate FT8 correctly in the Fox/Hound mode, I simply brought along the SD card from my home radio, also an ICOM IC-7610. Simply transferring my settings to the radio on the set allowed me to operate FT8 using my laptop with very little effort. All of my radio settings, including gain, communications port, etc. transferred and worked flawlessly along with my preconfigured laptop. My first contact on FT8 during setup the night before was with a station in Siberia.

I operated FT8 on 40 meters, which seems to be the only HF band that seems to work at the studio, due to extremely high RF noise levels associated with solar panel installations on the roofs of the buildings in the studio complex. On the rare occasions when the RF noise is not present, the crew tries to operate on 20 as well. Due to the ability of FT8 to get through with very weak signals, I was able to work all the way to the East Coast around 4 p.m. Pacific time on 40 meters.

The FT8 Fox/Hound mode was chosen and I set it up to allow up to four contacts in process at the same time. Fox/Hound mode is now commonly used on DXpeditions to maximize the number of contacts in a given time period. This was my first time operating as the Fox on FT8, and it was not difficult at all. Usually, of course, I am a "Hound" trying to get through to the rare DX. I used the most current version of WSJT-X (2.0.1) plus the latest firmware for the IC-7610 to optimize my ability to make FT8 contacts in the one hour I had allocated for operation.

After my operating time, it was time to go up into the audience seating to watch the episode being taped. What I got to see being produced was the next-to-last episode for season 7. One of the cast members, 14-year old Jet

Jurgensmeyer ("Boyd" in the show) and his father, Scott, both passed their Technician license exams on the last day I was there. I made sure they had the Ozark Patrol receiver kit from the 4-State QRP Group to assemble as a father-son project before I left. The Ozark Patrol is a great beginner's kit for these two new hams as it assembles by soldering the component leads to pads, making desoldering and correcting mistakes very easy.

I want to again thank both NN6JA and AA6RA for making my visit to the world of TV show production very enjoyable, and I look forward to many more seasons of "Last Man Standing" to come!

– 73 de KØNEB



Jet Jurgensmeyer ("Boyd" on the show) and his father, Scott, soon after they took and passed their Technician exams. (Courtesy of NN6JA)



Jet and Scott Jurgensmeyer try out their new ICOM ID-51A Plus 2 handhelds between show rehearsals. (Courtesy of NN6JA)

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We love it when our creative authors meld technology from different eras ... such as WA6ARA's fun project that combines old and new, mechanical and digital, by using a microcontroller to operate a servo to automatically send CQ with a straight key!

## Build a Straight Key CQer

BY MIKE HERR,\* WA6ARA

**W**hile I have modern radios and high-speed electronic keyers and paddles, I enjoy using a straight key and old rigs. It's a chance to slow down a bit and enjoy operating for operating's sake. There are a number of events and groups to help you enjoy the lure of straight keys as well, such as Straight Key Night (SKN), the Straight Key Century Club (SKCC), Novice Rig Roundup (NRR), and Novice Rig Night (NRN) held every Monday. I operate all of these using my trusty Heathkit DX-60B transmitter and a straight key handed down by my father, WB6MNX (SK).

These activities all have in common the use of straight keys. However, it can be tiring to send out CQ for long times waiting for a QSO, plus I like to busy myself in the shack with other projects while I call CQ. So I came up with a solution that allows me to send CQ automatically for the various events, but still use a straight key. While some may cry foul at my solution, I will let the sea lawyers fight that out. Here is my solution, the Straight Key CQer (*Photo A*). A short video of the operation is on YouTube at <https://youtu.be/g52sNoKuvp8>.

### The Straight Key CQer

The Straight Key CQer uses a miniature J-38 key built by Lee Hutchins, KA6IRL.<sup>1</sup> Any straight key may be used but it should be small, light pressure, and set for a short movement. The smaller and lighter, the less inertia and the greater possible speed range, the better. Other possible keys include the MS2 from American Morse<sup>2</sup> or many of the Christmas keys from Milestone Technologies.<sup>3</sup>

The substitute for the fingers on the key is a small model airplane servo. Model airplane servos are wonderful devices at low cost that can be com-



Photo A. The completed straight-key CQer.

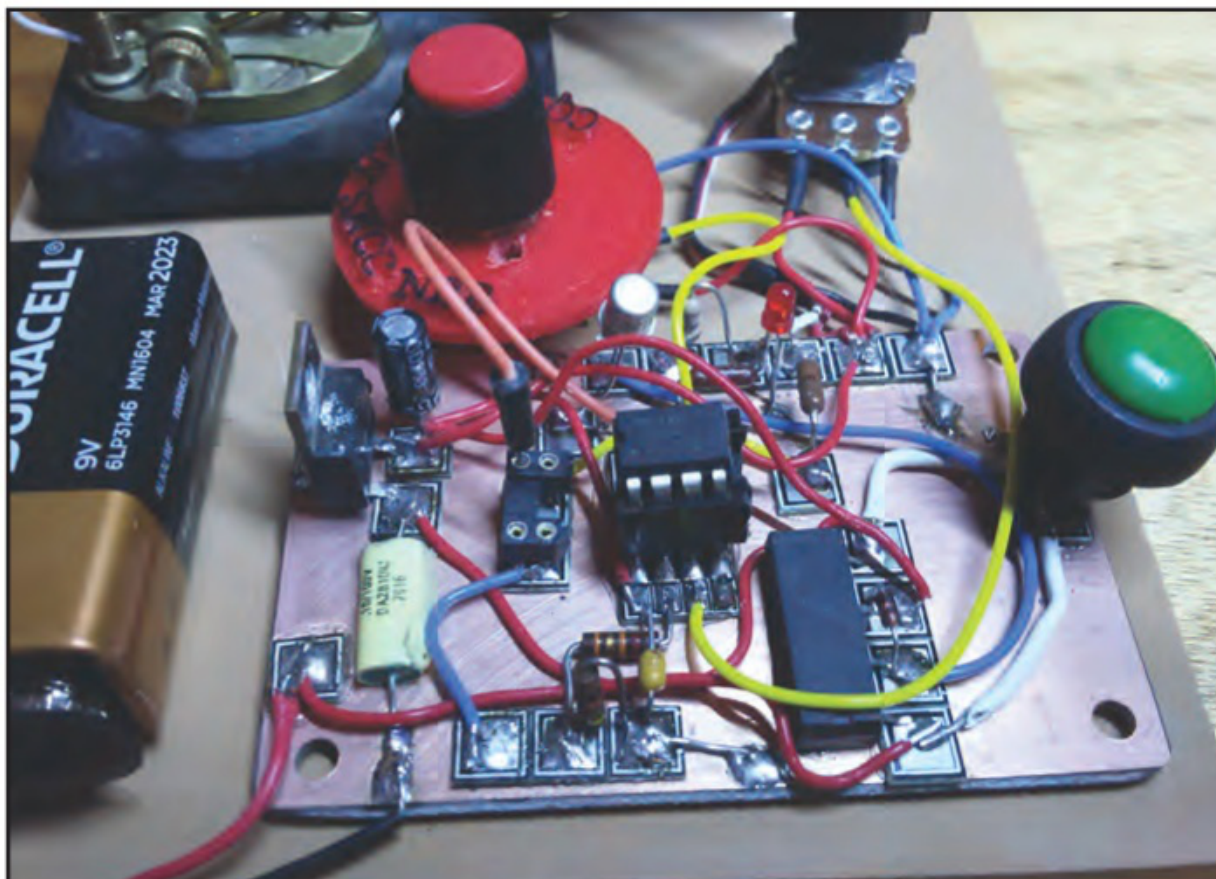


Photo B. Close-up of the author's board-construction technique.

\* [wa6ara@gmail.com](mailto:wa6ara@gmail.com)







Once the memory is selected, the PICAXE starts sending commands to the servo. The code is very simple, just commands to press the key down or up, as needed. The code is brute force; no attempt was made to simplify it, as the limit to the speed is the mechanical inertia of the key and the response of the servo used. As far as the PICAXE is concerned, I am only using about one-fifth of the available programming space. If you want to add more memories, it is easy to do. Also, a series of switches and resistors may be substituted for the potentiometer for more accurate control of the memories.

## Gotta Know the Code (Computer as Well as Morse)

To set up the PICAXE for your application, you will have to do a little code work. First, you will need to install the PICAXE editor, available at <www.picaxe.com>. The editor is easy to use. Also, you will need to build a programming cable, which is just simple wiring from the DB9 serial line to the Straight Key CQer board. *Figure 2* details the building of the programming cable.

Once the PICAXE editor is up and running, if you are a first-time programmer, I suggest you start with loading the program AS IS to the Straight Key CQer board.<sup>7</sup> Get out all the electrical and programming bugs with a known program listing prior to making changes. During programming, pins 2 and 3 of the Prg/Run connector must be shorted; then for operation, the short must be moved to pins 1 and 2. Once you are up and running, you can start to change the code. First, change my callsign to yours. You will need to change the individual letters and numbers in order to make up your call. Observe how the original letters and numbers were constructed, then replace “WA6ARA” with your call, following

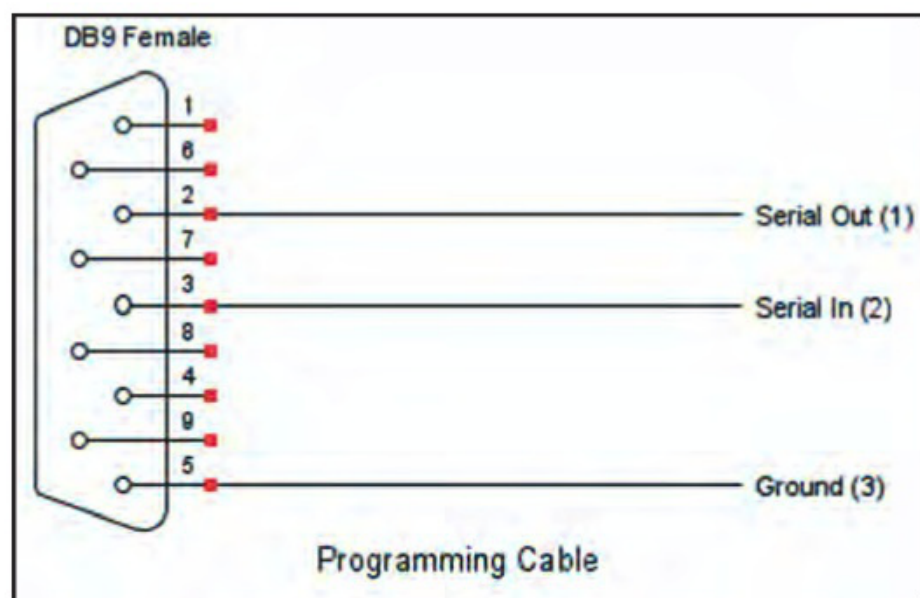


Figure 2. Schematic of the download connection.

the procedure below. The same goes for the CQ applications; maybe you want a different CQ sequence, a “ur 599” or whatever. There is plenty of room on the PICAXE.

Changing or adding new letters or numbers is simple. The code for “A” looks like this:

```
Ax: 'character A
      GOSUB DIT
      GOSUB DAH
      GOSUB SPACE
      RETURN
```

To add a new character, follow the same pattern. Name it with the letter and a small “x”, then put in the DIT and DAH subroutines to make up the Morse code pattern and return.

## HAM RADIO NEWS *(from page 3)*

### Hamvention® and ARRL Introduce Dayton Mobile App

Attendees at this year’s Dayton Hamvention® (which was also the 2019 ARRL National Convention) had the option of putting forum schedules, prize numbers, and other information on their smartphones through a new, free, Hamvention app. According to the *ARRL Letter*, the designers’ goal was to include exhibitor directories and maps, forum and dinner schedules, and winning prize numbers as hourly drawings are made. In addition, the app offered users the option to easily share their profile information with other attendees by scanning a QR code on each other’s badges. The app was available for Apple and Android mobile devices, as well as a web-browser version that was supposed to be compatible with just about any platform.

### “Put Howard to Work” ... On Second Thought, Don’t

A planned event to get ARRL CEO Howard Michel, WB2ITX, chatting on the air with League members via W1AW was scrapped after concerns were raised about its legality. The concerns related to the FCC rule that prohibits communications “on behalf of an employer.” According to the *ARRL Letter*, the fact that Michel is an employee of the League and that his on-air presence was publicized as an opportunity for members to talk with him raised concerns that the activity might be seen as crossing the line of permissible communications. “Out of an abundance of caution,” the *Letter* reported, Michel decided to cancel the event. He noted that he has

operated W1AW in the past and will do so in the future, but just as any other guest operator and “not as part of an ARRL-promoted event.”

### FCC Puts 90-Day Hold on Digital Rules Proceeding

It often takes a very long time for the FCC to respond to a rules change request, and sometimes technology changes during that time in ways that affect the original proposal. That seems to be the case with the ARRL’s nearly 6-year-old request for a change in amateur radio digital rules, and in the nearly three years since the FCC issued a Notice of Proposed Rule Making on the matter. One key element of the ARRL’s request, according to the *ARRL Letter*, was a signal bandwidth limitation of 2.8 kHz, the approximate bandwidth of an SSB voice signal. The FCC did not include that limitation in its 2016 NPRM and the ARRL filed comments opposing that change.

Apparently, the FCC was finally getting ready to announce a decision on the matter, but the ARRL now says that in the six years since the original filing, “new information has been presented by individuals and groups who support and oppose the FCC’s proposed” rule changes. The League asked the Commission to delay its consideration of a final decision on the matter for 90 days to provide it with time “to clarify the issues and determine whether a consensus can be reached on some or all of the issues raised by the FCC’s proceeding.” FCC staff agreed to the requested delay and will not take further action on the proposal (Docket #16-239) before July.

*(Continued on page 54)*



(from page 53)

## Hams in Thailand Celebrate New King with Special Event Station

The Radio Amateur Society of Thailand (RAST) operated special event station HS1ØKING in early May, commemorating the coronation of King Rama X (full name King Vajiralongkorn Bodindradabayarankun). According to the AMSAT News Service, the station operated maritime mobile from on board a Thai Navy aircraft carrier in the Gulf of Thailand, using the 80-, 40-, 20-, 15- and 10-meter bands on HF as well as 2 meters and the newly-activated geostationary amateur satellite, QO-100.

## AMSAT and ARRL Comment to FCC on Orbital Debris Mitigation

Both AMSAT and the ARRL have filed comments on an FCC proposal intended to address the growing issue of reducing the amount of debris in orbit. This debris poses risks to both satellites and manned space missions. The *ARRL Letter* reports that AMSAT claims the proposed rules would have “an extremely detrimental effect on both the Amateur Satellite Service and AMSAT’s ability to launch and operate new satellites.” AMSAT notes that amateur satellites typically have a longer lifespan than other small satellites and that this should be taken into account in crafting the rules. It also objected to a proposed altitude limit for low-Earth orbit satellites that it said would have made it impossible to launch several amateur satellites with elliptical orbits that otherwise meet the proposed standards.

The ARRL, commenting separately, said that while it supports efforts to reduce debris in orbit, the FCC “must tailor its regulations for the Amateur Satellite Service” and not “inadvertently impair (its) vitality by applying rules crafted for commercial satellite services.”

Another sticking point is a proposed rule that would require licensees of amateur satellites to indemnify the U.S. government against any claims against it as a result of satellite operations. AMSAT says this would make it financially impossible for it or any other U.S. entity to launch and operate amateur satellites. The ARRL agreed with this assessment in its comments.

(Continued on page 68)

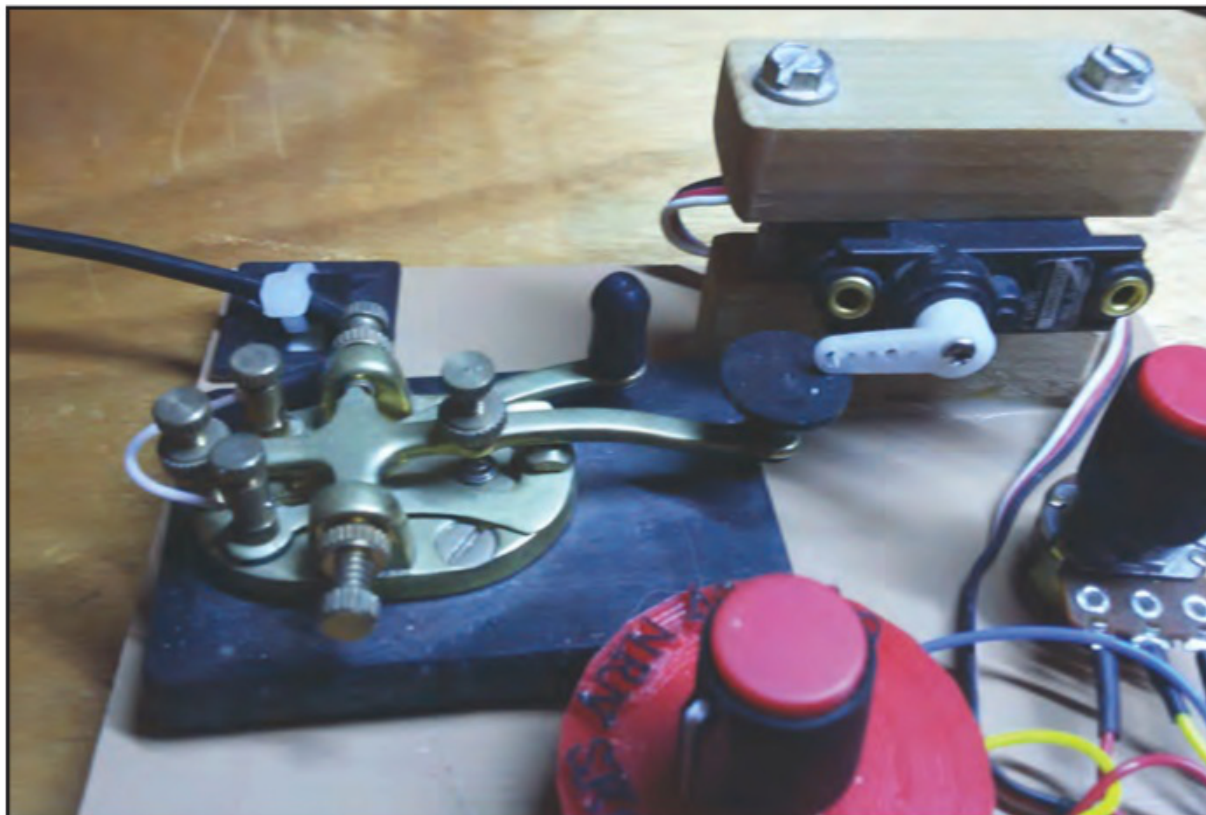


Photo C. Close-up of the mechanical interface of the servo and key.

Depending upon the key and servo you choose you may have to change the speed range. The two lines:

```
pauze=b2/5    'modify pause based upon speed
pauze=pauze+60 'modify pause again
```

change the potentiometer range. Changing the b2/5 to, say, b2/4 or b2/6, decreases or increases the span of the potentiometer. Changing pauze+60 to pauze+61 or 59 changes the offset or starting point of the potentiometer. Remember, we are using integer math here, so no decimal points are allowed! 59 is ok, 60 is ok, but 59.5 is not.

The mechanical assembly is simple and left up to the builder. You must hold the servo fixed to the key (*Photo C*), lest both start to walk away. I chose to clamp mine but others may use a more typical model airplane installation. If you use double-stick mounting tape, be sure to get the high-strength version. I did use such tape for mounting the key itself, the circuit board, pots, and battery. The dial indicator for the memories was 3D-printed. It doesn't have to be ... a piece of cardboard and a marker will work just as well. The key of the Straight Key CQer is hooked up in parallel with the main station straight key.

One note, this is not for QSK (break-in keying). Keeping with the novice rig theme, once turned on, the Straight Key keyer will send until it has completed its assigned memory. If you wish to interrupt the transmission, a normally-closed button or switch can be added in line with the battery to kill the power. Be aware though, that the servo may stop at the bottom of the stroke. Also, the speed does not change with potentiometer VR2 position once the CQ is started, as the speed is read at the start of the cycle and not re-read until the cycle is started again.

## A Bug Option

KA6IRL also has made a beautiful miniature J36 semi-automatic “bug.” With a little code change, and the servo turned sideways, it, too, could be used. This was a fun project, just in time for Straight Key Night, and isn't that what ham radio is supposed to be about?

### Notes:

1. <[www.qrpj36.com](http://www.qrpj36.com)>
2. <[Americanmorse.com](http://Americanmorse.com)>
3. <[www.mtechnologies.com](http://www.mtechnologies.com)>
4. <[www.picaxe.com](http://www.picaxe.com)>
5. The PicAxe 08M2+ is available from [Sparkfun.com](http://Sparkfun.com)
6. MePADS available from [QRPme.com](http://QRPme.com)
7. PICAXE code for the Straight Key CQer may be downloaded from the *CQ Overtime* page on the CQ website, <<https://tinyurl.com/y2jbuwf4>>.



# MATH'S NOTES

BY IRWIN MATH,\* WA2NDM

## A Well-Grounded Alternative to Radio?

**A**s in the case of last month's column, we would like to revisit a topic that is, perhaps, not so esoteric but can easily be duplicated by anyone with a bit of effort. And yes, it does really work and if you try it, you will be amazed. You will also see that many experimenters, not just Mr. Marconi, were actively looking for a way to communicate without wires in the late 19<sup>th</sup> century. Incidentally the first part of this column is a good project with which to inspire a technically-oriented youngster, although the rest might be beyond simple experimentation. Who knows who might be inspired to go further?

To recap my previous discussion: In the early days of radio, many schemes were developed to try to achieve communications without wires at the "dawn" of the use of radio frequencies, hence the term "wireless." One of these, which seemed to have real promise at the time, was to use the earth ground itself as a medium for conducting signals. However, as soon as Marconi captured the imagination of the public with his transatlantic feat and convinced them that electromagnetic radiation was the way to go, this means of communications was quickly forgotten. There is always some merit in older ideas, though, and we felt that this method of communicating should be seriously revisited as it certainly has interesting possibilities, particularly considering the circuitry and techniques we have available today. First, though, a bit of theory.

We all know that the Earth conducts but that it is not a perfect conductor. That is why people often soak the ground around antenna radials, pack salt into it and go through all sorts of manipulations to try to lower its resistance. Well, it is exactly this "shortcoming" on which ground communications relies. Referring to *Figure 1*, we can consider the ground between any two points as a resistor. But *Figure 1* is not totally accurate. The true nature of the ground is that it is an infinite number of resistors, connected in series/parallel as shown in *Figure 2*. This series/parallel three-dimensional combination

extends to cover the entire Earth. As a result, if we were to induce a signal across one resistor, it absolutely has to appear across all of the others but, of course, attenuated due to the numerous series/parallel combinations.

When this was tried (at the turn of the last century), the only equipment available were crude carbon microphones and simple earphone elements that, while sensitive, were really not comparable to anything we could configure today. *Figure 3* shows how an early scheme would have looked. Such a

system would work as far as a hundred feet or so but not too much more. The signals were quickly lost due to attenuation. Raising the battery voltage did not help much since there was still significant conductivity between the "transmitting" ground rods, and using too high a voltage resulted in heavy currents and heating of the microphone.

### A Ground Transmission Experiment

To see if there was any merit to contin-

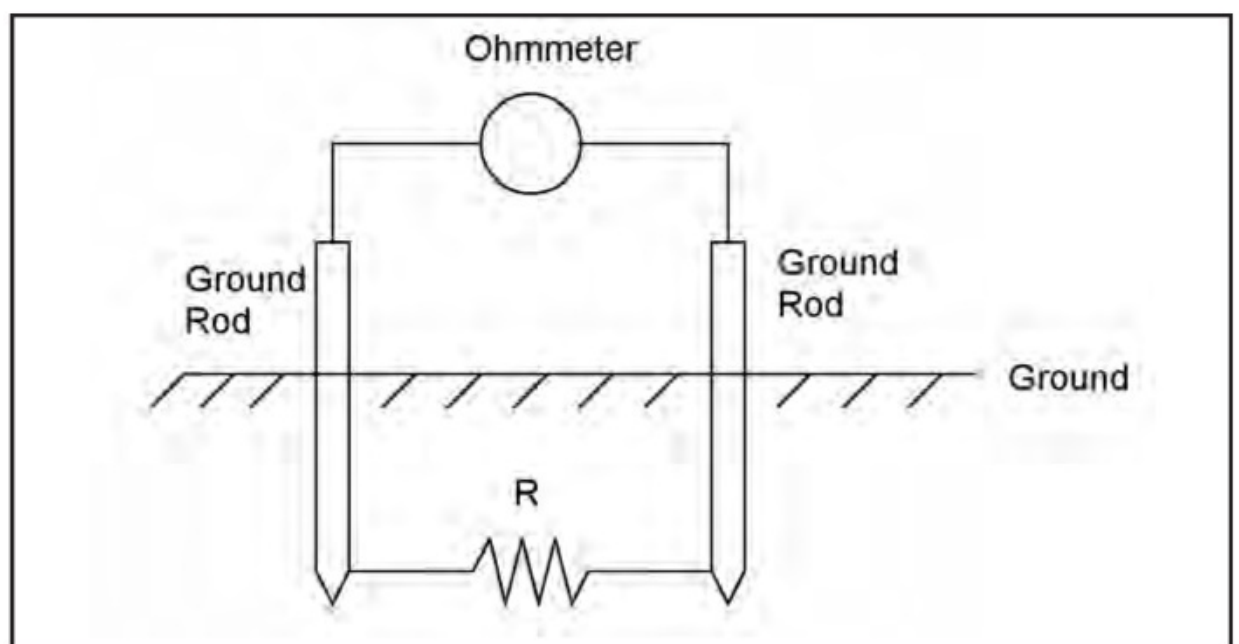


Figure 1. Basic schematic diagram of the Earth.

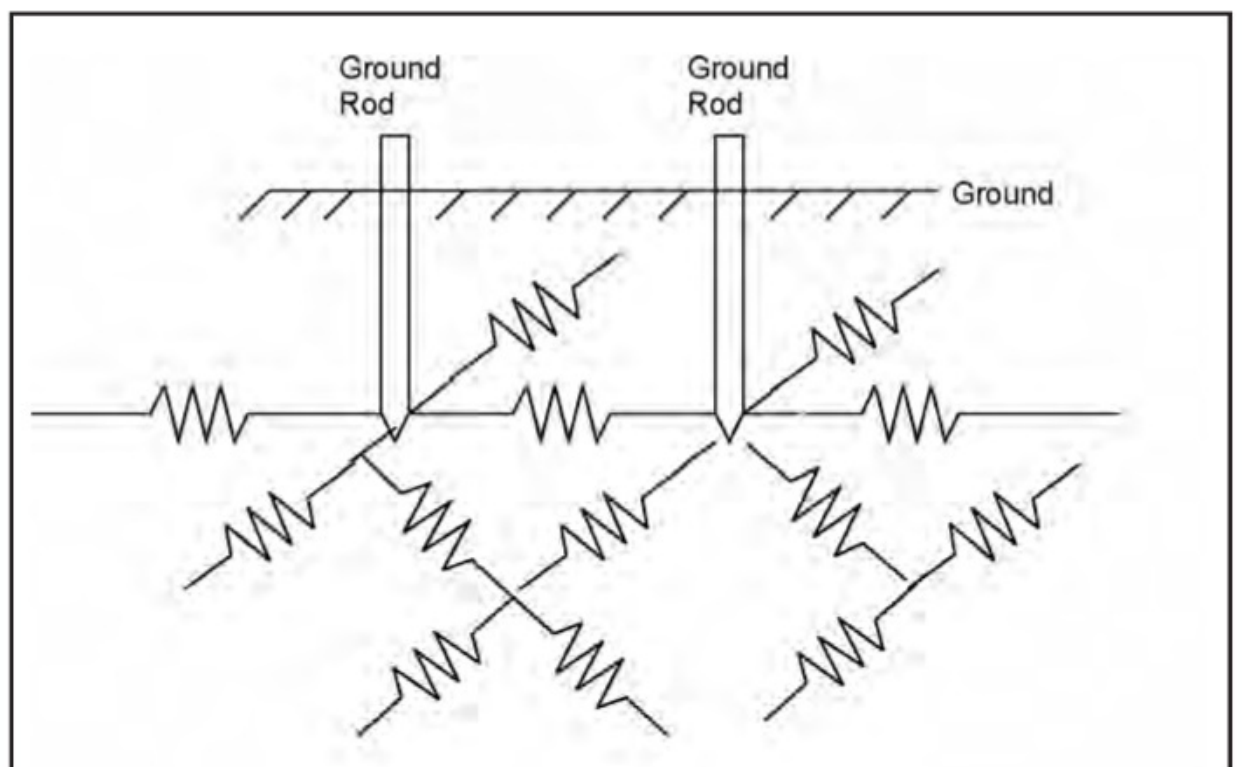


Figure 2. Real-world schematic diagram of the Earth.

\*c/o CQ magazine



uing to explore this mode of communication, we actually tried the following experiment. First, in an open field nearby, we drove two 6-foot ground rods into the ground 25 feet apart, leaving about a foot of each rod exposed. Next, we connected the 8-ohm output of a portable high-power electric guitar audio amplifier (with two 4-ohm, 50-watt resistors in series with each lead for safety) to the two ground rods. We then connected a CD player loaded with a “heavy rock” CD (which we thought appropriate) to the amplifier, thereby driving what we referred to as a “solid rock signal” into the ground.

We then built a small receiver that was really nothing more than a simple battery-operated audio amplifier as shown in *Figure 4*. We connected this to two smaller ground rods, each made of 12 inches of coat-hanger wire, rubbed with sandpaper so that any protective insulating coating was completely removed. When we pushed the coat-hanger wire rods into the ground, about 10 feet from the “transmitting” rods, the received sound was quite clear. We then tried to see just how far from the transmitter we could go and still receive the signals. We ran out of space since the field was only a cou-

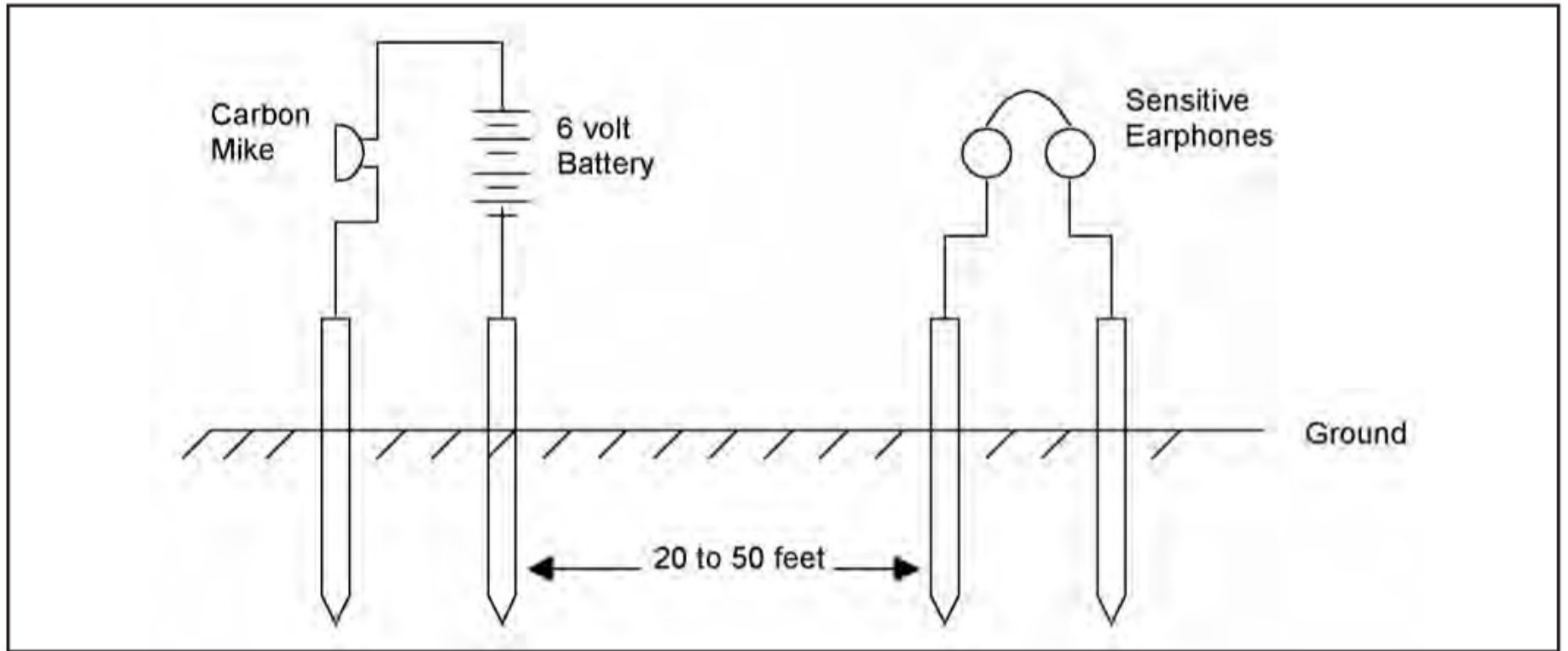


Figure 3. Early ground communications system.

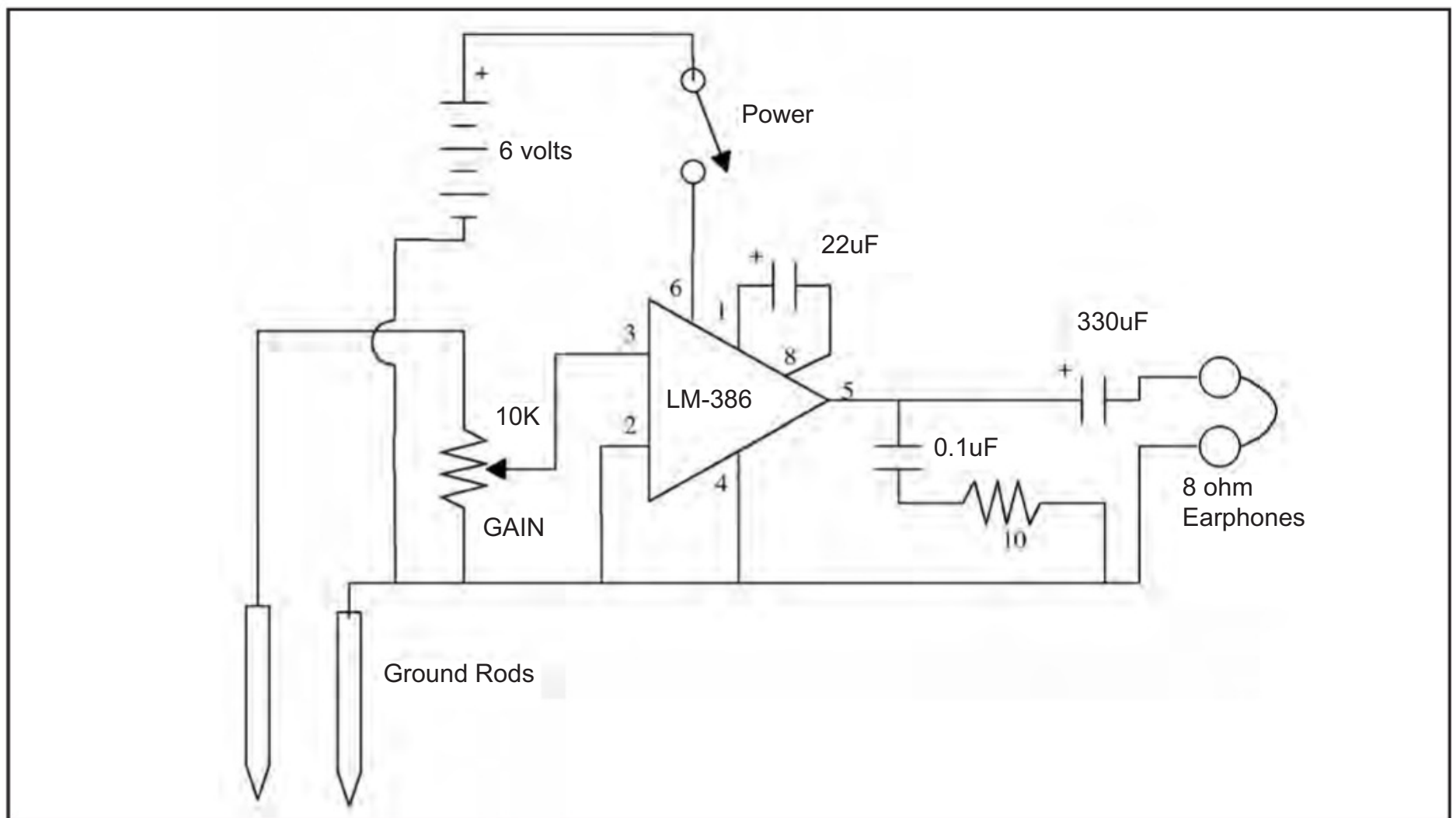


Figure 4. Schematic of simple ground-signal receiver.



ple of hundred feet long. At 125 feet, however, we could still hear the signal clearly but we also encountered quite a bit of static and 60-Hz hum when we cranked up the gain. It seemed that if we could just reduce or eliminate the noise and hum, we could extend the range quite a bit. Furthermore, the use of an even more powerful amplifier would no doubt have increased the range even more, but at this point we were limited as to what was on hand.

### Digging Deeper

The scheme we just described is, of course, just a simple direct connection and the noise, static etc. is the common “partner” result of long-distance connecting cables. So it is easy to see how the transmission range would be limited and subject to all sorts of extraneous signal and noise pickup. We wondered at the time, however, what the result would be if we used FM or — to be really modern — digital modulation techniques.

Surely one could easily build an oscillator at, say, 50 or 100 kHz, and FM or digitally-modulate it with audio. A very simple pulse amplifier could then be built at the receiving end. How far might this increase the transmission distance? In addition, a simple limiter circuit at the receiver could easily eliminate any amplitude-caused noise. Furthermore, if a 100-kHz carrier were used, perhaps better coupling to the ground would result since we would now be concerned with impedance between the transmitting and receiving ground rods, not just simple resistance. Tuned circuits or band-pass filters at the receiver could then also be used to narrow the pass band of what we were receiving, filter out any 60-Hz hum and reduce unwanted signals even more. Going still further, by using standard radio techniques such as different operating frequencies, many users could simultaneously communicate without interfering with each other. It seems that with some serious experimentation, we might be able to develop an entire alternate to wireless radio as we know it. By using both methods simultaneously, we could then double the amount of spectrum available for wireless transmissions.

While most of the above was originally related to inspire experimenters, I still think the reasoning is valid and can be accomplished without “professional” Bell Labs-type resources.

– 73, Irwin, WA2NDM

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# THE LISTENING POST

BY GERRY DEXTER

## Australian Shortwave Update



Photo A. Unique Radio's homepage wants to be sure you know where to tune for its shortwave programming. (screen grab from <[www.uniqueradio.biz](http://www.uniqueradio.biz)>)

**W**e reported in March that Radio Australia's decision in 2017 to shut down its shortwave service had become a campaign issue in this year's national elections, and that the opposition Labor Party had pledged to restore shortwave service to the remote Northern Territory if it won control of Parliament. While that election had not yet been held as this issue went to press, *Radio World* is reporting that private broadcasters are already filling the breach, with two stations already on the air and several others in the wings. The challenge for DXers in North America: Low power, low frequencies and wire antennas. They are essentially glorified ham stations (one is even using ham equipment) but as any low-band ham DXer can tell you, working Australia on the low shortwave frequencies is challenging but far from impossible. According to the article, the stations generally are running one kilowatt into wire antennas (frequently an inverted-V) on the 120-, 90- and/or 60-meter shortwave bands. Their programming and their signals are aimed mostly at residents of remote areas of Australia, which often rely on shortwave as a primary means of getting news and other information.

Unique Radio <[www.uniqueradio.biz](http://www.uniqueradio.biz)> uses an old Yaesu FT-757 GXII as its transmitter, operating upper sideband on 5045 kHz. Currently, the station has daytime-only authorization but according to

\*c/o CQ magazine



Photo B. Radio 4KZ, on the other hand, makes no mention of its shortwave service on its website. The station's primary programming is on medium wave on 531 kHz. (screen grab from <[www.4kz.com.au](http://www.4kz.com.au)>)

its website (*Photo A*), it is waiting for government approval to operate at night as well, most likely on 90 meters. New South Wales standard time is 10 hours ahead of UTC.

4KZ Radio <[www.4kz.com.au](http://www.4kz.com.au)> relays the station's medium-wave programming on 5055 kHz. The station's website (*Photo B*) makes no mention of its shortwave service, but it has been on the air since late 2017. It is part of the NQ Radio Network, and *Radio World* quotes the network's general manager as saying plans are in the works to also pro-

vide evening programming via its 4AM station on either 120 or 90 meters.

Also planned for the future, according to the article, are programming from the Radio X Network in New South Wales to be simulcast on 120, 90, and 60 meters. Two other "still in the planning stages" stations are hoping to get on the air in the near future from New South Wales and Victoria, again aiming primarily to provide news, information, and entertainment to the Australian Outback.

[*Leading Logs will return next month.* – ed.]





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# EMERGENCY COMMUNICATIONS

BY WALT PALMER,\* W4ALT

## *Stafford Disaster Relief and Emergency Assistance Act*

Last month, we discussed my visit to the Amateur Radio in Public Health & Medical Disasters (ESF#8) Conference in Camden, New Jersey. I've received several comments regarding the Stafford Act I mentioned a few times.

The following synopsis is based on a Wikipedia entry and offers an extensive overview of the Stafford Disaster Relief and Emergency Assistance Act.

The **Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act)** is a federal law designed to bring an orderly and systematic means of federal natural disaster assistance for state and local governments in carrying out their responsibilities to aid citizens. Congress's intention was to encourage states and localities to develop comprehensive disaster preparedness plans, prepare for better intergovernmental coordination in the face of a disaster, encourage the use of insurance coverage, and provide federal assistance programs for losses due to a disaster.

The Stafford Act is a 1988 amended version of the Disaster Relief Act of 1974. It created the system in place today by which a presidential disaster declaration or an emergency declaration triggers financial and physical assistance through the Federal Emergency Management Agency (FEMA). The Act gives FEMA the responsibility for coordinating government-wide relief efforts. The Federal Response Plan includes contributions from 28 federal agencies and non-governmental organizations, such as the American Red Cross. It is named for Sen. Robert Stafford (in Senate 1971-89), who helped pass the law.

Congress amended it by passing the Disaster Mitigation Act of 2000, and again in 2006 with the Pets Evacuation and Transportation Standards Act.

### **Titles**

#### **Title I: Findings, Declarations and Definitions**

Title I provides the intent of Congress to provide continued and orderly assistance from the federal government to state and local governments to relieve hardship and damage that result from disasters.

#### **Title II: Disaster Preparedness and Mitigation Assistance**

Title II authorizes the President to establish a disaster preparedness program that utilizes the appropriate agencies and gives the President the right to provide technical assistance to states in order to complete a comprehensive plan to prepare against disasters. The President may also administer grants to states to provide funding for the preparation and revitalization of emergency plans.

Title II articulates the necessity of a disaster warning system. This includes the readiness of all appropriate federal agencies to issue warnings to state and local authorities and the disbursement of warnings to the public. This title authorizes the President to make use of either the civil defense communication system or any commercial communications systems that are voluntarily given to the President to issue warnings to the public.

Pre-disaster hazard mitigation plans are also detailed in

Title II. Under this title, the President may establish a program to provide financial assistance to states through the National Predisaster Mitigation Fund. States can then develop a mitigation plan that can lessen the impact of a disaster on the public health, infrastructure, and economy of individual communities. The President may also establish a federal interagency task force to implement pre-disaster mitigation plans administered by the federal government. The director of the Federal Emergency Management Agency (FEMA) serves as the chairperson of the task force. Other members of the task force include relevant federal agencies, state and local governments and the American Red Cross.

#### **Title III: Major Disaster and Emergency Assistance Administration**

Title three explains that upon the declaration of a major disaster or emergency, the President must appoint a federal coordinating officer to help in the affected area. This coordinating officer helps make initial appraisals of the types of relief most needed, establishes field offices, and coordinates the administration of relief among the state, localities, and nonprofits. The President must also form emergency support teams staffed with federal personnel. These support teams are sent to affected areas to help the federal coordinating officer carry out his or her responsibilities. The President also helps with the establishment of regional support teams. Title three also explains the reimbursement process for expenditures by federal agencies under the Act, as well as the government's nondiscrimination requirements, penalties for misusing federal funds, and the requirements for mitigation plans.

#### **Title IV: Major Disaster Assistance Programs**

The procedures for declaring a major disaster are to be made by the governor of an affected state. When a disaster occurs, the governor executes the state's emergency plan. If the Governor then decides that the disaster is of such severity that the state and affected local governments cannot possibly handle the effects of the disaster, the Governor will make a request to the President explaining the amount of resources currently available and commit to the cost-sharing requirements in the Stafford Act. The President may then declare a major disaster or emergency in the affected area.

Title IV sets out the authority of the President during major disasters or emergencies, which includes directing any federal agency to help the affected area (including precautionary evacuations), coordinating all disaster relief assistance, providing technical and advisory assistance (issuing warnings, providing for the public health and safety, and participating in recovery activities), distributing medicine, food and other supplies, and providing accelerating federal assistance when the President deems it necessary. Lastly, the President may also provide any emergency communications or public transportation that an affected location might need. The federal share of these types of assistance is no less than 75% of the eligible costs. The President has the ability to contribute up to 75% of the cost of any state or local hazard mitigation effort that is deemed as cost-effective and substantially reducing the risk of a major disaster.

---

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During a major disaster the Governor may request that the President direct the Secretary of Defense to use the resources of the United States Department of Defense for the purposes of any emergency work. This work is only allowed to be carried out for 10 days. Emergency work is defined as "clearance and removal of debris and wreckage and temporary restoration of essential public facilities and services". Title IV also provides a framework for many essential governmental functions during an emergency including legal services, relocation assistance, distribution of food coupons, and unemployment assistance.

If, during an emergency, a local government has lost such a substantial amount of revenues that it cannot perform essential government responsibilities, the President is authorized to provide Community Disaster Loans. The loan amounts are based on need and the law provides formulas for determining eligible amounts.

This title also states that the federal government will not have the authority to impede the access of an essential service provider to an area impacted by a major disaster. A major service provider is defined as either: A telecommunications service, electrical services, natural gas, water and sewer services, or, is a municipal entity, nonprofit entity, or private entity that is responding to the disaster.

Types of housing assistance are identified under this title. The federal share of the costs eligible for housing assistance is 100%.

### Title V: Emergency Assistance Programs

Title V explains the process a state must follow to request that the President declare an emergency. The specific abilities of the President are also explained in this Title. The President can direct any federal agency to use its resources to aid the state or local government in emergency assistance efforts. He also has the responsibility to coordinate all disaster relief assistance and assist with the distribution of food, medicine, and other vital supplies to the affected public. The President may provide assistance with debris removal and provide any needed emergency assistance. This Title also gives the President the authority to provide accelerated federal assistance when it has not yet been requested.

### Title VI: Emergency Preparedness

Title VI explains the measures that must be undertaken to prepare for anticipated hazards, including creating oper-

ational plans, recruiting and training personnel, conducting research, stockpiling necessary materials and supplies, creating suitable warning systems, and constructing shelters. During a hazard, governments are expected to evacuate personnel to shelter areas, control traffic and panic, and control use of civil communications. After a hazard has occurred, governments must provide services such as firefighting, rescue, emergency medical, health, and sanitation. They must also remove debris and repair or restore essential facilities.

Title VI also sets out the authority and responsibilities of the director of FEMA. One responsibility of the FEMA director is to oversee the development and follow-through of emergency prepared-

ness compacts, otherwise known as Emergency Management Assistance Compacts (EMACs). "The Emergency Management Assistance Compact (EMAC) is an interstate mutual aid agreement that was developed out of the need to assist and coordinate resources across states in the event of a disaster situation." These compacts strive to deliver materials and services quickly to affected areas during an emergency. These plans must be submitted to Congress.

The FEMA director may also give financial contributions to the states for emergency preparedness purposes. The amount contributed by the director must be equally matched by the state.

Title VI also explains the require-

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ments for an emergency preparedness plan. The plan must be in effect in all political subdivisions of each state. It must also be mandatory and supervised by a single state agency. A plan must also include a way to provide emergency preparedness information to the public (including limited English speakers and those with disabilities) in an organized manner.

The last portion of Title VI addresses security regulations and requires completion of a loyalty oath by federal emergency employees.

#### **Title VII: Miscellaneous**

Title VII gives the President the

authority to determine any rule or regulation that may be necessary to carry out the powers that he is given in the Act. This can be either through a federal agency, or any other means the President sees fit. Payment deadlines were also established under this Title, along with restrictions on the confiscation of firearms for any reason other than failure to comply with federal law or as evidence in an investigation.

#### **Criticism**

There are many criticisms of the Stafford Act. The Institute for Southern

Studies has stated that the Act needs to give greater latitude to FEMA on how it responds to disasters that are extraordinarily devastating, such as Hurricane Katrina. This is especially true for FEMA's ability to provide financial assistance in the form of grants to states and localities suffering after such a disaster. The Institute for Southern Studies has also noted the red tape that has been associated with the Stafford Act in the Hurricane Katrina recovery efforts. In an article for *Frontline*, many others agreed that the process of handing out aid was hindered by bureaucratic red tape. This leads to a rather slow response from Washington to diagnose and resolve issues with recovery efforts.

Another criticism levied by the authors of the *Frontline* article included the provision in the Stafford Act that requires buildings that are destroyed to be rebuilt the same way that they were standing before the disaster occurred. For example, if a 50-year-old hospital was destroyed during a disaster, the Stafford Act would require the building to be constructed exactly how it was without any updates to the building.

Other criticisms of the Stafford Act focus on human rights issues that are present during emergencies and recovery efforts. The Stafford Act does not require that the federal government ensure displaced persons have the ability to participate in governmental decisions that affect the recovery efforts. This includes not only access to public forums about recovery planning and management, but the Stafford Act also does not address voting rights or civic participation issues for those who are displaced during a disaster.

Many people argue that while the Stafford Act allows the government to step in and provide housing and medical assistance, it does not require it to do so. Any housing, education, or healthcare provided during an emergency and the recovery efforts are provided at the sole discretion of the federal government. Even the rebuilding of medical facilities is discretionary.

While the Stafford Act does give special detail and instruction about the needs of the disabled and animals during an emergency, it does not specify any requirements for children or the elderly. These groups should be given more consideration during an emergency due to extenuating circumstances that could prevent them from following the same emergency protocol as an average adult.

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# ANALOG ADVENTURES

BY ERIC P. NICHOLS,\* KL7AJ

## 0 Hertz

**H**opefully, since our last installment, you've taken the opportunity to toss together and test a very simple op-amp-centered amplifier without releasing too much magic smoke. (Don't worry if you *did* happen to release some magic smoke; it's probably the best way to learn how to make electronic circuits work. Truth be told, my very personality is largely the result of having inhaled solder fumes and released magic smoke for several decades. Far be it from me to deprive any new ham of such an enriching experience).

Today, we will talk a bit about amplifying DC signals. As uninspiring as that may sound, it is an extremely useful skill to learn, and actually a lot more interesting than you may have thought.

Traditionally, electronics courses have divided electrical and electronic circuits into two basic categories, DC and AC. While there's nothing inherently wrong with this tradition, it does tend to create something of an artificial distinction between the two technologies.

Instead, I like to look at DC as being 0 Hz AC.

### Zero is a Number, Too!

One fine evening, when our middle daughter Jessica was about four years old, she came into the living room with a plate of cookies. She handed me a cookie from the plate. I said, "You know I hate odd numbers. I need *two* cookies." She grabbed my lone cookie back and said, "Zero is an even number, too."

I forbade Jessica to take any more math classes after that point. Despite my prohibition, she managed to memorize pi to 100 places sometime in high school. But I digress.

If we look at a DC signal as being an AC signal with zero frequency, at least one self-evident truth arises. And that is in the definition of the word *signal* itself. A signal should *signify* something. In other words, it should give us some information ... some *new* information. Stay with me for a few moments; this is not a mere philosophical abstraction.

Let's say we walk into an unfamiliar electronics shop, and we find a voltmeter

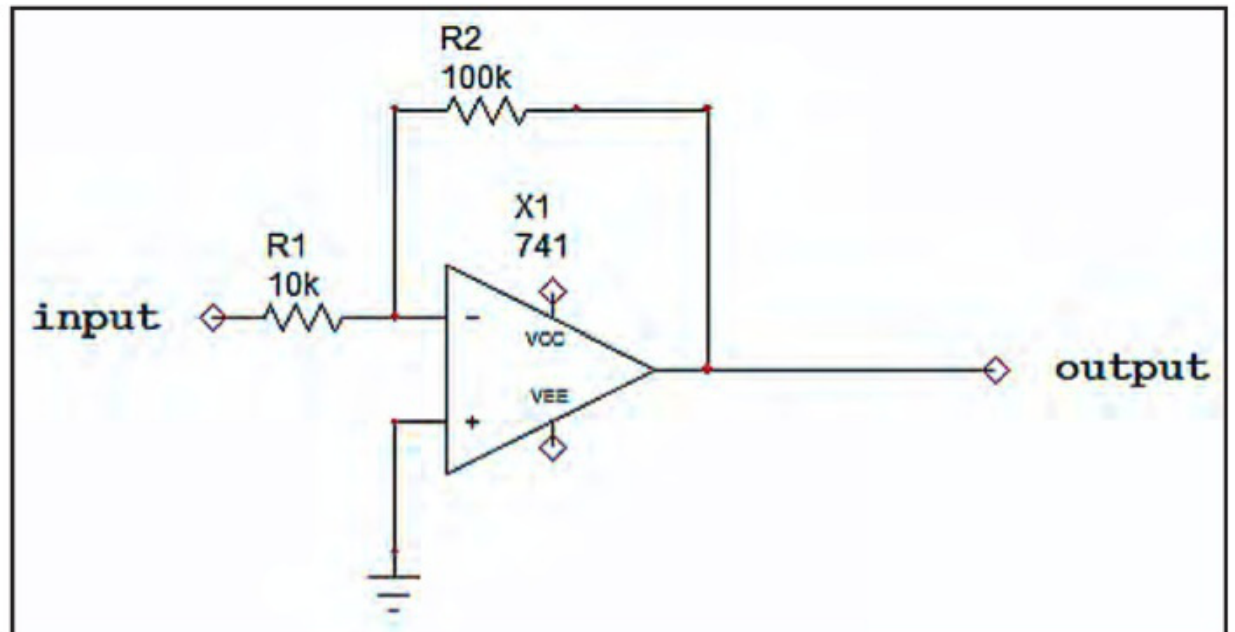


Figure 1. Inverting amplifier.

attached to a 9-volt radio battery with a pair of clip leads. Not too surprisingly, we find that the voltmeter is registering 9 volts. We have no idea *how long* the meter has been attached to the battery; it could have been there minutes, days, or even years (assuming it's a really high impedance voltmeter). What *frequency* is the voltage? If you're like the typical electronics practitioner, you'd probably say that it's an irrelevant question. It's obviously a DC voltage, a situation in which the frequency is undefined ... and undefinable. Or is it?

We can probably make a fair assumption that, at some time in the past, the voltmeter was not connected to the battery. We can go farther back in time to before the battery was manufactured, and *absolutely* conclude that there was no DC voltage (whether or not we measured it). In other words, there was some point in time at which our DC voltage *began*. And presumably, some time in the future at which it will cease.

The salient point here is that, if there was *any change* in the DC voltage, *at any time in the past or in the future*, the frequency is something other than zero. You are not likely to ever encounter a *true* DC voltage any time in your life. Not only does our example circuit have a frequency, it also has a *bandwidth*. We will go into this in more depth as we explore Fourier Analysis, later in this series.

If we agree that no DC voltage has eternally existed at its present state, but rather *arrived* at its present state from some other state, we can now look at

that DC voltage as a *signal*. It signifies something, namely, the beginning, the middle, and the end. It may not be easy to extract all that information, especially if it happened very slowly, but the information is there, nevertheless.

So now, we no longer need to differentiate between DC voltages and AC signals; in our new paradigm (don't you love that word?), all voltages are signals, with frequencies ranging from 0 Hertz clear up to a whole lotta Hertz (LHz). So with that out of the way, let's look at some techniques for measuring 0 Hz or near-0 Hz signals.

### Vive la Difference – Or – One Hand Clapping

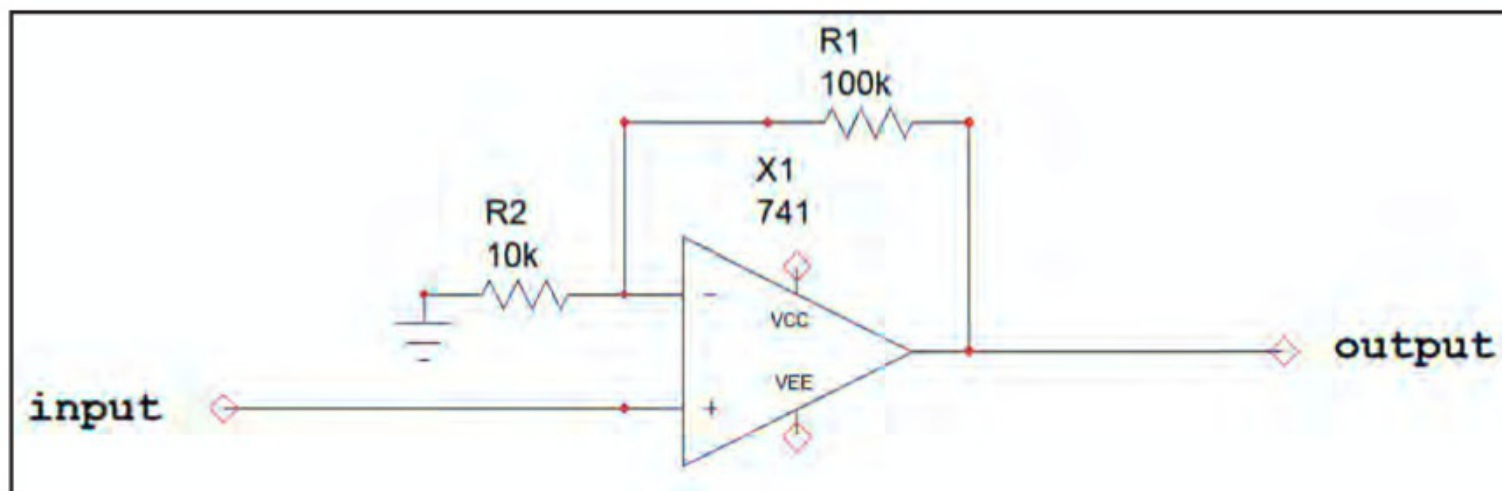
When we speak of voltage, we almost always speak of a *difference of potential* between two points in a circuit (or across a single component). While there are cases in which *absolute charge* is meaningful, such as in plasmas, where you can have big clouds of like-charged particles, most of the time we will use *voltage* to designate a difference of potential. Attempting to measure (or even define) the voltage at a single terminal of a battery is like one hand clapping ... it doesn't do us much good.

Since so much of what we do in electronics involves creating (and measuring) differences of potential, it's only natural that we employ a *differential amplifier* to measure this quantity. In the previous installment, we described how *all* op-amps have differential inputs; however, they are seldom wired as

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Figure 2.  
Non-inverting  
amplifier.



“pure” differential amplifiers. This is because the inverting and non-inverting configurations are not perfectly symmetrical with respect to ground. Compare *Figure 1*, an inverting amplifier with *Figure 2*, a non-inverting amplifier.

A better solution is the true differential DC-coupled amplifier, commonly known as the *instrumentation amplifier* (*Figure 3*). While precision instrumentation amplifiers are commonly available as monolithic building blocks, it’s simple enough to roll your own with “garden variety” op-amps, such as our familiar 741.

As you can see in *Figure 3*, the  $V_1$  and  $V_2$  inputs are genuinely symmetrical with respect to ground. A3 is operating in the differential mode, with the normal ground asymmetry being “swamped out” by A1 and A2. The output voltage will always be proportional to the *difference* of potential applied between  $V_1$  and  $V_2$ .

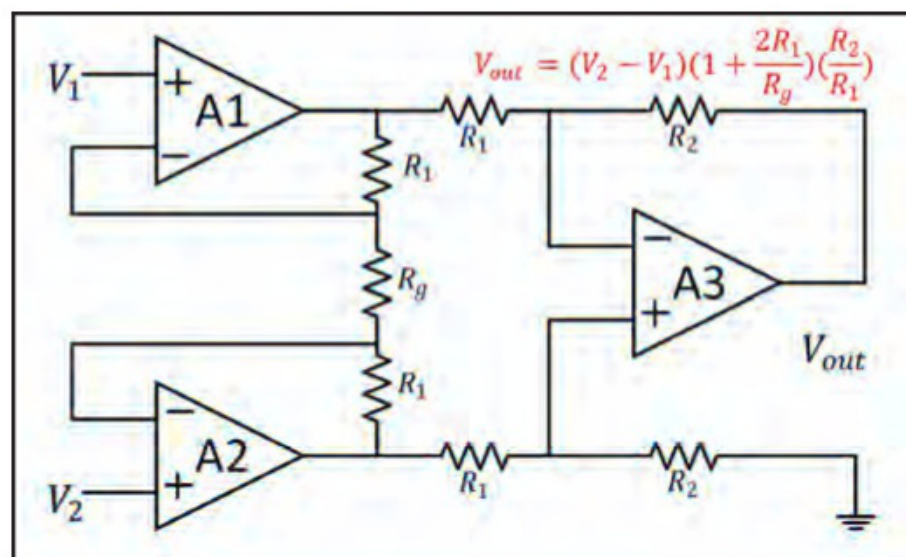


Figure 3. Schematic of a basic instrumentation amplifier.

## Get my Drift

One of the challenges in designing a DC-coupled amplifier is drift, which is primarily — but not always — thermal in nature. The direct coupling and cascading of op-amps can cause minuscule DC drift in an early stage to be amplified dramatically. One nice aspect about the instrumentation amplifier is that any drift in the early stages (A1 and A2 in this example) tends to cancel out. Since the circuit only amplifies the *difference* in potential between the two inputs, if they drift the same direction, the output will not reflect this drift. Which leads us right into our next topic.

## Common Theme

One of the great advantages of the instrumentation amplifier, regardless of the frequency it’s called upon to amplify, is its ability to *reject* common mode noise. External magnetic fields, for example the AC hum that permeates just about all of modern civilization in the vicinity of AC power lines, will be induced equally into both conductors of, say, a twisted pair cable. If the entire *system* leading up to the instrumentation amplifier is electrically and physically symmetrical, the amplifier can be highly immune to the interfering signal, only amplifying the *differential mode* (the desired) signal. The common mode rejection ratio (CMRR) is an important design parameter of an instrumentation amplifier, and is the ratio of the sensitivity of the device to desired signal to common mode noise, expressed in decibels. We’ll address the actual numbers involved in a later installment. The instrumentation amplifier is not a magic bullet for noise reduction, but it is certainly an important ingredient in the complete arsenal.

If the differential input of an instrumentation amplifier seems vaguely like a *balun*, you’re not mistaken. Indeed, a radio frequency instrumentation amplifier (now, at last, practical to implement) can serve as an “active balun” for receiving antennas. In fact, my eXOgon active antenna, described

in *Receiving Antennas for the Radio Amateur*, published by ARRL, uses just such a scheme.

## In the Loop

Feedback loops are not restricted to op-amps, of course, but they are easy to explore with these devices. As discussed earlier, an individual op-amp’s characteristics are determined entirely by the external feedback components. But what happens when you cascade several op-amps together? Is it possible to connect a feedback loop around an entire composite op-amp circuit? Indeed it is. And, actually, it’s one of the best ways to compensate for DC drift where you have a lot of cascaded DC amplifiers. To wax Biblical, negative feedback can cover a multitude of sins. But you need to be careful, because it can also create some entirely original ones. There is a finite, if small, amount of phase shift inherent in any op-amp amplifier. Because of this phase shift, negative feedback can actually become positive feedback at some frequencies. This is one of the subtleties of designing with op-amps, which we will cover in detail as we progress in this series.

## Bridging the Gap

One of the most common and interesting applications for the instrumentation amplifier is in conjunction with the Wheatstone Bridge. Now, like a lot of other useful circuits, the Wheatstone Bridge is used “from DC to Daylight” in one configuration or another. However, the DC Wheatstone Bridge is commonly used to measure minuscule *changes* of resistance such as those encountered with *strain gauges* (*Figure 4*).

A strain gauge is simply a piece of wire that changes resistance when you stretch it, and is commonly used to measure mechanical force, such as in a scale. Why does that happen? Because when you stretch a wire, it becomes longer and skinnier. No rocket science here.



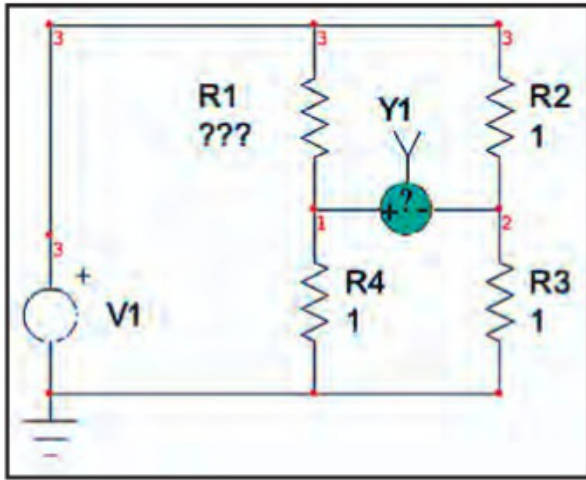


Figure 4. Wheatstone Bridge with strain gauge installed as R1.

In Figure 4, we have a simple Wheatstone Bridge with the strain gauge (unknown resistance) connected as R1. We've arbitrarily used 1 ohm for the remaining three legs. R2 can be adjusted to match the nominal resistance of the strain gauge in its resting state. The differential voltage measured between nodes 1 and 2 is applied to our instrumentation amplifier (designated as Y1). As R1 is stretched (strained), its resistance increases, causing the voltage at Node 1 to decrease.

## Just Compensation

While you probably aren't going to be using a lot of strain gauges in the ham shack, we can certainly apply some principles of general instrumentation to many places in said ham shack. There are many cases in which we can cancel out or compensate for instrumentation errors, and the bridge allows us to do this simply and directly. One of the sources of error in strain gauges is heating due to ohmic resistance ... a small but measurable error. If we replace R2 with an identical strain gauge wire (but not under any strain), any error due to thermal heating is canceled out. Pretty slick, eh?

We can also *intentionally* use a temperature sensitive component in place of R1 and use the bridge to give us a voltage proportional to temperature. And, in fact, this would be a more common application in the ham shack. Incidentally, the use of the instrumentation amplifier reduces or eliminates "loading" of the bridge, due to its inherently high input impedance.

We will be returning to the instrumentation amplifier many times throughout this series. But just to stir things up a bit, in the next installment, we will be exploring the op-amp without feedback, the very versatile, incomparable *comparator*.

Until next time, keep the bench clear and the soldering iron hot.



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Designed for use in harsh operating environments where electronic equipment will be subject to shock and vibration during use, the ruggedized KM6-HD subrack system, designed to meet MIL-STD 167, the U.S. Department of Defense Test Method Standard, is the latest development of the versatile KM6 subrack family from Verotec.

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Slide-in double swipe EMC (electromagnetic compatibility) continuity gaskets fitted to the 19-inch rack mounting angles and rear closing angles providing electrical continuity to adjacent panels or modules mounted in the front and rear. The side plates are solid, and either solid top and bottom covers or EMC ventilated pattern covers that facilitate cooling while preserving EMC integrity and are available as standard. Front- and rear-closing panels provide a fully screened EMC environment; inject/eject front panel handles, grounding clips, ESD clips and coding keys are available. The card guides can be screwed to the tiebars at the front and rear to improve retention.

KM6-HD meets the requirements of VMEbus, VXI, VME64x, VPX, VXS, cPCI, PXI and similar open architecture specifications; it accepts standard Eurocards in 3, 6 and 9U heights with depths of up to 400 mm. It is compatible with the full range of KM6-II accessories including front panels, plug-in units and modules. Optional heavy-duty handles for the rack mounting angles are available.

The KM6-HD subrack system is available now with pricing based on configuration. For more information, contact Verotec Inc., 150 Zachary Road, Suite 6, Manchester, NH 03109. Phone: (603) 821-9921, Email: <sales@verotec.us>. Website: <www.verotec.us>.





# KIT-BUILDING

BY JOE EISENBERG,\* KØNEB

## “Everyone Can Use a Pal”

### The QRPMc Pocket Pal II



As delivered, the Pocket Pal II has the board and most of the parts inside the supplied mint tin.

This month, I am building a kit that helps you find good parts at a hamfest flea market, or in your junk box. With the hamfest season in full swing, I have found that even the simplest things discovered in a flea market need to be tested somehow. There are treasures like LEDs, receivers, transmitters, speakers, headsets, and panel meters available, but no easy way to test them. The QRPMc Pocket Pal II is an Altoids®-sized kit put out by Rex Harper, W1REX, and tests all the things I just mentioned.

The Pocket Pal II combines a simple signal generator that works on 20 and 40 meters, a frequency counter, a panel meter tester, crystal tester, LED tester, and a speaker/headset tester. That is a lot of test gear in one small kit. And yes, it does fit easily in your pocket. Powered by a 9-volt battery, it becomes a powerful tool not only for flea market adventures, but for checking things in your junk box at home as well.

The PC board supplied with the Pocket Pal II is double-sided, plated-through and pre-tinned, so solder flows easily.

\*7133 Yosemite Drive, Lincoln, NE 68507  
e-mail: <k0neb@cq-amateur-radio.com>

**“The Pocket Pal II combines a simple signal generator that works on 20 and 40 meters, a frequency counter, a panel meter tester, crystal tester, LED tester, and a speaker/headset tester.”**

There are a few places, especially around the transistors, where the holes are very close together. I suggest using 0.020-thickness solder or thinner when soldering those areas to prevent solder bridges. Of course, any bridges that do occur can be easily removed by holding the soldering iron to that point and drawing the excess solder down the leads by holding the PC board so gravity helps the excess solder flow away from the board.

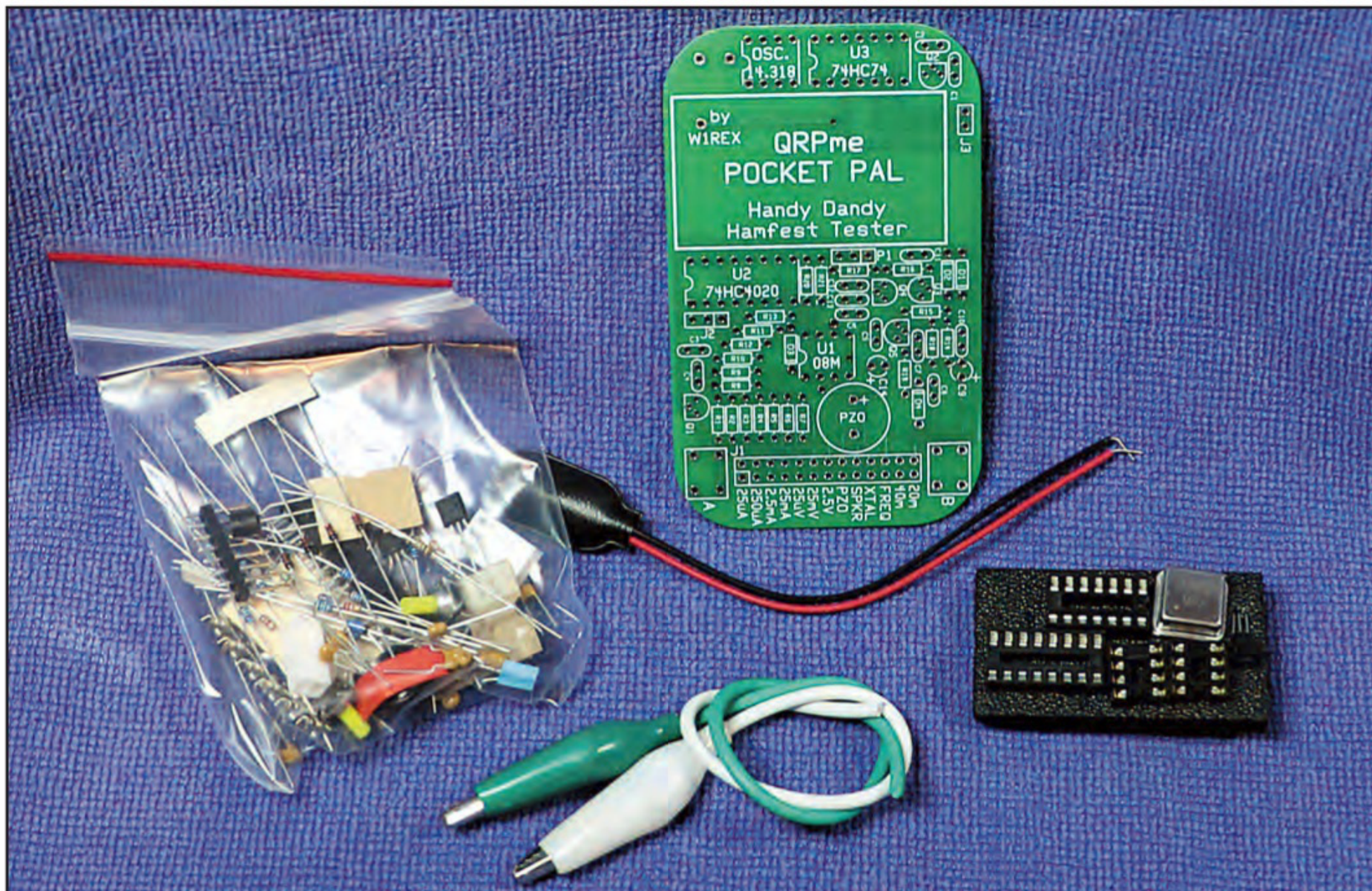
The PC board comes packed in the mint tin case supplied with it, along with most of the other parts stuffed inside. First off, I must say that since this kit uses a number of 1/8-watt resistors, many builders might have problems reading the very tiny color stripes on them. There are a couple of solutions to this problem, but one stands out as the best. Using a bright magnifying lamp helps a lot to identify these tiny resistors. The best solution by far is to use either a multimeter or a component tester to find the value of the resistor. Then you can sort them by value so it is easier to pick the correct resistor each time. I double-verify the resistors by using my meter again, just before I mount the part on the board.

The capacitors are tiny as well, so using the magnifying lamp helps again, as does using a component tester to verify their values, especially if they are rubbed off. Rex uses a stage-by-stage method for assembling this kit, so you build and test each function as you go along. This method allows you to be sure everything up to that point works before continuing assembly. I find that method the best of them all when building kits.

Once I got all the tiny resistors sorted out, I also sorted and tested the capacitors to make that part of the assembly go more easily as well. There are very few other components to deal with. There is a long connector that is the interface where you plug in the parts to be tested. I found it easiest to solder one pin on one end and then use a finger to press it tightly against the board while reheating that pin and doing the same on the opposite end. That way, it solders flush to the board. I use that same method to ensure the IC sockets are flush with the PC board. There are clear markings on the board that show you which set of pins to connect the device to be tested. LEDs can be simply placed on this socket as per the instructions, while other parts need to be connected via the clip lead set. Using the supplied parts, you can create a 2-pin plug that plugs into that socket and connect to the part in question.

There is also a 3-pin jack for reprogramming the PICAXE controller chip that is the heart of the Pocket Pal II. The firmware does come already burned onto the chip, but for





The board and bag of parts are stored inside the tin for shipment.



The completed Pocket Pal II ready to perform tests.

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(from page 54)

## Milestones: W1YL Awarded Russian Krenkel Medal

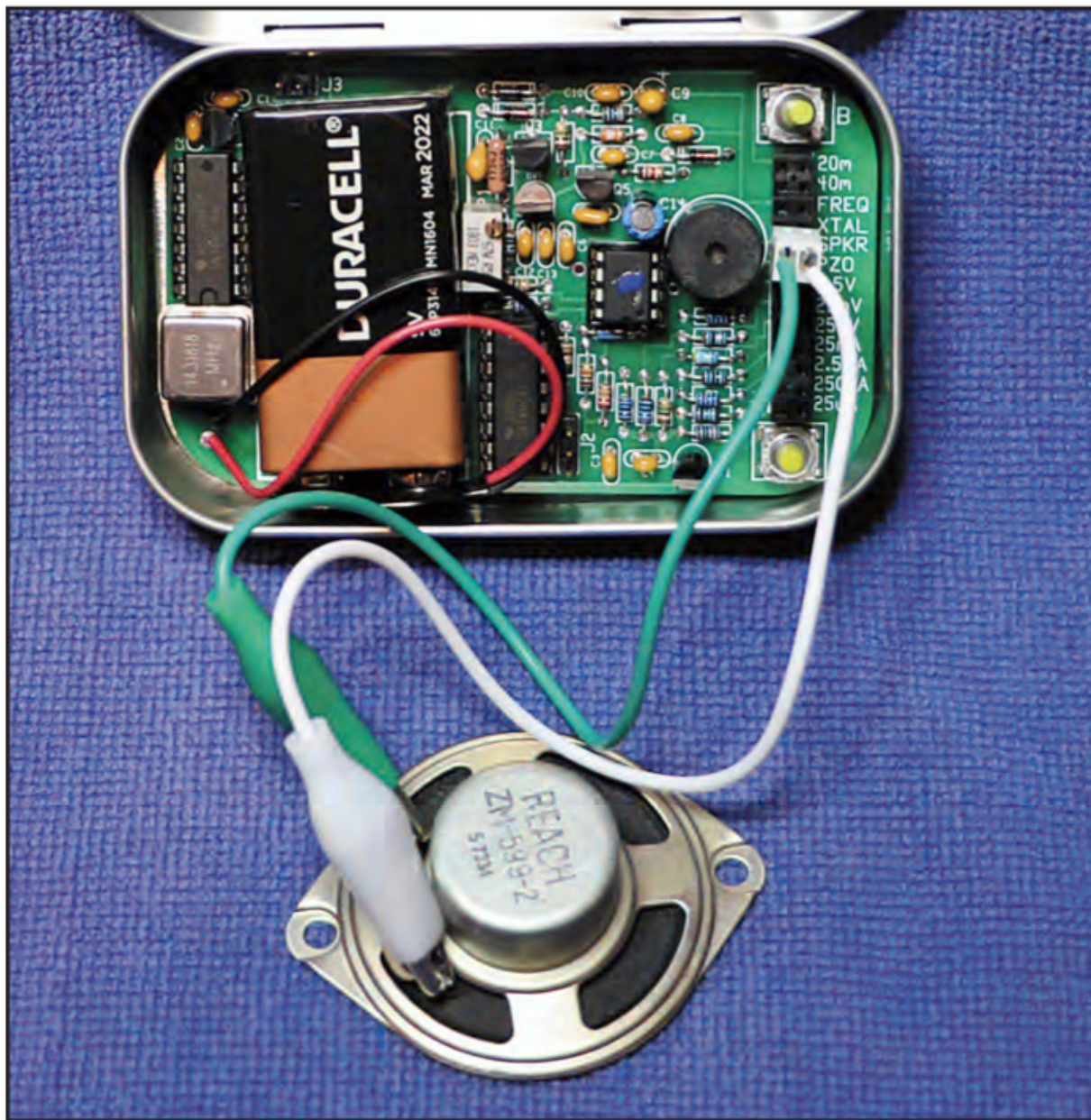
DX *grand dame* Ellen White, W1YL, is the latest recipient of Russia's E.T. Krenkel Medal, a prestigious award granted to individuals and organizations for outstanding global contributions to amateur radio. She is only the 28<sup>th</sup> recipient of the award, according to George Wagner, K5KG, who provided us with this news. Ellen was honored for her work as the ARRL's Deputy Communications Manager and QST DX Editor as well as being instrumental in the establishment of two contesting clubs, Murphy's Marauders (the predecessor of today's Yankee Clipper Contest Club) and the Florida Contest Club. For many years, Ellen also recorded QST magazine on tape for the Library of Congress's talking book program for the visually-impaired. Ellen was featured in the 2018-19 CQ Amateur Radio Calendar.

## Antenna Agreement Reached Between Arizona Hams and Homeowners' Association

The 75 hams living in the Sun City Grand community outside Phoenix, Arizona, have won the right to put up outdoor antennas. According to *Newsline*, the homeowners' association board of directors voted 6-1 to allow certain outdoor amateur antennas. These include flagpole antennas no more than 16 feet high (which may be erected in the front yard), as well as backyard verticals extending no more than 5 feet above the peak of the roof and wire antennas subject to the same height restrictions. Applications must first be approved by the standards office of the 10,000-home community's architectural review committee. The hams stressed the public safety value they can provide during emergencies in their negotiations with the HOA.

## New Distracted Driving Laws in Two States Exempt Hams

Hams and other two-way radio users are exempted from new bans in two states on the use of handheld electronic devices. *Newsline* reports that new laws in Arizona and Minnesota specifically exempt amateur, CB and commercial two-way radios from the otherwise total bans on handheld devices that are not totally voice-controlled.



*In the speaker test mode, it supplies a series of varying tones to test a speaker.*

those interested, the source code is open source and can be modified if you understand PICAXE programming. The manual also refers to cutting out a piece of cardboard to form an insulator for the bottom of the tin. As I have advanced in age, I find myself getting lots of mailings containing plastic cards that resemble credit cards that are only there to get your attention and open the envelope. I have found that many of these cards fit inside these mint tins with little or no modification. I only had to trim a tiny amount from each of the four corners with my wire cutters to make the plastic card I found fit perfectly. Thanks, AARP.

I found it takes a good afternoon to assemble this kit and having the case supplied makes it that much nicer when completed. There are two buttons on the board. One controls the voltage and current test functions as well as the microcontroller functions, while the other turns on the test oscillator and frequency divider. The divider allows you to choose between a 20-meter or 40-meter test signal. There is no power switch as the two test buttons are momentary, so power is turned off when not testing.

When you turn on the microcontroller functions, you hear a short message in Morse code. If a crystal is connected to the crystal test pins, it will give the frequency in Morse. If it senses a RF signal, it counts the frequency and sends it in Morse. If it doesn't sense RF, making the result zero, it goes into the audio test mode for testing speakers and headphones as long as the button is held down. The Pocket Pal II also can test a piezo speaker as well. There are special pins for connecting a piezo speaker. The Pocket Pal II is available from qrpme.com and sells for \$35.00 plus shipping and handling.

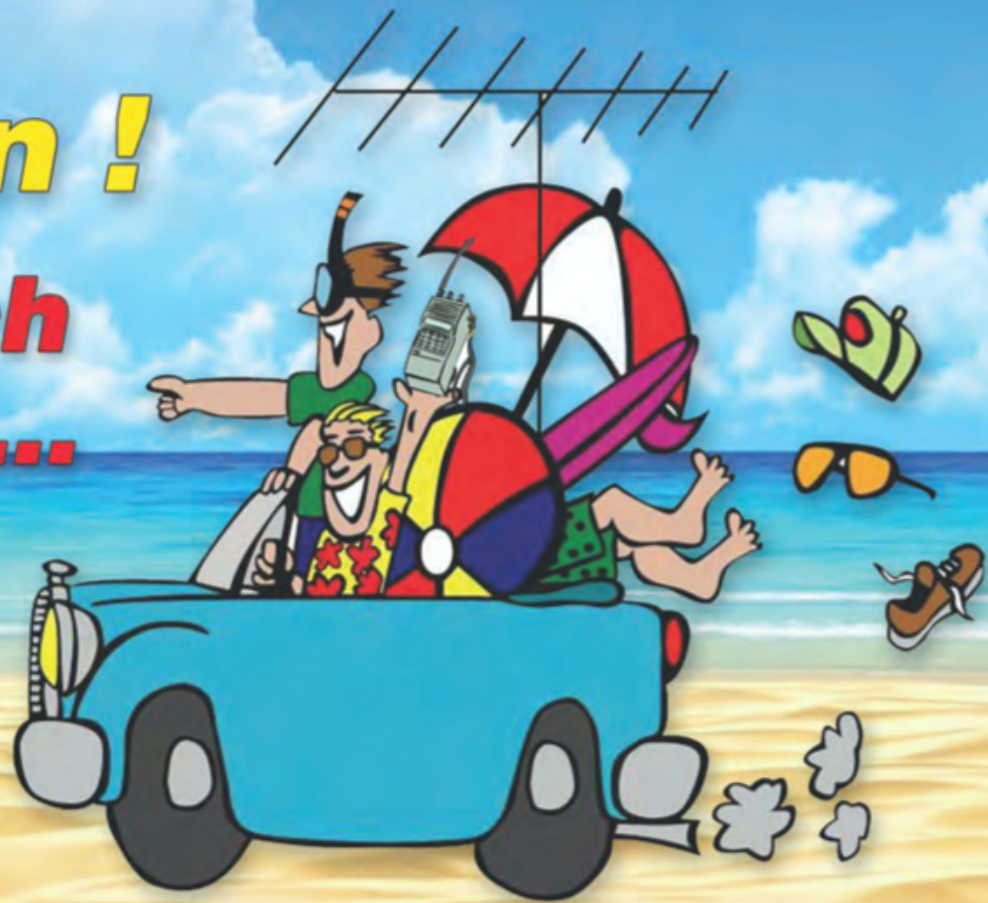
With Field Day upon us, it is a great time to demonstrate your kit radios and accessories to your fellow hams and show them how much fun it is to make and use the things you make yourself. I plan on coming to the upcoming Huntsville Hamfest in August, so be sure to say hi if you see me there, or at any other hamfest.

– Until next time, 73 de KØNEB



# Fun in the Sun!

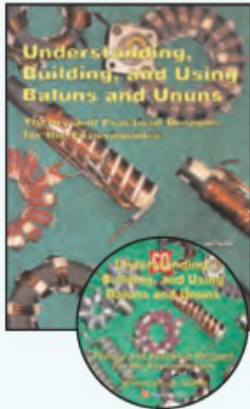
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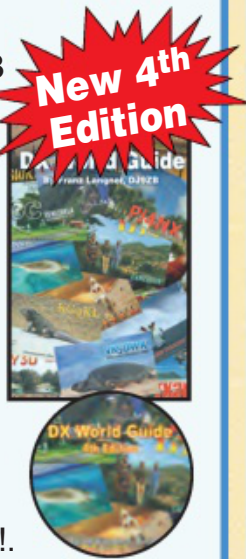
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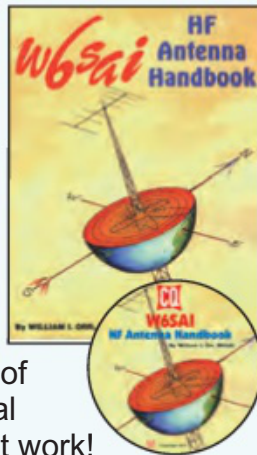
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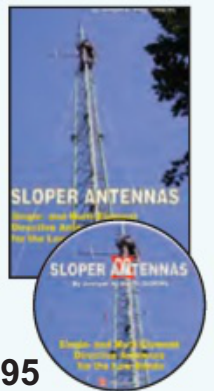
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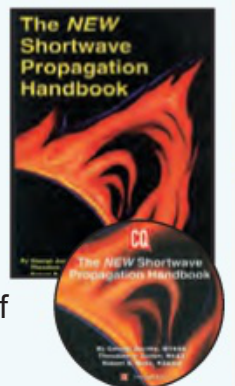


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## Spring Cleaning, Kit Building, and a Little Less Noise

Welcome to the June QRP column. By the time you read this column, I will have finished the dreaded task of spring cleaning. Each year my XYL plans a full weekend of cleaning the house from top to bottom (including my ham shack) to rid the house of dust and cobwebs. Other than a clean house, the only positive outcome from a weekend of cleaning is dining out at my favorite local Chinese restaurant while the kitchen is under lock-down for cleaning. One other positive outcome stemmed from this year's cleaning event; I found a QRP dummy load kit I had purchased at a hamfest and had presumably lost until I found it mixed in with my collection of antenna books, past CQ magazines, and an array of other items haphazardly stacked on a bookshelf in my ham shack. Finding this kit was timely as I had been preparing to install a noise-limiting module in my Yaesu FT-817 and needed a small project to refresh my soldering skills prior to tackling this job. When I excitedly told my XYL about my find, she reminded me how much good stems from spring cleaning ... I am sure I will be reminded of this again next spring.

This month we build the SMD-Dummy Load kit available from 3<sup>rd</sup> Planet Solar/KC9ON. The dummy load is designed for QRP/low-power communications and provides an inexpensive introduction into the world of surface mount devices (SMD). We also cover my experience installing bhi's DSP

Noise Reduction Module in the FT-817. It is a great product that has made a night and day difference in reducing background noise in the FT-817 and several other transceivers lacking digital signal processing (DSP) noise-reduction technology.

### 3<sup>rd</sup> Planet Solar's QRP SMD-Dummy Load Kit

3<sup>rd</sup> Planet Solar/KC9ON is owned by John Clements, KC9ON. The SMD Dummy Load kit (*Photo A*), a variety of other amateur radio kits, and miscellaneous parts (including toroids and small variable capacitors) are available via his website <www.kc9on.com>. The dummy load is designed for a 50-ohm load and reportedly operates from 500 kHz to 30 MHz with an SWR less than 1.1:1 and is usable up to 225 MHz with an SWR less than 1.3:1. The dummy load is rated for power levels up to 20 watts (for a short duration) which is perfect for QRP operation.

This kit was designed as a first-time build for those who have not previously worked with SMD. SMD components are tiny in comparison to their traditional through-hole counterparts and generally have no leads or pins for soldering to the PC board. Instead, these components are soldered directly to the surface of the PC board, and it takes practice (and patience) to mount them correctly. This technology has largely replaced through-hole construction in commercial products as it allows more parts to be packed onto the PC board, resulting in a smaller packaged product (i.e. compact transceivers).

\* <ka8sma@cq-amateur-radio.com>

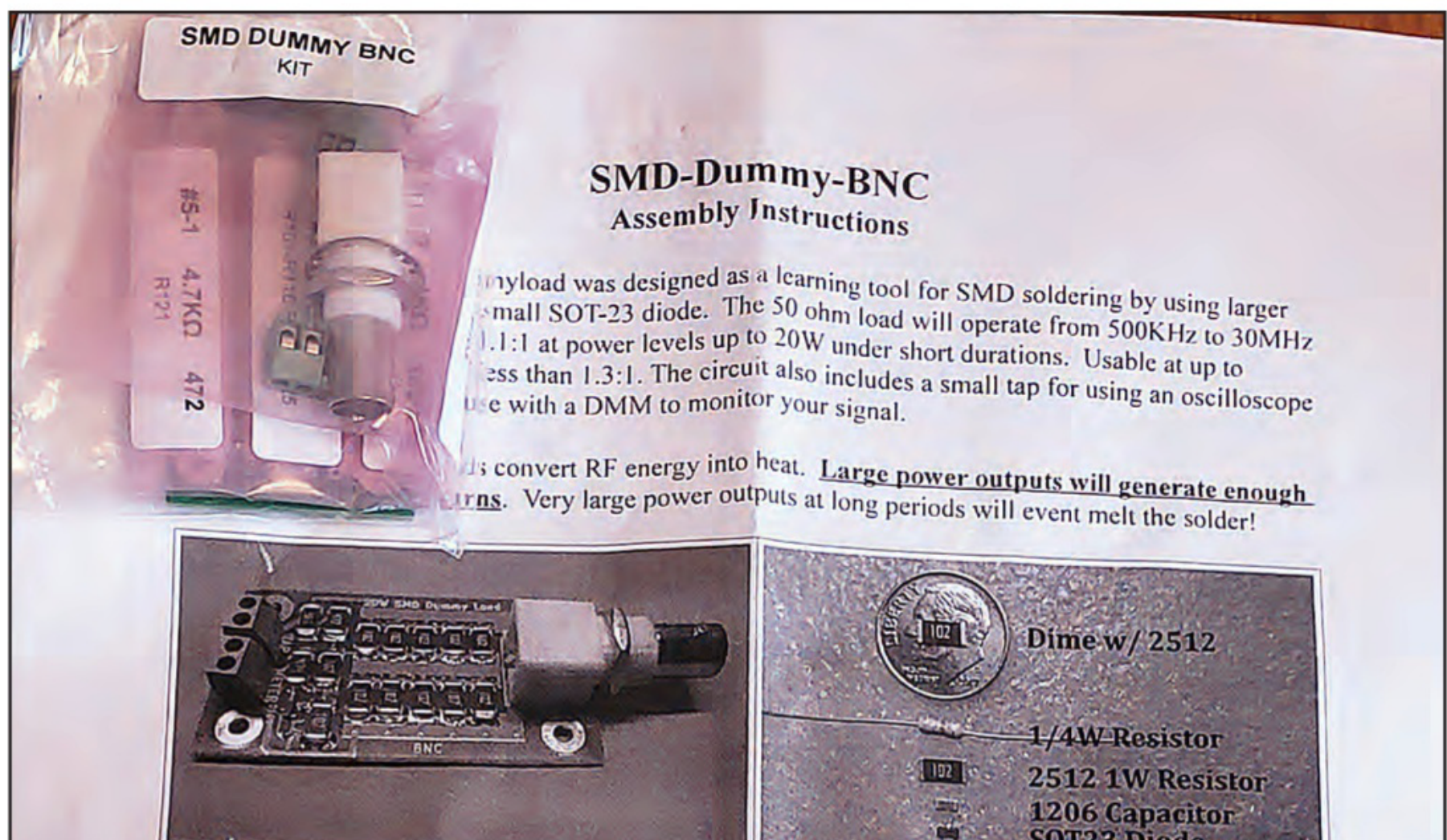


Photo A. The QRP SMD Dummy Load Kit. Simply packaged and ready to build.



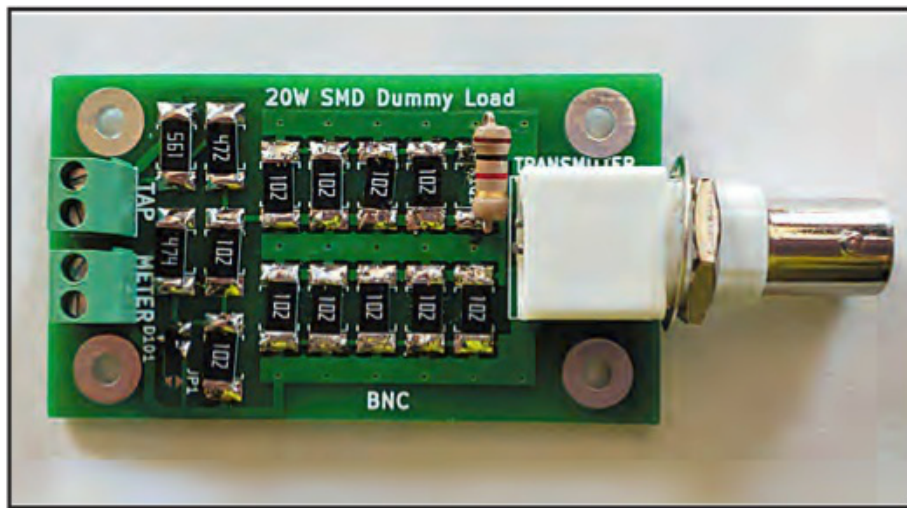


Photo B. The completed kit. Note my goof that resulted in the use of a through-hole style resistor to complete the build.

All my kit building and homebrew project experience has been with through-hole components. I am used to seeing resistors with color coded bands and easily identifiable values printed on the sides of ceramic and electrolytic capacitors. Surface-mount technology is different and often requires the use of a magnifying glass (at least for my weary eyes) to identify each part. If you have not previously worked with SMD components or are not sure which part is which, I recommend consulting the *ARRL Handbook* or online resources for additional information.

Since this was my first SMD project, I took my time and double-checked each part prior to soldering it to the PCB board. The kit contains 25 resistors, one diode, one BNC connector, a silk-screened PCB board, and two 2-pin terminal blocks for optionally connecting an oscilloscope and voltmeter to the circuit for monitoring your signal (a nice feature). All the parts are individually packaged so there is no need to sort the different resistors in the kit ... thank you, KC9ON. The PCB board is 1.4 inches by 2.5 inches in size and has a front and back side, as resistors are mounted on both sides of the board.

SMD components are often mounted on both sides of the PCB board to further reduce space requirements.

Total build time was about 1.5 hours. The tricky part for me was soldering the resistors to the board. The instructions provide several tips on how to properly solder SMD components. I found that "wetting" the pads on the PCB board with a little solder, sliding the resistor into position (using tweezers) and then holding it in place while soldering worked well. I was moving at a steady pace until I accidentally broke one of the resistors in half. I am not sure if I had pinched the resistor too hard when picking it up with my tweezers or applied too much pressure while holding it in place when soldering, but let it be known to the first time SMD part handler that these components should be handled with care. Since I had no 1K-ohm SMD resistors on hand, I raided my junk box and found a 1K-ohm resistor (through-hole style) that I tack soldered to the pads to replace the SMD resistor I broke. The through-hole style resistor is a monster in comparison to its SMD counterpart and sticks out like a sore thumb, but it got the job done.

The kit's instructions were clearly written and easy to follow. To ensure each resistor was properly mounted, the instructions suggest checking the total resistance at the transmitter's connection port with an ohmmeter after installing each resistor. A list of resistance values is provided to assist with this check. This exercise was very helpful in ensuring there were no mounting issues. Due to their size, I would not want to troubleshoot an issue on the PCB board after installation of all resistors is complete.

### The Burn Test

Photo B shows the completed kit ready for the burn test. I connected the dummy load to my FT-817 and adjusted the power output to 5 watts. After keying down the FT-817 for 20 seconds, the dummy load was barely warm to the touch and the FT-817's built-in SWR meter showed an SWR of 1.1:1. Since all of my QRP gear is 5 watts or less, I was not able to test the dummy load up to 20 watts, nor did I exceed more than 20 seconds of key down time with 5 watts input. It is



Photo C. bhi's ready-wired noise reduction module and instructions.



important to note that an enclosure for the dummy load is not supplied with the kit. This is fine for me as I have several small project boxes from past projects that need a home.

This dummy load kit gets a thumbs up. It was easy to build and provides a good introduction to surface mount technology. It also allowed me to dust off my soldering iron and practice soldering and working with small parts before installing the noise reduction module in my FT-817, which is full of SMD components.

### bhi's Noise Reduction Module – Excellence in a Small Package

Regular readers of this column know that I have a fascination with the FT-817. It is small, rugged, highly portable, and most importantly, it works. I use it in the ham shack for operating SSB, CW, and digital modes, contesting, portable operations, and working DX well into the wee hours of the morning (which annoys my XYL to no end -hi)! Although I love my FT-817, the background noise level is high in comparison to radios equipped with DSP technology. One fix for this problem is a DSP noise reduction module like the one offered by bhi (*Photo C*).

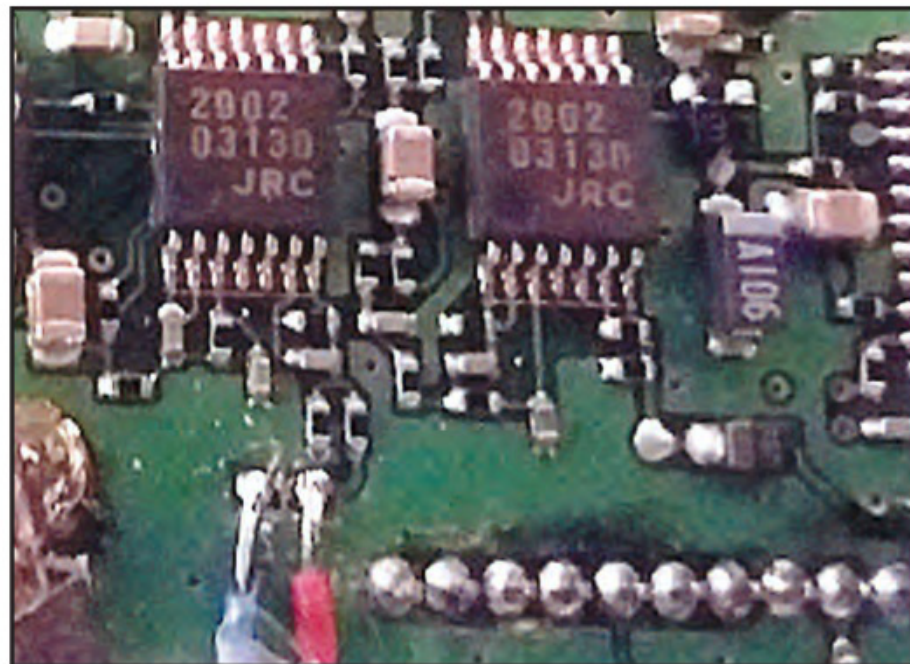
I have known about bhi's audio noise reduction module (Model Number NEDSP1061-KBD) for several years and have heard great things about this product, but my minimalist nature and desire to keep things simple (I am always hesitant to add any extras) has kept me from purchasing and installing this gadget until recently. After taking the plunge and installing this module, I truly regret not getting one year ago as it significantly reduces S6 to S7 background noise and allows me to hear DX stations otherwise buried in the noise floor.

This noise eliminator can be purchased from bhi in the UK <[www.bhi-ltd.com](http://www.bhi-ltd.com)> or from a stateside supplier of bhi products (GigaParts and DX Engineering are two that I am aware of). It comes ready-wired so you can install it yourself or have it professionally installed. The module is wired into the audio path of the transceiver and incorporates DSP technology that provides up to 35 dB of noise cancellation. The incoming audio signals are digitally processed which differentiates speech from background noise. A push button switch installed on top of the transceiver controls the desired level of noise reduction by attenuating unwanted noise and interference. An LED and audible beep alert the user each time a different level of noise reduction is chosen. The module operates on 5 to 15 VDC and draws its power from the radio by tapping directly into its power supply. Current draw is around 45 milliamps.

Module installation involves removing a surface mount capacitor from the bottom side of the FT-817's main PC board and soldering wires to the pads from which the capacitor was removed (*Photo D*), soldering two additional wires to the main board, and drilling two holes through the FT-817's case for installing the LED and a push button switch for selecting up to eight levels of noise reduction. A complete set of installation and operating instructions comes with the unit. The instructions outline step-by-step how to install the module and include close-up photographs of the FT-817's PC board showing the locations where work needs to be completed. I found the photographs to be most helpful during the installation process.

### Trouble in Paradise

After reading the instructions twice and familiarizing myself with the photographs, I set out to complete the project. My



*Photo D. Bottom side of the FT-817's main PC board where the SMD capacitor is removed and the module's wires are soldered to the pads.*

FT-817 is such an important part of me that removing the top felt like I was performing surgery on myself. The FT-817 was "under the iron" for a little over an hour while I carefully removed its PC boards, removed the tiny SMD capacitor from the bottom side of the main board, and completed the wiring. After resetting the PC boards and installing the push-button switch, I decided to fire-up the module before putting the case back together. After double-checking all connections, I connected my antenna and power supply and turned on the FT-817. The rig came to life and I heard stations on 20 meters blaring through the background noise I was so accustomed to hearing. After ensuring the radio was operating properly, I switched on the noise reduction module and nearly fell out of my chair when the background noise was reduced with a single push of the button. After each push of the button the background noise was further reduced until all I could hear was speech with no background noise. I played with the radio for nearly an hour with its cover partially off and the module hanging in mid-air supported by wires as I had not yet seated the module's PC board inside the FT-817.

After asking myself why I had not made this modification years ago, I seated the module inside the radio, tucked all the wiring inside, and placed the cover back on the radio. After the cover was in place and the last screw tightened, I turned on the radio and discovered the module was not working ... Arghhh! I removed the cover, checked all the power connections, and inspected the module's PC board. I could not find any obvious issues and concluded after several minutes of fiddling that I must have somehow damaged the DSP processor (chip) while positioning the board inside the radio.

### WD8BWW to the Rescue

I recalled seeing on bhi's webpage that professional installation was available via WD8BWW (Andrew Ruggiero) who owns Mid America Technology <[andyit28@gmail.com](mailto:andyit28@gmail.com)>, a factory authorized service center for Yaesu, Kenwood, and ICOM products. Without hesitation, I contacted WD8BWW and explained my situation. He was very helpful and offered several ideas of what the issue could be, but after a few minutes of speaking with him I thought the best way to resolve this issue was to pack up the FT-817 and ship it to him for repair as the thought of reopening the radio for another



round of troubleshooting (a frustrating endeavor) did not appeal to me.

As soon as WD8BWW received my FT-817 he tested the module and discovered the problem was a blown diode on the module's board. After discussing the fix with WD8BWW it appeared I had not seated the module's PC board correctly inside the FT-817 and the pads on the bottom of the module's PC board had likely shorted out against the FT-817's chassis, causing the problem.

Service from WD8BWW was excellent and the fee to fix the problem was too little, in my opinion. It cost me more to ship the radio (via UPS ground) for the repair than it did for the repair itself. WD8BWW's fee to professionally install the bhi DSP Noise Module is extremely reasonable — especially after factoring in the 48 hours of trauma I underwent waiting to hear if I had blown-up my trusty QRP rig by installing it myself.

The FT-817 is now back in the ham shack (*Photo E*) and the DSP filtering module is doing its job. I typically run the module at level 3 (out of 8) as this level removes most of the background noise leaving crisp, clear audio. On CW, the module does an excellent job in distinguishing between background noise and CW, leaving only dits and dahs to be heard. Just what the doctor ordered.

### Projects Complete!

KC9ON's SMD Dummy Load kit provides an inexpensive way to familiarize yourself with SMD components. The dummy load performs as it should (it's a dummy load, right) and its small size makes it easy for taking on the trail. KC9ON offers a lot of other kits, too, so be sure to check out his website.

Hands down, purchasing and equipping my FT-817 with bhi's noise elimination module is some of the best money I have spent in amateur radio. This installation can be performed by a ham with a modest level of technical experience; however, as I learned properly, seating the module's PC-board is crucial. If I had to do it again, I would spend the money to have the module professionally installed. The bhi module is available for several radios other than the FT-817 including the Kenwood TS-50S, ICOM IC-706MkIIIG, and the Yaesu FT-897. The module can also be added to the Yaesu FT-857 by WD8BWW, who has reviewed the schematic and determined how to make this addition. By mentioning these "non-QRP" radios I like to think I helped some QRO fellows this month — hi!

— Until August, 73



*Photo E. A happy FT-817 showing off its push button switch for the noise reduction module.*

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# MICROCONTROLLERS IN AMATEUR RADIO

BY ANTHONY A. LUSCRE\*, K8ZT

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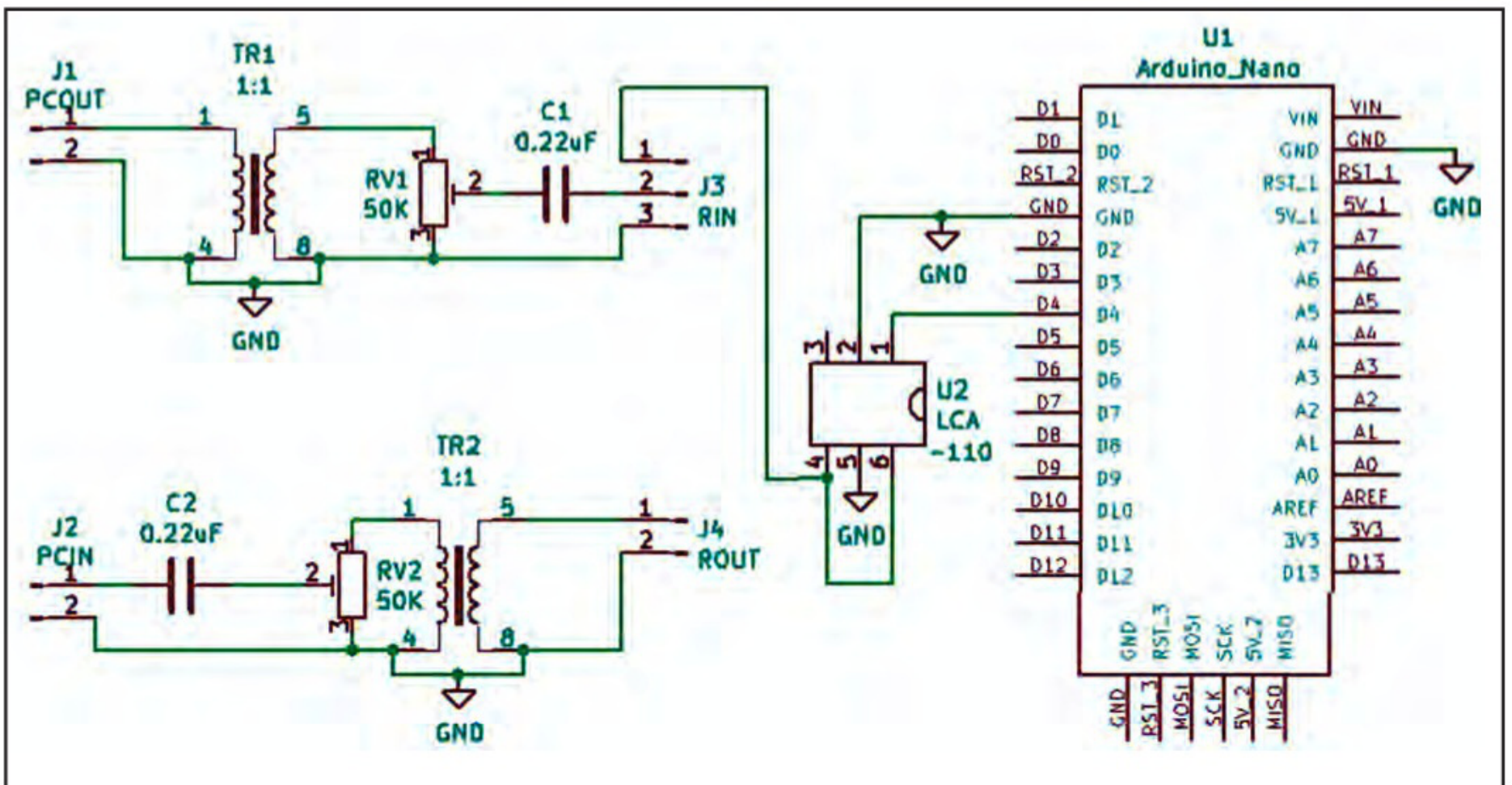
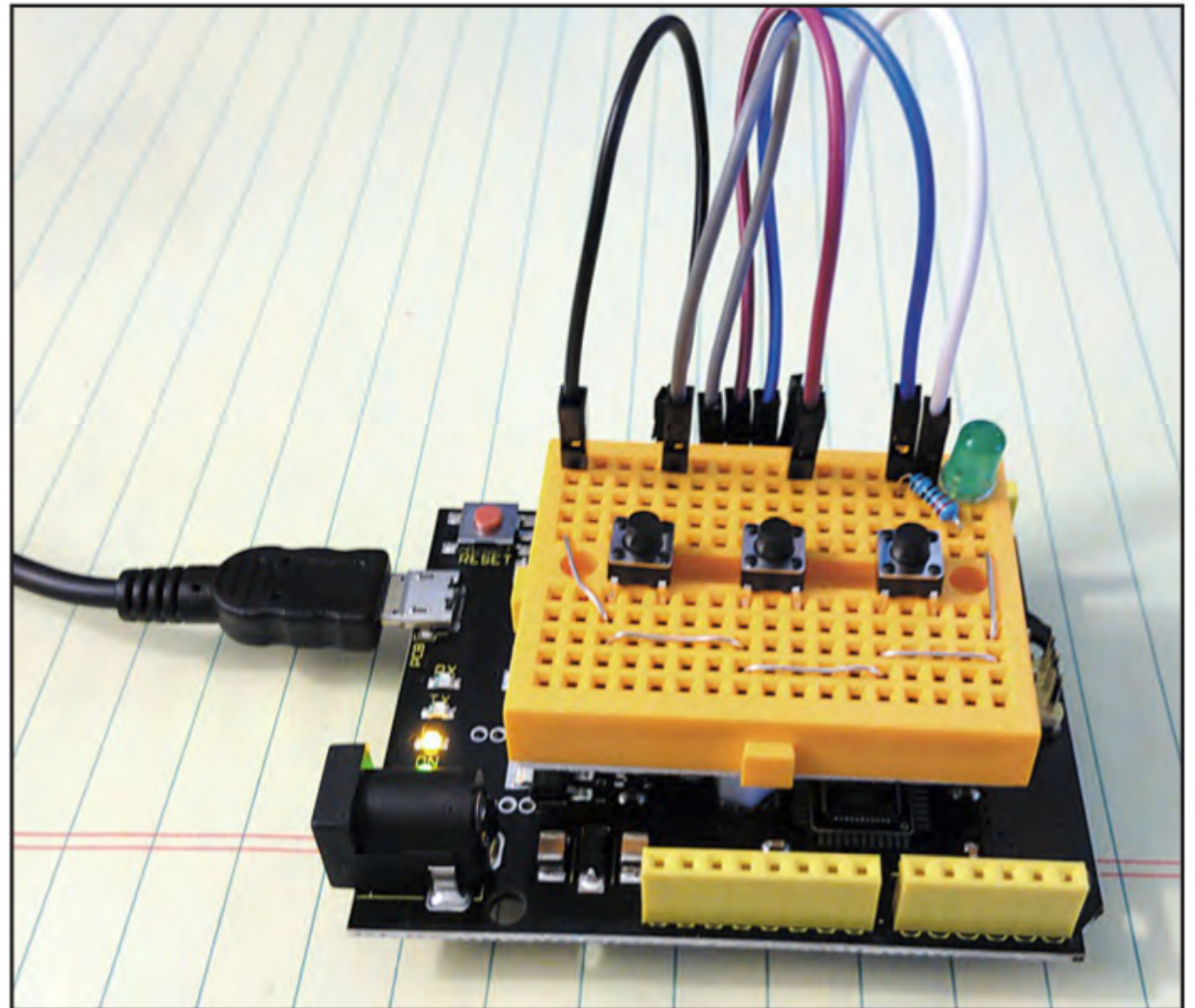
Plus, a Pi With a Pedigree

This month, we start with an email from Ralph Irons, N4RLI, who told me: "I recently developed a very simple Arduino Leonardo project, Num ++, which gives DigiPan software <[www.digipan.net/](http://www.digipan.net/)> the ability to automatically increment serial numbers for contest operating." He provided a short video demonstration link <<https://youtube/0aZpmwHbfv4>> and said the complete project description is at <<https://tinyurl.com/y5oqmkqm>>.

Ralph's project adds a missing feature to DigiPan software to allow easier contest exchanges. Pushing the first button sends his callsign to answer a CQ. Pressing the second button sends the contest exchange with an auto-

\*email: [k8zt@arrl.net](mailto:k8zt@arrl.net),  
website [www.k8zt.com](http://www.k8zt.com)

Ralph Irons, N4RLI's, Arduino Leonardo project, Num ++, allows DigiPan to automatically increment serial numbers for contest operating. (Photo by Ralph Irons)



John Price, WA2FZW's, "Yet Another Audio Interface for the Digital Modes (But With CAT Control)" schematic. (Courtesy of John Price)





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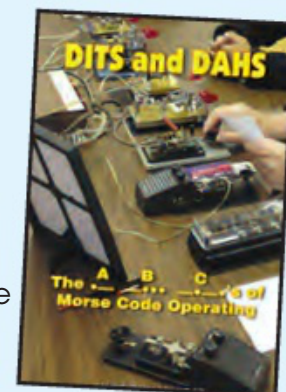
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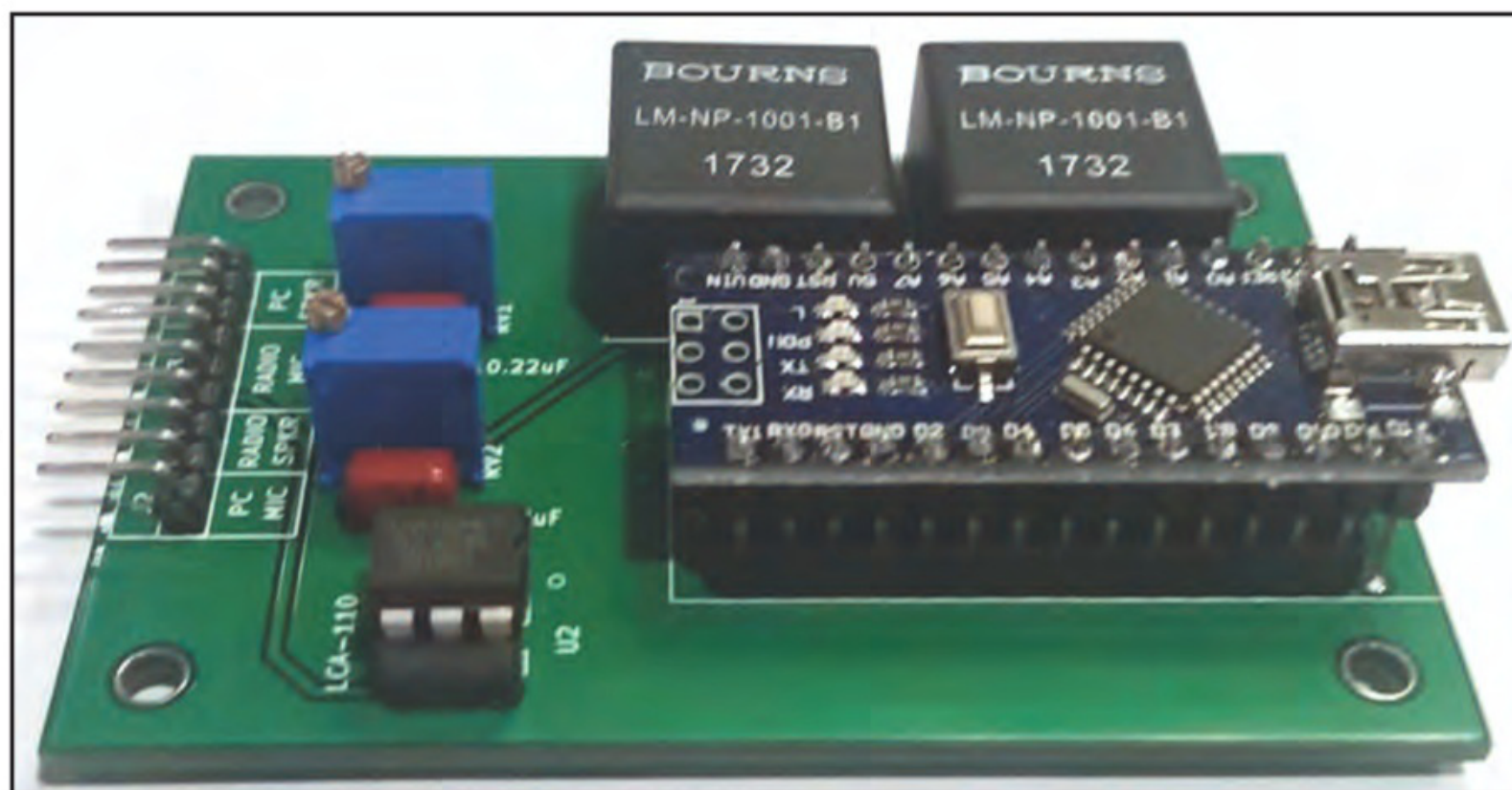
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John Price, WA2FZW's "Yet Another Audio Interface for the Digital Modes (But With CAT Control)" as a fully built circuit board. (Photo by John Price)



incremented serial number. Pressing the third will repeat the same exchange if the other station needs a fill.

Our next Arduino project comes from John Price, WA2FZW: "Yet Another Audio Interface for the Digital Modes (But With CAT Control)." John says his project "... is a hybrid of the 'EASY DIGI™' by KF5INZ' audio interface and a few other designs that are floating around. What's different about this one is that I added an Arduino Nano processor so that the transmitter could be keyed via CAT

control instead of using the more common RS-232 hack." After suffering a failure of his primary radio, John designed the interface to use with his old Swan-250C 6-meter rig, but it should work with almost any radio.

Looking over other projects from John, including an Arduino-based controller for the AR-22 rotator, I think John's motto could be, as he says, "computerizing stuff that was never meant to be computerized." Details on his AR-22 project plus lots of other great information can be found in the files sec-



tion of SoftwareControlledHamRadio@groups.io at <<https://tinyurl.com/yxzg6cvu>>.

## RigPi™ Station Server

Let's switch gears and take a look at a commercial product that utilizes a Raspberry Pi at its heart. The RigPi™ Station Server also known as the MFJ-1234, is the handiwork of Howard Nurse, W6HN, who has been writing ham radio software for more than 40 years and is also the son of former Heathkit President (and CQ Amateur Radio Hall of Fame inductee) David Nurse, W8GCD (SK).

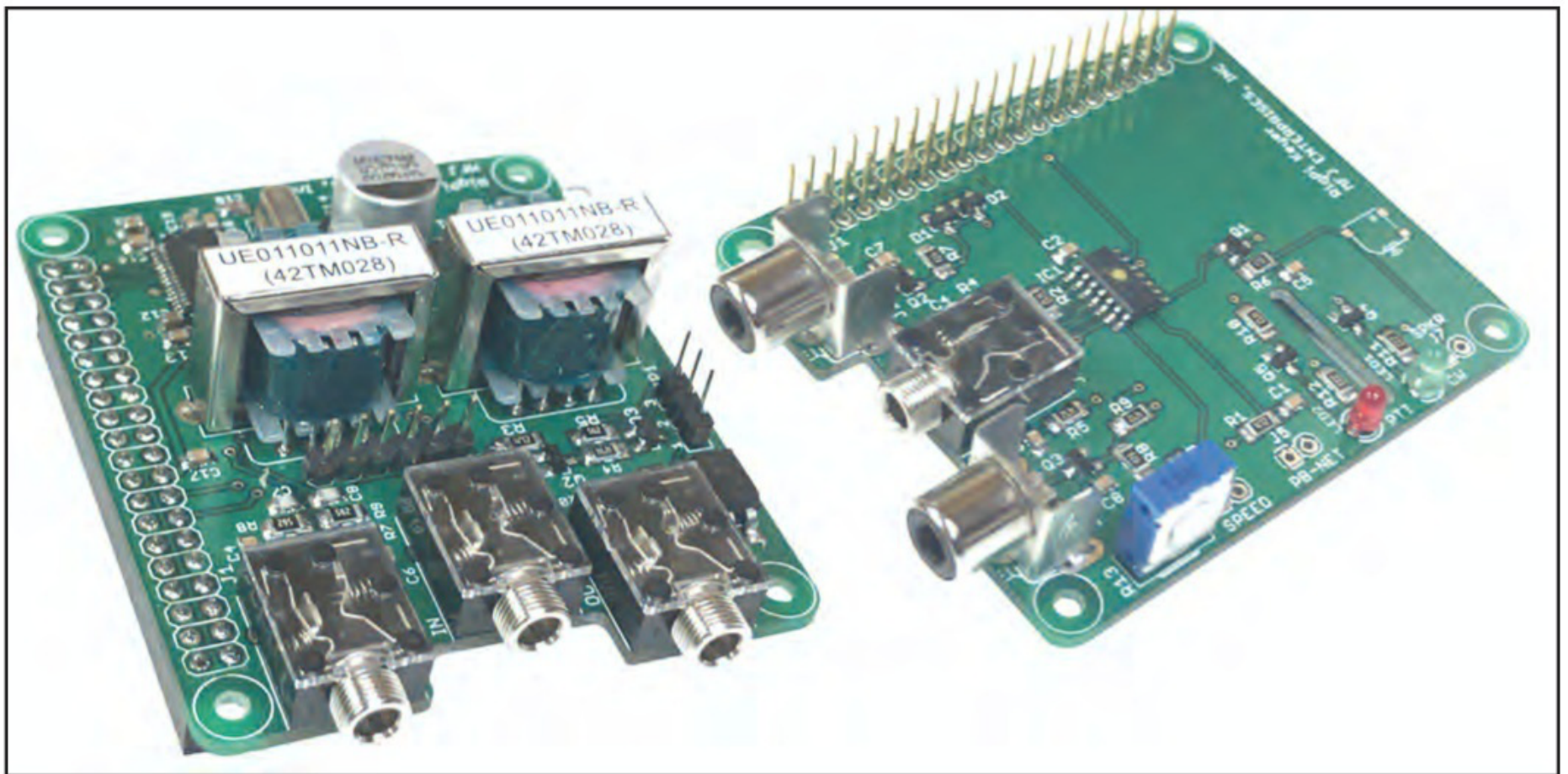
Here is the description from the RigPi website <<https://rigpi.net>>: "RigPi Station Server (RSS) is an easy-to-use multi-operator, multi-radio (MOMR) amateur radio control, logging, CW keying, spot management, and call lookup system. RSS is based on a Raspberry Pi computer running Linux, plus RigPi Keyer and RigPi Audio boards. RigPi Keyer uses the popular K1EL WinKeyer chip for keyboard or paddle input. RigPi Audio is used for Voice-Over IP (VoIP) and remote



The RigPi™ Station Server also as known as the MFJ-1234. (Courtesy of MFJ)



The RigPi™ in action. Here it's connected to an Elecraft KX3 along with the monitor showing RigPi Server Software in a web browser. (Courtesy of Howard Nurse)



In addition to the Raspberry Pi board, two important components in RigPi are the RigPi Audio Board that provides input and output audio for VoIP or other digital audio processing programs plus I/Q auxiliary inputs for use in Panadaptors; and the RigPi Keyer which generates perfect Morse code using the popular K1EL WinKeyer chip. (Courtesy of Howard Nurse)



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operations, or for digital modes and I/Q spectral display (panadapter). The RSS can be used on any computer or mobile device that provides an internet browser (*making it both platform and software independent –ed*).” The software for RigPi will be available on GitHub <<https://github.com>> as a free, open-source, download. This will allow you to add your own features to RSS.

In his email to me, Howard said the unit will be making its premier at the 2019 Dayton Hamvention™ at the MFJ booth. You can also order it via the MFJ website <[www.mfjenterprises.com](http://www.mfjenterprises.com)> or from other dealers carrying MFJ products. Howard also wanted to acknowledge the other hams involved in developing, tweaking, and getting the RigPi in production: Mike, WB8CXO; Jim, K8JK; Tom, W5KUB; Larry, KØLEJ; Mike, N6MQL; Marty, WA1VIN; Martin, K5FLU; and Ben, KB5ZO.

Do you know of a *Microcontroller Devices (µCD) in Amateur Radio* project or are you working on one yourself? I always welcome your email comments and questions to make this column better.



Close up of RigPi Server software. (Courtesy of Howard Nurse)



In addition to browser access, CommCat Mobile for iOS and CommCat for Windows can connect to RigPi RSS for radio control. (Courtesy of Howard Nurse)



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## ATSC 3.0: The Next Revolution in Broadcast Video

**Y**ou may know that the standard for broadcast television video since the digital conversion a few years ago is known as ATSC, which stands for Advanced Television Systems Committee, the name of the body responsible for formulating the standard (the analog standard in the U.S. and Canada was NTSC, for National Television Systems Committee). Almost as soon as the FCC and international standards bodies approved the initial ATSC standard, work began on a successor. ATSC 2.0 was nearly dead before it got off the ground, though. The rapid pace

of technology meant that a standard focused on advanced video compression, targeted advertising, better programming guides, and video on demand was outpaced by the marketplace before it could be formulated. That meant work quickly focused on ATSC 3.0, and that new standard will be coming to your TV in the next two years. So, get ready and we'll have a look at what that means.

**Table 1. Initial ATSC 3.0 Markets in the US**

Atlanta, GA  
Austin, TX  
Baltimore, MD  
Boston, MA  
Charlotte, NC  
Chicago, IL  
Cincinnati, OH  
Cleveland-Akron, OH  
Columbus, OH  
Dallas-Ft. Worth, TX  
Denver, CO  
Detroit, MI  
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Milwaukee, WI  
Minneapolis - St. Paul, MN  
Nashville, TN  
New York, NY  
Orlando-Daytona Beach-Melbourne, FL  
Philadelphia, PA  
Phoenix, AZ  
Pittsburgh, PA  
Portland, OR  
Raleigh-Durham, NC  
Sacramento-Stockton-Modesto, CA  
Salt Lake City, UT  
San Antonio, TX  
San Diego, CA  
San Francisco-Oakland-San Jose, CA  
Seattle-Tacoma, WA  
St. Louis, MO  
Tampa-St. Petersburg-Sarasota, FL  
Washington, DC  
West Palm Beach-Ft. Pierce, FL

### Will I Need to Buy a New TV Again?

Here's the good news and bad news: No, you won't need to go out and buy a new TV right away ... but without it, none of the new services will be available to you. The FCC and most world regulatory bodies have taken a market-based approach to 3.0. They are not mandating it with a hard implementation date as was taken with the initial digital conversion. Instead, stations wishing to broadcast in 3.0 must also maintain their 1.0 broadcast for now. Viewers won't notice much of a difference when local stations begin adding the new signal (although you might need to rescan your local channels on your TV). You can be sure that the stations will hype it constantly as the financial investment to begin the broadcasts in 3.0 is substantial.

### What Will the New Standard Offer?

ATSC 3.0 is a collection of about 20 sub-standards. The benefits attributed to the new digital broadcasts are many. For starters, high efficiency compression of the video (HEVC) for video up to resolutions of 3840 x 2160p, 4K television at up to 120 frames per second, a wide color range, digital watermarking, improved audio with two optional standards (Dolby AC-4 and MPEG-H-3D), the ability to "datacast," and a few things that are based on the wider data such as targeted advertising and a more sophisticated emergency alert system. Better support for mobile devices is also promised.

### Isn't This Going to Be Obsolete Soon, Too?

That's always a possibility with tests of 8K and higher resolutions already out there but in principle, the ability of 3.0 devices would include a "bootstrap" capability allowing for future changes. Time will tell how well and for how long that works. The FCC has indicated that it will neither require the installation of new tuners in new televisions nor will it offer any subsidy program for the industry and consumers.

### What About Backward Compatibility?

Obviously, with so much video already available and very little in 4K and up, the standard must allow for dealing with lower resolution video (and it does). While the tuners for 1.0 can't receive 3.0 broadcasts, the 3.0 devices will receive video from 720 x 480 and up or in other words, the lowest levels of current HD video.

### When Does it All Start?

Really soon now. On May 31, 2017, SBS, MBC, and KBS officially launched their full-time ATSC 3.0 services in major South Korean markets such as Seoul and Incheon. For U.S. viewers, the television industry expects between 20 and 40

\* email: [commhorizons@gmail.com](mailto:commhorizons@gmail.com)  
Twitter: [@shuttleman58](https://twitter.com/shuttleman58)



markets to have at least one local station broadcasting in 3.0 by the end of 2020<sup>1</sup>. The transition, as mandated by the FCC, requires that current “mandatory carry” rules for 1.0 remain in effect for the foreseeable future. You’ll not lose your cable or OTA (over the air) feeds in the next year or two. Stations will be required to provide sufficient on-air notice about any change to services. Further, stations won’t get a second channel for a gradual changeover. The FCC has said it recommends multiple broadcasters in each market co-locate ATSC 1.0 services on a single transmitter. Although many do this now, this might be a problem in smaller markets if owners can’t agree. Simultaneously, broadcasters would need to share any remaining transmitters for 3.0. This might make for some strange “tower friends.”

At some future point, ATSC 1.0 transmissions would end and stations could return to using their own transmitters. Issues might arise because of spectrum reallocation in some markets. In the past, voluntary transitions haven’t always worked well. In this case, the National Association of Broadcasters (NAB) is behind it and there is one standard. What consumers will do remains to be seen.

### You Don’t Suppose This’ll Be Done for Free...

TV stations are excited about the ability to add targeted advertising based on consumer locations or preferences, and the ability to add better warning notices. It also provides a “wake-up” capability if your device supports it so you won’t miss warnings. The standard provides for data to be geolocation-specific which, along with other consumer data flowing from your smart TV, phone, and GPS receivers, could mean very targeted advertising (location, demographics, etc.) Like similar efforts, this might make some consumers wary.

The ability to specifically target weather, public safety, and emergency information to TVs only in very specific areas would clearly have more value to consumers. One recent demonstration was able to show the ability to air fire warnings to a single street had it been available during the recent “Camp Fire” in California.

In order to reduce fraudulent distribution, the 3.0 spec allows for digital watermarking. It does not appear that, at present, there is much attention being paid to this feature.

### Audio: Your 12 channels or 3D?

The audio options for the standard include mono, stereo, and current surround sound for backward compatibility. However, the real excitement is for Dolby AC-4 and MPEG-H 3D audio. Dolby AC-4 is an evolution of current Dolby systems such as Dolby Digital Plus. AC-4 provides up to 5.1 audio channels (5 main speakers: Left and right front, left and right rear, and center) plus a bass speaker or subwoofer. All 3.0 TV tuners which support AC-4 must support 5.1 as a baseline. It also allows as an option for the delivery of 7.1.4 speaker systems (7 base speakers, one subwoofer, and 4 “height” or ceiling speakers). The good news is that AC-4 sound systems are already appearing on the market (at a price!).

The other option, H-3D, is more interesting. Its focus is to create the immersive experience or true 3D sound. Created by the MPEG organization and spearheaded by Fraunhofer, Technicolor, and Qualcomm, it allows for up to 64 speakers and 128 channels of audio. Sony has been an early adopter with the marketing name “360 Reality Audio” and the South Korea trade association has said that their 4K TVs will only support H-3D audio. South Korean manufacturers Kai Media and DS Broadcast will support it for studios and con-

sumers. The Deezer and Tidal music streamers plan to add audio content to their services<sup>2</sup>.

### Can I Buy a TV to See It?

Yes ... in South Korea. South Korea’s regulators and industry have set ATSC 3.0 as the standard for ultra-high definition (UHD) broadcasting in the country. In 2017, LG Electronics announced that 4K TVs sold in South Korea would include ATSC 3.0 tuners. In the U.S., it looks as if it will be 2020 or 2021 before your favorite electronics retailer will have UHD compatible TVs for sale. Unless, of course, you want to import your own from South Korea.

The technology in the TV industry is moving rapidly. Buckle up and get out your wallet for the ride.

### What’s On Your Mind?

As always, I am happy to receive your comments, suggestions, and ideas. Feel free to reach out to me and share what you are thinking.

#### References:

1. <<https://tinyurl.com/y2fug3fx>>
2. <<https://tinyurl.com/yy4zyov2>>
3. <<https://tinyurl.com/y58x2x9p>>

### Figure 2. Station Groups Planning to Deploy ATSC 3.0

Fox Television Stations  
 NBCUniversal Owned Television Stations  
 Univision  
 Spectrum Co (Sinclair Broadcast Group and Nexstar Media Group)  
 Pearl TV organization (Cox Media Group, The E.W. Scripps Company, Graham Media Group, Gray Television, Hearst Television Inc., Meredith Local Media Group, Nexstar Media Group, and TEGNA Inc).  
 America’s Public Television Stations (APTS group)  
 Capitol Broadcasting  
 Hubbard Broadcasting  
 News-Press & Gazette Broadcasting, PBS stations in the Phoenix Model Market Next-Gen TV test.

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# ANTENNAS

BY ROBERT GLORIOSO,\* W1IS, GUEST COLUMNIST

## A Different Twist on a Dual-Band VHF/UHF J-Pole

WA5VJB has been busy stringing antennas between satellites — in orbit — and wasn't able to finish his planned column for this issue. Filling in for Kent this month is Robert Glorioso, W1IS, who describes how he solved some problems in making dual-band J-poles (intended mostly for field use) function well on both 2 meters and 70 centimeters. — W2VU

The J-pole typically used as a VHF/UHF vertical is not the usual quarter-wave antenna with radials. Rather, it is a half-wave end-fed vertical dipole often made with TV type 300-Ohm twin lead that doesn't need radials<sup>1,2</sup>. I have been making 2-meter versions of these for members of our ARES group for a few years and they have been successfully used by new hams, formerly inactive hams, and active members as a simple way to get involved with ARES or build portable capability. They are often hung inside or outside a window connected to a hand-held VHF/UHF rig, though hanging it 20-50 feet up in a tree delivers even better results. We recently started using 70 centimeters (440-450 MHz) and, although the TV twin lead 2-meter J-poles sort of work on 70 centimeters, they aren't all that effective. After building several J-poles using twin lead with assorted 70-centimeter traps made from RG-174 and RG-8X coax, with marginal success achieving a satisfactorily low SWR on both bands, I tried using stranded wire 450-ohm ladder line and the results were much better. (If you're not sure what a trap is, read on.) In fact, use of stranded 450-ohm ladder line solved a problem I had with other cables, making it easy to tune with one adjustment to deliver acceptably low SWR, typically 2:1 or less, on both 2 meters and 70 centimeters. Tuning is required to account for anomalies in both construction and materials as I found that, not only did ladder line from different manufacturers behave slightly

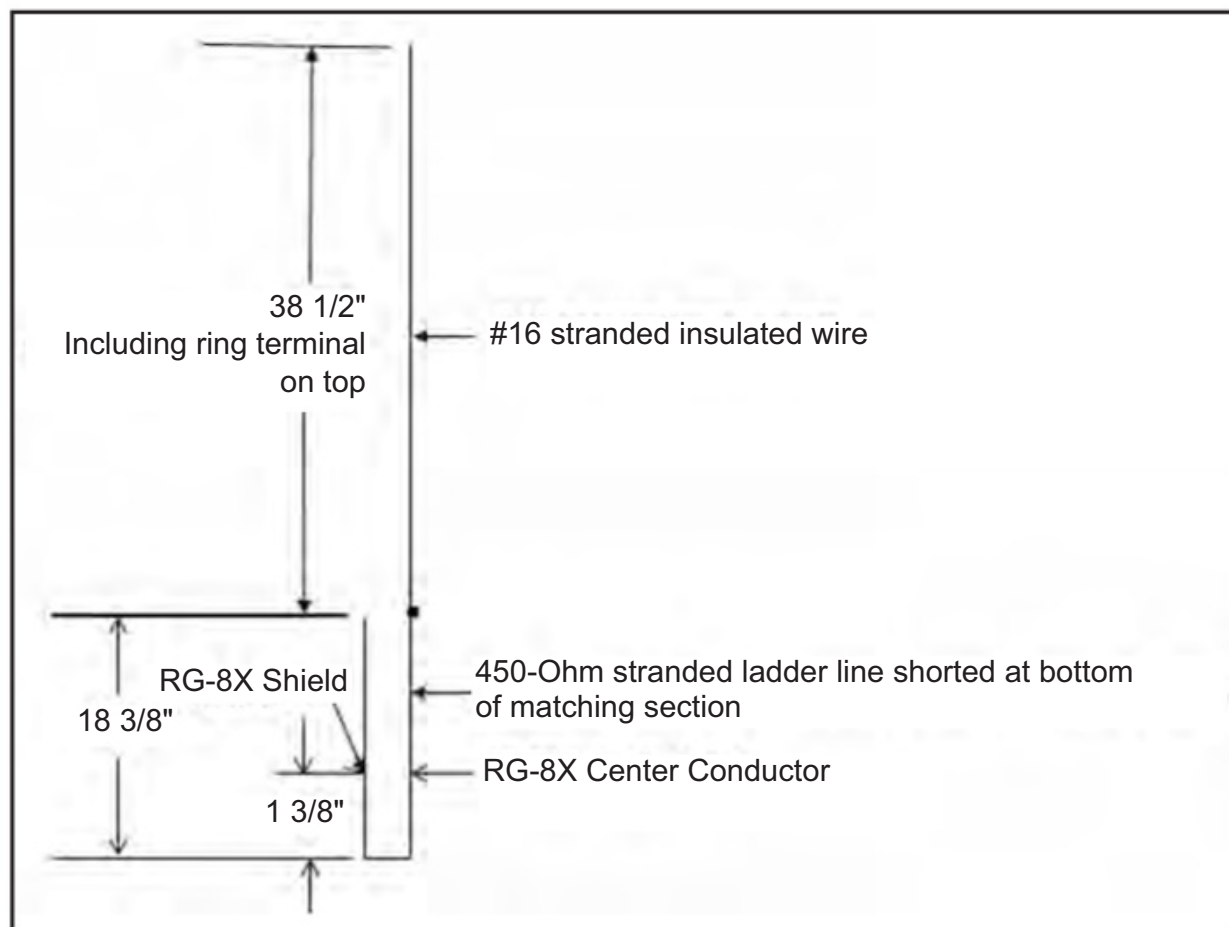


Figure 1. Two-meter J-pole dimensions

differently, but there also were variations in the same roll that was especially noted on 70 centimeters.

### A Bit of Theory

According to Wikipedia's description of a J-pole<sup>3</sup>, a half-wave antenna is usually fed from the center where the impedance is 73 Ohms, a fair match for the 50-Ohm coax we use. However, the impedance at the end of the dipole where the voltage is high and the current — theoretically zero, but actually just quite low — is 3000-5000 ohms and clearly not a good match for 50-ohm coax. The solution dates back to Zeppelin Airships in 1909, the early days of radio and aviation, when Hans Beggerow<sup>3</sup> invented the Zepp antenna. Aviation communications was not on VHF then as it is today, but on much lower frequencies, a few hundred kilohertz, requiring very long wire antennas trailing behind the aircraft. Rather than just throwing a wire out and having RF floating around the aircraft, Beggerow matched it with a quarter-wave match-

ing section also trailing behind the aircraft. The matching section consisted of two parallel wires, not unlike the open wire, ladder line or twin lead we use today, with one wire open at the far end and the other wire connected to a half-wave wire that actually radiates. The impedance at the far end of the matching section is much higher than at the driven end, 3000-5000 ohms. The J-poles we use for VHF and UHF today are really Zepps in a vertical configuration that depend on the same quarter-wave transmission line matching section. This results in a low impedance at one end of a quarter-wave transmission line being reflected as a high impedance at the other end. Thus, two quarter-wave transmission lines connected together in series to form a half-wave transmission line reflects the same impedance at each end.

The matching sections of this VHF/UHF J-pole uses a shorted quarter-wave transmission line made from stranded wire ladder line. The impedance at the shorted end is obviously near zero so it's driven a short way up

\* 70 Birch Hill Road  
Stow, MA 01775  
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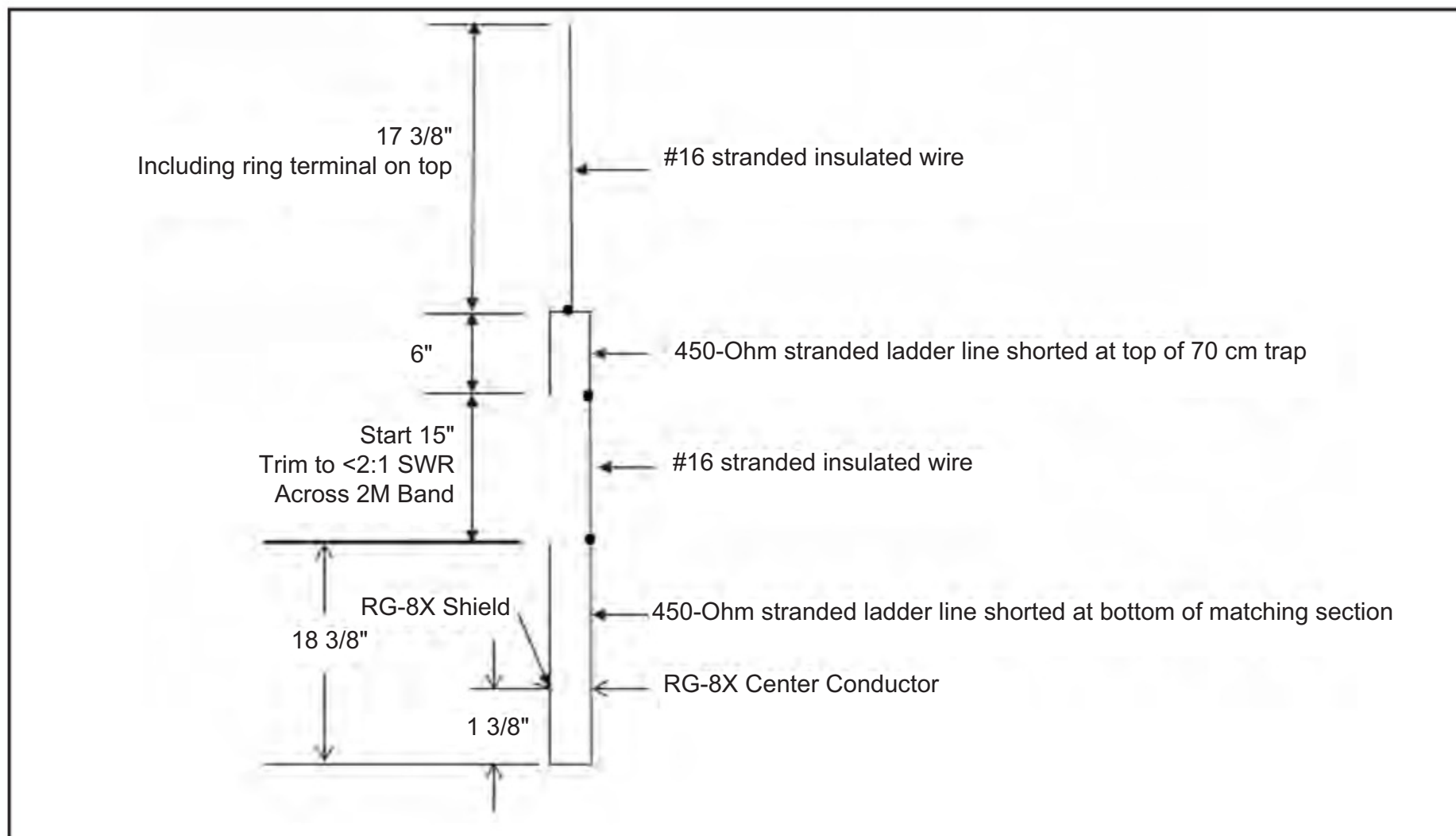


Figure 2. Dual-band (2m/70cm) J-pole dimensions

the line where the impedance is a good match to our 50-ohm coax as shown in the 2-meter J-pole diagram in *Figure 1*. One side of the high impedance end of the line is connected to the half-wave wire while the other end remains open.

In order to make a dual-band 2-meter/70-centimeter J-pole, we need a matching section that works on two frequency ranges, specifically 144-148 MHz and 440-450 MHz. If those frequencies are an odd harmonic apart, then the lower frequency section which is a quarter-wave on 2 meters is a three-quarter-wave section on the third harmonic, close to where we want to operate on 70 centimeters. How close? For example, the third harmonic of 146 MHz is 438 MHz, 7 MHz below our target of 445 MHz (the center of the FM portion of the band). That's not quite close enough to get a perfect match on both bands. In fact, the matching section used in this design that works well on 146 MHz is capacitive at 445 MHz. In order to use this matching section on 70 centimeters, we add inductance to compensate for the capacitance by making the 70-centimeter wire a bit longer. Normally, a

one-half wave on 445 MHz would be about 12.6 inches and a J-Pole for only 70 centimeters with a 2-meter matching section would have a longer wire, about 14 inches. The extra length provides the inductance to compensate for the capacitance of the matching section, thus making a useful, low SWR, 70-centimeter antenna.

Now that we can make separate 2-meter and 70-centimeter antennas with a 2-meter matching section, combining them into a single antenna is next. A 2-meter half-wave dipole is about 38 inches long so, if we can isolate the 14-inch 70-centimeter wire in a way that allows a 2-meter signal to pass through the isolation device while blocking the 70-centimeter energy, we can have both antennas on one feedline with a 2-meter matching section. The answer is a 70-centimeter trap, also known as a band-stop filter. Again, we take advantage of the impedance reflection capability of a shorted one-quarter wave transmission line that will "trap" the 70-centimeter energy while passing the 2-meter energy. The trap is a 6-inch piece of ladder line shorted at one end as shown in

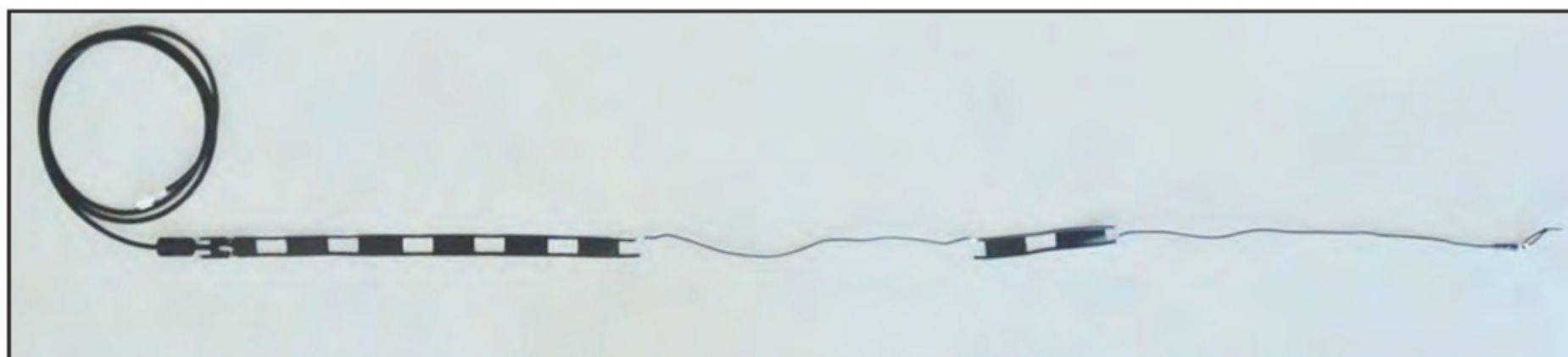


Photo A. Dual-band VHF/UHF J-pole



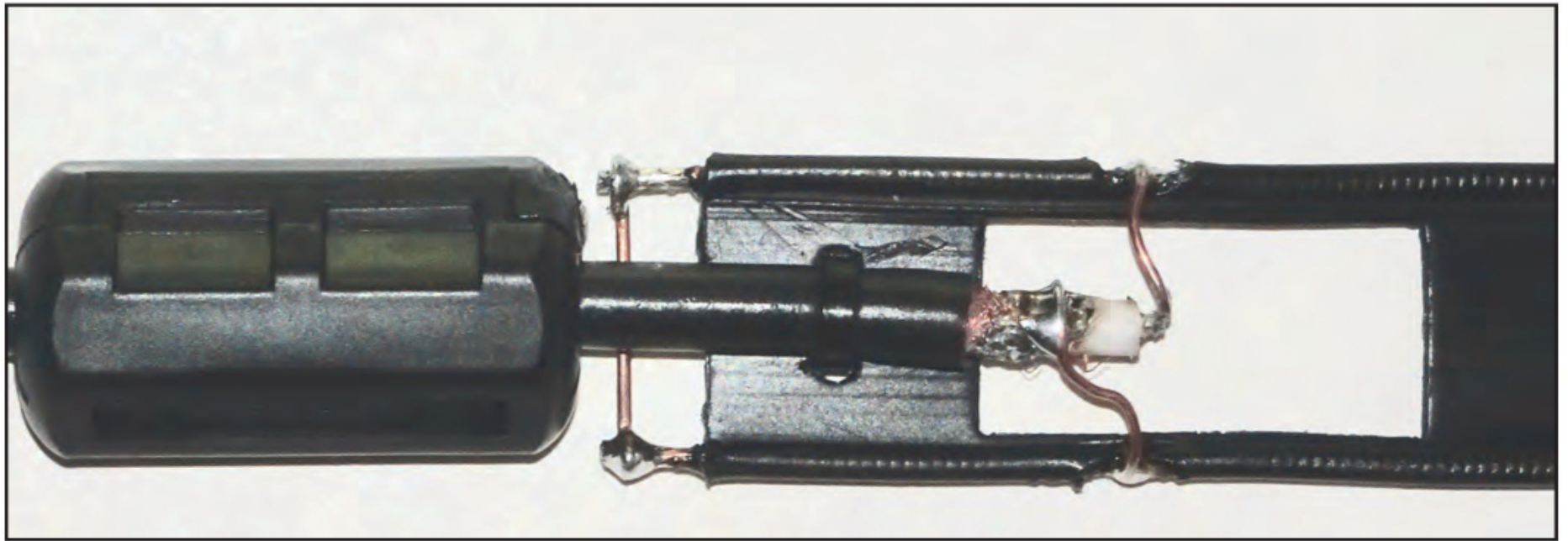


Photo B. Driven end of matching section

Figure 2 that looks like a high impedance to 70-centimeter energy on the wire and looks like a short to 2-meter energy, allowing it to pass through the trap.

### Construction

Refer to the photos in *Photos A* (completed antenna) and *B* (end of matching section) as you assemble the antenna.

Since this antenna was designed primarily for portable operation, stranded wire is used everywhere, making it easy to roll up and store in a go-kit, for example. The dimensions here are for stranded wire ladder line. Solid wire ladder line has a lower velocity factor, requiring shorter matching and trap sections.

Measurements are not difficult but require care, especially to obtain good results on 70 centimeters. Start by making the 2-meter matching section and the 70-centimeter trap. The wire ends of each should be no longer than 3/8 of an inch. Since there are several different configurations of stranded 450-ohm ladder line, it may be necessary to use a hobby knife to cut away the web at the ends to isolate the connection wires. Build the shorted sides first, using #18 solid wire for the short. Then carefully measure each from inside the short, marking then cutting them to length, 18-3/8 inches for the matching section and 6 inches for the 70-centimeter trap. Measure the feed point on the matching section 1-3/8 inches up from inside the short, strip 1/4-inch of the insulation and tin the wire. Drill two holes 1/4-inch apart in the matching section web to hold the strain relief cable tie.

Prepare six feet of RG-8X coax so the ends can easily be soldered to the matching section, as shown in *Photo B*. Using thinner coax such as RG-58 or RG-174 will work fairly well on 2 meters, but the losses will be high on 70 centimeters, even for a short length. Solder the coax to the matching section, attach a cable tie for strain relief and install a Type 43 clamp-on ferrite below the bottom of the matching section to keep RF off the outside of the feedline.

The final steps: Solder a ring terminal to the end of a roll of #16 stranded insulated wire then measure 17-5/8 inches from the tip of the ring terminal and cut the wire. Solder the wire to the center of the shorted end of the trap, leaving 17-3/8 inches between the shorted end of the trap and the end of the ring terminal. Make a loop using a cable tie around the ring terminal to serve as an insulator. Cut the 70-centimeter radiator to 15-1/2 inches of #16 stranded insulated wire and

solder it to the side of the matching section connected to the center of the coax; then solder the other end to one of the wires on the open end of the 70-centimeter trap.

### Tuning

To get an accurate measurement of the SWR, it is important to remain clear of the near field, about one wavelength away from the antenna, so if your coax is not six feet long, add a section of coax with a barrel connector to extend it to a least six feet. Connect the antenna to an antenna analyzer or a rig that measures SWR on 2 meters and cut the 70-centimeter radiator in 1/8-inch increments until the SWR is less than 2:1 across the 2-meter band. The 70-centimeter SWR will be acceptable, typically 2:1 or less, from 440-450 MHz. You can optimize the 70-centimeter SWR if you have an analyzer that covers that frequency range with further adjustment of the 70-centimeter radiator while cross-checking the 2-meter SWR. Tuning is a compromise between the two bands that are not quite a third harmonic apart.

If you don't have a way to measure SWR, cut the 70-cm radiator to 14-1/4 inches and you should be fine.

### Summary

So far, 13 of these antennas have been built, giving our ARES members a lightweight portable or fixed antenna for communicating on both bands. It also solved a TV twin-leaded 2-meter J-pole heating problem for one of our members who started with an HT and then purchased a 50-watt rig. This antenna handles 50 watts with aplomb.

### Acknowledgements

Thanks to Colin, W1DJR; Greg, N1DAM; and Peter, K1PAK, for their feedback and suggestions through the course of the development and writing of this article and to my XYL, Dee, W1MGA, for putting up with me as I spent more time than usual in the basement lab.

#### Notes:

1. J. Reynante, "An Easy Dual-Band VHF/UHF Antenna," *QST*, Sept. 1994, p. 51-52
2. "The DBJ-2: A portable VHF-UHF Roll-Up J-Pole Antenna for Public Service," *QST*, March 2009, p. 38-40.
3. Wikipedia, J-Pole Antenna, <[https://en.wikipedia.org/wiki/J-pole\\_antenna](https://en.wikipedia.org/wiki/J-pole_antenna)>



# VHF PLUS

BY TONY EMANUELE,\* K8ZR

## HamSCI Workshop 2019

### VHF Plus Calendar

ARRL June VHF Contest: June 8<sup>th</sup> – 10<sup>th</sup>  
DUBUS EME Contest 5760 MHz: June 8<sup>th</sup> & 9<sup>th</sup>  
DUBUS EME Contest 3400 MHz: June 29<sup>th</sup> & 30<sup>th</sup>  
CQ World Wide VHF Contest: July 20<sup>th</sup> & 21<sup>st</sup>  
Central States VHF Society Conference: Lincoln, NE  
July 25<sup>th</sup> – July 27<sup>th</sup>  
ARRL 222 MHz & Up Distance Contest: August 3<sup>rd</sup> & 4<sup>th</sup>  
ARRL 10 GHz & Up Contest: August 17<sup>th</sup> & 18<sup>th</sup>  
ARRL September VHF Contest: September 14<sup>th</sup> – 16<sup>th</sup>  
ARRL 10 GHz & Up Contest (Weekend 2):  
September 21<sup>st</sup> & 22<sup>nd</sup>  
ARRL EME Contest 2.3 GHz & Above:  
September 21<sup>st</sup> & 22<sup>nd</sup>

The second HamSCI Workshop was held Friday March 22<sup>nd</sup> and Saturday March 23<sup>rd</sup> in Cleveland, Ohio, at Case Western Reserve University (CWRU). For those not familiar with HamSCI, it was started in 2015 by ham-scientists who study upper atmospheric and space physics. Dr. Nathaniel Frissell, W2NAF, an assistant research professor at the New Jersey Institute of Technology Center for Solar-Terrestrial Research (NJIT-CSTR) and Dayton's 2019 Radio Amateur of the Year, was one of the principal organizers of HamSCI. The intent of HamSCI and its associated projects is to help advance our understanding of radio propagation by taking advantage of the network of radio amateurs as citizen scientists to observe and collect data in support of ongoing research activities.

Examples of the data collection networks that are generating a wealth of data for the study of HF and VHF propagation include: the Reverse Beacon Network, the Weak Signal Propagation Reporting Network (WSPRNet), PSKReporter, DX Cluster, and ClubLog. In the aggregate, these networks are generating large sets of data that was unthinkable just a few years ago. Over time, the data will further enhance our understanding of radio propagation<sup>1</sup>.

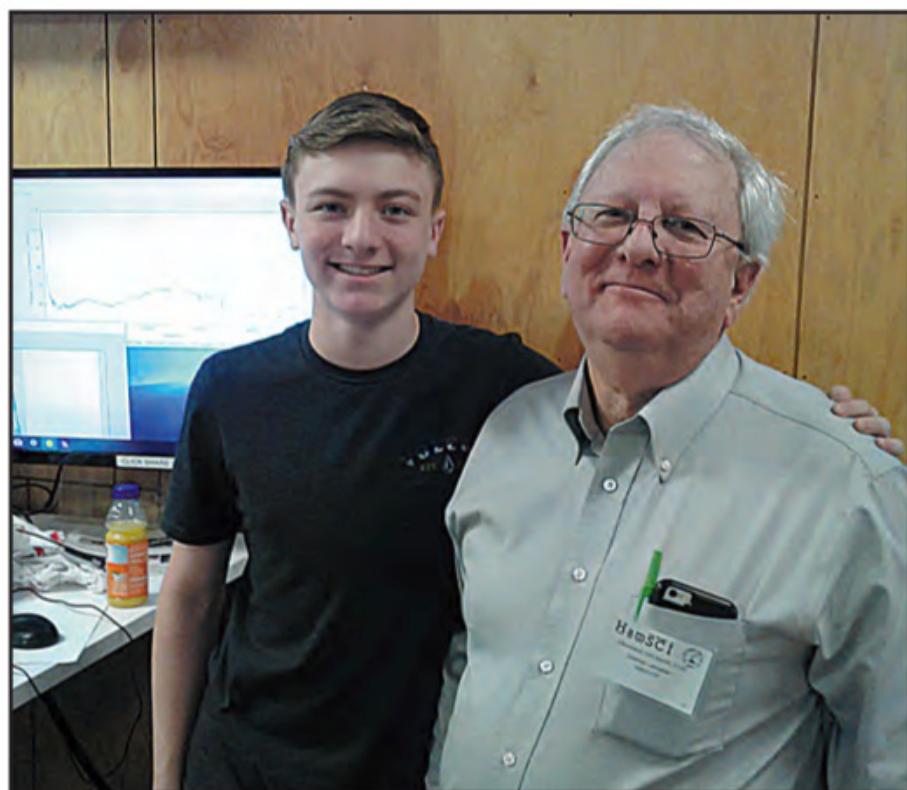
The HamSCI Workshop consisted of over 20 presentations from scientists and amateurs alike, with Saturday afternoon dedicated to working project demonstrations by several of the authors as well as a tour of CWRU's Makerspace<sup>2</sup> called the "Thinkbox." The topics presented ranged from *New Directions in Sporadic-E Research* by Bill Engelke, AB4EJ, to *Space Science for Ham Radio Operators* by Larisa Goncharenko, Ph.D. of the MIT Haystack Observatory.

The seemingly plain-vanilla titled presentation: *WWV Doppler Shift Observations*<sup>3</sup> was fascinating in that the study was based on WWV observed data collected by John Gibbons, N8OBJ, over a 28-year period. While John was studying for his Technician license in 1991, he pondered whether it was possible to determine when a propagation path was "usable." He concluded that he could track changes in propagation by monitoring WWV broadcasts.

John designed and built a Z80-based microprocessor system with an interface to Heathkit's Most Accurate Clock (HMAC) GC-1000. A 3-channel, crystal-controlled receiver, the GC-1000 monitored WWV on 5, 10, and 15 MHz and would lock on the frequency of the strongest signal. An observer could watch the MUF move up and down by monitoring the HMAC<sup>4</sup>. Nearly 4,000 lines of Z80 assembly language code later, N8OBJ's "HMAC Propagation Monitoring System" began collecting data. Check out



Presenters at HamSci Workshop included (from l. to r.) Frankie Bonte, KE8HPA, and her brother, Seamus, KE8GTT. (All photos by K8ZR)



Also presenting at HamSci Workshop were Ethan S. Grace and his grandfather, George Lemaster, WB5OYP.

c/o CQ magazine  
email: <k8zr@cq-amateur-radio.com>



John's website <[www.n8obj.com/index.html](http://www.n8obj.com/index.html)> for the data – arranged by year and frequency – which he has collected over the past 28 years<sup>5</sup>.

Members of the Army Cyber Institute at West Point presented *Conquering the Skip Zone: Short Range Voice and Digital NVIS Communication*. Military units are routinely in situations where the local geography — a mountain, for example — makes radio communications problematic. Satellite communications is a solution but it risks being detected by the adversary.

Using an Elecraft KX3 and a near-vertical incidence sky-wave (NVIS)<sup>6</sup> antenna on the 60-meter band, Army Lieutenant Colonel Stephen S. Hamilton, Ph.D., KJ5HY, and his team demonstrated the effectiveness of FT8 at very low power levels to overcome local obstacles and establish reliable communications while maintaining a small RF footprint.

Not all the presentations and projects were conducted by scientists or amateurs with decades of experience. George Marshall High School freshman Ethan S. Grace of Fall Church, Virginia, presented *Sudden Ionospheric Disturbances (SIDs) and Personal Space Weather Stations*. Under the watchful eye of his grandfather and mentor, George Lemaster, WB5OYP, Ethan built a VLF receiver and monitoring system to observe SIDs at home.

The brother-and-sister team of Seamus, KE8GTT, and Frances “Frankie”, KE8HPA, Bonte, ages 14 and 16 respectively, students at St. Francis DeSales High School in Columbus, Ohio, presented *Hams: The First Makers*. Their presentation compared amateur radio's long history of builders and experimenters to today's Maker movement with its emphasis on building and experimentation. Their joint effort was based on their experiences at the Makerspace called “The Point” at Otterbein University near Columbus.



Nathaniel Frissell, W2NAF, was honored with the 2019 Dayton Hamvention Amateur of the Year award for his work organizing HamSci.

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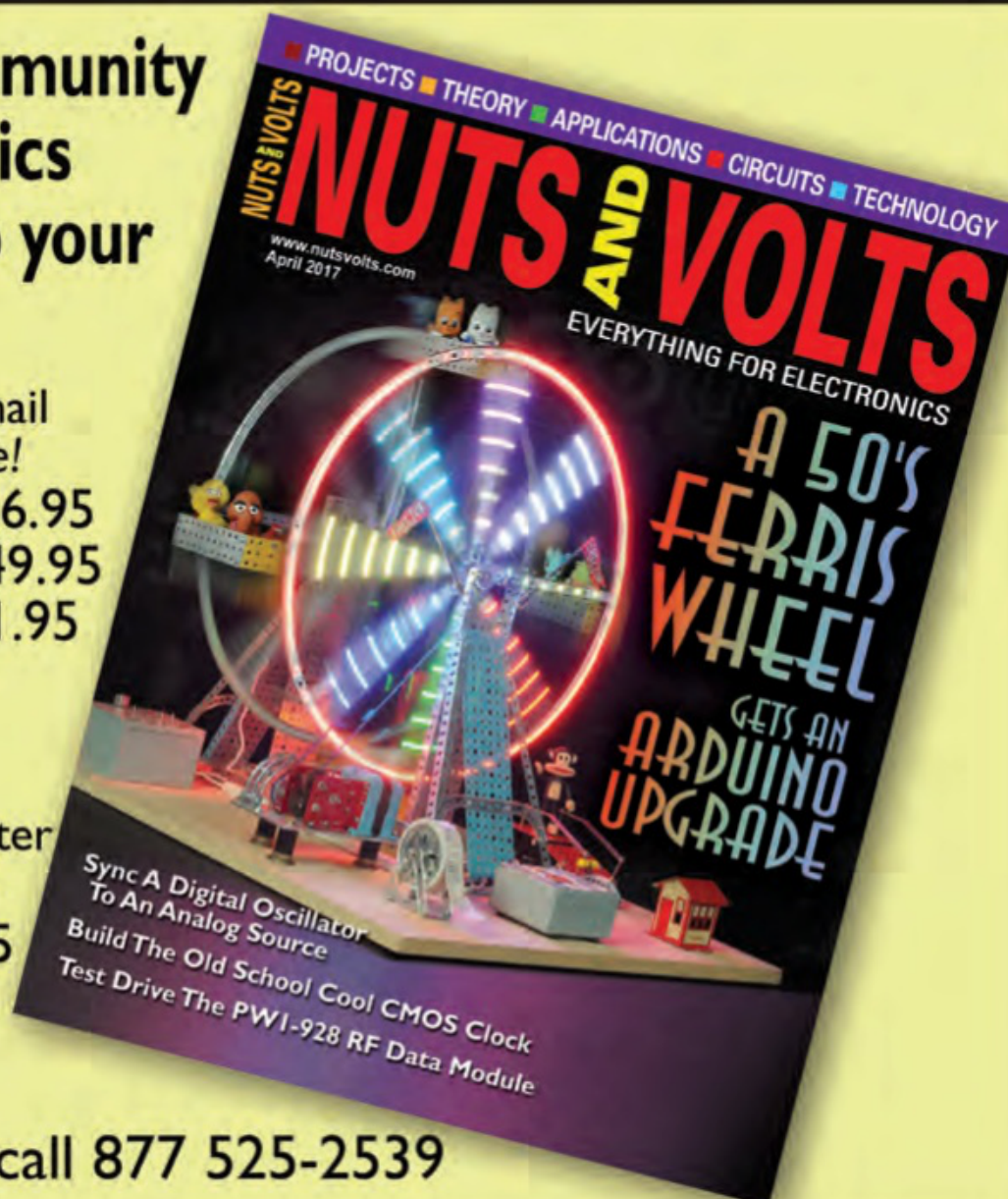
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University of Michigan students Kit Ng, N9KIT, and Mayda Pandya show off their experiment at the HamSci Workshop.

Image yourself as a teenager making a technical presentation and answering questions in front of an audience of nearly 100 scientists and experienced amateurs. Articulate and enthusiastic, the trio represented their generation well. Congratulations to Ethan, Seamus and Frankie for a job well done.

Congratulations are also in order for the Case Western Reserve University ARC (W8EDU) host team led by Kristina Collins, KD8OXT; Nathaniel Vishner, KB1QHX; and Dr. David Kazdan, AD8Y. The venue was first class in every respect. W2NAF and

members of his science/program committee, Dr. Phil Erickson, W1PJE; Dr. Ethan Miller, KG8U; and Mr. Bill Liles, NQ6Z, assembled an interesting program that included invited speakers Carl Luetzelschwab, K9LA<sup>7</sup>, Dr. Larisa Goncharenko and Ward Silver<sup>8</sup>, NØAX. It was by all measures an excellent workshop and it will be a tough act to follow in 2020.

### Solar Cycle 25 Forecast

In April, at the 2019 Space Weather Workshop held in Boulder, Colorado, an international panel of propagation



HamSci demo area at CWRU Thinkbox (Makerspace).



### ICOM Releases IC-V86

Looking for a tough 2-meter radio that can withstand the most rigorous outdoor elements? ICOM is introducing an all-new, MIL-SPEC, and IP67 portable: The IC-V86.

The IC-V86 is a new handheld radio with an output of 7 watts of RF and 1.5 watts of audio frequency (AF) output, as well as MID-STD-810 C, D, E, F, & G. Additionally, the new IP67 design places the IC-V86 into a new category of rugged VHF portables. The built-in CTCSS and DTS encoder/decoder ensures that every transmission is crystal clear.

Included is a large capacity Li-ion battery pack (BP2250 mAh), providing 19 hours of battery life and rapid charger with user-selectable Charging Control Function to reduce battery degradation. Additionally, an optional BP-299, 3150 mAh, extra large capacity Li-ion battery pack is also available.

Solid construction meets IP54 and MIL-STD 810G standards, protecting the radio from water, dust, vibration, and shock.

ICOM said the IC-V86 is available now and has a suggested retail price of \$169. For more information, contact ICOM America, 12421 Willows Road NE, Kirkland, WA 98034. Phone: (800) USA-ICOM. Website: <<https://tinyurl.com/yxztug5f>>.





CWRU's W8EDU ARC is comprised of (from l. to r.) Rachel Boedicker, AC8XY (club president); Aidan Montare, KB3UMD; and Skylar Dannhoff, KD9JPX.

experts offered their expert opinions regarding upcoming Solar Cycle 25. The panel predicts that Cycle 25 will be similar in size to current Cycle 24 with the sunspot maximum occurring no earlier than 2023 and no later than 2026. The end of Cycle 24 / start of Cycle 25 is forecast to occur no earlier than July

2019 and no later than September 2020. The panel's final detailed forecast for the next cycle is slated for release at the end of the year.

It is not too late to register for the Central States VHF Society Conference to be held in Lincoln, Nebraska, at the end of July; or too early to plan to attend

Microwave Update in Dallas in mid-October. See the respective websites for details.

73 and hope to work you in the CQ World Wide VHF Contest July 21<sup>st</sup> & 22<sup>nd</sup>.  
– Tony, K8ZR

**Notes:**

1. HamSCI was instrumental in organizing and promoting the Solar Eclipse QSO Party (SEQP) in August 2017. The SEQP generated over 30,000 QSOs, 618,000 RBN spots, 630,000 WSPR spots, and 1,237,000 PSK-Reporter spots. In total, over 2.5 million spots were recorded during the 8-hour-long SEQP.

2. See: <[www.makerspaces.com/what-is-a-makerspace](http://www.makerspaces.com/what-is-a-makerspace)>

3. Authors: David Kazdan, AD8Y; S. Dannhoff; A. Montare; and John Gibbons, N8OBJ.

4. One limitation of the system is that the HMac, i.e. radio, can only monitor one frequency at a time and not all three frequencies simultaneously.

5. John's efforts to keep the Heathkit GC-1000 running over the past 30 years is an interesting story in itself. See his website for details.

6. NVIS: Near Vertical Incidence Skywave is used for short-range communications, i.e., greater than ground wave and less the sky-wave ~ 50-400 miles.

7. ARRL Central Division Vice Director and *National Contest Journal* (NCJ) editor from 2002 to 2007. See Carl's website at: <<http://k9la.us>> for a wide range of excellent presentations on radio propagation.

8. Editor of the *ARRL Handbook for Radio Communications* and other ARRL publications.

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# LEARNING CURVE

BY RON OCHU, KOØZ

## Beyond Line of Sight

**H**ave you noticed that ham radio operators often combine two or more interests with their ham radio passion? Hams who have pilot's licenses enjoy working aeronautical mobile. Others enjoy travel and go on DX-peditions to far-away locations. If they enjoy astronomy, they may make contacts with satellites or search outer space using radio telescopes.

Amateur radio is truly a diversified hobby and this diversity is the impetus for continued growth. Along these lines, the fields of ionospheric and meteorological studies can help find ways to extend communications range for grid chasing in the VHF (very high frequency), UHF (ultra high frequency), and SHF (super high frequency) bands.

### Line of Sight

Many hams learn that communication paths at VHF and higher frequencies are limited to "line of sight." Line of sight simply means a radio wave's direct path between two antennas. Merriam Webster adds, "the straight path between a transmitting antenna (as for radio or television signals) and a receiving antenna when unobstructed by the horizon." Typically, the radio wave will travel a bit farther past the visu-

al horizon and this is called the radio horizon. The radio horizon extends to approximately 5/4 of the visual horizon.

When it comes to "getting out" for a VHF or higher signal, height is everything. Increasing height increases the line of sight and the radio horizon path. That's why VHF/UHF repeaters are located on top of locations with high elevations, such as skyscrapers or mountains. A VHF antenna on top of a 100-foot tower now has a line-of-sight distance of 12.25 miles and a radio horizon distance of 14.14 miles. Handy RF distance calculators can be found at SouthWest Antennas <<http://tinyurl.com/yxobn3h3>> or QSL.net <[www.qsl.net/w4sat/horizon.htm](http://www.qsl.net/w4sat/horizon.htm)>.

### Beyond Line of Sight

Fortunately for VHF and above aficionados, VHF-SHF propagation isn't always limited to line of sight. There are other means of propagation such as sporadic E ( $E_s$ ), meteor scatter, EME (earth moon earth), and weather phenomena. For this month's column, let's focus on some signal enhancements based on the weather.

Here's our chance to combine ham radio with another scientific interest, meteorology. Late spring, summer, and early fall are good times to take advantage of these meteorological enhancements. Some of the biggest weather effects on VHF-SHF propagation come in the form of *refrac-*

\*Email: <[ko0z@cq-amateur-radio.com](mailto:ko0z@cq-amateur-radio.com)>

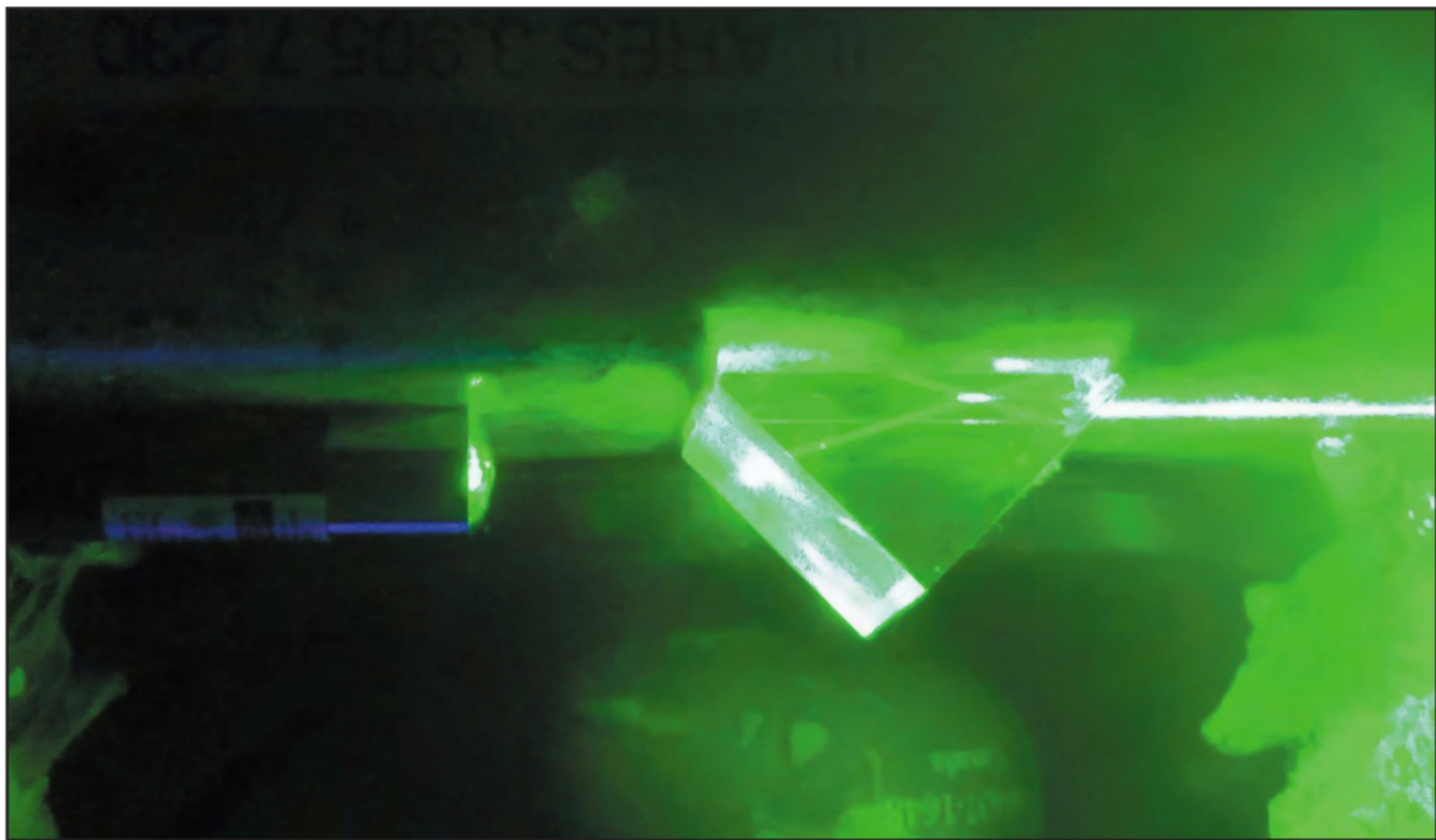


Photo A. A green laser beam traveling through air (less dense medium) encounters a prism (denser medium) and the light beam is bent (refracted) downward. (Photo by KOØZ)



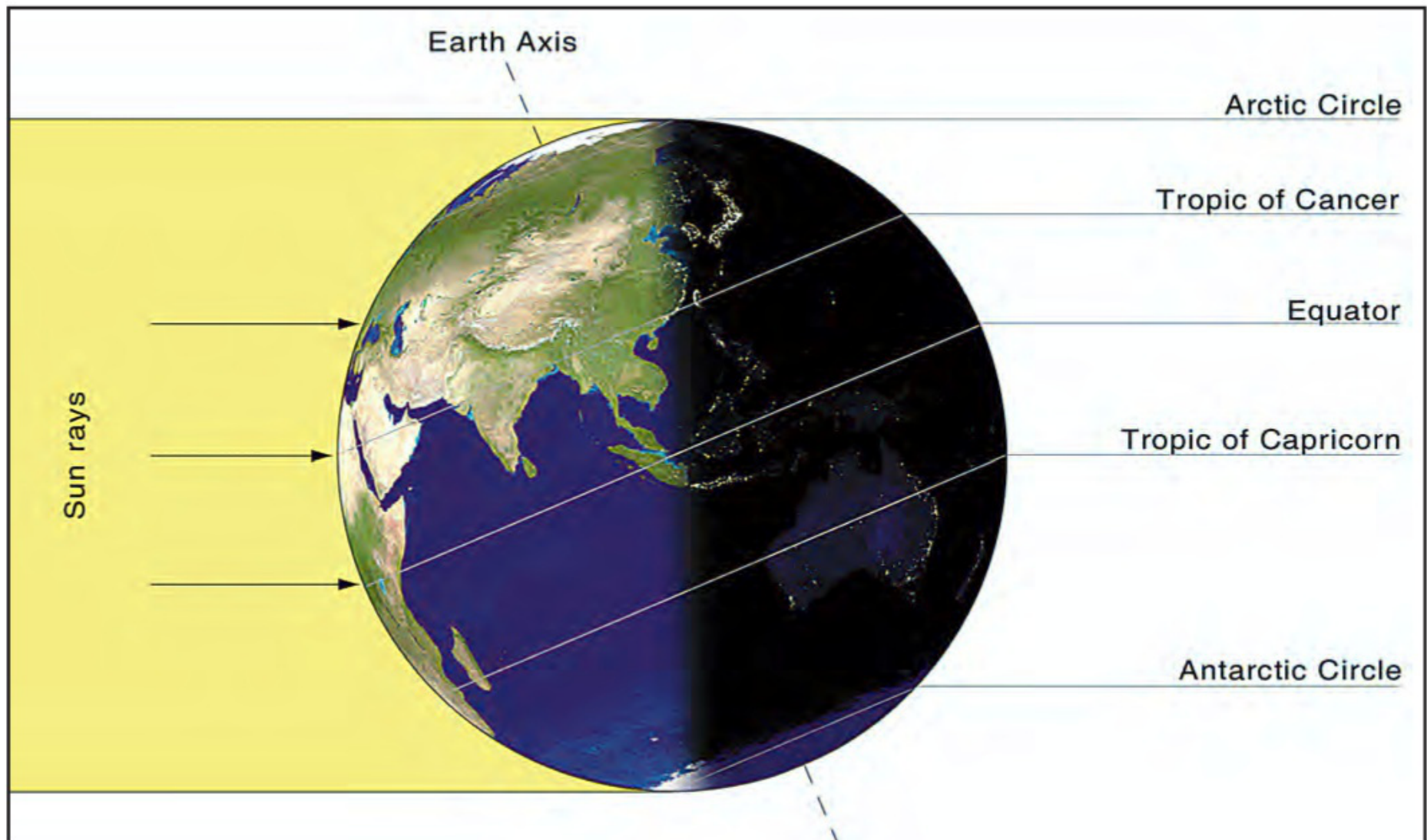


Figure 1. During the summer solstice, the Sun's energy directly hits the Earth's Northern Hemisphere. (All images from Wikipedia except as noted)

tion, super refraction, and ducting. Let's take a look at refraction first.

### Refraction Redirects!

When a radio wave travels from a less dense medium to a denser medium, it can be bent and redirected to Earth. A laser beam is electromagnetic; and like a radio wave, light can be refracted. *Photo A* nicely illustrates light refraction. Another comparable refraction example is the appearance of a pencil in a glass of water. The pencil looks bent while looking through the glass of water. Refraction is what allows VHF-SHF signals to travel a quarter of the way past the optical horizon, thereby creating the radio horizon. But wait! Did you know refractive properties can extend radio propagation even farther than the radio horizon with the right meteorological conditions? This is called *super-refraction*.

### Weather Basics

During the warmer months, the sun's rays hit the Earth's surface more directly, which results in the ground absorbing and reflecting more heat into our lower atmosphere (*Figure 1*). Scientists call this *convective heating*. As hot air rises from the ground, it begins to cool and, eventually, some of the heat is radiated back into space. However, there are times when the warmer air is trapped. It's during these warmer, humid months when hot air traps cooler air beneath it, that VHF-SHF "radio magic" happens. When the right conditions exist, propagation extending well beyond line of sight is possible.

### High-Pressure Systems

Most of us tend to think of high-pressure systems to generally mean few clouds, no storms, and a nice stretch of weath-

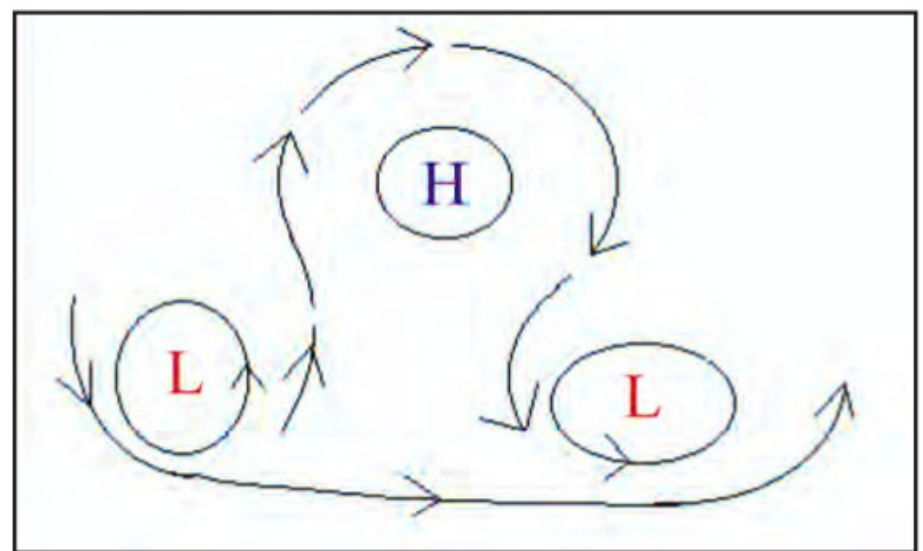


Figure 2. A high-pressure system called an omega block, because it looks like the Greek letter omega, can set up very favorable enhanced tropo conditions.

er ahead. Sometimes these high-pressure systems become "anchored" over an area (*Photo B*). When high pressure is overhead and the sun is out, the air can become hot and humid then expand upward.

When the sun sets, the ground begins to cool, and the rising hot air begins to cool off with height. However, as a result of the high-pressure system, air molecules are forced back down toward the surface. Air molecules begin to compress under the increasing weight and reheat. Eventually, a warm air barrier created by the high pressure prevents the rising cooler air from lifting upwards, trapping it beneath the warmer air. This condition creates what meteorologists call a *temperature inversion* (*Photo C*), which can last a few hours or



even a few days. Typically, these inversions range in altitude from 300 feet to 1,000 feet. When VHF-UHF signals encounter an inversion, they can exceed line of sight by hundreds of miles, depending on the size and refractive indices of the inversion layer.

In addition to high-pressure temperature inversion, humidity levels play an important role in supporting radio prop-

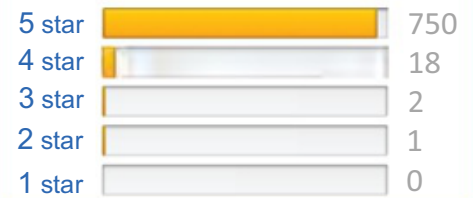
agation enhancement. If there isn't enough water vapor in the air, there may not be enough density in the medium to refract our VHF-SHF signals. It's also important to note that windless days are closely associated with radio propagation enhancement. When a huge high-pressure system sets up across the country, known as an omega block because it resembles the Greek letter

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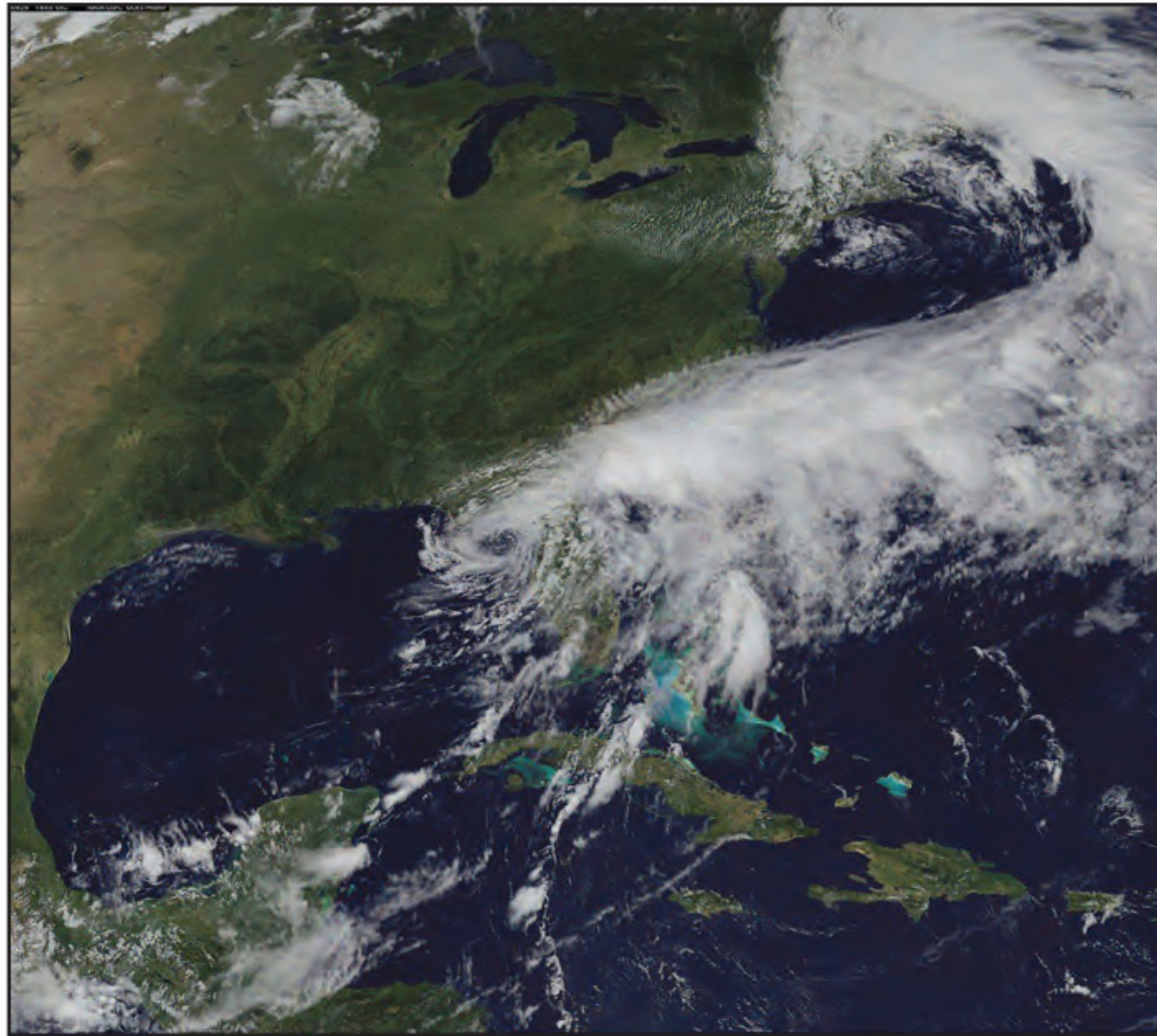


Photo B. GOES weather satellite image revealing a high-pressure system extending from the Rocky Mountains towards the east coast which is pushing a low-pressure system (comma shaped clouds) off toward the Atlantic Ocean.

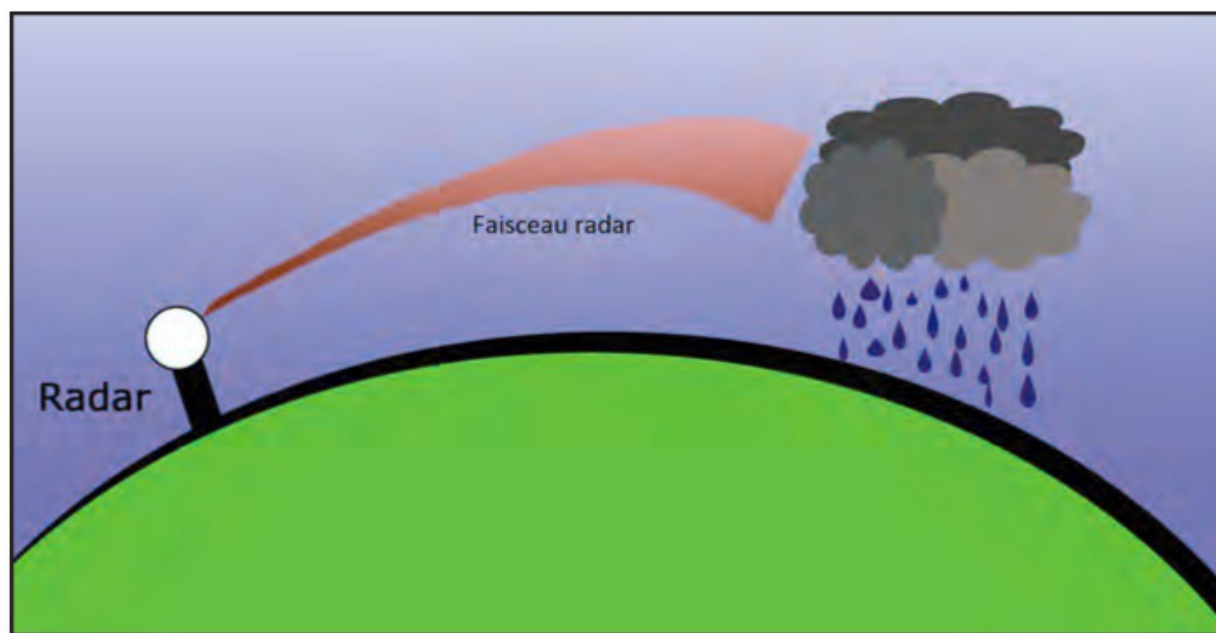


Figure 3. During hot, humid months, the super-refraction phenomenon can greatly extend a weather radar's range and create false returns on the screen.



omega “ $\Omega$ ” (Figure 2), strong VHF-SHF propagation can result. Underneath the omega block’s ridge of high pressure, the air may be hot, humid, and stagnant and not too comfortable for outside work, but for working grids and new states on VHF-UHF, it can be a boon. Weak-signal enthusiasts call this tropo (short for tropospheric) and look for VHF-UHF openings in early morning and late evening.

These high-pressure systems also affect NWS (National Weather Service) radar systems by extending the WSR-88D radar’s signal much, much farther than usual which can cause false readings. Meteorologists call this *anomalous propagation* (Figure 3).

### Ground Clutter Indications

The Sidewinders on Two Radio Club (SWOTRC) website gives us good advice as to how we can use the WSR-88D radar displays as an indicator of *super refraction*, <[www.swotrc.net/TropoStuff.htm](http://www.swotrc.net/TropoStuff.htm)>. The site advises us to first be aware of what normal ground clutter looks like on the radar display (Photo D). Ground clutter is made up of reflective surfaces near the radar site such as buildings, hills, etc. It looks roughly like a light-blue circle around the radar transmitter site in the center of the screen.

The SWOTRC website article goes on to point out that National Weather Service radars do not filter out “false echoes,” which also include what is known as “ground clutter.” When tropo conditions set up, WSR-88D ground clutter returns



Figure 4. Temperature inversions combined with humidity can create favorable boundaries (ducts) for VHF-SHF communications.

tend to extend farther out than usual. At these times, the weather radar can pick up storm reflections far beyond its normal range. To the weather observer looking for storms, these false echoes can be confusing, but to the ham looking for the potential of tropo enhancement, it can be a tool to indicate that conditions are good for beyond line-of-sight communications! The conditions that enhance the troposphere to bend VHF/UHF signals over the horizon are the exact same conditions that create the “false” storm images on these radars.

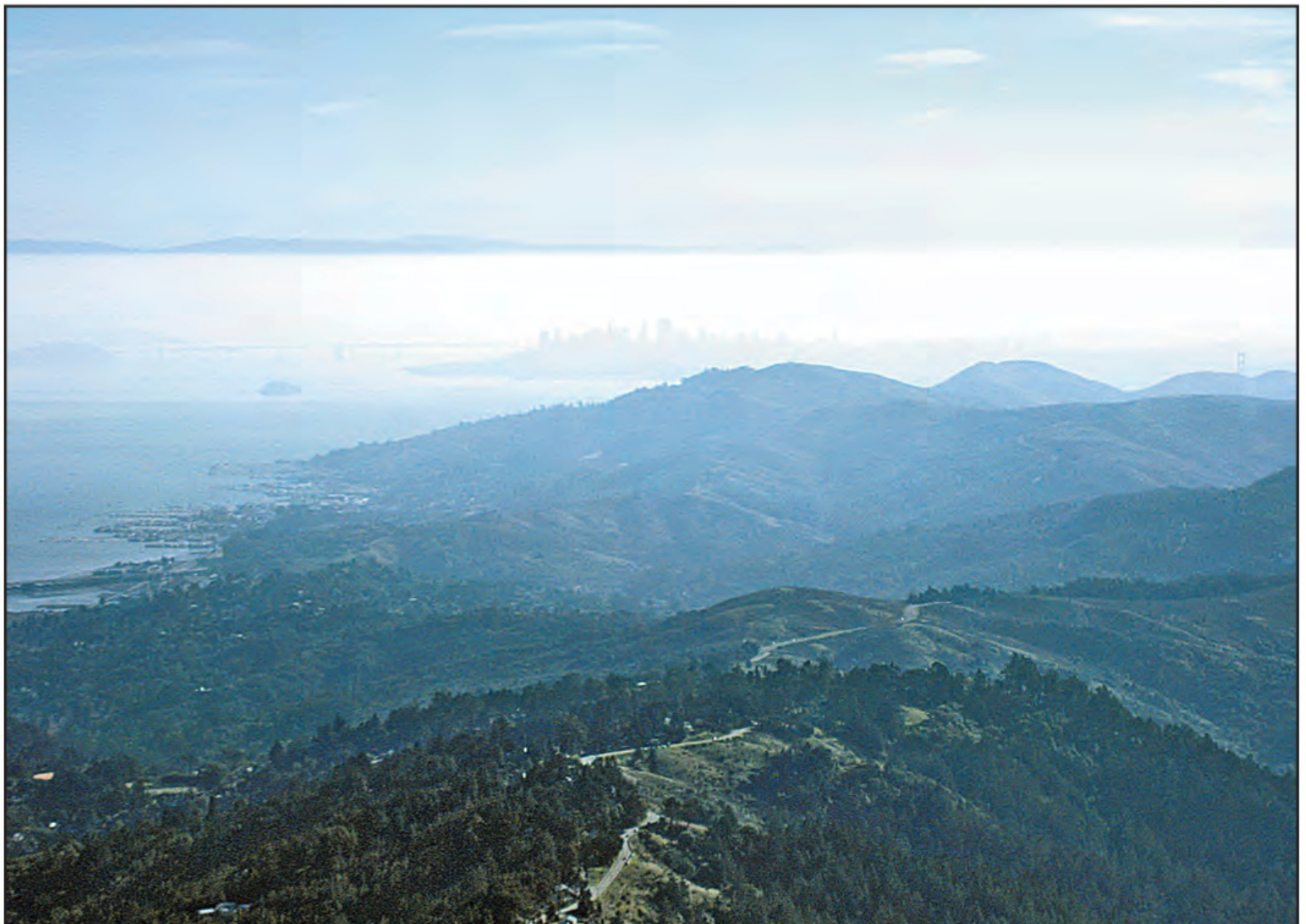


Photo C. A temperature inversion over San Francisco, California. The boundary between the warm air trapping the colder air can be seen.



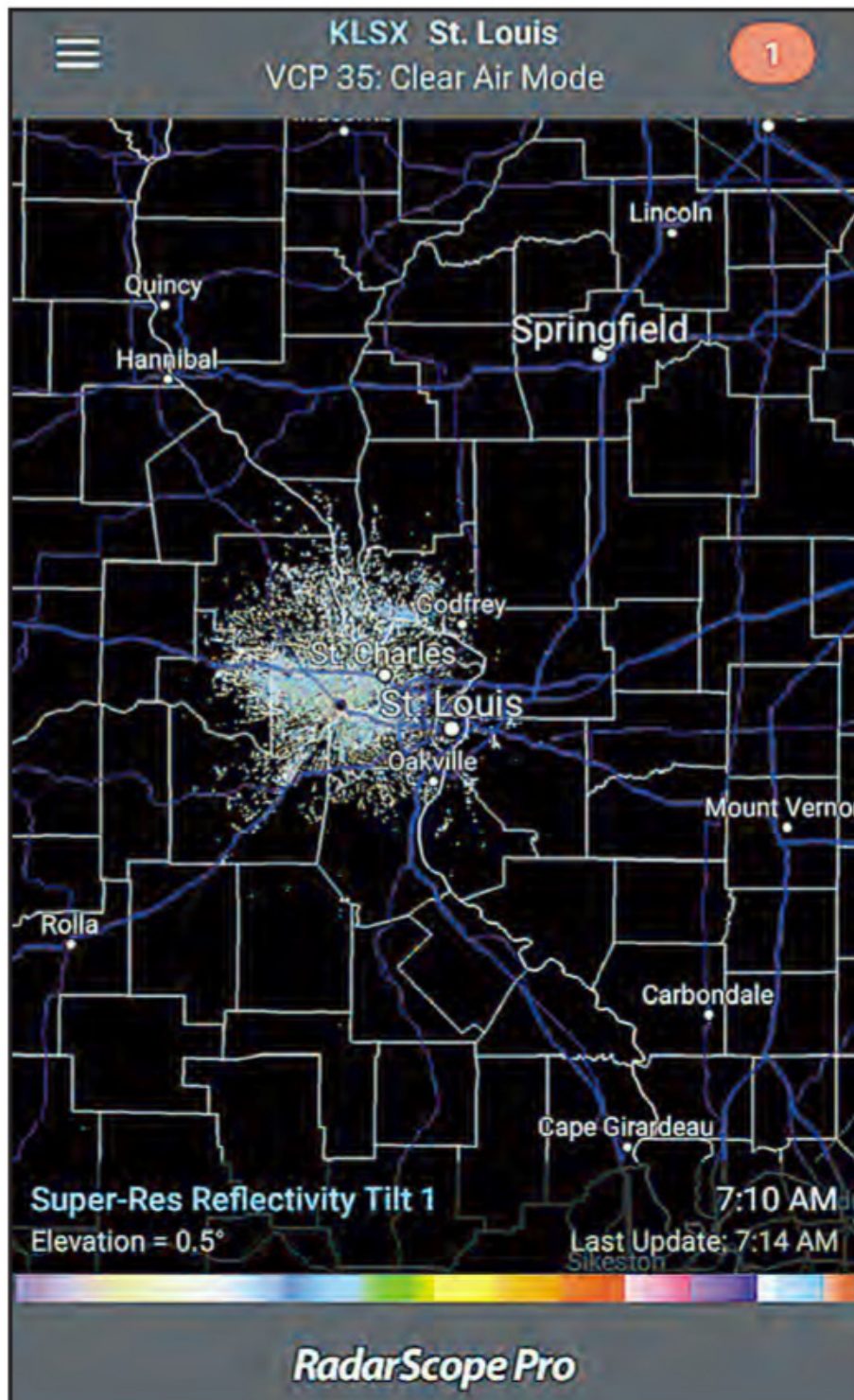


Photo D. Typical ground clutter return seen by the WSR-88D weather radar at St. Louis, Missouri. (Photo by KOØZ)

First, determine where the real storm systems are located by using a radar map that *does* filter clutter. Use a commercial national weather radar site display, such as <http://tinyurl.com/yec3u97>. Keep in mind that storms do not create tropo conditions. You are checking to make sure that storms are not in your local NWS radar coverage area. Next, check your local NWS WSR-88D radar display. Compare the current ground clutter image to one you know is “normal” and see if the ground clutter range is greater. If your local NWS radar is indicating storm clouds, when in reality they are far beyond the local system’s range, there’s a good chance that there is tropo enhancement in the directions of the “false” returns.

### Radar Imaging Can Help

Notice that once the sun sets, many radar sites (usually those close to water) have a light-blue image surrounding them. This represents the ground clutter. Later in the evening, the light blue image can become much darker as tropo develops and more intense signal reflections will be colored yellow and red. These are the areas that strongly favor enhanced conditions (Photo E). Again, check the commer-

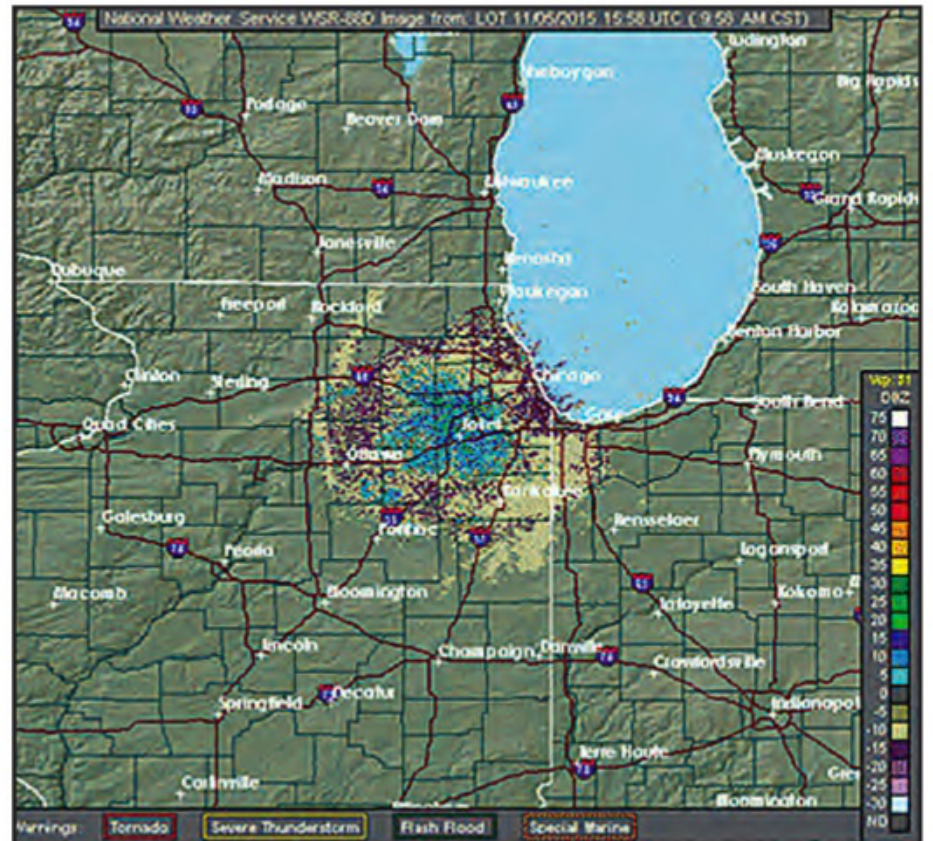


Photo E. Chicago weather radar’s ground clutter return is extending as evidenced by the red and purple, which can be an indication of tropo enhancement.

cial site to verify where the real storm systems are. If you are located underneath an area of a false storm image, point your antenna towards it, for the potential of tropo enhancement is out there. The SWOTRC website encourages us to try this technique, noting that “Once you have watched a NWS radar site for signs of enhancement and you’ve experienced a tropo opening, the NWS WSR-88D radar images will become quite apparent.”

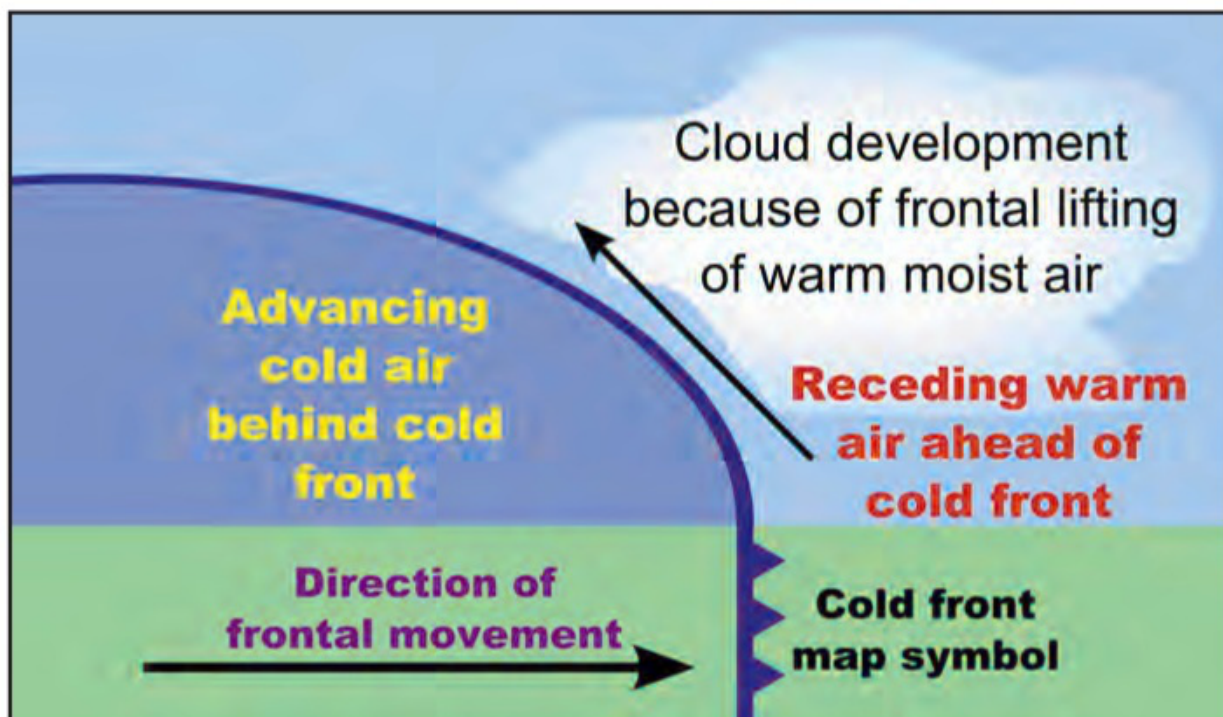
Another website to check out for 2-meter propagation is <http://aprs.mennolink.org>. APRS (Automatic Packet Reporting System) data is shown visually on a map of the U.S. Strong propagation areas are shown as darker colors. This map makes it easy to see enhanced areas of propagation. Although VHF/UHF propagation can occur at any time during the day, early morning (before sunrise) and early evening (after sunset) are optimum times to check for enhanced propagation, especially while under a high-pressure ridge.

While high-pressure ridges, such as an omega block, generate enhanced conditions in the troposphere, the granddaddy of them all is the *tropospheric duct*.

### Tropospheric Ducting

The properties of humidity, high pressure, and inversion associated with tropo propagation are the same when it comes to ducting, but the main difference is the altitude of the enhancement. Typically, non-ducting tropo occurs roughly between 100 and 1,000 meters (330 and 3,280 feet) while tropospheric ducting occurs a bit higher. Tropospheric ducting sets up about 500 meters to 3 kilometers (1,600 to 10,000 feet) in altitude. VHF, UHF, and some SHF signals will travel hundreds of miles along the duct (Figure 4). In some ways, a tropospheric duct is like the air ducts in your home’s heating/air-conditioning system. Instead of sheet metal to guide air throughout your home, temperature inversions along with humidity create an RF (radio frequency) guide (duct) that can propagate the RF hundreds of miles away. There are plenty of great, instructional videos on the topic of tropo enhancement. Ham Nation with CQ Contributing Editor Gordon





*“During summer, when a storm front advances, weak-signal enthusiasts carefully watch the weather maps and listen for distant signals on their radios.”*

Figure 5. An advancing cold front during hot, humid days can trap warm air over cold air; thereby setting up favorable ducting conditions.

West, WB6NOA, has an excellent video <<http://tinyurl.com/y2wcmgys>> as does Larry Shaunce, WDØAKX, using FM simplex <<http://tinyurl.com/y5xywc6p>>.

Advancing cold fronts pushing up against a high-pressure system often create ducts (Figure 5). Cold air rushes underneath the warm air, trapping the

moist air underneath the warmer air and a duct forms along and ahead of the advancing front. If conditions are right, a nice duct can form, and signals can travel hundreds and sometimes even a thousand miles. Talk about extending line-of-sight communications.

In general, flat landscapes favor tro-

pospheric signals. Large bodies of water are ideal surfaces for tropo during hot summer weather. Some of the most famous VHF-SHF tropo paths are between Hawaii and California, Australia and New Zealand and Australia to Indonesia. These paths are common during summertime. On the other hand, high mountainous regions inhibit the formation of tropo propagation. Hams located in the Midwest look forward to tropo enhancement that forms over the Great Plains. During summer, when a storm front advances, weak-signal enthusiasts carefully watch the weather maps and listen for distant signals on their radios. You, too, may become inspired to watch the weather and to be more “radioactive” on the VHF-SHF bands!

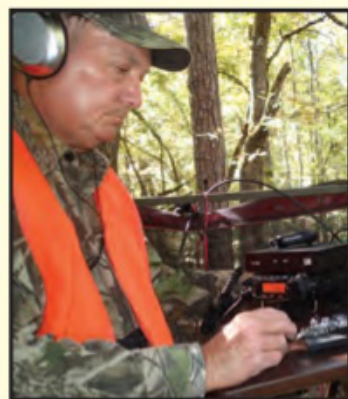
Thank you for your attention and for reading CQ.

– Until next time, 73 and GL,  
Ron KOØZ

## BEHIND THE BYLINES...

*... a little bit about some of the authors whose articles appear in this issue*

**Mark Schreiner, NK8Q** (“Finding My True North,” p. 10), has been a ham since 1982 and currently enjoys operating QRP CW, often while hiking. Mark also enjoys HF mobile operating, primarily on 17 meters, and sometimes drives to a park or other quiet location on his lunch break to work CW. His trip to Isle Royale National Park was nearly 20 years in the making!



**Terry Joyner, W4YBV** (“Hamming and Hunting,” p. 18), is a frequent contributor to CQ. He has written before about IOTA (Islands On The Air) activations with his radio club in Georgia. This issue’s article deals with a more solitary pursuit, as his ham station is now keeping him company during quiet times while deer hunting.

**Martti Laine, OH2BH** (“OH1ØX: A New IOTA Counter Right on Our Doorstep,” p. 23), is a DXing legend. Not only has Martti operated from all over the world, he has organized

initial amateur radio operating expeditions from a dozen “new” countries including Albania and Kosovo. This article keeps him closer to home, activating a new Islands On The Air “counter” on an Arctic island shared by Finland and Sweden.



**Zvika Segal, 4Z1ZV** (“9G2DX – 4X DXpedition to Ghana,” p. 28), combines ham radio with other hobbies, such as off-roading, photography, and 3D printing. He used the opportunity to install a network of DMR repeaters in Ghana as the starting point for a DXpedition to this rarely-heard DX entity. As he notes in his article, during the visit, he and his expedition-mates met all of the country’s currently-licensed hams ... both of them!

**Mike Hudgens, W6YQ** (“Jesse Bunnell – Civil War Telegrapher,” p. 42), teaches philosophy at the South Dakota School of Mines and Technology. He is the author of several books, including the recent *The Shakespeare Films of Grigori Kozintsev* and *Sisters of Fate: the Myths That Speak Themselves*. These days, Mike’s favored mode is CW, and each day at sunrise and sunset, he monitors the low end of the HF bands, hoping for the 17-meter opening that never comes. Among the keys attached to his desk — a Bunnell sideswiper.



## Focus on CQ Awards: The USA Counties Award (USA-CA) and Introducing Our New USA-CA Custodian, Brian Bird, NXØX

While we continue our search for a successor to K1BV as Awards Editor, we'll continue to profile CQ's own operating awards with a close-up look at USA-CA (the USA Counties Award), including some rules updates and the introduction of a new award custodian. —W2VU

**Q**uick! How many counties are there in the United States? If you're a county hunter, you'll know the answer off the top of your head. And if you think it's a challenge to make confirmed contacts with 100 countries or all 50 states for ARRL's DXCC or Worked All States awards, try on CQ's USA-CA for size.

Earning the USA-Counties Award All-Counties recognition requires making confirmed contacts with hams in every coun-

ty in every state in the United States. How many is that? How about 3,077? Even with an introductory level of "only" 500 counties, USA-CA is and has always been one of the most challenging awards in amateur radio. But the really amazing thing about USA-CA is that it isn't just a piece of "wallpaper." Rather, the quest for counties provides a snapshot of what our hobby can be and should be all about.

CQ introduced USA-CA 58 years ago, in 1961. Over the ensuing six decades, a ham radio subculture has emerged among the thousands of hams who have actively sought this award. Knowing how difficult it can be to work "the whole ball of wax," members of the county-hunting community routinely go out of their way — literally as well as figuratively — to help their fellow county-hunters edge closer to their

### USA-CA Award #1266: Patty Chiles, ACØCU



Patty Chiles, ACØCU, sits with her cat in the shack she shares with her husband, Ernie, WØRMS. (Courtesy of ACØCU)

I earned my Technician license in 1994, for the sole purpose of being able to communicate with my husband Ernie, WØRMS, on the local 2-meter band. Seeking a greater challenge, I upgraded my license in 2004 to General and Amateur Extra. Like so many newbies, I was afraid of the radio and of making mistakes. Eventually, I accepted Ernie's challenge and overcame my fears to earn my Worked All States award from the ARRL.

In 2011, with support from my Elmer in the chair next to me, I began making radio contacts, many of them on 6 meters. I ordered my first QSL cards and was off and running. Ernie told me that I needed to get on OMISS to make more contacts and gain more experience, so I joined that wonderful group of guys and gals, who helped me earn my WAS. I noticed at one point that I had over 700 U.S. counties, and I commented that I wanted to work every county in the country, starting with my home state of Kansas. Ernie

told me that I could get a certificate for 500 counties and then obtain endorsements, but I was adamant that I didn't want to do it that way — it was all or nothing for me.

I began listening to the County Hunter nets and making contacts, and I ordered my first MRCs (mobile replay cards). It was difficult at first, but I eventually learned what to do and what not to do. Because I am still employed, I worked counties before work, on my lunch hour, after work, on weekends, and on holidays. I have even been known to take a vacation day just to grab some rare counties. I worked every state QSO party I could. I kept plugging away, crossing them off my list one by one and excitedly checking the mailbox every day. I learned patience: If I missed a county, I knew that it would come around again ... some day.

When I got to the final 10 counties, I began to search QRZ to find someone who would work a sked with me, and eight people graciously gave me counties. K8ZZ gave me my last mobile county — and that left only Edmonson County, Kentucky. As it happens, a fellow club member and spelunker, Stan Sides, KØQMV, regularly goes to that county, and he volunteered to take a portable station to give me my last county. He set it up at a friend's cabin and gave me a fine signal report!

It was sheer stubbornness that saw me through my goal of finishing the USA-CA: I Will Not Quit. I like a challenge, and this certainly qualified as one. Setting a goal and working hard to reach it is what keeps all of us moving, and I am already thinking about what my next challenge should be.

I owe many people many thanks for their help in reaching my goal. I am thankful for every OMISSer, every County Hunter, every QSO party participant, and every individual who was willing to work a schedule with me and who was gracious enough to return an MRC or a QSL card. The person who gave me one contact is just as important as the person who gave me 50, because I couldn't have done it without either. I am thankful for the card checkers who spent so much of their time going over 3077 cards. I am thankful to everyone who supported me in this effort — and that includes my husband, who is my biggest supporter and who never complained when I bumped him off the local net because there was a county I needed! —ACØCU



# Complete Rules – The CQ USA-Counties Award (USA-CA) Program

Updated June 2019

The United States of America Counties Award (USA-CA), sponsored by CQ magazine, is issued for confirmed two-way radio contacts with specified numbers of U.S. counties under rules and conditions hereafter stated.

## The USA-CA Program

### A. Award Classes

The USA Counties Award is issued in seven different classes, each a separate achievement as endorsed on the basic certificate by use of special seals for higher class. Also, special endorsements are made for all one band or mode operations, subject to the rules.

Class	Counties Required	States Required
USA-500	500	Any
USA-1000	1000	25
USA-1500	1500	45
USA-2000	2000	50
USA-2500	2500	50
USA-3000	3000	50
USA-3077	ALL	50

### B. Conditions

1. USA-CA is available to all licensed amateurs everywhere in the world and is issued to them as individuals for all county contacts made, regardless of calls held, operating QTHs, or dates.

2. Special USA-CA awards are also available to SWLs on a heard basis.

3. All contacts must be confirmed by QSL, and such QSLs must be in the applicant's possession for identification by certification officials. Electronic verifications from sources approved by CQ are acceptable. A list of acceptable online sources may be found at <https://tinyurl.com/yyzjzwur>.

4. Any QSL card or other confirmation found to be altered in any way disqualifies the applicant.

5. QSOs via repeaters, satellites, and phone patches are not valid for USA-CA. QSOs using remote station technology are permitted, provided that all contacts are made over a direct RF path between the remote station and the station contacted.

6. So-called "team" contacts, wherein one person acknowledges a signal report and another returns a signal report, while both amateur callsigns are logged, are not valid for USA-CA. Acceptable contact may be made with only one station at a time.

### C. County Identity

1. Unless otherwise indicated on QSL cards or in an electronic confirmation database, the QTH printed on cards or entered into an electronic confirmation database profile will determine county identity.

2. If no county name is provided by the contacted station, an online city and ZIP code search may be conducted to determine the county of contact.

3. For mobile and portable operations, county information stated on confirmations is the only acceptable proof of county identity.

ultimate goal of working them all. County-hunters will frequently detour from a planned trip route — sometimes by hundreds of miles — to visit and provide contacts from a rare county, especially if they know another county-hunter needs that contact to close in on the top award level. Others will make special county expeditions — similar to DXpeditions or the newer gridDXpeditions — to make rare counties available for contacts. Often, these trips or detours are made at considerable expense, with the only "reimbursement" being the hope that someday, someone else will do the same for them (or, perhaps, someone already has and they are "paying it forward" for others). If you get involved in county-hunting, you'll come away not only with a beautiful certificate (featuring all 50 U.S. state flags) but with a bunch of new friends all over the country.

## A New USA-CA Custodian and a Rules Update

County-hunting grew out of the Certificate Hunters' Club, or CHC, started in the 1950s by Clif Evans, K6BX. In 1961, Clif came to CQ with the concept of the USA-CA award and became its first "custodian" (it's unclear why our other awards have managers, but USA-CA has a custodian). He and then-editor Arne Trossman, W2DTJ (SK), got the program off the ground and Clif administered it for the next three-plus years. Only four more USA-CA custodians have followed — Ed Hopper, W2GT, from 1964 to 1983; Dorothy Johnson, WB9RCY, from 1983 to 1992; Norm Van Raay, WA3RTY, from 1993 to 1997, and Ted Melinosky, K1BV, for 21 years, from January 1998 to January 2019.

I am pleased to introduce the sixth USA-CA Custodian, who takes over the reins as of this issue, Brian Bird, NXØX. Brian will introduce himself more completely in this space next

## SPURIOUS SIGNALS

By Jason Togyer W3MCK  
spuriouscomic.blogspot.com



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4. In the case of cities, parks, or reservations not within counties proper, applicants may claim any one of the adjoining counties for credit (once).

#### D. Administration of USA-CA Program

1. The USA-CA program is administered by a CQ staff member acting as USA-CA Custodian, and all applications and related correspondence should be sent directly to this person's QTH.

2. Decisions of the Custodian in administering these rules and their interpretation, including future amendments, are final.

#### E. Record Book and Bookkeeping

1. The scope of the USA-CA Award makes it mandatory that applications be submitted in a specific format. Contacts must be arranged alphabetically by state and then alphabetically by county within each state. Information provided for each contact must include callsign, date of contact, band and mode, in that order. Computer-generated lists must be in a tabular format with separate columns for each field listed above.

2. A completed USA-CA Record Book (as available) or computer-generated listing of qualifying contacts constitutes the medium of basic application and becomes the property of CQ for record purposes. On subsequent appli-

cations for either higher classes or for special endorsements, the applicant may use additional Record Books to list required data, or he or she may make up alphabetical lists conforming to requirements.

3. Record Books are not currently in print, but existing copies will be accepted for all applications. At such time that Record Books may again become available, these rules will be updated and notification will be published in CQ magazine.

#### F. Application

1. Make Record Book or computer-generated list entries necessary for county identity and enter other log data necessary to satisfy any special endorsements (band/mode) requested.

2. Have two licensed amateurs (General Class or higher) or an official of a national-level radio organization or affiliated club certify that QSL cards or acceptable electronic confirmations for all contacts as listed have been seen. The USA-CA Custodian reserves the right to request any specific cards (or other confirmations) to satisfy any doubt whatsoever. In such cases, the applicant should send sufficient postage for the return of cards by registered mail.

3. Send the original completed Record Book (not a copy) or computer-generated listing, along with certification forms and handling fee to Brian Bird, NXØX, 4567 Caribou Lake Road, Duluth, MN 55811-9607. Fee is \$6.00 U.S. for CQ subscribers (subscribers must include a copy of a recent CQ mailing label), and \$12.00 U.S. for non-subscribers. Applicants outside the United States must include an additional \$6.00 U.S. for postage if a certificate is requested. For later applications for higher class seals, send Record Book or self-prepared list per rules and \$1.25 U.S. For application for later special endorsements (band/mode) where certificates must be returned for endorsement, send certificate and \$1.25 U.S. for handling charges (\$6 U.S. for stations outside the U.S.). Note: At the time any USA-CA Award certificate is being processed, there are no charges other than the basic fee, regardless of the number of endorsements or seals; likewise, one may skip lower classes of USA-CA and get higher classes without losing any lower awards credits or paying any fee for them. Fees may be paid by check or money order payable to Brian Bird, or via PayPal to <nx0x@aol.com>. Applicants qualifying for the USA-CA All Counties Award (3077 counties) have the option to purchase a plaque. Contact the award custodian for details.

4. Computer-generated contact lists, certification, and witness documents must be sent on paper or by email, along with the appropriate fee, to the Award Custodian (address above), *not* to the CQ offices. Emailed applications may include an attached file in spreadsheet or other tabular format and must include a listing of all claimed contacts, in alphabetical order by state, and by county within each state.

The USA-CA Award Program is sponsored by CQ - The Radio Amateur's Journal, 17 West John Street Hicksville, NY 11801.

Printable state-by-state county maps of the United States may be downloaded from <<https://tinyurl.com/y59morxq>>. Questions? Send email to NXØX at <nx0x@aol.com>.



month, but here are some basics: Brian has been a county hunter since the 1990s and earned the USA-CA All Counties Award in 2004, followed a year later by his wife, Shari, KBØMHH. The two of them hosted the national county-hunters' convention back in 2011. Brian is an airline pilot in "real life," so he's probably flown over more counties than most of us have worked.

The change in custodians also offers us the perfect opportunity to update some of the rules, which look very similar to those first published back in 1961. The updates primarily reflect the realities of living in the 21<sup>st</sup> century, such as replacing IRCs (International Reply Coupons) as a payment method with PayPal; and permitting (encouraging) applications to be submitted by email rather than only on paper. Also, due to significant increases in the cost of international postage, it is necessary for us to add a DX postage surcharge for mailing certificates to addresses outside the United States. The complete updated rules appear in this column.

## Tips to Get You Going

If we've piqued your interest in chasing counties and going after the USA-CA award, here are some tips for getting started:

- First, go through your logs and QSLs (including eQSLs; sorry, no Logbook of the World yet) and see how many counties you already have worked and confirmed. Many hams include county information on their QSLs or you can search online to match up their city or town with the appropriate county;
- Watch for state QSO parties. These weekend events encourage activation of as many counties as possible in a

given state, and special efforts are often made to activate counties with very small ham populations;

- Likewise, get on the air during the ARRL Sweepstakes and various VHF contests; you may need to interpolate counties from the information you're provided (or ask for it during the contact), but that can be part of the fun;

- Finally, take advantage of the solar minimum. At this point in the sunspot cycle, working DX can be a huge challenge. But even when the bands aren't open on multi-thousand-mile paths, you may have great opportunities to work domestic stations on shorter propagation paths and build up your county totals.

There is no time limit for working USA-CA, and you may include contacts made from any location in which you have operated and with any callsign you may have held in the past. So check your logs and QSLs, start keeping track, and enjoy the hunt!

## Help Wanted: CQ Awards Editor

As of this issue's deadline, we were still looking for a successor to K1BV as CQ Awards Editor (as noted elsewhere in this column, Brian Bird, NXØX, has agreed to take on the role of USA-CA Custodian). Awards Editor candidates should be accomplished "wallpaper" collectors with a passion for discovering and sharing information on operating awards from around the world, have the time to research and write a monthly column, and be able to reasonably express themselves with the written word. If you're interested in taking on this role, please contact Editor Rich Moseson, W2VU, at <w2vu@cq-amateur-radio.com>.

## OUR READERS SAY...

### "Smart Cars"

Editor, CQ:

I read your April editorial where you mention V2X technology (so-called "smart cars"). In the article you talk about how cool it would be for your car to recognize stop lights or adjust according to speed limit changes. That already exists without V2X; you just need one of these...



– Matthew Kaskavitch, KØLWC  
Denver, Colorado  
...and a Tesla owner

### Conflicting Color Standards

Editor, CQ:

Very good article by Irwin Math, WA2NDM ("Math's Notes," March 2019, "Electrical Safety Considerations"). I would like to add a few points.

1. Everybody refers to house electrical wiring as being 120V or 240V. However, that is the RMS voltage. The peaks are about 170V and 340V, respectively. If people knew they were dealing with that much voltage, they might, I hope, be even more careful.

2. People should also be aware that the BLACK is the color used for ELECTRONIC grounds (look at your test leads). But BLACK is also used for the HOT wire for ELECTRICITY. We should NEVER connect color to color unless you are positively, absolutely sure of what the wires do. I know of an electronics engineer who ordered his technician (over the technician's objections) to connect ALL black wires in the equipment together. When they turned the power on, the engineer got a big surprise. Evidently, not all schools teach this basic fact.

3. While I am all for homebrew equipment, I do think that it is better if people purchased a commercial electrical socket tester rather than build their own. They are well insulated, pretty cheap, and available at all good hardware stores. I'd hate to think that someone could be electrocuted by a homebrewed piece of "safety" equipment.

– John Majka, K9AAN

### "Math's Notes" Book?

The following letter was directed to "Math's Notes" editor Irwin Math, WA2NDM:

Dear Irwin,

I was curious if you had published a compilation of "Math's Notes." I find the articles fascinating and a big help for using new ICs and tech.

– Pete Zenner, KEØBRS,  
Sioux Falls, SD

WA2NDM replies:

Thank you, Pete. The topic has been discussed from time to time with CQ's publisher, and is still under discussion, but we're not there yet.



## CONTESTING

BY DAVID SIDDALL,\* K3ZJ

### Early Summer Operating Activities

*Headliners Include ARRL Field Day, IARU HF Championship, and the CQ World Wide VHF Contest*

*Plus: New WSJT-X FT4 Digital Mode for Contesters; World Radiosport Team Championship (WRTC) Rules Evolution*

**T**his is an excellent time to finish antenna fix-ups and rebuilds. At least where I live, it is best to be done before the summer's heat peaks and it's just too hot to work outside. The air-conditioned shack is much more comfortable. This is conducive to getting in some operating time, either in the shack or on some short expeditions to higher elevations, cooler islands, or at least under the shade of trees in a park (*This is, after all, our annual "Take it to the Field" special – ed.*).

June is the month for ARRL's annual VHF contest. Many operators are likely to switch to digital mode FT8 when the bands otherwise lack discernible SSB or CW signals. This year's event will be held from 1800 UTC on Saturday, June 8 through 0300 Monday, June 10 (Saturday morning or afternoon through Sunday evening in North America). This contest covers all bands six meters and higher, notwithstanding "VHF" in its name. The complete rules are at <[www.arrl.org/june-vhf](http://www.arrl.org/june-vhf)>, and see last month's column.

Last month we discussed Field Days in IARU Region 1, which are separate affairs for CW (in June) and Phone (in September). This month, it's time to focus on our own Field Day event. Every year on the fourth weekend of June, the ARRL's Field Day is held in the U.S. and Canada. Technically, Field Day is not a contest, but it can be for you if you treat it as one. A great thing about Field Day is that it is an all-purpose activity. It just depends on your goals and how you approach it. The format is flexible, and accommodates just about every interest: Contesting, emergency preparation, local club social activities, hiking, and camping. The event is as varied as it gets in ham radio.

After Field Day and the July 4<sup>th</sup> weekend, it is time for the IARU HF Championship. While this year there will be no WRTC competitors in the field to spur participation and excitement, aspiring competitors are sure to be on the air vying to secure the points needed to become team leaders at the next WRTC that will be held in northern Italy in July 2022.

With release expected to be in the timeframe of the 2019 CQ World Wide VHF Contest in July, a new option in the WSJT-X suite of digital modes is now being tested. FT4 is specifically designed for contesting. It is similar to FT8 in operation, but designed to be faster and more contest-friendly. FT4 is said to be capable of yielding QSO rates similar to those attained using traditional RTTY. The first announcement said the mode would be available for general contest

use only on or after July 15 – perhaps in time for the CQ World Wide VHF Contest on July 20-21, but too late for the ARRL VHF Contest and Field Day operations in June (see discussion below).

Finally, this year we are hearing very competitive operators on the air in the major contests. These are the ones who stick with it when propagation conspires to prevent pileups. These competitors incessantly call CQ and tune around the bands even when conditions are marginal and answers are few and far between. Some of these operators, as mentioned above, are competing to be named team leaders for the 2022 WRTC competition. This month, we begin a multi-part series on the World Radiosport Team Championship. From a fairly high level, we somewhat selectively examine how the qualification and competition rules evolved into those that are governing the competition today.

#### ARRL Field Day

The ARRL Field Day on-the-air activities begin on Saturday, June 22 at 1800 UTC and run through Sunday, June 23 at 2100 UTC. Antenna set-up starts the day before for many. All bands and modes are used, except for 60, 30, 17, and 12 meters. Rules and other information are at <[www.arrl.org/field-day](http://www.arrl.org/field-day)>.

ARRL Field Day began as an event in 1933, and today it is the single most popular ham radio on-the-air meeting in the U.S. and Canada. More than 40,000 radio amateurs participate, both individually and with friends and clubs<sup>1</sup>. It is a time when many aspects of amateur radio come together to highlight the many roles, multiple modes, and diversity of purposes within the ham radio community that we all enjoy.

As noted above in the introduction, Field Day is a time to have fun *your way*. Operations take place from every conceivable location on the fourth weekend of June each year. Enjoyment can be in the form of a picnic, a campout, practice for an emergency, a contest, a time to activate a mountaintop or a park, or to try operating from a boat on a lake or in a bay or the ocean. The enjoyment is in getting out and having fun operating and exchanging locations with fellow hams. It can be an opportunity to try out an idea for a portable or fixed antenna, or to practice running or search-and-pounce skills from your fixed station.

Field Day also is used as an opportunity to demonstrate amateur radio to the public. If you are looking for a Field Day group or want to take some friends to visit an operating site, check out the list of planned field day sites maintained by the ARRL at <[www.arrl.org/field-day-locator](http://www.arrl.org/field-day-locator)>.

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email: <[k3zj@cq-amateur-radio.com](mailto:k3zj@cq-amateur-radio.com)>



Unlike authentic contests, complete logs do not need to be submitted for Field Day. Only a dupe sheet is required. And no certificates are awarded. Results are published in the December issue of *QST* and posted on the ARRL website.

## IARU HF Championship

The IARU HF Championship runs for 24 hours, from July 13 at 1200 UTC through July 14 at 1159 UTC. The 24-hour format makes it easy to participate in the contest and still take part in other weekend activities. The normal contest bands, 160-10 meters, are all in play for this one. Contacts with different IARU zones, IARU headquarter stations, and certain IARU officials, make up the pool of multipliers. Adding to the complexity of devising a winning strategy is that more points per QSO are earned for contacts with stations in a different IARU zone, and the maximum (5) points is earned for each contact with a station located in a different zone *and* continent.

The IARU HF competition is multi-mode, with both CW and SSB employed. Each mode is its own separate category, as well as a third “combined” CW/SSB category. So those who prefer one or the other mode may compete using only their

favorite mode, while those who like both modes can use both. Competition rules are at <[www.arrl.org/iaru-hf-championship](http://www.arrl.org/iaru-hf-championship)>.

This year the excitement and special awards of WRTC will not be present, but the next group of WRTC aspirants will be on full time to further their quest to win a team leader slot. Even though it is a true multi-mode contest, however, my observation has been that activity skews more to the CW side, unlike some other contests.

The Reverse Beacon Network (RBN) has made CW participation, in particular, fun even for low power and antenna-challenged stations under challenging propagation conditions. Hordes of callers can be attracted when the band is favorable, if one is on a clear frequency within range of some RBN receivers. In last month’s column under “tips” we offered some timely information on how to maximize your chances of being spotted on the RBN.

## CQ World Wide VHF Contest

The week after the IARU HF Championship, CQ’s own CQ World Wide VHF contest will take place on six and two meters. This is a true “VHF” contest, utilizing all modes but only the

## Calendar of Events

### All year

May 31- June 2  
June 1-2  
June 1-2  
June 1-2  
June 8  
June 8  
June 8-9  
June 8-9  
June 8-9  
June 8-9  
June 8-9  
June 8-10  
June 10  
June 15  
June 15  
June 15  
June 15-16  
June 15-16  
June 15-16  
June 19  
June 22-23  
June 22-23  
June 22-23  
June 27

### CQ DX Marathon

PODXS 070 Club Three Day Weekend Contest  
10-10 Open Season PSK Contest  
Dutch Kingdom Contest  
Kentucky QSO Party  
Asia-Pacific SSB Sprint  
RSGB 1<sup>st</sup> 40m QSO Party  
VK Shires Contest  
Portugal Day Contest  
REF DDFM 6M Contest  
GACW WWSA CW DX Contest  
DRCG Long Distance Contest (RTTY)  
ARRL June VHF QSO Party  
RSGB 80m Club Championship, Data  
AGCW VHF-UHF Contest  
ARRL Kids Day Contest  
FIRAC VHF Contest  
Stew Perry Topband Challenge  
West Virginia QSO Party  
All Asian CW DX Contest  
RSGB 80m Club Championship, CW  
ARRL Field Day  
His Maj. King of Spain SSB Contest  
Ukrainian DX DIGI Contest  
RSGB 80m Club Championship, SSB

### <http://bit.ly/vEKMWD>

<http://bit.ly/2Srdp8A>  
<http://bit.ly/1FrFeBc>  
[www.dkars.nl/index.php?page=rules](http://www.dkars.nl/index.php?page=rules)  
[www.kyqsoparty.org](http://www.kyqsoparty.org)  
<http://jsfc.org/apsprint>  
<http://bit.ly/2YS3E2O>  
<https://tinyurl.com/y5mzefw7>  
<https://tinyurl.com/3jgwf36>  
<http://concours.r-e-f.org/index.php>  
[www.wwsatest.org/english](http://www.wwsatest.org/english)  
[www.drcg.de](http://www.drcg.de)  
[www.arrl.org/june-vhf](http://www.arrl.org/june-vhf)  
<http://bit.ly/2RsAJ4a>  
<http://bit.ly/1IFdRW0>  
[www.arrl.org/kids-day](http://www.arrl.org/kids-day)  
[www.firac.de/index.html](http://www.firac.de/index.html)  
[www.kkn.net/stew/stew.rules.txt](http://www.kkn.net/stew/stew.rules.txt)  
<https://tinyurl.com/y2hays6h>  
<http://bit.ly/2SWx5fR>  
<http://bit.ly/2RsAJ4a>  
[www.arrl.org/field-day](http://www.arrl.org/field-day)  
<http://bit.ly/1cKAR5V>  
[www.izmail-dx.com](http://www.izmail-dx.com)  
<http://bit.ly/2RsAJ4a>

July 1  
July 1  
July 1-7  
July 6  
July 6-7  
July 6-7  
July 6-7  
July 6-7  
July 10  
July 13  
July 13-14  
July 13-14  
July 20  
**July 20-21**  
July 20-21  
July 21  
July 25  
July 27-28  
**Sept. 28-29**

RAC Canada Day Contest  
RSGB 80m Club Championship, CW  
10-10 Int. Spirit of 76 QSO Party  
FISTS Summer Slow Speed Sprint  
Marconi Memorial HF Contest  
DL-DX RTTY Contest  
Original QRP Contest  
PODXS 070 Club 40 Meter Firecracker Sprint  
RSGB 80m Club Championship, SSB  
FISTS Summer Sprint  
IARU HF Championship  
Veron SLP Contest  
RSGB 2nd 40m QSO Party  
**CQWW VHF Contest**  
North American RTTY QSO Party  
CQC Great Colorado Gold Rush  
RSGB 80m Club Championship, Data  
RSGB IOTA Contest  
**CQWW RTTY DX Contest**

<https://tinyurl.com/yydd2ud9>  
<http://bit.ly/2RsAJ4a>  
<http://bit.ly/1FrFeBc>  
<http://fistsna.org/operating.html#sprints>  
[www.arifano.it/contest\\_marconi.html](http://www.arifano.it/contest_marconi.html)  
[www.drcg.de](http://www.drcg.de)  
[www.qrpcc.de/contestrules/index.html](http://www.qrpcc.de/contestrules/index.html)  
<http://bit.ly/2FUmeOL>  
<http://bit.ly/2RsAJ4a>  
<http://fistsna.org/operating.html#sprints>  
[www.arrl.org/iaru-hf-championship](http://www.arrl.org/iaru-hf-championship)  
[http://swl.veron.nl/Rules\\_SLP.html](http://swl.veron.nl/Rules_SLP.html)  
<http://bit.ly/2YS3E2O>  
**www.cqww-vhf.com**  
<http://ncjweb.com/NAQP-Rules.pdf>  
<https://tinyurl.com/yxar3mmt>  
<http://bit.ly/2RsAJ4a>  
<https://tinyurl.com/y4bxmq5d>  
**www.cqwwrtty.com**

– Contest Calendar compiled by Cathy Ross





## STMicroelectronics STM32WB Ultra-Low-Power Wireless Microcontrollers

Mouser Electronics, Inc. is now stocking the STM32WB wireless microcontrollers from STMicroelectronics (ST). Supporting Bluetooth® 5.0, ZigBee 3.0, and OpenThread connectivity, the dual-core STM32WB microcontrollers are ideal for a broad range of applications, including wearable devices, home security products, smart lighting, fitness and medical devices, industrial appliances, and asset tracking.

ST's STM32WB wireless microcontrollers are based on ST's low-power STM32L4 microcontroller, and offer a rich peripheral set with power-conscious performance. Centered around a 64-MHz Arm® Cortex®-M4 application processor core and an Arm Cortex M0+ network processor core, with up to 1 Mbyte of on-chip flash and 256 Kbytes of SRAM, the microcontrollers integrate a 2.4-GHz radio transmitter optimized for low power consumption and high RF performance.

The microcontrollers feature multiple power-saving modes, including adaptive voltage scaling, 13-nA shutdown mode, and an adaptive real-time accelerator to enable zero-wait-state execution from flash memory. The devices offer state-of-the-art security features including public key authorization, customer key storage, and an elliptic curve encryption engine. The highly integrated microcontrollers also include a crystal-less USB 2.0 Full-Speed device, 32-MHz RF oscillator, analog peripherals, and a Quad-SPI port to connect to external memory.

The STM32WB microcontrollers are supported by the P-NUCLEO-WB55 Nucleo Pack, a development kit that includes a Nucleo-68 board with pre-mounted STM32WB55RG microcontroller, and a USB dongle with onboard STM32WB55CG microcontroller.

The STM32 Wireless MCU is offered in a choice of 48-pin UQFN, 68-pin VQFN, or 100-pin WLCSP with up to 72 general-purpose I/Os (GPIO). All packages are ECOPACK2® compliant. The STM32WB microcontroller is available now and has a suggested retail price of \$7.81-\$9.71. For more information, contact Mouser Electronics Inc., 1000 N. Main St., Mansfield, TX 76063. Website: <www.mouser.com>.

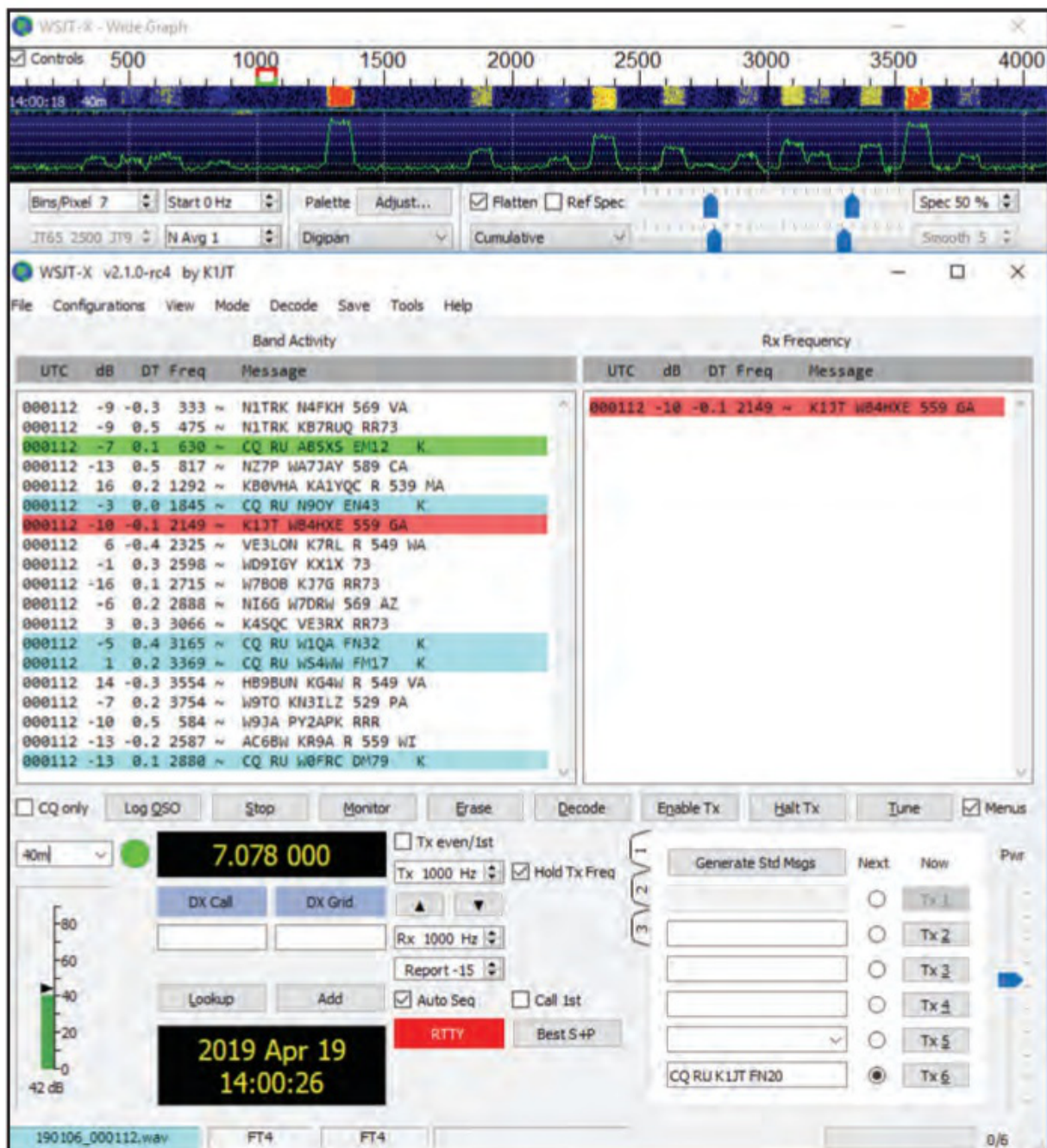


Figure 1. Screen shot showing display of simulated FT4 decoded signals. FT4 is expected to allow an astounding 20-25 separately decodable signals within the 2-kHz bandwidth typically occupied by a single RTTY signal, AND to correctly decode the FT4 signals 10 or more dB weaker than possible with RTTY. (Screen shot courtesy WSJT-X FT4 team announcement)

two VHF bands, 6 and 2 meters. (Technically, 222 MHz is a “VHF” band, but it is not included for this contest.)

The competition is scheduled to last for 27 hours, starting at 1800 UTC on Saturday, July 20, and continuing until 2100 UTC on Sunday, July 21. In addition to SSB and CW, FT8 has been a major mode used for the past two years, and we expect to “see” a lot of FT4 signals this year — if it is released in time (more details below). Multipliers consist of 4-digit grid squares worked per band.

This contest has a unique fun category for backpackers and temporary portable operators. “Hilltopper” is a QRP single-operator category limited to a maximum period of six continuous hours of operation. Any power source may be used. This unique category is perfect for a short expedition for the Summits on the Air (SOTA) program <www.sota.org.uk>, Islands on the Air (IOTA) <https://

iota-world.org>, Parks on the Air <https://parksontheair.com>, or other short forays, whether to a “hilltop” or the seashore.

The rules for the CQ World Wide VHF Contest are unique in other ways and do *not* track those of the ARRL VHF contests, nor the other CQ World Wide contests. So participants are urged to read the rules. Self-spotting and use of non-amateur means of communication generally is *not* allowed, but special provisions apply for meteor scatter (MS). All entrants in all categories, including single operators, may use spotting assistance such as the DXCluster, the Reverse Beacon Network (RBN) and skimmers. The complete competition rules are at <www.cqww-vhf.com/rules.htm>.

A new WSJT-X digital mode specifically designed for contest use, designated FT4, has been announced and is



## Youth Contesting Update

Young contesters continue to make their presence known on the airwaves, often with the added benefit of being invited by big-gun contesters to operate from highly competitive stations. Here are a few updates...



In early March, Phillippe Luty, LX2A, hosted a youth group at his "big gun" station LX7I for the ARRL DX Phone contest in conjunction with IARU Region 1's Young Contesting Program (YCP). Shown at the LX7I superstation are (L-R) Markus Großer, DL8GM; Tom James, F4HWS; Tomi Varro, HA8RT; Claudia, DC2CL; and Louis Fahnenschmidt, DK4EE. (Photo courtesy YOTA/YCP)



Team Exuberance, an ad-hoc youth contesting team, piloted K3LR's station to a claimed top North American score in the multi-op two-transmitter category in the March CQ World Wide WPX Phone Contest. All six operators are 20 years of age or younger. From left-to-right, first row, are Marty Sullaway, NN1C; Violetta "Kat" Latham, KM4ATT, and Bryant Rascoll, KG5HVO; second row middle is host Tim Duffy, K3LR; third row L-R are David Samu, VE7DZO; Tomi Varro, HA8RT, and Levi Jeffries, K6JO. (Photo courtesy K3LR)



OZ5E is the latest "big gun" station to join IARU Region 1's Youth Contesting Program. OZ5E will be piloted by a youth team during this summer's RSGB IOTA contest, July 27-28. Pictured in the OZ5E shack last summer are (L-R) Jan Thogerson, OZ1ADL; Andrew Huddleston, OZ1XJ; and CQ Contest Editor Dave Siddall, K3ZJ. An excellent view of the Danish countryside encircling the OZ1ADL/OZ5E station is in the video showing Andrew and his "ham band" at <https://tinyurl.com/hh9ffk6>. (Photo courtesy K3ZJ)





Photo A. Joe Taylor, K1JT, and CQ VHF+ Editor Tony Emanuele, K8ZR, at the VHF Super Conference that was held in Northern Virginia in April. Joe is the author of WSJT-X, including the newly-announced FT4 mode intended for contest use. See text for details. Tony will have more on the conference in his July column. (K3ZJ photo)

up to 10 dB weaker than used for RTTY contacts, and FT4 uses much less bandwidth than RTTY.

The “Release Candidate” for FT4 was to be made available on April 29 and be functional until June 7, 2019. Copies will become disabled after June 7, and a General Availability (GA) release is currently scheduled for July 15 or later if testing is successful. However, on April 27 at the 2019 VHF Super Conference in Sterling, Virginia, K1JT stated that the release date is not certain, and that he would prefer to release it with sufficient time for operators to become familiar with it before a contest, such as the CQ World Wide VHF. For additional up-to-date information, go to <https://tinyurl.com/y5yl66nj> and <https://tinyurl.com/y9fc9bk3>.



## WRTC2022 Qualification and Competition Rules (Part 1)

The next World Radiosport Team Championship (WRTC) competition will be held in Italy in 2022. Although the WRTCs form an unbroken chain, from 1990 in Seattle to 2022 in Italy, it is underappreciated that each competition is held under rules that are not identical to those used for the preceding competitions. Each national organizing committee adopts the qualification and competition rules for its event, with advice and wisdom from the sanctioning committee that is composed of the leaders of previous WRTCs. The rules for each successive competition have evolved naturally. Each different organizing committee has applied the knowledge and experience of its members.

Thus, the rules for the ninth WRTC drawn up by the Italian organizers start with and draw upon those fashioned by the eight previous organizing committees. The earlier committees represent WRTC competitions held in the U.S., Slovenia, Finland, Brazil, Russia, and Germany. It can be seen that the rules are based upon a fairly large and diverse group of organizers and competitors literally spread around the world.

At the end of the day, the Italian organizers have to take the body of work constructed by the previous organizing committees and adapt it to local conditions in Italy, changing times in ham radio technology, and improvements based upon earlier problems and complaints. This is *not* a small task!

In the immediate past, for example, Brazil in 2006 was the first in which many of the team leaders were selected based upon actual computed contest results. A sophisticated qualification scoring system was introduced and applied to a world divided into 14 qualifying regions. The top qualifiers in each region were invited to form a team to compete in Brazil.

Another adaptation in Brazil recognized that year’s low sunspot activity and Brazil’s geographic location relatively distant from ham population centers. The competitors operated with identical linear amplifiers and employed identical 40-meter beams to try to overcome the obstacles of propagation and location.

discussed immediately below in more detail. Public release of the mode for general use is scheduled for July 15, but is not certain. If it is available by then, I expect that there will be many operators experimenting with FT4 in the CQWW VHF contest, just as they did two years ago after FT8 was released for general use.

## FT4: A New Digital Protocol for Contesting

On April 22, a new digital mode was announced. FT4 (Figure 1) is designed specifically for contesting. Joe Taylor, K1JT (Photo A); Steve Franke, K9AN; and Bill Somerville, G4WJS, announced the new protocol and schedule for its testing and general release. As many readers know, FT8 has been very successful, but contests are won by quickly completing large numbers of QSOs and some contesters wondered if something could be done to speed up the QSO process without losing the benefit of working stations at and below the receiver noise level.

It became apparent, especially during the ARRL Roundup (which allows use of any digital mode in addition to traditional RTTY) that when the band is open, QSOs can be made much faster using the traditional modes of SSB, CW, and RTTY. Of course, when the band is “closed” for contacts using those traditional modes, FT8 could be successful in adding contacts and difficult multipliers.

One could have stopped at this point and figured that when to employ FT8 and when to rely on other modes is an aspect of strategy to maximize contacts and scores. However, the WSJT-X development team decided to see if the weak signal aspects of FT8 could be modified to increase QSOs-per-hour without losing too much of the weak signal aspect and seem to have succeeded.

FT4 is an experimental digital mode intended to be used specifically in contests. It promises rates approaching those that can be realized using RTTY. FT4 is claimed to be about 2.5 times faster than FT8, which would compare favorably to RTTY contest speeds. The advantages of using FT4 are that, on average, contacts can be made between signals that are



# ANNOUNCEMENTS (from page 2)

**UPPERCO, MARYLAND** — The Baltimore Amateur Radio Club will hold the **Father's Day Hamfest & Marketplace** from 8 a.m. to 2 p.m., Sunday, June 16 at the Arcadia Carnival Grounds, 16020 Carnival Avenue. Email: <w3ft67@yahoo.com>. Website: <www.w3ft.com>. DXCC card checking.

**WHEATON, ILLINOIS** — The Six Meter Club of Chicago will hold its **62nd Annual Hamfest** beginning 7 a.m., Sunday, June 16 at the DuPage County Fairgrounds, 2015 Manchester Road. Email: <wd9gjk@arrl.net>. Website: <www.k9ona.com>. Talk-in 146.52 or 146.37+ (PL 107.2). VE exams, ARRL card checking.

## JULY

**HARRISBURG, PENNSYLVANIA** — The Harrisburg Radio Amateurs' Club will hold its **48th Annual Firecracker Electronics Expo and Hamfest** beginning 8 a.m., Saturday, July 6 at the Harrisburg Area Community Center, 3599 Industrial Road. Contact: Terry Snyder, WB3BKN, P.O. Box 355, Halifax, PA 17032. Phone: (717) 896-0256. Email: <wb3bkn1@gmail.com>. Website: <www.w3uu.org>. Talk-in 146.13+ (PL 100). DXCC / WAS card checking.

**OAK CREEK, WISCONSIN** — The South Milwaukee Amateur Radio Club will hold its **Swapfest 19'** beginning 6:30 a.m., Saturday, July 6 at the American Legion Post 434, 9327 South Shepard Avenue. Contact: Karen, KC9WQJ, (414) 578-0492 or Mike Lea, W9MRL, (262) 880-2091. Website: <www.qsl.net/wa9txe>. Talk-in 146.91.

**SALISBURY, NORTH CAROLINA** — The Rowan Amateur Radio Society will hold the **34th Annual Firecracker HAM-FEST** from 8 a.m. to 2 p.m., Saturday, July 6 at the Salisbury, NC Civic Center, 315 Martin Luther King Avenue, S. Contact: Doug Spriggs, W4DCS, (704) 762-0192. Email: <w4dcs@arrl.net>. Website: <www.rowanars.com>. Talk-in 145.41 (PL 136.5) or 146.52. VE exams.

**PLAINS, PENNSYLVANIA** — The Murgas Amateur Radio Club will hold the **40th Annual Wilkes-Barre Hamfest and Computerfest** beginning 8 a.m., Sunday, July 7 at the Polish American Veterans Hall, 2 South Oak Street. Contact: Herb, K2LNS, (570) 829-2695. Email: <murgasarc@fmail.com>. Website: <http://hamfest.murgasarc.org>. Talk-in 146.61 (PL 82.5). VE exams.

**INDIANAPOLIS, INDIANA** — The Indianapolis Hamfest Association will hold the **49th Annual Indianapolis** from 2-7 p.m., Friday, July 12 and from 6 a.m. to 2 p.m., Saturday, July 13 at the Marion County Fairgrounds, 7300 E. Troy Avenue. Phone: (317) 829-6868. Website: <www.indyhamfest.com>. DXCC card checking.

**ERIE, PENNSYLVANIA** — The Wattsburg Wireless Association will hold the **18th Annual Northwest PA Hamfest** beginning 7:30 a.m., Saturday, July 13 at the Greene Township Municipal Building, 9333 Tate Road. Email: <hamfest@wattsburg-wireless.us>. Website: <www.wattsburg-wireless.us>. VE exams.

**PHOENIXVILLE, PENNSYLVANIA** — The Mid Atlantic Amateur Radio Club will hold the **Valley Forge Hamfest** beginning 8 a.m., Saturday, July 13 at the Kimberton Fire Co. Fairgrounds, 762 Pike Springs Road. Contact: Jeremy Carlo, N2ZLQ, (917) 612-2163. Email: <n2z1q@marc-radio.org>. Website: <www.marc-radio.org>. Talk-in 146.13- (PL 131.8) or 147.06+ (PL 131.8). VE exams.

**ROSEVILLE, MINNESOTA** — The Minnesota Amateur Group of Independent Communicators will hold the **16th Annual MAGIC TAILGATER** from 8 a.m. to noon, Saturday, July 13 at the Galilee Lutheran Church, 145 N. McCarrons Boulevard. Website: <www.magicrepeater.net>. Talk-in 145.170 (PL 100).

**TEXAS CITY, TEXAS** — The Tidelands Amateur Radio Society will hold the **Texas City, Tidelands Hamfest** from 8 a.m. to 2 p.m., Saturday, July 13 at the Doyle Convention Center, 2010 5th Avenue North. Contact: TARS, P.O. Box 73, Texas City, TX 77592. Website: <www.tidelands.org>. Talk-in 147.14 (PL 167.9) or 442.025 (PL 103.5). VE exams, T-hunt.

**AUGUSTA, NEW JERSEY** — The Sussex County Amateur Radio Club will hold the **41st Annual SCARC Hamfest** beginning 8 a.m., Sunday, July 14 at the Sussex County Farm & Horse Show Fairgrounds, 37 Plains Road. Phone: (973) 862-8197. Email: <hamfest@scarcnj.org>. Website: <www.sussexhamfest.org>. Talk-in 147.30+ (PL 151.4). VE exams.

**ESSEX, MONTANA** — The 85th Annual Glacier-Waterton International Hamfest will be held Friday, July 19 through Sunday, July 21 at the Glacier Meadow RV Park, 15735 U.S. Highway 2 East. Email: <directors@gwhamfest.org>. Website: <www.gwhamfest.org>. VE exams, T-hunt.

**RENO, NEVADA** — The Sierra Nevada Amateur Radio Society will hold **NVCON and 2019 ARRL Nevada State Convention** from 9 a.m. to 5 p.m., Friday, July 19 and from 9 a.m. to 5:30 p.m., Saturday, July 20 at the Boomtown Casino Hotel, 2100 Garson Road. Phone: (775) 453-4142. Email: <info@nvcon.org>. Website: <http://nvcon.org>. VE exams, special event station.

**ALEXANDER, NEW YORK** — The Lancaster Amateur Radio Club will hold the **Batavia Hamfest** beginning 6 a.m., Saturday, July 20 at the Alexander Firemen Grounds, 10708 Alexander Road (Rt. 98). Contact: Luke, N2GDU, <luke48@gmail.com>. Website: <http://w2so.org>. Talk-in 147.285 (PL 141.3). VE exams.

**CARY, NORTH CAROLINA** — The Cary Amateur Radio Club will hold its **47th Annual SWAPFEST** from 9 a.m. to 1 p.m. Saturday, July 20 at Harold Ritter Park, 301 West Lochmere Drive. Website: <www.caryarc.org>. VE exams.

**CHEHALIS, WASHINGTON** — The Chehalis Valley Amateur Radio Society will hold the **21st Annual Ham Radio Tailgate Swap Meet** from 9 a.m. to noon, Saturday, July 20 at the Southwest Washington Fairgrounds, 2555 N. National Avenue. Contact: John, (360) 273-5929. Email: <k7osk@boatanchor.com>. Website: <http://cvars.org>. Talk-in 147.060+ (PL 110.9).

**ELYRIA, OHIO** — The Northern Ohio Amateur Radio Society will hold **NOARFEST** from 8 a.m. to noon, Saturday, July 20 at Lorain County Community College-John A. Spitzer Conference Center, 1005 N. Abbe Road. Contact: Carl Rimmer, W8KRF, (216) 256-9624 (before 9 p.m.). Email: <noarsfest@noars.net>. Website: <www.noars.net>. Talk-in 146.70- (PL 110.9).

**KENAI, ALASKA** — The Moosehorn Amateur Radio Club will hold the **12th Annual Kenai Peninsula Hamfest** from 10 a.m. to 3:30 p.m., Saturday, July 20 at the Kenai American Legion Hall, 902 Cook Avenue. Contact: Ed Cole, KL7UW, (907) 776-5829. Email: <kl7uw@acsalaska.net>. Website: <www.kl7uw.com>. Talk-in 146.88-. VE exams.

*(Continued on page 104)*

## Errata – 2018 CQWW DX SSB Contest

• The 40-meter Assisted Low Power scores found in the Top Scores chart are incorrect. The winners should be:

**7 MHz**  
UK9AA...322,934  
EI9HX...320,160  
Z33C...185,806

• The caption for LY5XX's photo is incorrect. It should read: Karolina, LY5XX, is a versatile rookie operator on SSB and CW! Unfortunately, the castle tower on the computer is not part of the station!

• The plaque winners table should be corrected as follows: ASEAN Multi-Two winner should be: YE2A (Ops: YBØJS, YBØARJ, JJ1DQR, YB2DX, YB2LSR, YB2TJV, YB2WB, YB2WA, YB3KM, YD2XVT) and not 9M2CHS.

The callsign receiving the Multi-Two Japan plaque is JE2YRB (not JE2YRP).

Finally, we lost a letter on Contest Director K1AR's email address in the results article. If you need to contact John, his correct email address is <cqk1ar@gmail.com>.

In 2010 in Moscow, a significant attempt was made to equalize the stations that each team would use. All competitors operated "Field Day style." For the first time, all operating sites were temporary, with tents and generators located in fields. Identical antennas were constructed and erected at each tent for the competitors. Volunteers came from across Russia to man the sites. Also new in WRTC 2010 was that both operators were allowed to operate at the same time, so long as only one transmitted at any single instant.

In Boston in 2014, the organizers elected to continue with the field-day style of operation employed in Moscow four years earlier. However, this time each member of the two-member team was permitted to operate independently of the other. That is, interleaving QSOs no longer was necessary. Both team members could transmit simultaneously. Thus, Moscow's form of multi-single operating morphed into a form of multi-two operation. This resulted in more QSOs for each team and for the thousands of hams around the world trying to make contacts with the teams.

Since Brazil's WRTC in 2006, one of the unique aspects of the competition to qualify for a WRTC chair is that individual qualifications are limited to a geographic area. So one's geographic location is not *per se* helpful or disqualifying, although competitors inevitably complain about the station "to the east" or "to the south" that is within the same qualifying area but has a "huge" geographic propagation advantage.

Some of the complaints are, in fact, justified. But there is only so much that can be done, and each organizing committee has sought to create as much parity as possible in the qualification process.

Next month we will look at the specific rules that govern the process for qualifying at the next WRTC in Italy.

*– Until next month, 73, Dave, K3ZJ*

### Note:

1. The CQ World Wide DX and WPX Contests attract more participants than ARRL Field Day, but are worldwide in scope while Field Day focuses on the United States and Canada.



## DXpedition Funding Revisited

I've covered this subject in the past but it may be time to continue the discussion. Recently, a few DXpeditions have decided to challenge some of the DXpedition funding organizations' policies. As such, I feel that it is appropriate to review this subject.

How do DXpedition funding organizations solicit and distribute their funds? Each one is a little different. Having handled QSLs for multiple megaDXpeditions, I have some internal knowledge of various requirements. Also, as you may know, I am the current president of The International DX Association (INDEXA) <www.indexa.org> and we have our own requirements for DXpedition funding.

It is the ultimate responsibility of all funding organizations to do their best to protect their investment in any DXpedition that they are asked to support. This usually starts by requiring that the team requesting the support is legitimate. This involves a screening of the DXpedition including a full list of team members, their experience, and receipt of a bona fide overall plan. Further information may be required, including proof of landing permission, license, a verified boat/transportation contract, a list of equipment, and any other information related to the overall plan. Is the DXpedition destination rare enough to deserve funding? (INDEXA requires the entity to be in the top 60 per Club Log, for example). Each funding organization has its own requirements and may include some IOTAs (Islands on the Air) that are rare, although their DXCC entity rank is not rare.

Next will usually be a requirement for an "honorable" QSL policy, including a future LoTW upload. Who is the QSL manager? Will QSLs be handled via the bureau? Most funding organizations require that a fair QSL policy be followed by which a QSL will be mailed as long as appropriate funds are provided for return mail. If OQRS is used, a description of that policy is usually requested. OQRS is generally encouraged as a resource for the DXpedition to collect some funding as long as other

methods are accepted. However, the funding organizations still would like to know the OQRS plan in order to confirm that it is fair. It is worth noting that many of the European funding organizations require the DXpedition to provide a QSL service for the supporting organization's members. The funding organization collects log data from its members and provides this list of QSOs to the DXpedition's QSL manager, who would process those cards at no charge and send them to one collection point where they would be passed along to the individual members of the funding organization.

The funding organizations always require that their logo is placed on the DXpedition website and on the QSL cards. A few may want "support request stuffers" to be included with the QSL cards when mailed by the QSL manager. Many ask for a "unique story" from the DXpedition written for the funding organization's newsletter. Sometimes, a banner and/or team apparel (T-shirts, etc.) are supplied and the funding organization asks for appropriate team photos to be provided after the DXpedition is over. It's all about marketing.

Some of you *only* want an LoTW upload. Let me explain why this is coun-

### 5 Band WAZ

As of April 15, 2019  
2130 stations have attained at least the 150 Zone level,  
and  
1018 stations have attained the 200 Zone level.

As of April 15, 2019  
**The top contenders for 5 Band WAZ** (Zones needed on 80 or other if indicated):  
CHANGES shown in **BOLD**

Callsign	Zones	Zones Needed	Callsign	Zones	Zones Needed
AK8A	199	17	W1FZ	199	26
DM5EE	199	1	W2LK	199	23
EA5RM	199	1	W3NO	199	26
EA7GF	199	1	W4LI	199	26
H44MS	199	34	W4UM	199	23
HAØHW	199	1	W6DN	199	17
HA5AGS	199	1	W6RKC	199	21
I5REA	199	31	W9XY	199	22
IKØXBX	199	19 on 10M	WAØMHJ	199	23
IK1AOD	199	1	WA2BCK	199	23
IK8BQE	199	31	9A5I	198	1, 16
IZ3ZNR	199	1	EA5BCX	198	27, 39
JA1CMD	199	2	F5NBU	198	19, 31
JA5IU	199	2	G3KDG	198	1, 12
JA7XBG	199	2	G3KMQ	198	1, 27
JH7CFX	199	2	HB9FMN	198	1 on 80&10
JK1BSM	199	2	JA1DM	198	2, 40
K1LI	199	24	JA3GN	198	2 on 80&40
K2RD	199	18	JA7MSQ	198	2 on 80&10
K4HB	199	26	JH1EEB	198	2, 33
K5FUV	199	23	K2EP	198	23, 24
K5TR	199	22	K2TK	198	23, 24
K7UR	199	34	K3JGJ	198	24, 26
K9KU	199	22 on 15	K3LR	198	22, 23
KBØEO	199	23	K4JLD	198	18, 24
KZ4V	199	26	K5OT	198	18, 23
N3UN	199	18	KZ2I	198	24, 26
N4NX	199	26	N2QT	198	23, 24
N4WW	199	26	N4GG	198	18, 24
N4XR	199	27	N8TR	198	18, 23 on 10
N8AA	199	23	UA4LY	198	6 & 2 on 10
RA6AX	199	6 on 10M	UN5J	198	2, 7
RU3DX	199	6	US7MM	198	2, 6
RWØLT	199	2 on 40M	W5CWQ	198	17, 18
RX4HZ	199	13	W6OUL	198	37, 40
RZ3EC	199	1 on 40M	W6TMD	198	34, 40
S58Q	199	31	W9RN	198	26, 19 on 40
SM7BIP	199	31	WC5N	198	22, 26
SP3RBG	199	2 on 10M	WL7E	198	34, 37
VE2TZT	199	23	ZL2AL	198	36, 37
VO1FB	199	19			
W1FJ	199	24			

The following have qualified for the basic 5 Band WAZ Award:

Callsign	5BWAZ #	Date	# Zones
JJ3PRT	2124	2019-03-18	200
IWØSAF	2125	2019-03-20	200
N7RD	2126	2019-03-25	169
UT7UV	2127	2019-03-29	200
JR1WCT	2128	2019-04-05	161
KD5M	2129	2019-04-07	200

Updates to the 5BWAZ list of stations:

Callsign	5BWAZ #	Date	# Zones
KØEEO	1998	2019-03-19	180
W1TSP	2050	2019-03-22	193
W7AH	1311	2019-03-22	189
K7LY	1839	2019-03-25	185
RL3FA	1983	2019-03-31	196
KE4KMG	2061	2019-04-07	161
IKØFVC	1927	2019-04-08	200
JH4UYB	1536	2019-04-11	200

New recipients of 5 Band WAZ with all 200 Zones confirmed:

5BWAZ #	Callsign	Date	All 200 #
2124	JJ3PRT	2019-03-18	1012
2125	IWØSAF	2019-03-20	1013
2127	UT7UV	2019-03-29	1014
2129	KD5M	2019-04-07	1015
1927	IKØFVC	2019-04-08	1016
1536	JH4UYB	2019-04-11	1017

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Award Manager, John Bergman, KC5LK, 125 Deer Trail, Brandon, MS 39042-9409. The processing fee for the 5BWAZ award is \$10.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$15.00 for nonsubscribers. An endorsement fee of \$2.00 for subscribers and \$5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to John Bergman. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. KC5LK may also be reached via e-mail: <kc5lk@cq-amateur-radio.com>.

\*Please note: Cost of the 5 Band WAZ Plaque is \$100 shipped within the U.S.; \$120 all foreign (sent airmail).

\* Email: <n200@comcast.net>



## ANNOUNCEMENTS *(from pg. 102)*

**LOUISA, KENTUCKY — The Big Sandy Amateur Radio Club** will hold its **Hamfest** from 8 a.m. to 1 p.m., Saturday, July 20 at the Lawrence County Community Center, 205 Bulldog Lane. Contact: Tom Lykins, K4LID, (606) 638-4735, Email: <k4lid@panix.com>. Website: <http://bsarc.org>. Talk-in 147.390 (PL 127.3).

**SCHAUMBURG, ILLINOIS — The Motorola Amateur Radio Club** will air special event station **K9MOT** to commemorate Motorola's contribution to the Apollo program. Frequencies include 3.83, 7.23, 14.245, 21.435 MHz for SSB; 3.543, 7.043, 14.043, 21.043, 28.043 MHz for CW. QSL to Motorola ARC, P.O. Box 59701, Schaumburg, IL 60159. Email: <k9mot@arrl.net>. Website: <www.qsl.net/k9mot>.

**SLIDELL, LOUISIANA — The Ozone Amateur Radio Club** will hold the **2019 Slidell EOC Hamfest** from 8 a.m. to 2:30 p.m., Saturday, July 20 at the John Slidell Park Gymnasium, 105 Robert Boulevard. Email: <hamfest@w5ala.net>. Website: <www.w5ala.net>. Talk-in 147.27+ (PL 114.8). VE exams.

**PEOTONE, ILLINOIS — The Kankakee Area Radio Society** will hold **KARSFEST 2019** beginning 6 a.m., Sunday, July 21 at the Will County Fairgrounds. Contact: Art Reis, K9XI, (815) 348-7752. Email: <karsfest@gmail.com>. Website: <www.w9az.com>. VE exams, card checking.

**SOMERSET, PENNSYLVANIA — The Somerset County Amateur Radio Club** will hold the **Somerset County PA Hamfest** from 8 a.m. to 1 p.m., Sunday, July 21 at the Somerset County Technology Center, 281 Technology Drive. Contact: Stew, AK3J, (814) 444-0637. Email: <ak3j@arrl.net>. Website: <www.k3smt.org>. Talk-in 147.195+ (PL 123) or 443.250+ (PL 123). VE exams.

**VAN WERT, OHIO — The Van Wert Amateur Radio Club** will hold the **31st Annual Van Wert Hamfest** beginning 8 a.m., Sunday, July 21 at the Van Wert County Fairgrounds, 1055 S. Washington Street. Contact: Steve Kouts, WA8WKF, (419) 771-8152. Email: <secretary@w8fy.org>. Website: <http://w8fy.org>. Talk-in 146.850.

**WASHINGTON, MISSOURI — The Zero Beaters Amateur Radio Club** will hold its annual **Hamfest** from 7 a.m. to 1 p.m., Sunday, July 21 at the Washington Elks Hall, 1459 West 5th Street. Contact: Bruce Serbus <kd0kcf@sbcglobal.net>. Talk-in 147.24+. VE exams.

**LINCOLN, NEBRASKA — The Central States VHF Society** will hold the **53rd Annual CSVHFS Conference** from 3-8 p.m., Thursday, July 25; 8 a.m. to 5 p.m., Friday, July 26; 8 a.m. to 10 p.m., Saturday, July 27; and Sunday, July 28 at the Country Inn & Suites by Radisson, 5353 N. 27th Street. Email: <registration@csvhfs.org>. Website: <http://2019.csvhfs.org>. DXCC / VUCC / WAS / WAC card checking.

**OKLAHOMA CITY, OKLAHOMA — Ham Holiday 2019** and the **2019 ARRL Oklahoma State Convention** will be held from 3-9 p.m., Friday, July 26 and from 8 a.m. to 3 p.m., Saturday, July 27 at Oklahoma City Community College, 7777 S. May Avenue. Website: <http://hamholiday.com>. VE exams.

**CHAMBERSBURG, PENNSYLVANIA — The Cumberland Valley Amateur Radio Club** will hold the **CVARC Hamfest 2019** from 8 a.m. to noon, Saturday, July 27 at the Cumberland Valley Engine & Machinery Association Show Grounds, 1501 Cridders Church Road. Email: <hamfest@w3ach.org>. Website: <http://w3ach.org>. Talk-in 147.120+ (PL 100). VE exams.

**MONUMENT, COLORADO — The Pikes Peak Radio Amateur Association** will hold the **PPRAA 49th Annual Ham Radio Megafest** from 8 a.m. to 1 p.m., Saturday, July 27 at Lewis-Palmer High School, 1300 Higby Road. Email: <megafest@ppraa.org>. Website: <http://ppraa.org>. Talk-in 146.970- (PL 100). VE exams.

**WAYNESVILLE, NORTH CAROLINA — The Western Carolina Amateur Radio Society** will hold the **WCARS Hamfest 2019** from 8 a.m. to 2 p.m., Saturday, July 27 at the Haywood County Fairgrounds, 758 Crabtree Road. Email: <wcars.nc.hamfest@gmail.com>. Website: <www.wcars.org>. VE exams.

**RAVENNA, OHIO — The Portage Amateur Radio Club** will hold its **Hamfair 2019** from 8 a.m. to 3 p.m., Sunday, July 28 at the Maplewood Career Center, 7075 State Route 88. Contact: Joanne Solak, KJ3O, (330) 274-8240. Email: <kj3o@arrl.net>. VE exams.

**UTICA, NEW YORK — The Utica Amateur Radio Club** will hold **RadioCom 2019** from 8 a.m. to noon, Sunday, July 28 at the Deerfield Firehouse Grounds, 5476 Trenton Road. Contact: Bob Decker, AA2CU, (315) 797-6614. Email: <tbd2626@yahoo.com>. Website: <www.uticaarc.com>. Talk-in 146.76-. VE exams.

## The WPX Program

### CW

3895 ..... K5PE      3896 ..... BW/G4TDS

### SSB

4202 ..... LZ1CRI      4206 ..... W9ROG  
4203 ..... N1KEZ      4207 ..... N0WA/DU7  
4204 ..... G0DTX      4208 ..... DL1DV  
4205 ..... KN4HPJ

### Mixed

3823 ..... IZ5IMB      3831 ..... MI0GTA  
3824 ..... NX8E      3832 ..... K4MJA  
3825 ..... JA1RRA      3833 ..... K9BBQ  
3826 ..... KB7SAT      3834 ..... KG6BXW  
3827 ..... W5UJ      3835 ..... N9BUB  
3828 ..... EA5GDY      3836 ..... K7CTV  
3829 ..... AJ4M      3837 ..... DL5KLX  
3830 ..... JS1MRA      3838 ..... SM6YEC

### Digital

1018 ..... IZ5IMB      1026 ..... OH6HSD  
1019 ..... NX8E      1027 ..... HS5XWY  
1020 ..... JA1RRA      1028 ..... SM6YEC  
1021 ..... KV2H      1029 ..... KG6BXW  
1022 ..... KB7SAT      1030 ..... T12TBO  
1023 ..... PD0DNA      1031 ..... DL1DV  
1024 ..... AJ4M      1032 ..... N9BUB  
1025 ..... PY5SAT

**CW: 350:** KC9UL. **550:** JA1RRA. **700:** VA7CRZ. **950:** AB10C.

**SSB: 350:** AA1LS, DL1DV. **400:** K6DLB, W5UJ. **550:** N1KEZ. **600:** W9TVX. **1300:** VA7CRZ. **2500:** AB10C.

**Mixed: 450:** AJ4M, KG6BXW. **500:** NX8E. **550:** K9BBQ, K7CTV. **600:** KB7SAT, KE4H, N3DF. **700:** IZ5IMB, JS1MRA. **750:** N9BUB. **900:** JA7FVA, AL4Y. **950:** WR7X. **1000:** JA1RRA, N1KEZ. **1050:** PY4AZ. **1100:** DO3GE. **1200:** KE4KMG. **1850:** VA7CRZ. **2400:** NE6I. **2550:** HB9BIN. **2950:** AB10C. **3950:** K9UQN.

**Digital: 350:** DL5KLX. **400:** NX8E, JA7FVA, KA0ZOZ. **450:** JA1RRA, W9TVX, KG6BXW. **500:** DL1DV. **550:** K7CTV. **600:** KB7SAT, N3DF. **650:** IZ5IMB, N1KEZ, N6DBF, VA7CRZ. **700:** AL4Y, HS5XWY. **750:** N9BUB. **800:** NE6I, WR7X, W1KE. **900:** W9TVX, N6DBF. **950:** PY4AZ, DO3GE. **1350:** W2/JR1AQN. **1400:** HB9BIN. **1600:** K3VAT. **1650:** AB10C.

**160 Meters:** KE4KMG, AJ4M, DO3GE

**80 Meters:** NX8E, K7CTV

**60 Meters:** AB10C

**40 Meters:** IZ5IMB, NX8E, KC9UL, KG6BXW, K7CTV

**30 Meters:** AL4Y, JF20HQ

**20 Meters:** IZ5IMB, KB7SAT, W5UJ, W9TVX, EA5GDY, KC9UL, K9BBQ, HS5XWY, DL1DV, WR7X

**17 Meters:** K3VAT, HB9BIN

**15 Meters:** K6DLB, DO3GE

**10 Meters:** W9TVX

**Asia:** BW/G4TDS, N0WA/DU7, HS5XWY, KG6BXW, K7CTV

**Europe:** IZ5IMB, JA1RRA, PD0DNA, W4TTO, EA5GDY, MI0GTA, G0DTX, OE6HSD, HS5XWY, SM6YEC, DL1DV, N9BUB, DL5KLX

**Oceania:** HS5XWY

**North America:** KV2H, KB7SAT, W5UJ, JA7FVA, AJ4M, KN4HPJ, K4MJA, K9BBQ, KG6BXW, T12TBO, DL1DV, N9BUB, DO3GE, K7CTV

**Award of Excellence with 160 Bar:** HA5WA

**60M Bar:** AB10C

**6M Bar:** AB10C, HA5WA

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage for airmail) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will now accept prefixes/calls which have been confirmed by eQSL.cc. and the ARRL Logbook of The World (LoTW).

\*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are \$6.50 each.

terproductive to a DXpedition's ultimate project goals. Most DXpeditions, especially ones to the "rare" places around the globe, rely on support from funding organizations, clubs, dealers, and manufacturers. All of them provide their support in exchange for appropriate publicity. After all, that is how they can warrant their support. A funding organization is looking for people to send in

## The WAZ Program

### SINGLE BAND WAZ

#### 6 Meter

144 .....HA9PP, 25 Zones

#### 17 Meter Digital

2 .....HA5WA

#### 20 Meter Digital

9 .....JA70UV

#### 20 Meter RTTY

80 .....N4MM

#### 40 Meter Digital

2 .....JA70UV      3 .....HA5WA

#### 160 Meter

571 .....IZ0AEG, 40 Zones      575 .....SP5DIR, 40 Zones  
572 .....IW0SAF, 30 Zones      576 .....RL3FA, 31 Zones  
573 .....W7AH, 30 Zones      577 .....JA1CPU, 30 Zones  
574 .....UT7UV, 36 Zones      578 .....K9RX, 35 Zones

#### 160 Meter Updates

568 .....IZ8VYU, 33 Zones      523 .....SV8BHN, 40 Zones

### ALL BAND WAZ

#### CW

1025 .....K9CJM

#### Digital

77 .....SP6NIN      80 .....W2DXE  
78 .....JK1GOK      81 .....VY2HH  
79 .....JA7BAL      82 .....K15BLU

#### Mixed

9690 .....N4MIK      9699 .....KL6LU  
9691 .....AA1QD      9700 .....W2DXE  
9692 .....JJ3PRT      9701 .....BH4QYX  
9693 .....N0IS      9702 .....JS1MRA  
9694 .....F5VHQ      9703 .....IK3SWB  
9695 .....W4MAY      9704 .....K15BLU  
9696 .....IT9JPS      9705 .....N4EFS  
9697 .....K0YY      9706 .....W4BH  
9698 .....JD1BLY

#### SSB

5440 .....IT9JPS      5441 .....KD5M

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Award Manager, John Bergman, KC5LK, 125 Deer Trail, Brandon, MS 39042-9409. The processing fee for all CQ awards is \$6.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$12.00 for nonsubscribers. Please make all checks payable to John Bergman. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. KC5LK may also be reached via e-mail: <kc5lk@cq-amateur-radio.com>.



## CQ DX Awards Program

### New Award – SSB

AA1LS .....2655

### Endorsements – CW

N5KAE .....181  
KEØA .....320  
WØVIT .....339

### Endorsements – SSB

N5KAE .....283  
WA5UA .....324/28,3.5/7 MHZ  
AA1LS .....28 MHZ

The basic award fee for subscribers to CQ is \$6. For non-subscribers, it is \$12. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. We recognize 341 active countries. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.

contributions. A dealer or a manufacturer is looking to promote its business. A regular “club” is looking to promote the club.

Let’s face it, it’s all about marketing. Adding a logo on a web page is needed, but it doesn’t last. It doesn’t get very much exposure. Some supporting businesses use their support in their advertising. But the one thing that outlasts the web pages and the advertisements in the magazines is the actual DXpedition QSL cards. Every time someone looks at a QSL card, he or she will see the assorted logos, and those images last forever. Currently, the normal policy for early LoTW uploads is to do uploads for anyone requesting a QSL card first. Then a full LoTW upload to everyone else is usually done, but sometimes up to one year after the operation is QRT. In other words, PLEASE understand WHY LoTW is not often offered without a QSL card request. It’s all about the marketing, and the supporters really do deserve as much as is possible in order to encourage them to continue to provide support in the future.

I’ll leave this subject with one last comment. Funding organizations rarely offer to support any DXpedition. They only respond to requests for support. If

a DXpedition team makes any comments about not getting support, let it be known that it either did not request support, or it did not provide adequate documentation with its request and the request was either denied or withdrawn. That is how it is. That being said, even the best plans can run into problems.

### Club Participation!

I want to wrap up this column with another subject that I have previously addressed. But it has been a while. If you have any interest in DXing, please be active in your local DX club if there is one in your region. If not, then get active in your local amateur radio club, or when applicable, how about both? You represent a very “active” part of ham radio. Share it with others.

Too often, our clubs have a large number of members who pay their annual dues, but rarely come to meetings or other activities, such as Field Day or special events. When I look at my own local clubs, I have seen this happening for many years. But lately, I see it is not getting better. Using very loose numbers, I can remember when the local ham radio club would draw 50% or more of its membership to every meeting. Today, that number is probably closer

# DX World Guide

## New 4th Edition! By Franz Langner, DJ9ZB

Known throughout the DX and DXpedition world as a meticulous and tireless operator, Franz Langner, DJ9ZB, is also noted as one of the most knowledgeable individuals in Amateur Radio in terms of documenting DXCC entities.

This is the fourth edition of his series of books bearing the title *DX World Guide*. It was first published in Germany in 1988 and followed by a second edition, also in Germany in 1977. The third edition, published in the U.S.A in 2012 was the first to use color throughout. This 380-page, fourth edition, also full color throughout, includes information on well over 300 DX entities.

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to around 20-25%. DX clubs aren't much better, but they have more of an excuse since they are regional clubs often covering much larger areas. This is why I encourage all of you reading this column to consider participating in clubs as much as you are able. There is nothing like the one-on-one, eye-to-eye camaraderie that you experience at a meeting. Be part of the experience. I know times have changed with the internet and all that goes with it. Once upon a time, the "club meeting" was where we saw programs and learned about our hobby. That can still be done, just not quite in the same ways. Offer your DX experiences to your local club. Offer to do a couple of presentations at your meeting. Join up with some other DXers in the local club and thrill the membership with DX! If you are looking to start a nice little show, a simple way is to buy or borrow the BS7H Scarborough Reef DXpedition DVD. You can borrow this DVD from the Northern California DX Foundation for a modest fee. As a matter of fact, the foundation has a large library of presentations available. Take a look on its website at <<https://tinyurl.com/y258dr8z>>. Perhaps others may jump out at you. NCDXF does this as a

valuable service for ham radio clubs. I highly recommend it.

That'll do it for this month. I'm working on my modest antenna farm here, now that the weather has gotten nice again. Some of you might think I'm a "big gun." I do not consider myself as such. That title belongs to others. My setup includes a 3-element SteppIR with 40-30 dipole element (the trombone!), and wires for 160 and 80. So, with three antennas, I am on 160-6 meters. My tower is a 54-foot crankup/tilt-over. That's it. The radio that I usually use is a K3 with a KPA500 amplifier (500 watts). I have an OM 1.5-kilowatt amp, but only use it sparingly in some contests and on 160. I won an FTDX1200 a couple of years ago and I use it almost exclusively on FT8, but also on FD and special events. It is nice to have a backup. So, as you can see, I am not one of those guys with a dozen 100-foot-plus towers on 100 acres. I am a DXer first, DXpeditioner (when able) second, and a contester third. I stay involved in my local club as their Field Day chairman and I look forward to working everyone from N2OB again this year. This will be my 55<sup>th</sup> consecutive Field Day!

## CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 340 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is \$1.00 each plus SASE. (Stickers for the 340 level and Honor Roll are available.) Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA.

### CW

DL3DXX .....339	K4CN.....339	N7RO .....339	K8SIX.....338	K9OW .....334	W9IL .....329	ON4CAS.....321	KT2C ..... 307	PP7LL .....282
HB9DDZ .....339	K4JLD .....339	NØFW .....339	KA7T .....338	PY2YP.....334	IKØADY.....328	KEØA.....320	K4DGJ.....307	WR7Q .....282
K4IQJ .....339	K4MQG .....339	OK1MP.....339	WA5VGI .....338	WG5G/.....334	OZ5UR .....328	HB9DAX/.....319	W4ABW.....306	N2VW.....280
K9MM .....339	K5RT .....339	W3GH .....339	W1DF .....338	QRPp.....334	AB4IQ .....327	QRPp.....319	K7ZM .....305	K4EQ.....280
N4MM .....339	K7LAY .....339	W4OEL.....339	W9RPM.....338	WD9DZV .....334	K6CU .....326	HA1ZH.....318	HA5LQ.....301	WB5STV.....277
WB4UBD .....339	K7VV .....339	W5BOS .....339	G3KMQ .....337	K2OWE.....333	KE3A .....326	N6PEQ.....318	RN3AKK.....300	Y06HSU.....275
WS9V .....339	K8LJG .....339	W7CNL.....339	KØKG .....337	K5UO.....333	EA5BY .....325	W6YQ .....318	WA9PIE.....298	
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K2FL.....339	N4JF.....339	WK3N.....339	W6OUL .....336	K6LEB .....331	N7W0 .....324	RA1AOB.....313	WA2VQV .....292	
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### SSB

AB4IQ.....340	K5TVC .....340	VE2PJ .....340	JA7XBG .....339	K8ME .....336	N6AW.....333	WØULU .....329	KW3W .....320	K4ZZR .....304
DJ9ZB .....340	K6YRA.....340	VE3MR .....340	KØKG .....339	EA3BMT .....335	OE3WWB .....333	CT1AHU .....328	TI8II .....320	K7ZM .....303
DL3DXX .....340	K7VV .....340	VE3MRS.....340	W2FKF.....339	F6HMJ.....335	WD9DZV .....333	N1ALR.....328	Y09HP .....320	4Z5FL/M.....302
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EA4DQ.....340	K9MM .....340	W3AZD.....340	K7LAY .....338	IW3YGW .....335	N2VW.....332	K7HG.....327	N7YB.....315	4X6DK.....298
HB9DDZ .....340	KE5K .....340	W3GH .....340	K9HQM .....338	OE2EGL.....335	N5YY.....332	K6GFJ .....326	IV3GOW .....312	K2HJB .....295
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K4IQJ .....340	NØFW .....340	W9SS .....340	W2CC.....338	VK4LC .....334	WA4WTG .....330	ON4CAS .....323	RA1AOB .....308	WA9PIE.....282
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# PROPAGATION

BY TOMAS HOOD,\* NW7US

## The Sun in Sonic and Visual Art; an Aid to Scientists

### A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

#### Sunspots:

Observed Monthly, March 2019: 6  
12-month smoothed, September 2018: 4

#### 10.7 cm Flux:

Observed Monthly, March 2019: 72  
12-month smoothed, September 2018: 70

#### A<sub>p</sub> Index:

Observed Monthly, March 2019: 6  
12-month smoothed, September 2018: 7

### One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

#### Sunspots:

Observed Monthly, March 2018: 2  
12-month smoothed, September 2017: 11

#### 10.7 cm Flux:

Observed Monthly, March 2018: 68  
12-month smoothed, September 2017: 76

#### A<sub>p</sub> Index:

Observed Monthly, March 2018: 8  
12-month smoothed, September 2017: 10

**D**uring the last decade, amazing advances have been made in the tools and techniques used to research our nearest star. For example, solar scientists now have at their command an array of space weather satellites and other spacecraft that enable researchers to see in much greater detail the dynamic moment-by-moment activity of our Sun. With precision instruments, scientists look for patterns and cycles, causes and effects, which help us understand the way our Sun works.

A new research technique is being developed by researchers at the University of Michigan's Department of Atmospheric, Oceanic and Space Sciences, and the School of Music. By applying music and art to a set of live solar wind data, scientists may now take a "sonic" view of solar weather, allowing them to *hear* patterns that their eyes might miss. These data are usually represented visually, as numbers or graphs. University of Michigan researchers have "sonified" the data, creating an acoustic, or musical, representation of it.

The researchers' primary goal was to try to hear information that might not be visually apparent from solar wind speed and particle density data gathered by NASA's Advanced Composition Explorer satellite.

The process of sonification isn't new. It is how Geiger counter radiation detectors emit clicks in the presence of high-energy particles.

"What makes this project different is the level of artistic license I was given," said composer and recent U of M School of Music graduate Robert Alexander.

The product, which Alexander says is "in between art and science," sounds appropriately primal and otherworldly. In one version, Alexander used what he describes as a tribal drumbeat to represent the rotation of the sun, and he layered the voice of a singer (his sister) to represent the charge state of carbon atoms, for example.

"Every piece of scientific data tells a story. I'm expressing this story through music," Alexander said. "These sonifications present scientific data in a way that is immediately visceral."

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@NW7US  
@hfradiospacewx

The solar wind – which is a stream of charged particles emanating from the sun – fills the solar system and interacts with the planets, said Jason Gilbert, a research fellow in the Department of Atmospheric, Oceanic, and Space Sciences. We've explored some of the technical details about the solar wind in previous editions of this column.

You can hear one recording of this sonification, and see a 3D video of the Sun made at the time of the recording, at <<https://tinyurl.com/yy6f2sch>>. The video description explains, "[t]his video contains imagery gathered from the STEREO satellites during March 2007 when they came into alignment for 3D viewing.

### LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for June 2019

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
<b>Above Normal:</b> 8,11-16,20	A	A	B	C
<b>High Normal:</b> 1,5,10,18-19,23,27-28	A	B	C	C-D
<b>Low Normal:</b> 3,6-7,9,17,21-22,25,30	B	C-B	C-D	D-E
<b>Below Normal:</b> 2,4,24,26,29	C	C-D	D-E	E
<b>Disturbed:</b> n/a	C-D	D	E	E

Where expected signal quality is:

A--Excellent opening, exceptionally strong, steady signals greater than S9

B--Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C--Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D--Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.

E--No opening expected.

### HOW TO USE THIS FORECAST

1. Using the Propagation Charts appearing in "The New Shortwave Propagation Handbook," by George Jacobs, Theodore J. Cohen, and R. B. Rose.

2. Find the Propagation Index associated with the particular path opening from the Propagation Charts.

3. With the Propagation Index, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a Propagation Index of 1 will be poor to fair on June 1, while on June 2 propagation may not occur, then on June 3, poor conditions, if any propagation is possible, and so forth.

Alternatively, you may use the Last-Minute Forecast as a general guide to space weather and geomagnetic conditions throughout the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet, and space weather should be mild. On the other hand, days marked as Disturbed will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these geomagnetic conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the ionosphere supports the path that is in consideration. This chart is updated daily at <http://SunSpotWatch.com> provided by NW7US.



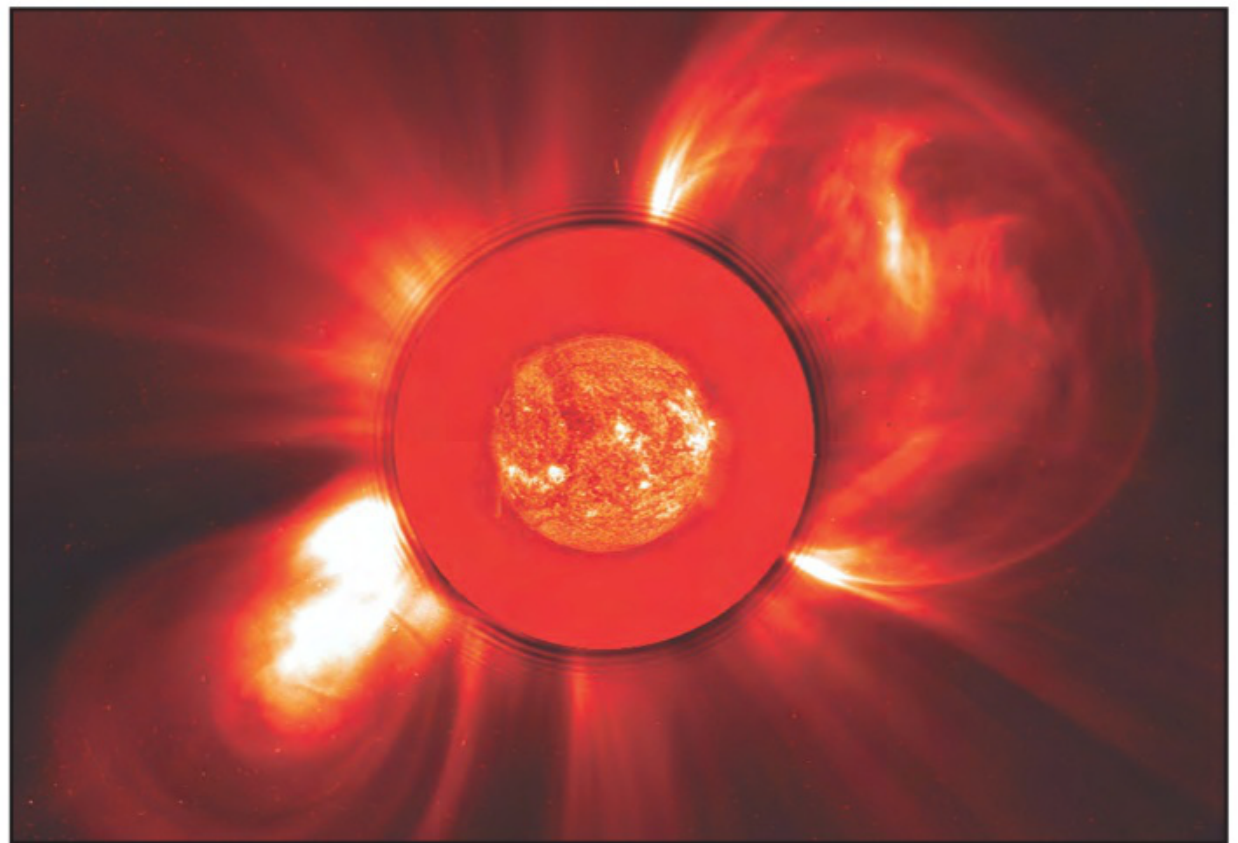


When data from STEREO A and B are sent to the left and right eye respectively, we gain a new perspective with an added sense of depth. Sonified data adds yet another dimension, as we're able to hear some of the phenomena that are unfolding in space at this very moment. The introductory simulation contains audio generated from satellite measurements of coronal mass ejections, and the following STEREO footage is accompanied by recordings of magnetic field activity that were collected over the same time period. The low hum toward the end of this video is caused by the periodic rotation of the Sun, which occurs roughly every 27 days (when measured at the equator)."

Download and explore the technical details from <https://tinyurl.com/yy3cdc7y>. For a general explanation of sonification, check out Wikipedia, <https://tinyurl.com/p2nb9pz>.

## HF Conditions

June marks the changeover from equinoctial to summertime propagation conditions on the shortwave (HF) bands. Solar absorption is expected to be at seasonally high levels, resulting in generally weaker signals during the hours of



This "Best of SOHO" image by the observatory's LASCO C2 coronagraph shows what appears to be two coronal mass ejections (CMEs) heading in symmetrically opposite directions from the sun. A 304Å image from SOHO's Extreme ultraviolet Imaging Telescope (EIT) taken on the same day has been superimposed over the dark disk which blocks the sun so that the LASCO instrument can observe the structures of the corona in visible light. (Courtesy of ESA/NASA/SOHO)

daylight when compared to reception during the winter and spring months.

When using the *Last-Minute Forecast* chart (see the chart online at <http://SunSpotWatch.com>, just a bit down the page and on the left), please realize that the column you should use now is generally the (1) column, as we are at the very bottom of the solar cycle. Use the (2) column if the flux is averaging around 80 or higher for a few days or more, but to be conservative, use the (1) column for the rest of the period. Since we've not seen a flux higher than 72 for a long period, the forecast in the (2) column is probably unrealistic.

Ten-meter propagation to DX locations far to the east and west is rare dur-

ing the peak of summer. With the low solar activity at this stage of the cycle, I don't expect to see much on 10 meters, except via Sporadic-E ( $E_s$ ) short-skip propagation. Solar activity just won't create a high-enough Maximum Usable Frequency (MUF) on most F-layer DX paths. North-south paths on 10 meters may yet present opportunity for limited and short-lived DX, especially around sunrise and sunset.

Seventeen and 15 meters will be just a bit more reliable than 10, holding some promise. But these will still be a challenge with the decreased solar activity.

Twenty meters is poor to fair during the hours of darkness, and fair to good during daylight hours. The best openings on 20 will be the hours around sunrise and sunset.

Recurring coronal holes will cause occasional periods of geomagnetic storminess during June, degrading higher latitude signal paths more than middle and low latitude paths. Coronal holes and the associated high-speed solar winds are the bane of propagation during the solar minimum. These geomagnetic storms will play rough on HF propagation. In addition, noise from electrical storms increases considerably during June and the summer months. These higher static levels will make DXing on 40, 80, and 160 meters more challenging.

The 30- and 40-meter bands should

**Looking Ahead...** Here are some of the articles we're working on for upcoming issues of **CQ**.

- Ham Uses for Computer Power Supplies
- CQ Hall of Fame Announcements
- Results: 2019 CQ World Wide RTTY WPX Contest

### Plus...

- Hams and Makers: Perfect Together

### Upcoming Special Issues

October: Emergency Communications  
December: Technology  
February: QRP

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offer good DX conditions during the early morning, late evening, and at night despite higher static. Look for Europe and Africa as early as sunset. After midnight, start looking south and west for the Pacific, South America, and Asia. Short-skip should be possible out to about 750 miles during the daytime.

Expect some openings on 80, much like how 40 meters will be acting. Fairly frequent short-skip openings up to 1,000 miles are possible during darkness, but expect very few daytime openings with all the static and absorption.

### VHF Conditions

The summertime  $E_s$  season for the Northern Hemisphere begins in force in May. By June, things could be hot on 6 meters and there might even be openings on 2 meters. During the late spring and summer months, a sharp increase at mid-latitude of  $E_s$  propagation occurs. Through June, you can expect to see 20 to 24 days with some  $E_s$  activity. Usually these openings are single-hop events with paths up to 1,000 miles, but June's  $E_s$  openings are often double-hop. Europe can generally be worked from the east coast throughout June.

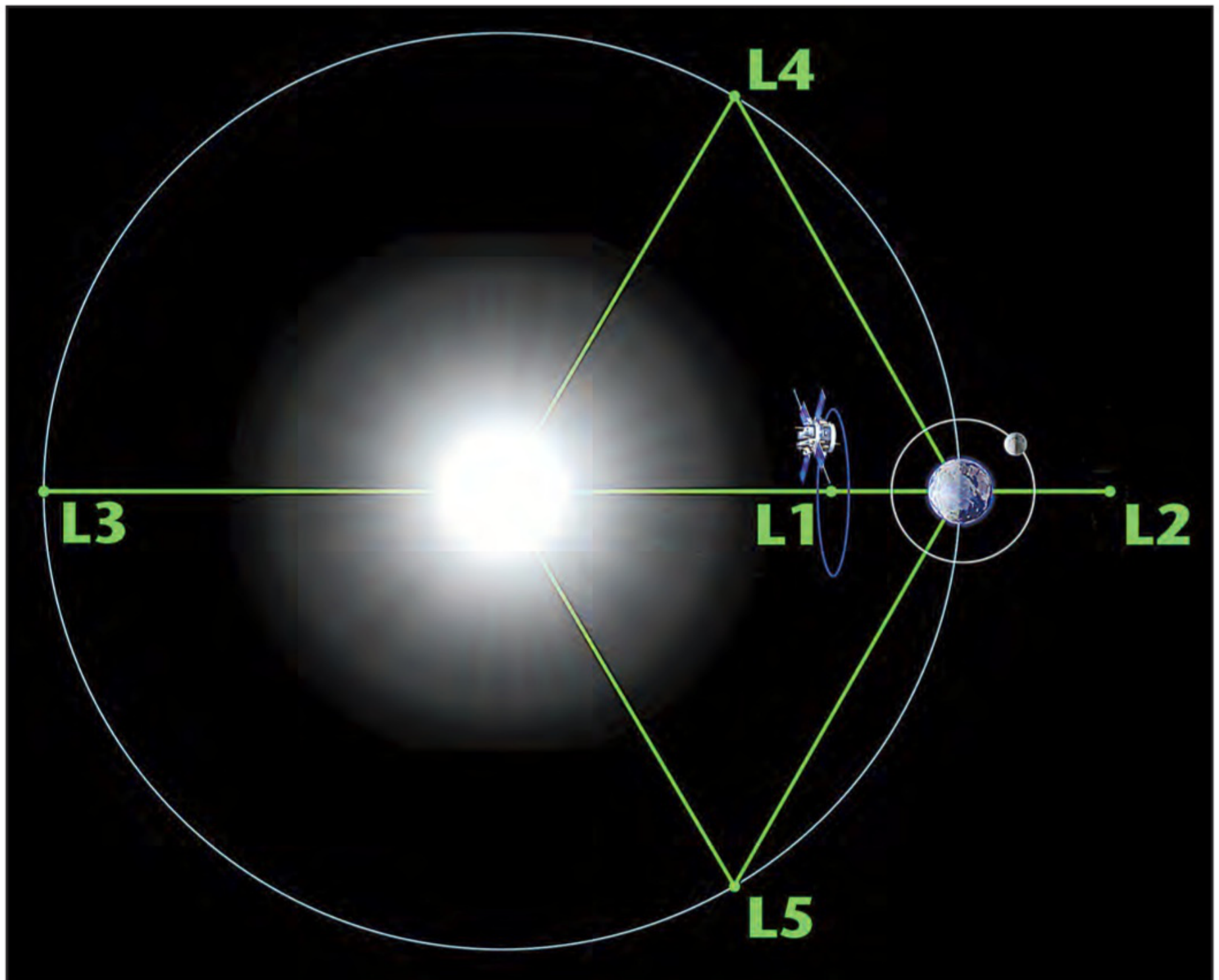
During daylight hours, monitor 6 meters for transcontinental openings, as well as between Hawaii and the western states, and between the Caribbean and Central and South America. The best time to look for these is during the afternoon, especially when conditions are High Normal or better.

There is usually a seasonal decline in Transequatorial Propagation (TE) during the summer months, but some 6-meter openings may still be possible during June. The best time to catch an opening across the geomagnetic equator is between 8 and 11 p.m. local daylight time.

If you use Twitter.com, you can follow <@hfradiospacewx> for hourly updates that include the K index numbers. You can also check the numbers at <<http://sunspotwatch.com>>, where this columnist provides a wealth of current space weather details as well as links. Please report your observations of any notable propagation conditions by writing this columnist via Twitter, or via the Space Weather and Radio Propagation Facebook page at <<https://fb.me/spacewx.hfradio>>.

### Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly



NASA's Advanced Composition Explorer (ACE) orbits a point between Earth and the Sun called a Lagrange point, labeled here as L1. Sitting well outside of Earth's magnetosphere, ACE can observe material streaming off the sun before it enters near-Earth space. (Courtesy of NASA/H. Zell)



## Oops...

### Erp, ERR in EIRP

CQ MF/LF Editor John Langridge, KB5NJD, reports that an eagle-eyed reader caught an error in terminology in his April column, "Let's Talk About Transmitting Loops for MF and LF":

Glenn, W9IQ, sent a note indicating that I had an error in reporting in this article and he is correct. On page 68, I referred to 120 milliwatts as EIRP (Equivalent Isotropically Radiated Power) in the text and caption for Figure 2. This value is actually radiated power. After review of the notes from N1VF (whose antenna is described in the article), Ben did note that this value was, in fact, radiated power. He added that he'd made no attempt to determine a realistic directional component that would be necessary to determine EIRP. He also noted that the 120-mW value was a ballpark figure and his actual EIRP would be a bit higher, which turns out to be true. This was my error.

Glenn indicated that at 0.2% efficiency and a linear directivity of 1.5 for a small loop:

$$\text{Gain} = \text{Directivity} * \text{Efficiency} = 1.5 * 0.002 = 0.003$$

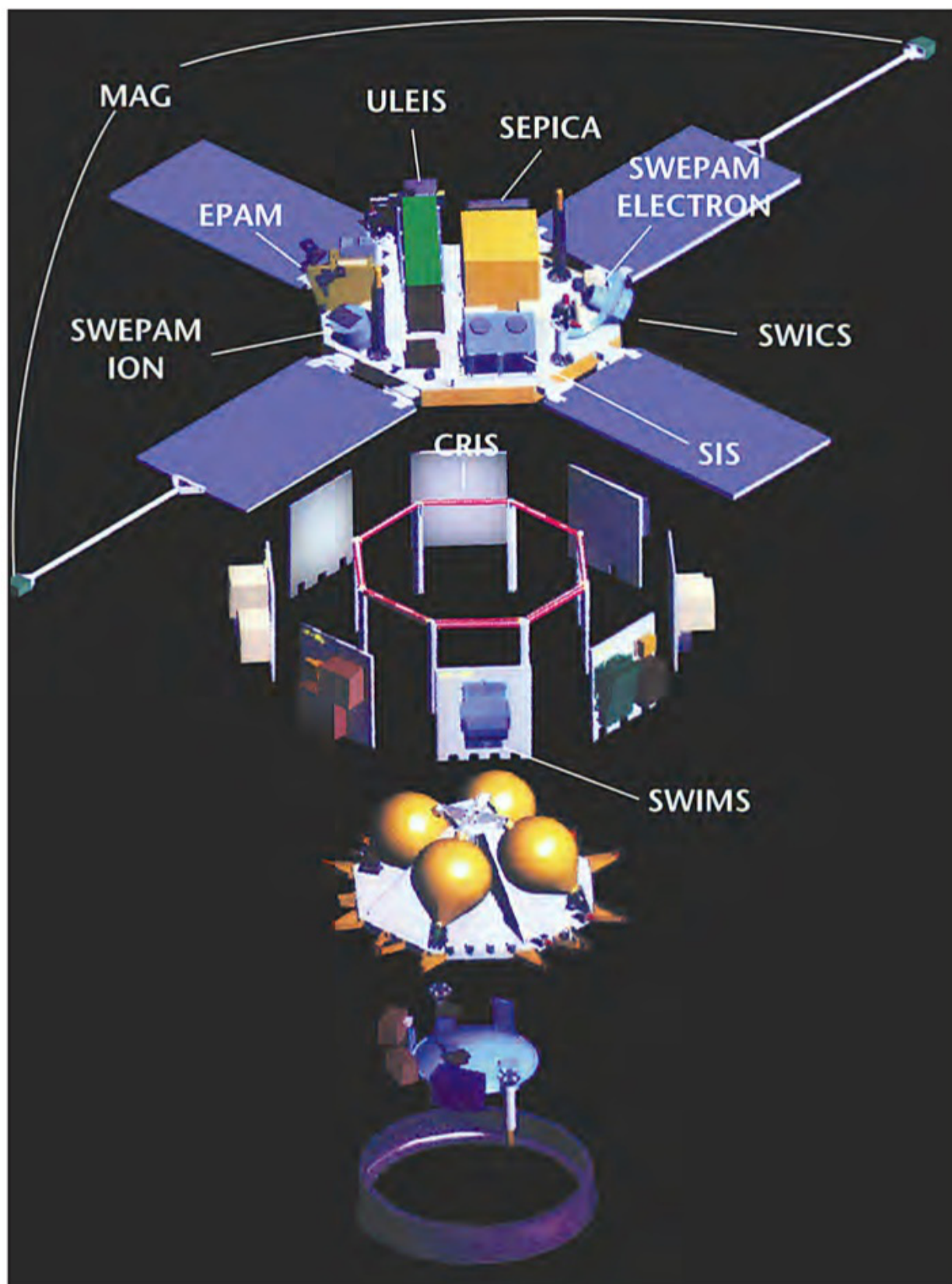
This, multiplied by the input power, is the EIRP:

$$\text{EIRP} = \text{Gain} * \text{Power} = 0.003 * 60 \text{ watts} = 180 \text{ mW EIRP}$$

Glenn also pointed out that there is loss associated with the resonating capacitor and coupling transformer but rarely do we consider those problems at these frequencies given that there is already a tremendous amount of wiggle room in the process. Those small values simply get lost in significantly higher loss values that we experience.

Practical determination of EIRP for loops and verticals will be presented in my July 2019 column. It will not be a theory-heavy discussion. Instead, we will focus on taking practical measurements and plugging in numbers to calculate values so you can get on the air with confidence. There are plenty of theoretical references available that include details on the topic like N6LF's notes. The FCC also has a document online, titled "Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System." It can be found at <https://tinyurl.com/yxkdgc6e>.

Thanks to Glenn, W9IQ, for pointing out this error.



Exploded diagram of the ACE spacecraft with instruments labeled. (Courtesy of California Institute of Technology)

mean observed sunspot number for March 2019 was 5.7. The 12-month running smoothed sunspot number centered on September 2018 was 4.0. A smoothed sunspot count of 5, give or take about 5 points, is expected for June 2019.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 71.5 for March 2019. The 12-month smoothed 10.7-cm flux centered on September 2018 was 70.1. The predicted smoothed 10.7-cm solar flux for June 2019 is 67.

The observed monthly mean planetary A-Index ( $A_p$ ) for March 2019 was 6. The 12-month smoothed  $A_p$  index centered on September 2018 was 7.3.

Geomagnetic activity this month should be mostly quiet with fair to good propagation conditions, except for those days indicated in the *Last-Minute Forecast* during which we expect degraded propagation (remember that you can get an up-to-the-day Last-Minute Forecast at <http://SunSpotWatch.com> on the main page).

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may email me, write me a letter, or catch me on the HF amateur bands. If you are on Facebook, check out [www.facebook.com/spacewx.hfradio](http://www.facebook.com/spacewx.hfradio) and [www.facebook.com/NW7US](http://www.facebook.com/NW7US) — speaking of Facebook check out the *CQ Amateur Radio Magazine* fan page at [www.facebook.com/CQMag](http://www.facebook.com/CQMag).

— 73, Tomas, NW7US



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"World of Keys – Keys III" book features highly detailed views and photos of keys, bugs, and paddles like few people have ever seen (\$18)!. Also still available, "Keys II" (\$16) and "QRP Romps!" (\$18), plus "Your Guide to HF Fun" (\$16). Available from dealers nationwide.

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**HONDURAS DX VACATION:** K3, Alpha 86, SteppIR, Meals, Private Facilities. HR2J, (206) 259-9688.

**HY POWER ANTENNA COMPANY** <<http://www.freewebs.com/hypower>> Multiband dipoles, delta loops, half squares and QRP antennas.

**NEW AMATEUR RADIO MAP** with DXCC list updates. Full color 22 x 34" – \$10. Free shipping on club orders. <http://www.hamradiomap.qth.com/>

**QRP KITS: [www.breadboardradio.com](http://www.breadboardradio.com)**

**NEED ROPE?** All kinds, types, including: antenna rope, hauling, gin. FREE, free consultation, Go to <<http://www.davisropeandcable.com/>>. Veteran owned, K1PEK, 978-369-1738.

**FUTURE TIMES:** Dreams and visions of Disasters. Great guide book for Hams. [www.xlibris.com/futuretimes.html](http://www.xlibris.com/futuretimes.html)

**HAWAII DX VACATION:** SteppIR antennas, amplifiers, private. KH6RC, <[www.leilanibedandbreakfast.com](http://www.leilanibedandbreakfast.com)>.

**HAM TRAVELERS** Discount travel, tours, cruises, more. [www.GreatExpectationTravel.com](http://www.GreatExpectationTravel.com)

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

**PROMOTIONAL VIDEO:** 15-minute DVD describes amateur radio's fun and public service. Details: <[www.neoham.org](http://www.neoham.org)>.

**WANTED: OLD QSL CARD COLLECTIONS.** Collector seeks US & DX cards. W2VRK, 9 Laird Terrace, Somerset, NJ 08873; e-mail: <[tpllrs@comcast.net](mailto:tpllrs@comcast.net)>.

**TELEGRAPH KEY INFORMATION AND HISTORY MUSEUM:** <<http://w1tp.com>>

**HAM RADIO GIFTS:** <[www.mainestore.com](http://www.mainestore.com)>

**FT243 AND HC6U CRYSTALS:** [www.af4k.com](http://www.af4k.com)

**OLD QSLs Available.** 50's and 60's, DX and USA. Specify call, send SASE. [W5SQA@arrl.net](mailto:W5SQA@arrl.net)

**RFI Filters** <[www.RFchoke.com](http://www.RFchoke.com)>

**SOTA BEAMS:** <<http://www.sotabeams.co.uk>>. G3CW

**CRANK-A-WATT Power & More** via KE5NYS. Visit <[www.FactorReady.com](http://www.FactorReady.com)>

**FMTV ARTICLES:** Comprehensive transmitter and receiver deviation calibration, standards, intermodulation, power amplifier calculations. WB9OQM, <http://mathison.freeshell.org>

Wanna ham in the **CAYMAN ISLANDS?** Go to <[www.martykaiser.com/24a.htm](http://www.martykaiser.com/24a.htm)>.

**[www.SecondHandRadio.com](http://www.SecondHandRadio.com)**

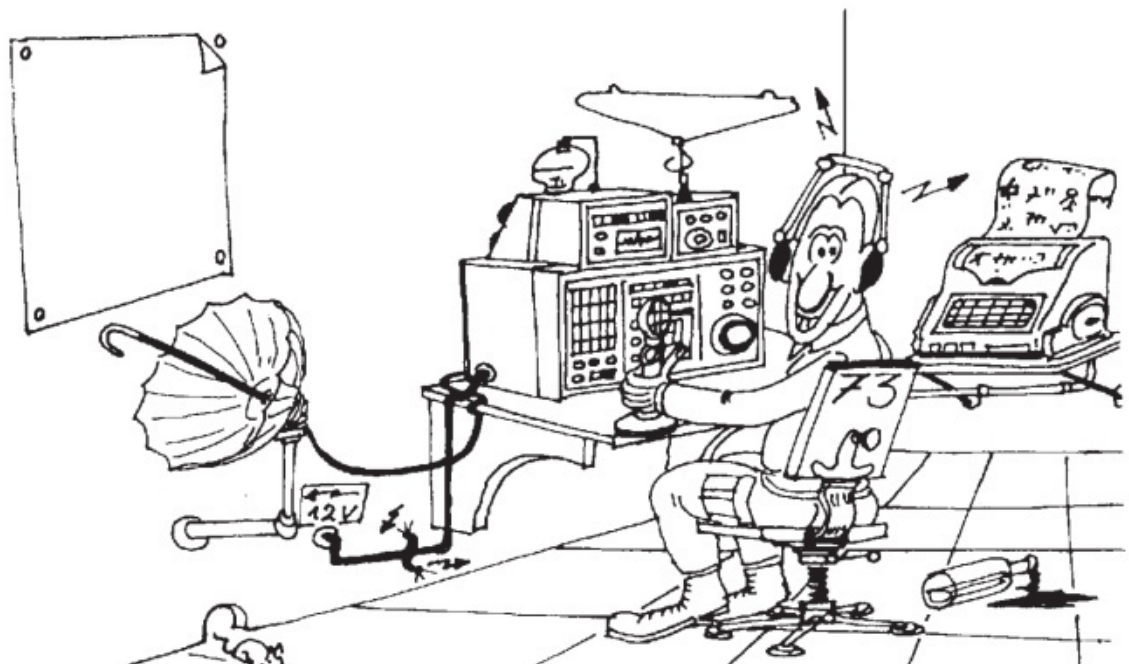
**HF Mobile or Fixed Virtual X Antenna Patent:** For Sale or License. Request Free Power Point Presentation file. Shows design details, pictures, prototype tests. Design applies to a broad frequency range for many antenna arrays/beams/verticals. <[lgslay@sbcglobal.net](mailto:lgslay@sbcglobal.net)>. Larry Slay, K5WUL

**FOR SALE: Samlex Power Supply** Model SEC 1223, 13.8V @ 25 amps. Not working. Includes operating manual and schematic. Price \$50 or best offer. Contact Harry, W9HRQ, at <[harrygraziano@gmail.com](mailto:harrygraziano@gmail.com)> or phone 1-773-334-4492.

YAESU FT-840, has FM-747 FM unit, YF-112A 6 kHz AM filter and manual. Problem with main tuning, otherwise good \$150. FC-800 1.8-30 MHz 150W remote ATU for FT-840 or FT-890. working with cables and manual, \$125. Shipping additional. KB2DMD, (215) 541-1099.

**ANTENNA & TOWER HARDWARE:** Aluminum plates: Boom to elements, boom to mast, GP/Vertical antennaground plates, Rohn 25/45 to cross arms plates, Hexabeam / spiderbeam Hubs, Moxon hubs, U bolts with saddles. **All info at: [e78WW@yahoo.com](mailto:e78WW@yahoo.com) or at e-bay store: [stores.ebay.com/yz4iz0](http://stores.ebay.com/yz4iz0)**

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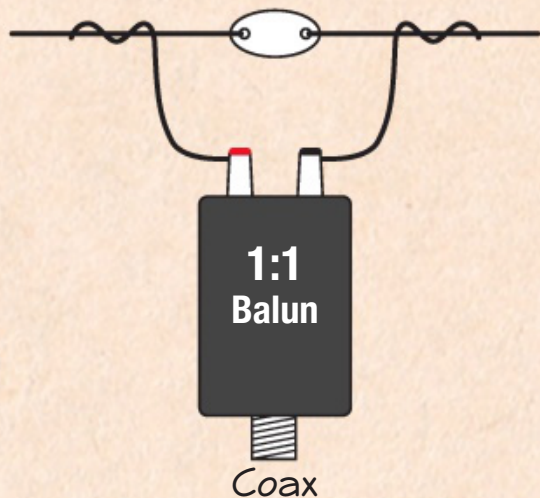
# WHERE TO USE LDG BALUNS & UNUNS

# LDG

Not sure which balun or unun is right for your antenna? See our handy chart below to help you determine which is the best fit for your set-up. All LDG baluns and ununs handle up to 200 Watts PEP and cover frequencies from 1.8 to 30MHz. Visit us at [www.ldgelectronics.com](http://www.ldgelectronics.com) or see your favorite dealer today to learn more and to see our full line of products.

**\$30** ea. | 200 Watts PEP  
1.8-30MHz

DIPOLE  
Length =  $468/\text{freq}$

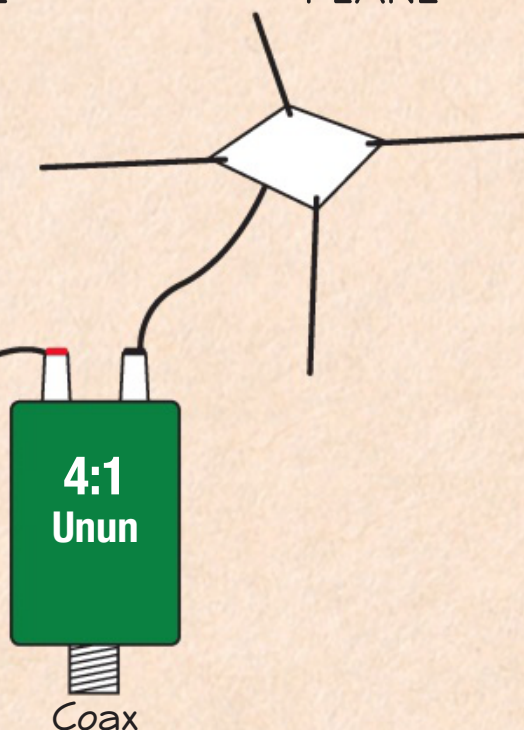


LADDER LINE/TWIN LEAD

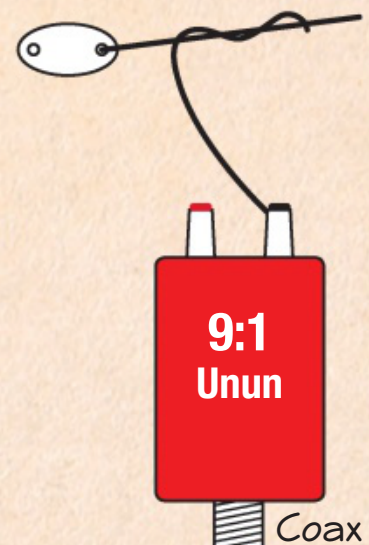


18' THRU 43'  
VERTICAL

GROUND  
PLANE



END FED WIRE  
30' - 135'



>30' Coax Cable

