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COMMUNICATIONS & TECHNOLOGY  
February 2019

# CQ

## QRP Special



**On the Cover:** Members of the Ski Country ARC in Colorado wait to start a hidden transmitter hunt on the 2018 CQ World Wide Foxhunting Weekend. Results on page 66, details on page 110.



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• Dual Antenna  
• 1000W SSB / 350W Digital

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• Dual Bargraph  
• 1.8 to 54MHz  
• 600W SSB / 200W Digital



**AT-200PROII**  
200 Watts Desktop  
• Tunes 10:1 SWR  
• 2 Year Warranty  
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# ANNOUNCEMENTS

## FEBRUARY

**RICHMOND, VIRGINIA** — The Richmond Amateur Telecommunications Society will hold **Frostfest** and the **2019 ARRL Roanoke Division Convention** from 8:30 a.m. to 3:30 p.m., Saturday, February 2 at the Exhibition Hall-Richmond Raceway Complex, 600 E. Laburnum Avenue. Website: <<http://frostfest.com>>. Talk-in 146.880- (PL 74.4). VE exams, DXCC card checking.

**SANDY, UTAH** — The Utah Digital Communication Conference 2019 will be held from 9 a.m. to 5 p.m., Saturday, February 2 at the Salt Lake Community College Conference Center, 9750 South 300 West. Email: <[utahdcc@gmail.com](mailto:utahdcc@gmail.com)>. Website: <<http://utah-dcc.org>>.

**SPRINGFIELD, VERMONT** — The Connecticut Valley FM Association will hold its **Swap Fest** beginning 8 a.m., Saturday, February 2 at the Springfield VT VFW Post 771, 191 River Road. Email: <[swapmeet@cvfma.org](mailto:swapmeet@cvfma.org)>. Website: <[www.cvfma.org](http://www.cvfma.org)>. Talk-in 146.760- (PL 110.9).

**ORLANDO, FLORIDA** — The Orlando Amateur Radio Club will hold the **Orlando Hamcation** and **2019 ARRL Southeastern Division Convention** from 9 a.m. to 5 p.m., Friday, February 8; 9 a.m. to 5 p.m., Saturday, February 9; and 9 a.m. to 2 p.m., Sunday, February 10 at the Central Florida Fairgrounds & Expo Park, 4603 West Colonial Drive. Contact: Orlando Hamcation, P.O. Box 574962, Orlando, FL 32857. Phone: (407) 841-0874 or (800) 214-7541. Email: <[info@hamcation.com](mailto:info@hamcation.com)>. Website: <[www.hamcation.com](http://www.hamcation.com)>. Talk-in 146.760- (PL 103.5) or 443.050+ (PL 103.5). VE exams, special event station K1AA.

**DANVILLE, INDIANA** — The Hendricks County Amateur Radio Society will hold the **Hendricks County Hamfest 2019** on Saturday, February 9 at the Hendricks County Fairgrounds, 1900 E. Main Street. Website: <[www.hcars.org](http://www.hcars.org)>.

**TRAVERSE CITY, MICHIGAN** — The Cherryland Amateur Radio Club will hold its **46th Annual Ham Radio Swap-N-Shop** from 8 a.m. to noon, Saturday, February 9 at the St. Francis High School Gymnasium, 123 E. 11th Street. Contact: Joe Novak, W8TVT, (213) 947-8555. Website: <[www.cherrylandarc.com](http://www.cherrylandarc.com)>. Talk-in 146.860- (PL 114.8). VE exams.

**MACON, GEORGIA** — Special event station **TM16AAW** will air from Sunday, February 10 through Sunday, February 24 to celebrate the 16th Antarctic Activity Week. Frequencies include 10-40 meters mostly on SSB. QSL \$2 and a SASE to Francois, F8DVD, directly or through the bureau. Email: <[a.pole@loposte.net](mailto:a.pole@loposte.net)>. Website: <[www.waponline.it](http://www.waponline.it)>.

**YUMA, ARIZONA** — The Yuma Amateur Radio Hamfest Organization and the Amateur Radio Council of Arizona will hold the **Yuma Hamfest** and **2019 ARRL Southwest Division Convention** from noon to 5 p.m., Friday, February 15 and from 8 a.m. to 5 p.m., Saturday, February 16 at the Yuma County Fairgrounds, 2520 East 32nd Street. Email: <[info@yumahamfest.org](mailto:info@yumahamfest.org)>. Website: <[www.yumahamfest.org](http://www.yumahamfest.org)>. Talk-in 146.780- (PL 103.5). VE exams, DXCC card checking, T-hunt, balloon launch.

**HOXIE, ARKANSAS** — The Lawrence County Amateur Radio Club will hold its **Winter-Fest 2019** beginning 8 a.m., Saturday, February 16 at the Hoxie Service Center, 500 SW Lawrence Street. Contact: Dale Stratton, (870) 759-2067. Email: <[stratton\\_dale@yahoo.com](mailto:stratton_dale@yahoo.com)>. Website: <<http://w5wra.org>>.

**MARLBOROUGH, MASSACHUSETTS** — The Algonquin Amateur Radio Club will hold its **Amateur Radio Flea Market** from 9 a.m. to 1 p.m., Saturday, February 16 at Marlborough 1st Charles W. Whitcomb School, 25 Union Street. Contact: Tom Ikeda, KA1OS, (508) 919-6136 (before 9 p.m.). Email: <[fleamarket@n1em.org](mailto:fleamarket@n1em.org)>. Talk-in 147.27+ (PL 146.2). VE exams.

**RICKREALL, OREGON** — The Salem Repeater Association will hold the **39th Annual Salem Hamfair** beginning 9 a.m. to 3 p.m., Saturday, February 16 at the Polk County Fairgrounds, 520 S. Pacific Highway West. Contact: Chris Portal, W7CLP, (503) 779-6998. Email: <[hamfair@w7sra.org](mailto:hamfair@w7sra.org)>. Website: <[www.w7sra.org](http://www.w7sra.org)>. Talk-in 145.33- (PL 186.2).

**BRIGHTON, COLORADO** — The Aurora Repeater Association, Rocky Mountain Ham Radio, and Cherry Creek Young Amateur Radio Club will hold the **ARA Swapfest** from 9 a.m. to 1 p.m., Sunday, February 17 at the Adams County Fairgrounds, 9755 Henderson Road. Contact: Wayne Heinen, NØPOH, (303) 699-6335. Email: <[info@n0ara.org](mailto:info@n0ara.org)>. Website: <[n0ara.org](http://n0ara.org)>. Talk-in 147.15+ (PL 100). VE exams.

**LIVONIA, MICHIGAN** — The Livonia Amateur Radio Club will hold its **49th Annual SWAP-N-SHOP** from 8 a.m. to noon, Sunday, February 17 at the Civic Park Senior Center, 15218 Farmington Road. Contact: Livonia ARC, P.O. Box 51532, Livonia, MI 48151-0532. Phone: (734) 941-5043. Email: <[k8uns@arrl.net](mailto:k8uns@arrl.net)>. Website: <[www.livoniaarc.com](http://www.livoniaarc.com)>. Talk-in 145.35 (PL 100).

**MANSFIELD, OHIO** — The Intercity Amateur Radio Club will hold the **Mid-Winter Hamfest & Computer Show** beginning 7 a.m., Sunday, February 17 at the Richland County Fairgrounds, 750 North Home Road. Contact: Danny, W8DLB, (419) 566-3267. Website: <[www.iarc.club](http://www.iarc.club)>. Talk-in 146.94 (PL 71.9). VE exams.

**ALBUQUERQUE, NEW MEXICO** — The Rocky Mountain Ham Radio will hold the **2019 New Mexico TechFest** from 8 a.m. to 5 p.m., Saturday, February 23 at the New Mexico Veteran's Memorial Event Center, 1100 Louisiana Boulevard, SE. Email: <[techfest@rmham.org](mailto:techfest@rmham.org)>. Website: <[www.rmham.org](http://www.rmham.org)>.

**BIG FLATS, NEW YORK** — The K2LIM VHF/UHF Contest Club Group will hold its **Winter Hamfest** from 8 a.m. to noon, Saturday, February 23 at the Big Flats American Legion, 45 Olcott Road South. Phone: (607) 739-7305. Website: <[www.ka2lim.com](http://www.ka2lim.com)>. VE exams.

**DALTON, GEORGIA** — The Dalton Amateur Radio Club will hold the **2019 Dalton Hamfest** from 8 a.m. to 2 p.m., Saturday, February 23 at the North Georgia Agricultural Fairgrounds, 500 Legion Drive. Contact: DARC, P.O. Box 211, Dalton, GA 30722. Email: <[w4drc@yahoo.com](mailto:w4drc@yahoo.com)> or <[w4drchamfest@yahoo.com](mailto:w4drchamfest@yahoo.com)>. Website: <[www.w4drc.com](http://www.w4drc.com)>. Talk-in 145.230- (PL 141.3). VE exams.

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## FCC Back to Full Strength (But Closed at Press Time)

The Federal Communications Commission once again has five members, with the Senate confirmation of Brendan Carr for a full five-year term (he'd been filling a vacated seat since 2017) and of Geoffrey Starks, who is replacing former Commissioner Mignon Clyburn. They join Chairman Ajit Pai and fellow Commissioners Michael O'Rielly and Jessica Rosenworcel.

Starks moves up from a staff position as Assistant Chief of the Enforcement Bureau. The Senate also confirmed Kelvin Droegemeier as director of the White House office of Science and Technology Policy. (Tnx K3ZJ)

At press time in mid-January, the FCC remained essentially closed due to the partial shutdown of the federal government. See News Bytes on page 10 for more details on how the shutdown is affecting ham radio.

## ARRL to FCC: Incorporate Parity Act Provisions into Part 97

The ARRL has filed a petition for rulemaking with the FCC requesting the inclusion of provisions of the Amateur Radio Parity Act in its rules for the Amateur Radio Service. The bill is intended to protect the rights of amateurs to put up antennas and operate from homes that are covered by restrictive covenants or homeowner association rules, many of which prohibit outdoor antennas and/or any amateur radio operation. The Parity Act bill was passed by the House of Representatives but not by the Senate, and died at the end of the 2017-18 session of Congress.

According to the *ARRL Letter*, the specific proposal is to add a new rule prohibiting the enactment or enforcement of any private land use restriction that fails to permit amateur radio operation, fails to permit installation of an effective outdoor antenna or does not meet the "minimum practicable restriction" standard that already applies to state and local laws and ordinances. The final language of the Parity Act bill, which the League wants incorporated into the FCC rules, was controversial because some antenna law experts felt it might cause more harm than good, requiring all amateurs living with private land use restrictions to request permission to put up any antenna, including those not currently required to do so.

The FCC had not taken any action on the petition prior to the federal government shutdown in early January.

## Initial Qualification Rules Announced for WRTC-2022

The first qualifying event for the 2022 World Radiosport Team Championship (WRTC 2022) will be held this month — the ARRL International DX CW contest — and the WRTC organizing committee has launched its official website and posted the initial qualification rules. According to the *ARRL Letter*, the committee is trying to make the event accessible for more teams from more places, noting that "WRTC is now for everybody," not just big guns. The selection areas will be geographically smaller to provide more chances to qualify for all contesters on all continents, and team leaders will select operating partners from the top ten applicants who did not qualify as team leaders. WRTC 2022 will be held in Bologna, Italy, the birthplace of Guglielmo Marconi. The official website (English version) is at <http://wrtc2022.it/en/>.

## 2019 YOTA Camp to be in Bulgaria

The Bulgarian Federation of Radio Amateurs will be hosting this summer's ninth annual Youngsters On The Air (YOTA) camp in

August. Young hams between the ages of 15 and 25 will be eligible to attend. According to the South African Radio League (which hosted the 2018 camp), individual member societies of the International Amateur Radio Union (IARU) will select their representatives. The program is sponsored by IARU Region 1, which represents Europe, the Middle East, and Africa, but campers have attended from around the world.

## Partial Refunds Available for Bouvet Donations

Leaders of the aborted 3YØZ DXpedition to Bouvet Island last February are offering partial refunds of donations made to help cover trip expenses. The expedition was cancelled at the last minute due to weather conditions. The *ARRL Letter* reports that, after covering all expenses incurred, the group is offering to refund 48% of all contributions. However, they'd rather donors "pay it forward" to help fund future DXpeditions.

Donors have five options: 1) Get a refund check; 2) Donate your refund to the 3YØZ team to help members recover some of their personal expenses; 3) Donate the refund to the Northern California DX Foundation (NCDXF) or 4) the International DX Association (INDEXA) to help fund future DXpeditions; or 5) the default option, if no instructions are received, a four-way split between the 3YØZ team, the NCDXF, INDEXA, and GDXF, the German DX Foundation. Donors should contact team co-leader Bob Allphin, K4UEE, with instructions.

## New General Class Exam Questions Released

The question pool from which General Class amateur radio license exams will be composed starting this coming July has been released. According to the National Conference of Volunteer Examiner Coordinators, the new Element 3 question pool will be used from July 1, 2019 to June 30, 2023. Questions (including one corrected diagram) may be downloaded at <https://tinyurl.com/y7pwoyzm> in .docx, .pdf or .txt format (with a .jpg option for the corrected diagram).

## Satellite Roundup

The first geosynchronous amateur radio satellite successfully orbited was undergoing in-orbit testing in early January. AMSAT-DL, Germany's amateur satellite organization, was conducting the transponder tests on the Phase 4-A, or Es'hail-2, satellite. Owned by the Qatar Satellite Company, Es'hail 2 has been moved to its permanent orbital position over Africa at 25.5° east longitude. According to AMSAT-UK, the satellite is expected to provide continuous access to hams from Brazil to Thailand.

If you think packet radio is dead, don't look up. A new packet system has been delivered to the International Space Station, where it was awaiting installation at press time. According to the *ARRL Letter*, the original packet system aboard the space station relayed nearly 89,000 messages, or roughly 250 per day, in the first half of 2017 before failing in July of that year. The original system had been in regular use for some 17 years. Timing of the new installation will depend on crew availability.

Two amateur satellites carrying D-STAR payloads were launched in late December aboard a Russian Soyuz flight. As of press time, beacon transmissions had been successfully received from both D-STAR-ONE-Sparrow and D-STAR-ONE-iSAT. A third ham satellite was deployed on the same launch, this one carrying a packet digipeater on 70 centimeters.

Finally in satellite news, the AMSAT News Service reports that a Polish student satellite — PW-Sat2 — with a downlink-only transmitter of 435 MHz, deployed a student-built deorbiting sail it was intended to test. Video of the deployment is available on YouTube at <https://tinyurl.com/y8hfunqa>.



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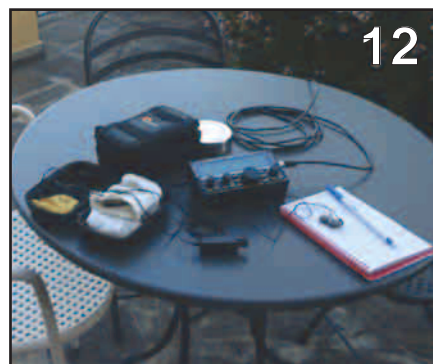


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Tales of the 2018 CQ World Wide Foxhunting Weekend

By Joe Moell, KØOV

Members of the Ski Country Amateur Radio Club in Colorado wait to start a hidden transmitter hunt on the 2018 CQ World Wide Foxhunting Weekend. Details on page 66. (Cover photo by Bob Cutter, KIØG)



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# AR-DV1

## Multi-mode Digital Voice Receiver

Get your hands on the industry-leading analog and digital voice receiver that automatically recognizes and monitors popular digital modes including APCO P25, DMR, dPMR™, NXDN™, MOTOTURBO™, D-Star™, Digital CR, Yaesu System Fusion, Kenwood and Alinco EJ-47U formats. You also get analog AM, WFM, NFM, CW and Upper & Lower Sideband reception.

Packed with features like a SD/SDHC card to record audio, back up its 2,000 memories or update its field-upgradeable firmware, the AR-DV1 can operate on its own or using computer control through its micro USB port. The multi-purpose display shows the digital or analog mode, DMR color codes, channel IDs, P25 NAC Codes and more!



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*The AR-DV1 is available in a professional (unblocked) or USA consumer version.\**

*For more information on the AR-DV1, go to [www.aorusa.com](http://www.aorusa.com)*

### Check these AR-DV1 Features:

- wide band coverage from 100kHz to 1300MHz\*
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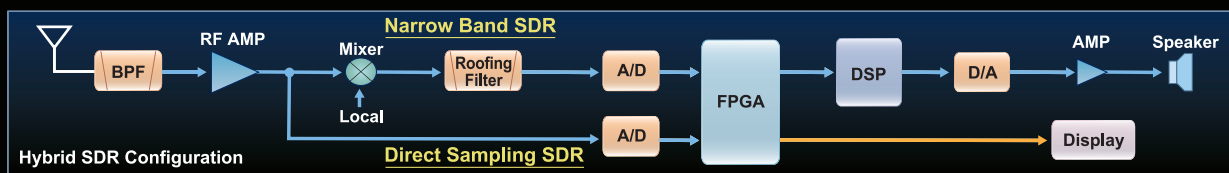
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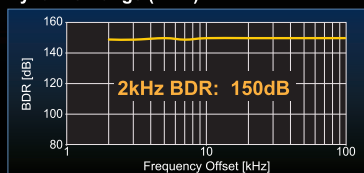
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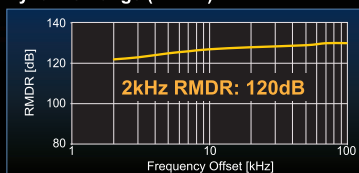
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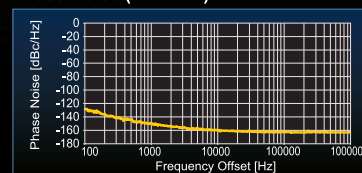
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# ZERO BIAS: A CQ Editorial

BY RICH MOSESON,\* W2VU

## The Lure of Less

**W**e hams like to get more for less. Just check out the haggling at a hamfest flea market if you have any doubts. Part of it is being frugal (or “cheap” if you prefer), but another part is the challenge of seeing how far you can stretch a buck. At hamfests, this challenge is about dollars, but on the air, it’s the same challenge that drives the QRP, or low power, enthusiast to see how far he or she can stretch a watt. And just as it’s possible to get some amazing deals at a hamfest, you can make some amazing QSOs with QRP. In fact, it may be easier since there are more opportunities. Hamfests happen here and there, scattered around the calendar and the country. The ham bands are available 24 hours a day, 7 days a week, wherever you happen to be. And believe it or not, there are still plenty of great QRP DXing opportunities even now, at the bottom of a sunspot cycle that never really had much of a top.

In my mind, the lure of less for QRP extends beyond just output power. My ham project for New Year’s Day was building a new “Cricket” 30-meter QRP transceiver from the 4 States QRP Group. It met several “lure of less” criteria — less money, less time, and less to connect to it to put it on the air. The kit is downright cheap; it took just one afternoon to build, the board has a built-in hand key and it runs on a self-contained 9-volt battery. There are only two connections: An antenna and headphones. It also doesn’t have a volume control or tuning knob (it’s crystal-controlled), but hey, this is the lure of less personified. I haven’t had time yet to put it on the air and make any contacts (when I tested it after construction, the band was completely dead, confirmed on a second receiver), but I already know what

three quarters of a watt can do on 30 meters. That’s 50% more power than I used with a different QRP rig a couple of years ago to make a contact with central Europe. Stay tuned...

Hopefully, I’ve piqued your interest at least a little bit in the lure of less. But if you aren’t convinced, there’s — well — more,

*(Continued on page 22)*

### Hello, Joe!

In early January, Kit-Building Editor Joe Eisenberg, KØNEB, made his way from Nebraska to New York to present a forum at the annual Ham Radio University event on Long Island. Joe and I got together for lunch in New York City at — where else? — Eisenberg’s Sandwich Shop, which proudly states that it’s been “Raising New York’s cholesterol since 1929!” We thoroughly enjoyed the visit ... and the sandwiches! Great to see you, Joe!



CQ Kit-Building Editor Joe Eisenberg, KØNEB, and CQ Editor Rich Moseson, W2VU, enjoying lunch at Eisenberg’s Sandwich Shop in New York City. Joe was visiting to present a kit-building forum at Ham Radio University.



W2VU’s newest QRP kit ... a 4-States QRP Club “Cricket” transceiver for 30 meters. A 9-volt battery and hand key are on the board, so all you have to plug in are headphones and an antenna.



Eisenberg’s Sandwich Shop in the Flatiron district of New York City is narrow, very busy at lunchtime, and “the lure of less” does not apply here.

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

## OUR READERS SAY:



### The W9IOP Second Op

*Our November cover story on the W9IOP Second Op DXing aid brought back happy memories for many readers, as well as several letters from them. Here are a few:*

Editor, CQ:

The cover of the most recent CQ magazine caught my eye while I was browsing in our library today. I found Terry Joyner's article, "Blast From the Past: The W9IOP Second Op," very interesting as I never knew who W9IOP was or that he was an avid contester. I fondly remember the Second Op. I had one at my operating position many years ago and used it frequently.

Mr. Joyner wrote that W9IOP moved to Electro-Voice after working at CQ magazine in its early days. He mentions the names of a couple of hams at E-V and I would like to name another and tell a little about the division he headed.

He was Russell M. Planck, W9RGH. At the time I knew Russ, he was a vice president at E-V and manager of RME (Radio Manufacturing Engineers), an E-V division at the time. Russ and Eric G. Shalkhauser, W9CI, founded RME in the 1930s to manufacture receivers and other equipment for the ham market. Some of their best-known receiver models were the RME 69, 45 and 4350 (*many of which are still on the used market today on eBay and other places – ed.*). I believe that Eric retired after he and Russ sold the business to Electro-Voice after World War II. About 1954, the RME plant moved into a former auto dealership two blocks from my home in Washington, Illinois. The plant manufactured the RME 4300 and 4350 receivers, a matching VHF converter (the model number escapes me), and E-V Power Point phono cartridges. You know where this young ham (K9AXG at the time) spent a lot of his time.

Russ was my Boy Scout Explorer advisor. In addition, he and his assistant, John Overly, became my mentors. Their help and encouragement aimed me into a career in electronics, first as an electronic technician and later in electronic and computer engineering.

Your readers may be interested in another item. The November 1952 CQ was the Special Novice issue. The cover article was "Putting the 6146 on Two Meters," by Robert V.

Morris, WN2IHM. Four or five years after the article was published, my father and I built that transmitter. I was a junior in high school at the time. We were not successful in getting it to work at the time and the project was set aside for other, more pressing, projects like term papers and finals.

Some years later, after I had graduated from Hofstra University's engineering school, my father brought the transmitter and the CQ magazine to my home on Long Island. I realized my error after rereading the article and we soon had it lighting a fifteen-watt light bulb to about half brilliance. The transmitter has never made a contact.

I shall be happy to bring this transmitter to your office and show it to you. I am only about an hour from Hicksville.

73,  
Steven E. Perry, W2HAF  
Rocky Point, New York  
sperry@optonline.net

W2VU Replies:

What great memories, Steve! We'll be in touch about getting together with you and your radio!

Editor, CQ:

Loved the piece on Electro-Voice and W9IOP. Do you remember that you carried an interview with (E-V co-founder) Al Kahn, K4FW, more than 17 years ago?

73,  
Ted Cohen, N4XX

W2VU replies:

Thanks, Ted, and yes, I remember that interview well (December 2001 CQ, p. 16). I also remember that you conducted the interview and wrote the article! Lots of connections here!

*The following letters were directed to author Terry Joyner, W4YBV:*

Terry:

Thank you for resurrecting the memory of the W9IOP Second Op (in November CQ). I wore mine out; don't know where it went. Maybe it disintegrated.

Larry was a premier op of that time. He dominated CW Sweepstakes from whichever call area he operated.

I don't remember him as a DXpedition guy. However, I recall the time when he operated from the Vatican. There was no "up 5." It was pound away right on his frequency until you got through. As a friend of mine observed, "chasing him was like operating Sweepstakes."

Thanks, again. Happy New Year,  
Kurt Meyers, W8IQ, (ex-W8IBX)  
Toledo, Ohio

Hi Terry,

Until a couple years ago I had the Second Op on my radio shelf. The last time I looked at it, I noted that much of the info was so far out-of-date that it was no longer of value to me and threw it away. I also have a similarly-sized round slide rule that I have retained. It is too sentimental to me to discard.

Thanks for the memories, Terry.

73 and Happy New Year,  
Jack Friend, AK7O  
South Salt Lake, Utah



## Impact on Ham Radio of Federal Government Shutdown

**A**s this is written in early January, the federal government is partially shut down due to a funding dispute between the President and Congress. The FCC is among the agencies affected. We hope that, by the time you read this, an agreement has been reached to reopen all federal agencies. However, the impact on hams will likely extend beyond the shutdown. Here's a snapshot of how the shutdown affected government agencies and services typically used by hams, including any expected post-shutdown effects.

### FCC

The FCC shut down all but essential functions (such as spectrum auctions) as of January 3. The Universal Licensing System (ULS) and Electronic Comment Filing System (ECFS) websites continued to be accessible; however, there was no staff support behind them. Amateur license processing was shut down, including new licenses, upgrades, vanity call requests, renewals, and administrative changes (such as a change of address). There will be a backlog in all of these functions once the government reopens, so hams filing license-related applications can expect processing delays. If similar situations in the past are used for guidance, licenses due to expire during the shutdown period will remain valid as long as a renewal application has been filed in a timely manner. All other applications will be processed in the order received once the staff is back at work. Deadlines on comments or reply comments on open rulemaking proceedings will likely be extended by the number of days during which the FCC was shut down (although we are not aware of any amateur-related proceedings currently in comment or reply-comment periods).

### NOAA/Space Weather Prediction Center

The Department of Commerce was also affected by the shutdown. Its many agencies include the National Oceanic and Atmospheric Administration (NOAA), the umbrella agency for the National Weather Service and the Space Weather Prediction Center (SWPC). The National Weather Service and its Storm Prediction Center remained operational because they are essential to protection of life and property (even though workers were not being paid during the shutdown). The SWPC web page also said it was remaining open, but as you can see from Figure 1, the "Space Weather Conditions" seg-

Notice posted on the FCC's Universal Licensing System (ULS) web page:

Lapse in Government Funding

Effective: January 3, 2019 2:00 p.m.

System: Universal Licensing System (ULS)

Due to a lapse in funding, the operations of the Federal Communications Commission will be limited with no system support. We regret any inconvenience.

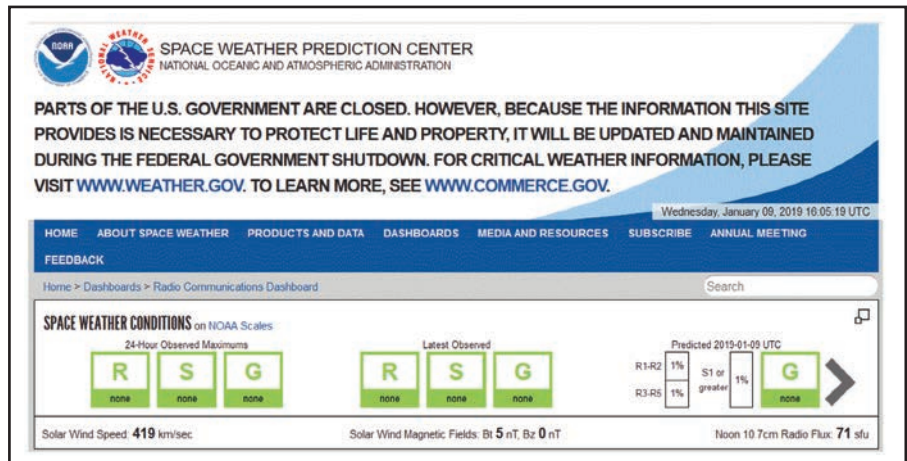


Figure 1. The Space Weather Prediction Center's web page says it will be updated during the federal government shutdown, but the "Space Weather Conditions" box at the bottom of the image suggests otherwise. (From SWPC website)

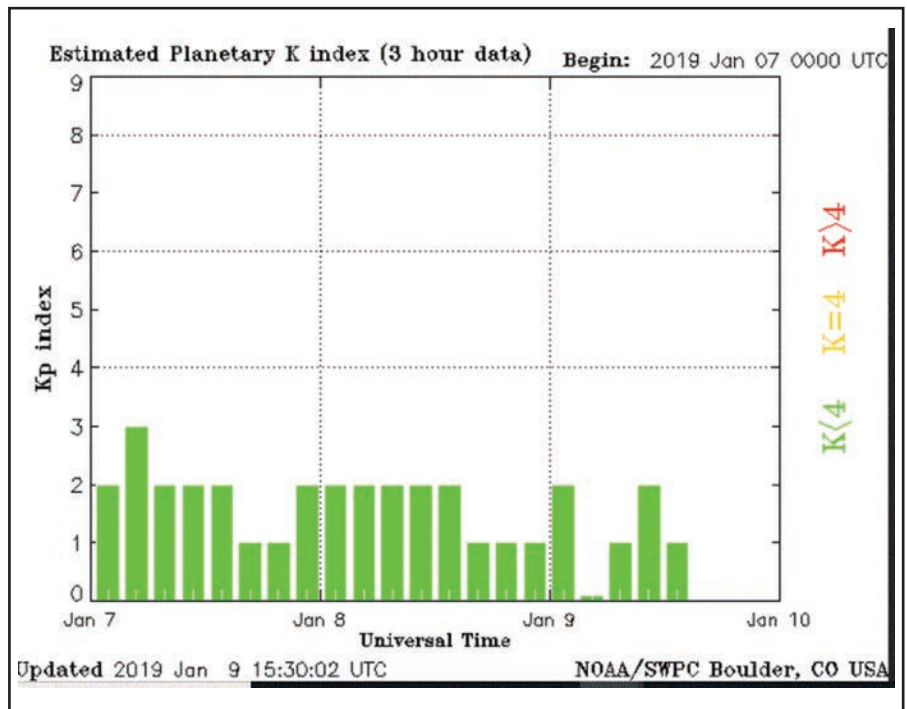
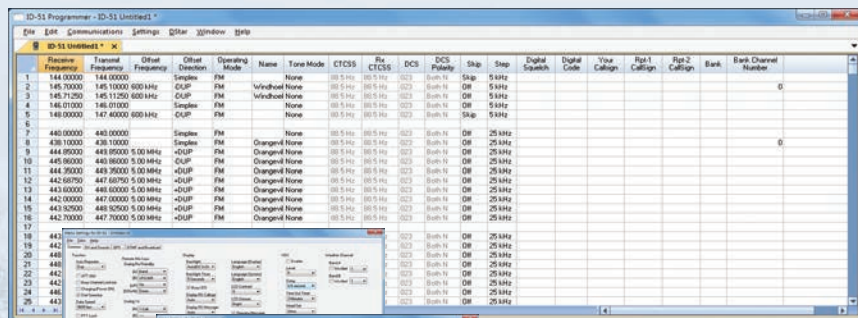


Figure 2. Some space weather data remained available, such as this graph of the K index, current when the screen shot was taken. (SWPC, via sunspotwatch.com)

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ment of the page contained no data. Other data was available, such as the K index graph in Figure 2.

## NIST/WWV

The National Institute of Standards and Technology (NIST) is also part of the Commerce Department and was similarly affected by the shutdown. Radio stations WWV and WWVH remained on the air, but the WWV's web page (Figure 3) had no current information available. (Sidenote: To the best of our knowledge, the future status of WWV, WWVB, and WWVH remains uncertain. The Commerce Department eliminated their funding in its latest budget request, but as far as we know, Congress has not taken final action on the department's budget.)

## NASA

All NASA operations were shut down except for those necessary to maintain

safety aboard the International Space Station (Figure 4). It is unclear at this point how amateur satellites scheduled for launch aboard NASA rockets will be affected. If a launch is part of an ISS

resupply mission, it will presumably move ahead on schedule. Other launches may be delayed as a result of the shutdown. Check the status pages for individual satellites for updates.

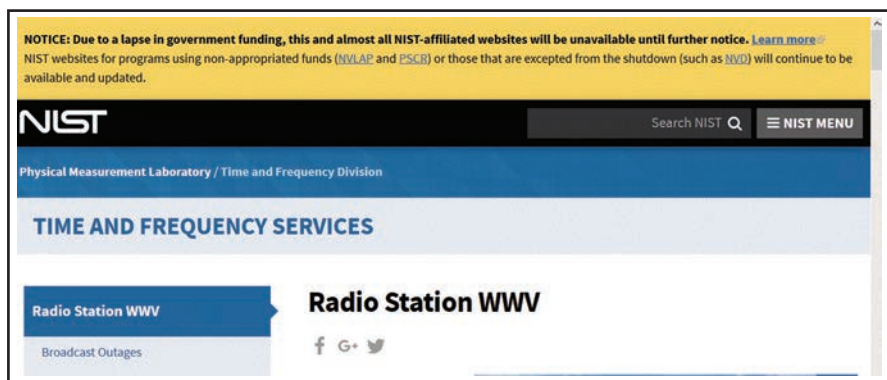


Figure 3. The WWV web page was not being updated during the shutdown; however, WWV itself continued broadcasting. (NIST website)

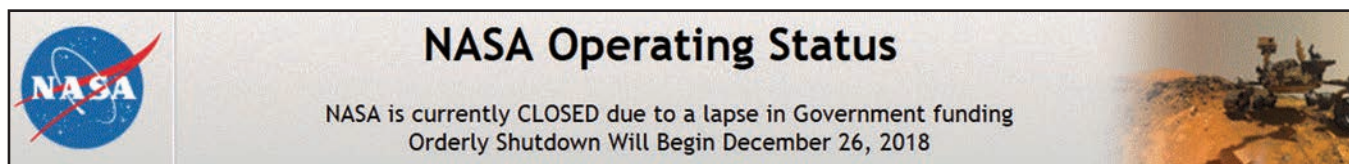


Figure 4. This notice on NASA's homepage said it all ... only operations critical to maintaining crew safety and experiments aboard the International Space Station remained open. The rest of NASA was closed for the duration.



*Another notch on the bucket list for NK6A ... a vacation in Italy that included not only QRP operating but a visit to one of radio's most historic sites. Don shares his adventure, as well as a photo tour of some great Italian cities.*

## QRP, Marconi, and Me

### ***Photo Essay of a Hamming Vacation to Italy***

**BY DON MINKOFF,\* NK6A**

**E**very amateur should have a bucket list. Mine includes traveling to a far-flung destination and being DX as part of a DXpedition; visiting ARRL headquarters and operating from W1AW; operating from a cruise ship as /MM (maritime mobile) from a faraway location; earning DXCC, 5-band DXCC, WAS, and Honor Roll. The list continues to grow. Having goals and achieving them over a number of years

as an active ham has been good for me and good for the hobby.

I visited ARRL headquarters way back in 1990 and operated two days at W1AW, check. DXCC, check; WAS, check; maritime mobile, check. Visit the birthplace of radio<sup>1</sup>? Check! I'm still looking to join a DXpedition.

So how did I come to visit the birthplace of wireless? Why Italy for a vacation? Why take a radio with me?

#### **The Chance to Be DX**

I always take a radio with me on vacations for a chance to be DX. I began with



*Photo A. A statue of Guglielmo Marconi welcomes visitors to the Marconi Museum in Bologna, Italy. (Photos courtesy of the author)*

\* 12567 Brooklake Street  
Mar Vista, CA 90066  
email: [nk6a@arrl.net](mailto:nk6a@arrl.net)



*Photo B. Overview of Florence. Our B&B was on the left side of the Arno River, away from the main part of the city.*





*Photo C. B&B operating position in Florence. The antenna was mounted on a balcony railing and I operated from inside to escape the mosquitoes!*

the Elecraft K2 on Maui in Hawaii. I brought an Elecraft K1 to Canada and on subsequent trips, a KX1 maritime mobile (and for shore visits in Canada). I returned to Hawaii on the island of Kauai with the new KX3. For my trips to Ireland and Portugal, I also took the KX3<sup>2</sup>.

I planned to explore Italy with my new KX2. I made sure to find B&Bs and small hotels that would allow me to set up and operate from the room or a nearby park. I used room descriptions and photos as well as Google Earth to find suit-



*Photo E. Making contacts from the Il Rondo Boutique Hotel in Montepulciano, Tuscany.*

able locations from which to operate from my room. Balconies and patios were a plus. My wife and I would be spending 20 days touring Italy from Rome to Modena and Venice plus the Cinque Terre and, in Bologna, the Marconi Museum (*Photo A*).

Operating from Italy is easy as you do not need a special license to operate. It is on the CEPT<sup>3</sup> country list. ARRL has a list of countries with license requirements. Just bring a copy of your license and a print out of T/R 61-01. I would be I/NK6A.

I packed my suitcase with 25 feet of coax, my Ventenna HFp vertical plus a long wire with counterpoise. My carry-on contained the KX2, paddles, and spare battery. I had no issues traveling between Los Angeles, London and



*Photo D. Tuscany, our home for five days.*





*Photo F. Our Tuscan farmhouse B&B for the next three days.*

Italy. I only had to remove all items from my carry-on while in London.

### **Seven Cities in 20 Days**

I operate for a short time on each day of our vacations. Vacation comes first! Our first stop was Rome. We picked a small hotel close to all the well-known sites with the important bonus of a rooftop where I could operate. Sadly, the roof also contained a bar and spa, which were very crowded during my time for operating, so no operation from Rome.



*Photo G. Setting up my antennas in the garden of Il Refugio.*



*Photo H. Cinque Terre overview.*





Photo I. Perfect operating position at the Park Hotel Argento in Levanto.

Our next stop was Florence (*Photo B*). Once again, we'd picked a small B&B outside the busy center of the city. Our room had a balcony and patio. I was excited to try my first operation from Italy. Setting up my antenna outside, I discovered that what I had read about Florence was very true ... mosquitoes! I tried operating outside and was bitten and chased inside. I set up the antenna on a railing closer to our room (*Photo C*). The location was not ideal and I made but one QSO to Spain. The radio would have to take a back seat to museum visits and being a tourist for a few days. I was happy with one Q. My operating schedule was usually in the late afternoon after visiting historical sites, usually between 1300 and 1500 UTC.

We rented a car and drove to Tuscany (*Photo D*), and our first stop was the Il Rondo Boutique Hotel in Montepulciano. This small 18<sup>th</sup>-century boutique hotel had a very nice outdoor area, perfect for setting up and operating. I had the entire garden to myself and set up for an hour of operating (*Photo E*). Conditions were excellent. I did tell the office staff that I would be operating and managed to make 5 Qs during our short stay, one on 14 MHz and all the rest on 10 MHz.

Running low power adds a bit of skill to making a contact. Calling CQ should be done on known QRP frequencies (14.060, for instance). I noticed on other frequencies that many European stations were calling CQ and adding QRP to their calls. I had no problems making contacts on 30 meters calling CQ. My power was usually 5-8 watts out. I made

a total of seven contacts, including stations in Greece, Germany, Slovenia, a portable station in Scotland plus two Summits on The Air (SOTA)<sup>4</sup> stations. Running QRP power, I usually look for other like-minded folks, and SOTA activators usually run low power. I am active in SOTA so I always look at the SOTA watch alert page on my phone. I was also checking DX Summit plus looking at the Reverse Beacon Network<sup>5</sup>.



Photo J. Antenna setup in our B&B by a window in Modena.

show/hide my last filters

showing spots for DX call: I/NK6A rows to show: 15

search spot by callsign

de	dx	freq	cq/dx	snr	speed	time
OH8WW	I/NK6A	14055.0	CW CQ	0 dB	23 wpm	1600z 04 C
WZ7I	I/NK6A	14055.0	CW CQ	5 dB	23 wpm	1600z 04 C
SE0X	I/NK6A	14055.1	CW CQ	8 dB	23 wpm	1600z 04 C
GI4DOH	I/NK6A	14055.0	CW CQ	5 dB	23 wpm	1600z 04 C
ES5PC	I/NK6A	14054.9	CW CQ	8 dB	23 wpm	1600z 04 C
OH6BG	I/NK6A	14055.1	CW CQ	15 dB	23 wpm	1600z 04 C
GW8IZR	I/NK6A	14055.0	CW CQ	6 dB	23 wpm	1600z 04 C
SE5E	I/NK6A	14055.0	CW CQ	5 dB	23 wpm	1600z 04 C
OH6BG	I/NK6A	14040.5	CW CQ	3 dB	24 wpm	1555z 04 C
GW8IZR	I/NK6A	14040.5	CW CQ	3 dB	24 wpm	1555z 04 C
SE5E	I/NK6A	14040.5	CW CQ	3 dB	24 wpm	1554z 04 C
SE0X	I/NK6A	14040.5	CW CQ	7 dB	24 wpm	1554z 04 C
UD4FD	I/NK6A	14042.2	CW CQ	4 dB	25 wpm	1703z 03 C
OH6BG	I/NK6A	14042.2	CW CQ	3 dB	25 wpm	1703z 03 C
SE5E	I/NK6A	14042.1	CW CQ	9 dB	25 wpm	1703z 03 C

Photo K. RBN report from indoor operation in Modena. I made only one QSO but my QRP signal was heard as far away as Pennsylvania!





Photo L. Next stop, Venice. Down the Grand Canal and turn left up a small alley ...



Photo M. Antenna set up on balcony over a small canal in Venice.

Our next stop was a small village near Lucca called Sant' Andrea di Cómposito. This small three-room B&B, (Il Rifugio) is run by two guys originally from Hawaii (Photo F). They couldn't have been nicer and more accommodating. One of the owners provided me with mosquito repellent. Yes, they also had a swarm of mosquitoes.

I set up my vertical and my long wire outside on the lawn (Photo G). Conditions were excellent. There was no noise and I heard a lot of signals. I monitored the DX Summit and also checked the SOTA watch page. I made two contacts with activators on a summit, YO/HB9DST and OK2BWB. I managed to operate two of our three days here, and one



Photo N. Local QRM from the canal below my antenna. You can't put a filter on an accordion!

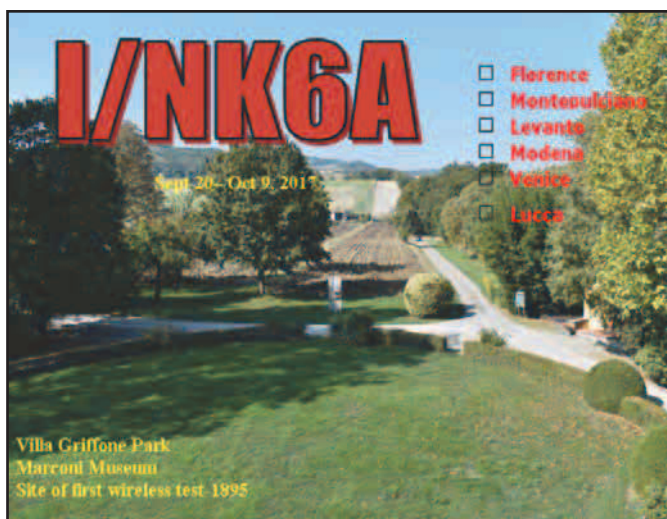


Photo O. Making time for some portable QRP operating can add a new dimension to any vacation. Just make sure to acknowledge your contacts with "the final courtesy" of a QSO.



## A Trip Back to 1895

**T**raveling to Italy for a vacation was a no-brainer. I am into cooking and all things Italian, including cars. I was attending a radio club meeting and a visitor from Italy was sitting next to me. Fabio, IZ4AFW, and I began to talk and discovered that we both had a mutual ham friend in Brazil, PY2NY. Fabio is from Bologna, and when I told him I would be visiting Italy the following summer, he invited me to visit the Marconi Museum there. My wife and I made plans and arranged for our tour once we arrived in Bologna from Modena.

I had the good fortune to visit the house and grounds where the very first transmission of a wireless signal was successfully sent in 1895. The Marconi Museum is housed in Villa Griffone, once the residence of the Marconi family and where a young Guglielmo Marconi experimented with wireless (*Photo P*). Standing on the grounds and looking toward the hill where the signal was received (*Photo Q*) was a humbling experience. Learning about Marconi's study of Herztian waves, Maxwell, and other well-known names reminded me of how I studied for my radio exams. I was familiar with all those names.

We met Fabio at the museum, where Adriano, I4YCE, conducted the tour (*Photo R*).

The Marconi museum houses many exhibits and very accurate reconstructions of experiments that were carried out in 1895. Working models of early coherer receivers and spark gap transmitters were on display (*Photo S*). The coherer was the first detector (invented in 1890). The reception of Morse code via radio waves was performed by the coherer detector. Early transmitters were spark gaps using a Ruhmkorff coil and Branly coherer for the detector.

The Marconi magnetic detector (*Photo T*) became the official detector used by the Marconi Company from 1902 through 1912.

The first transmission of a wireless signal took place on a hill 1.5 miles from the Villa.

Like most significant inventions, radio had not just one "father", but many. Maxwell, Hertz, Lodge, Branly, and Tesla were but a few of those contributing to early wireless.



*Photo P. The Marconi Museum in Bologna is located in the Villa Griffone, where the Marconi family lived and young Guglielmo conducted his wireless experiments in the late 1800s.*



*Photo Q. Marconi's first wireless test from the Villa grounds to the top of the nearby hill covered a distance of 1.5 miles.*



*Photo R. Outside the Marconi Museum and ham station. From left, Don, NK6A; Fabio, IZ4AFW, and our tour guide, Adriano, I4YCE (photo by Sheila Mann)*



The museum grounds are also home to the IY4FGM radio club (*Photo U*), which is housed in the old Villa family chapel (*Photo V*). The G. Marconi Memorial Station is managed by the Club Associazione Radioamatori Italiani in Bologna. I was invited to operate for the limited time we had before catching our train to Venice. I made two quick contacts (*Photo W*) and had to leave.

The Marconi Museum will be one of the host locations for the next World Radiosport Team Championship, WRTC 2022<sup>6</sup>.



*Photo S. Reproduction of first spark gap transmitter used by Marconi in 1895.*



*Photo T. Magnetic detector, which took the place of the coherer receiver.*



*Photo U. Amateur station IY4FGM is part of the Marconi Museum. The inventor said he always considered himself to be an amateur.*



*Photo V. The Marconi Memorial Station, IY4FGM, is located in a chapel on the museum grounds.*



*Photo W. The author operating IY4FGM. (Photo by Fabio, IZ4AFW)*

afternoon I was visited by the neighbor kids and our B&B host. I decided to have them listen to SSB so they could hear what was being said. Tuning around 20 meters, I found a station in Greece operating a contest. I didn't bring a mic with me, but with the KX2 I could use the built-in mic and called. I worked SV5FBG on SSB with only 3 watts. It was time to recharge the battery. I worked Germany, Russia, Belgium, the Netherlands, Spain, Croatia, Austria, Denmark, and a special event station from Bulgaria, LZ251MKP. My totals from two days of casual operating were 15.

The next stop on our tour was the town of Levanto at the top of the Cinque Terre (*Photo H*). I found a hotel online with car parking, and our room had a private patio ... with no mosquitoes. A fantastic operating position (*Photo I*). I set up my antenna using a clamp to a metal gate, ran the radials out to the patio and began to listen. I answered a CQ on 10.108 MHz and made contact with 407TC in Montenegro. I also worked the Czech Republic, George, RU3ZL, and a station in Finland. I didn't make many contacts this time, but it was a fantastic location to visit.

After three days of eating wonderful seafood and walking about, we drove to Modena. My purpose here was not so much to operate my radio but to visit the Ferrari museums and eat wonderful food. We found a very old B&B dating back to the 19<sup>th</sup> century in the old town called Salotto delle Arti. Unfortunately, it was up three flights of stairs with no balcony or access to the outside. But this B&B did not disappoint. I was getting a bit itchy for my one Q and decided to just try listening by setting up my antenna inside by the open window (*Photo J*). The room had a very high ceiling. I tried 20 meters and called CQ on 14.055. I got a call from Jim, SV8ANW, in Greece. My RST was 569. Not bad for inside, running 5 watts. We actually had a nice QSO. He was running 100 watts. I later checked the Reverse Beacon Network (*Photo K*) and saw I was heard in Pennsylvania by WZ7I. That is why I love QRP.

After dropping off our car in Bologna and visiting the Marconi museum there (see sidebar), we headed to our final stop, Venice (*Photo L*), by taking the train, jumping on a water bus, and finally walking down narrow alleys and over canals. The 400-year-old B&B we found was on a canal, and our room was on the third floor with a balcony overlooking a canal. I was a bit concerned about mounting my antenna on the railing with

the canal right below. I opted to use the stand and mounted it next to the railing on the patio and ran the coax into the room (*Photo M*). It worked just fine. We had two full days in Venice, and I was able to keep my antenna up and out so I could operate when I had free time. Only three QSOs, though: Z3ØU, E77EA, and LZ3ZX.

I had local QRM from all the gondolas cruising by (*Photo N*) from morning until late at night. It's hard to put a filter on an accordion. Some of you might be won-

dering if I rented a gondola and operated marine mobile. I thought about it.

## Traveling Light

QRP is traveling light, using small portable radios that you can take anywhere. You do not need a large antenna. You do not need to even bring a power supply. All are battery-operated. Low power and low current do not mean you cannot get out. It is very satisfying to make contacts when away from your shack and in a foreign country (*Photo O*).

### Notes:

1. Ed. note: Radio has many "fathers," from Mahlon Loomis to Alexander Popov and Nikola Tesla. Fans of each will debate endlessly who actually "invented" radio. But there is little question that Guglielmo Marconi was the first to realize the world-changing potential of radio communication and who created the wireless industry that underlies so much of today's communication technology.
2. See Don's previous article about this trip, "Sardines, Wine, Whiskey, Cows and a Radio (QRP DXpedition to Portugal and Ireland)," Feb. 2016 CQ, p. 14
3. European Conference of Postal and Telecommunications Administrations (CEPT) radio amateur license –US Extra and Advanced class licensees wishing to operate while in Europe are eligible to do so if the country they are visiting participates. Always carry a copy of your amateur license and a copy of form T/R 61-01.
4. <<http://sotawatch.org>> - SOTA is an award scheme for radio amateurs that encourages portable operation in mountainous areas. Participation is possible for all radio amateurs and shortwave listeners. There are awards for chaser and activators.
5. <[www.reversebeacon.net](http://www.reversebeacon.net)> - The Reverse Beacon Network, or RBN, is a network of stations listening to the bands and reporting what they hear, when, and how well.
6. <<http://wrtc2022.it>>

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*Software-defined radios offer the low-power operator a big advantage, especially in our sunspot-challenged times — the inclusion of a panadapter to let you see as well as hear signals on a band. W2JAZ set out to build a portable SDR-based QRP station.*

## Traveling Light: QRP with an SDR Radio and a Windows® Tablet

BY RICK LAWN,\* W2JAZ

**A**s a licensed amateur radio operator since 1965 (originally WN3EIQ), I've been at it for a long time. I've enjoyed many aspects of the hobby that seems to keep on giving. I've built a wide range of transmitters, receivers, and transceivers like the two-tube, two-band "Scrounger" featured in the September 1964 issue of *Electronics Illustrated*, and such kits as the Heathkit HW-7 and the A & A Engineering 20-meter transceiver. Some are still in boxes waiting for the time to build them. I also have an Elecraft KX3 in my stable, but I find a certain lure and mystique in operating small, homebrewed, non-commercial radios.

### SDR for QRP

I think the most interesting QRP experiences I've had lately have been in building and operating SDR radios. I first encountered software-defined radio (SDR) technology as an owner of various Flex Radios including the 1500, their QRP model. With the rig's panadapter or bandscope, I felt like someone had finally given me X-ray vision and I could now use my eyes and ears. SDR radios changed my world and operating habits so much that I've found it hard to go back to analog-style radios where I can't see signals as well as hear them. During these times when we often experience miserable propagation, QRP operation has become even more challenging and I've found that having eyes on the radio spectrum can help immeasurably. Despite these poor conditions I've continued to pursue SDR QRP operation using various radios, all in an effort to improve my operator skills while maintaining as small and portable a station as possible.

\* email: <rjlawn@gmail.com>



Photo A. The Softrock Ensemble RXTX and bandpass filter (on top).

My first QRP SDR kit was designed and marketed by Tony Parks and built around the Si570 programmable oscillator and ATTINY85 controller (now sold by KB9YIG). Richard Robson, Sr., WB5RVZ, has gone to great lengths to document the building process along with testing and troubleshooting Softrock kits. It is not the purpose of this article to go into a technical explanation of SDR technology, but rather to discuss how I use it to my advantage in QRP operation.

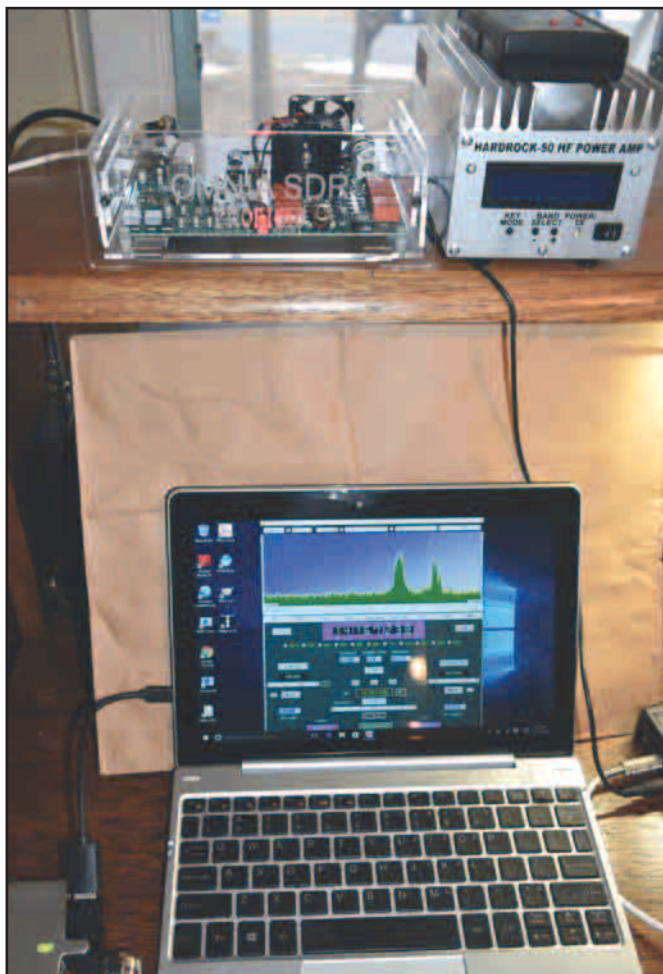
Assembly of Tony's Softrock kit was also my first building experience working with surface mount devices (SMD) so it was a challenge. His receiver and transceiver kits became popular enough to encourage the birth of his company — Dash Five, Inc<sup>1</sup>. I built the Softrock Ensemble RXTX for the 40-

30-, and 20-meter bands (Photo A). The output was only about 1 watt and it required external sound cards and a computer to work. I used various software including HDSDR and PowerSDR (all free). It did not work particularly well for CW because of latency issues and QSK (break-in) operation was not possible. There were workarounds for casual CW QSOs, but in a contest or sprint situation where a quick TXRX turnaround cycle is essential, I found CW operation to be frustrating with this radio. I added a Mini-Boots II amplifier which, of course, helped on the power side, but there were too many hardware requirements and cables external to the rig itself, making simple, portable, QRP SDR operation a bit inconvenient.

While the Softrock Ensemble wasn't the ultimate radio for my needs, it did



Photo B. Multus Proficio station including Elecraft T1 autotuner and the Hardrock50 amplifier (for those times when QRP won't cut it).



further open my eyes, so to speak, to the world of SDR technology and its benefits in QRP operation. The panadapter, much like the waterfall available in digital modes, provides a clear view of much of the band. With SDR radios' typically low-noise receivers, visual filters, DSP and other software enhancements, the QRP operating experience has become nearly as good as that offered by high-end base receivers.

I continued to look for other inexpensive options that might simplify operation and I found the Peaberry, which was a partial kit and — compared with the Softrock kits — had the advantage of an on-board sound card that cut down on necessary outboard gear. I didn't get in line quickly enough, though, and lost out on the opportunity to purchase a Peaberry before permission was given to Ron Patton, W4MMP, to produce the rig commercially. Ron assembled a capable team that worked on further developing the Peaberry's technology. They arrived at the Omnia Proficio, now renamed the Multus Proficio after a copyright issue surfaced<sup>2</sup>.

I am one of the early adopters of this 10-band plus general coverage, 5-watt transceiver (*Photo B*), and I set out to build a small QRP SDR station around this radio. In my opinion, it is the best buy in QRP SDR transceivers and all it takes is a single USB cable to a Windows 10® computer! (*Photo C*) The kit requires minimal skills as the all SMD components are pre-soldered to the board. This transceiver now uses the Kenwood CAT protocol, provides accessory ports for an outboard autotuner (I use the Elecraft T-1 when needed) and an external amplifier PTT control. I've found it works great with the Hardrock50.

Initially, the Proficio was dependent on using freely distrib-

Photo C. The complete Multus Proficio station. All that's needed is a single cable between the rig and a Windows 10® laptop or tablet.



## ZERO BIAS (from page 8)

right in this issue, our annual QRP Special! We've got other hams' stories of QRP success, a review of a portable mast for QRP operating in the great outdoors, and several projects of interest to the QRPer (but not limited to low-power enthusiasts).

QRP Editor Scott Rought, KA8SMA, offers his "Top Ten List" of reasons for operating QRP, and he reviews the SOTAbeams "Tactical 7000hds" collapsible antenna mast that can be tucked into a backpack. NK6A shares the fun he had operating QRP on a trip to Italy; NJ3K tells us how he worked 100 countries not only with low power, but also while mobile and operating only CW; and K9GH shares his memories of operating QRP maritime mobile on a cruise with his son's scout troop. Plus, our cover story is about the hunt for extreme QRP — the results of the 2018 CQ World Wide Foxhunting Weekend.

On the technical side of things, W2JAZ shows us how to operate QRP with a software defined radio and Windows® tablet in "Traveling Light;" K2AOP shares his circuit for a low current and ultra-high resistance meter; WØPCE describes how to build an amplified absorption wavemeter, and N4KYW tackles the challenge of building enclosures for QRP gear ... with a trip to the kitchen accessories aisle in the supermarket.

If we still haven't persuaded you to turn down the power level on your rig, we also have PA3EWP's tale of making a DX-pedition to the Kingdom of Tonga and operating as A35EU; Emergency Communications Editor W4ALT looks at EmComm and accessibility for hams with physical limitations; DX Editor N2OO reviews ClubLog's "most wanted" entity list and examines why certain places are so hard to contact, and Contesting Editor K3ZJ introduces us to the growing use of realtime contest scoreboards on the World Wide Web that show how various competitors are doing while a contest is under way.

Finally, we introduce a new column this month — "Analog Adventures" by Eric Nichols, KL7AJ. While more and more radio communications is "going digital," Eric is here to remind us that radio itself is analog and to offer tips, techniques, and projects to keep your analog radio skills as sharp as your digital ones. "Analog Adventures" debuts on page 74.

Housekeeping note: As this issue goes to press, we are still looking for possible successors to K1BV in both of his long-worn hats as Awards Editor and USA-CA Awards Manager. If you or someone you know is interested in either one or both of these positions, please drop me a note and we can talk. — 73, Rich, W2VU

uted HDSDR software with a small application supplied by Multus-SDR that served as a bridge. I ran this setup on a Windows 7 laptop or desktop computer. One can add an additional sound card as needed if you wish to operate SSB, but it runs CW and digital modes as is with the addition of virtual audio port software such as Virtual Audio Cable. I discovered a good USB sound card buy on eBay (Enermax Dream-Bass) that didn't break the bank and provides stereo inputs and outputs at a sampling rate of 96k, so bandwidth is

quite adequate. Further software development by Ron and his team has enabled the rig to run with their own standalone app known as MSCC-Core (Photo D) which is no longer dependent on HDSDR or any other application. The Proficio with the latest release of MSCC-Core now provides plug and play operation.

Since it requires Windows, and prefers version 10, I set out to find small tablets than might accommodate operation of the Proficio SDR transceiver or other QRP radios. My first inexpensive tablet,



Photo D. NetBook tablet running MSCC-Core software.



Photo E. Tablet running MSCC-Core with USB hub, soundcard, and Pico keyer



Photo F. The FunCube Dongle Pro+ USB SDR receiver covers 150 kHz to 240 MHz and 420 MHz to 1.9 GHz.

which still works well, was an 8-inch WinBook available from Microcenter and runs Windows 10 quite well. I eventually found, though, that I needed a bit more screen real estate to simultaneously have the MSCC-Core application running with the panadapter window as well as logging software or digital communications programs such as fldigi<sup>3</sup>.

I also learned something about the way USB communications works. Since the WinBook does not have a keyboard or built-in mousepad, if I didn't want to use my big fingers on the rather small touchscreen to execute commands, I would need to hang a USB hub from the single USB port provided by the tablet in order to use a wireless mouse and/or keyboard. I found that the hub slowed things down noticeably. But the USB hub did provide a means of attaching an external soundcard and a mouse/keyboard combo (Photo E). Had I used a powered (active) hub rather than the unpowered (passive) one I had available, things might have worked better without noticeable lags.

With a straight key (I use a small Pico Keyer), Carolina Windom, and an early version of MSCC-Core software, I placed in the top three in an NAQCC Sprint in the W2 Division. Not a bad showing, and the only thing that held me back from making a few more Qs was the latency in CW operation and poor band conditions.

Since this experience, the radio's operating software has been greatly improved and new developments in filtering, noise reduction systems, and so forth are being rapidly introduced by the developers. TX/RX turnover is handled by a relay, so lightning-fast QSK operation will not likely ever be possible, but the turnover is now quite acceptable and delay time can now be adjusted.

I also installed two virtual programs to handle audio (Virtual Audio Cable<sup>4</sup>) and serial communications (Virtual Serial Port Manager<sup>5</sup>). These apps allow one to create more virtual serial ports to

control such applications as WSJT-X, fldigi, or a logging program. The free "Com0Com" app<sup>6</sup> also works fine for this latter purpose.

Recently I improved the computer situation further, returning to eBay where I purchased a very slightly used NetBook tablet with a touch screen, detachable keyboard with built-in mousepad, single audio and USB ports, and a storage expansion SD card slot. And best of all, the NetBook provides slightly more screen real estate at 10.1 inches. It boasts a quad-core processor and doesn't seem to get too bogged down by the added USB hub, though I've not yet tried running many applications at once.

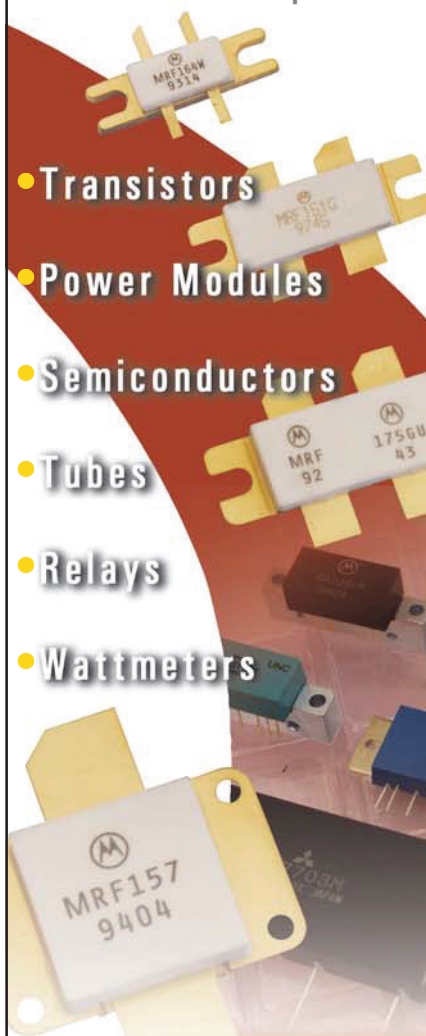
### Beyond Proficio

Other SDR receivers that offer a panadapter provided by various software applications such as HDSDR, SDR#, SDR Play, and others, can enable the operator to quickly see where the signals are in a passband. These are inexpensive USB "dongle" receivers that boast very broad frequency coverage. There is a great deal of information on the internet and in various publications about such setups, many of which can tune up to 1.2 GHz or even higher. These SDR receiver dongles sell for as little as \$20 on the low end to just over \$200 for a high-end model of SDR Play or the FunCube Dongle Pro+ (Photo F)<sup>7</sup>. Coupled with a companion transmitter, T/R switch, and small tablet or laptop, an exceptionally high-quality QRP station can be assembled at a low cost and provide eyes on the band through the SDR advantage for QRP operations.

### Notes:

1. <<http://fivedash.com>>
2. <[www.multus-sdr.com](http://www.multus-sdr.com)>
3. <<https://tinyurl.com/y8mgzs7u>>
- 4, 5. Available from various online sources
6. <<http://com0com.sourceforge.net>>
7. <[www.funcubedongle.com/?p=155](http://www.funcubedongle.com/?p=155)>

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Photo A. The A35EU team on the beach in Tonga. From left, Martin, PA4WM; Ronald, PA3EWP; Tom, GM4FDM; and Pat, EI5IX. (Photos courtesy of the A35EU team)

*"Being the DX" from the South Pacific at the bottom of the sunspot cycle adds some challenges to a DXpedition, especially when the prime target area for contacts is western Europe — literally half a world away.*

## A35EU: DXpedition to the Kingdom of Tonga

BY RONALD STUY,\* PA3EWP

Over a few beers during the hamfest in Friedrichshafen last year, several of us were talking about our next DX destination. Personally, I don't like to go to the same country twice. We mentioned a few possibilities in the Pacific. Some were out of our scope because of the cost and/or the difficulty of getting there. Frank, DL4KQ, mentioned Myanmar and everybody thought that was a great idea. From July through mid-September, we worked on this destination. Frank did most of the work because he had some contacts in Myanmar. He even flew there to make some arrangements with the local government. Everything seemed fine, but after a month back home, we still hadn't received the official papers. We wanted to go to Myanmar in October, so there were only a few weeks left to organize this trip. We started to look for a backup plan.

Another possible destination we talked about in Friedrichshafen was Tonga, in the South Pacific. This is an easy place to activate. A lot of tourists go there, there are daily flights, and getting a license is also no problem. Tonga is not so high on the most wanted list, but still interesting, especially for Europe. Within two weeks, nearly everything (license, location, and flights) was organized. So, we were ready for the following step. By the end of September, we decided to postpone Myanmar and focus on Tonga.

Only three operators from our group wanted to go to Tonga: Tom, GM4FDM; Martin, PA4WM; and your author, PA3EWP. We needed a fourth operator, and the opening was quickly filled by Pat, EI5IX. The team was ready to go for a new adventure (Photo A).

### The Kingdom of Tonga

Tonga is a Polynesian country and archipelago comprising 169 islands, of which 36 are inhabited. It is the only kingdom

\* <rstuy1@chello.nl>



*Photo B. The group had full use of this building at the Heilala resort for its station.*



*Photo D. Ronald receiving the A35EU license — including 60-meter privileges — from the Tongan telecommunications officer.*



*Photo C. Martin headed up the antenna assembly operation. Here, he's building the 17-meter vertical dipole array, or VDA.*

in the South Pacific. The total surface area is about 750 square kilometers (290 square miles) scattered over 700,000 square kilometers of the southern Pacific Ocean. The sovereign state has a population of approximately 100,000 people, of whom 70% reside on the main island of Tongatapu. The Tongan people first encountered Europeans in 1616 when the Dutch vessel *Eendracht*, captained by Willem Schouten, made a short trading visit. Other Dutch explorers came later, including Jacob Le Maire (who called on the northern island of Niuaotupapu); and in 1643 Abel Tasman (who visited Tongatapu and Ha'apai). Later noteworthy European visitors included James Cook (British Royal Navy) in 1773 and 1777. Tonga became a British protectorate in 1900 and regained full independence in 1970, but is still a part of the UK's Commonwealth of Nations.

### Location on the Island

We found a nice location on the western part of the main island (*Photo B*). The beach resort Heilala at Kanokupolu is located at the Ha'atafu beach. Because we were there during the low season, we got carte blanche to setup our antennas; we had only to take care of not to disturb the few other guests. A previous Scottish DXpedition had also used this QTH, and they gave us a lot of useful information. It was possible to set up the antennas at the edge of the beach. The beach itself was impossible because it was also used by other visitors.

### The Biggest Challenge

Our biggest challenge would be the low sunspots. Working Europe from the South Pacific at nearly the bottom of the sunspot cycle would not be easy. Looking at the propagation prediction programs, it appeared that it would be possible to work western Europe only on 20, 30, and 40 meters. But with weak signals. So, the challenge became even bigger. We knew that every additional dB of gain would be very helpful. We decided to make vertical dipole arrays (VDAs)





*Photo E. The completed antenna farm. If you look closely, you'll see (from left) the 17-meter VDA, the 30-meter VDA, the 20-meter VDA and the 80-meter vertical.*

for 17, 20, and 30 meters. Martin — with help from Jan, PA4JJ, and Henk, PA3GCV — built the VDAs and the other wire antennas (*Photo C*). They did a great job.

## Travel to Tonga

It would be a long journey to our destination. The team meeting point would be Doha in Qatar. Tom flew from Edinburgh, Pat from London, and Martin and I from Amsterdam. We left Tuesday 23 November for a 6-hour flight to Doha. Pat joined us one hour after we arrived. We received a message that Tom had a problem. His plane was broken and could not leave Scotland. This would be a challenge to catch his connecting flights. When we boarded our plane to Auckland, New Zealand, we received a message that his delay was five hours and maybe we would meet him in Auckland. For the next 17 hours, it would be quiet without any info from Tom. This is the second longest flight at this moment, and we can say that is long! We arrived in Auckland and heard that Tom would leave Doha in a few hours, so he would arrive only one day later at Tonga. We had 11 hours of layover time in Auckland before our next flight. We put our luggage in a storage room and went by taxi to the city, had a nice short walk and visited the sky-tower to see Auckland from a height of 220 meters (722 feet). After lunch, we went back to the airport for our last part of the trip. The flight from Auckland was only 2-1/2 hours. We arrived at the Tonga airport around 19:30 local time. After collecting our luggage and a nearly 1-hour drive, we arrived at 21:30 at the Heilala resort.

## Antenna Setup

Early the next morning, we started assembling our antennas. We decided to focus on 17, 20, 30, and 40 meters for the first day. We soon noticed that we would have a challenge with the coaxial cables. We brought approximately 500 meters (1,650 feet) of coax with us. From the shack to the beach was roughly 100 meters (330 feet). Around noon, I had to

quit to meet Tom at the airport. He arrived around 13:00. From the airport, we went to the telecommunication office to collect our license (*Photo D*). We had already been in contact a few times with Officer of Telecommunication by email and phone about the license. He had added the possibility of operating on the 60-meter band, and we were very pleased with this addition. For many, or maybe everyone, Tonga would be a new DXCC entity on 60 meters. After leaving the office, we went shopping and back to the resort. Martin and Pat were ready with the 17- and 20-meter VDA; only the 30-meter VDA still had to be erected. We needed four men to



*Photo F. The A35EU 3-station setup. Sometimes, all three were in use at one time. In this photo, Pat, EI5IX, is using all three stations at once on FT8!*

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### Radio Setup:

Radio	Amplifier
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Elecraft K3	THP 1.1
SUNSDR	Homemade 600 watt

Table 1.

### Antennas:

Band	Antenna
160m	Inverted Vee
80m	Vertical + 1 elevated radial on 18m Spiderbeam pole
60m	Inverted Vee
40m	Vertical + 1 elevated radial on 11-meter fiber pole
30m	VDA on 18m Spiderbeam pole 20m VDA on 12 meter fiber pole
17m	VDA on 12 meter fiber pole
10-15m	Multiband vertical + 1 elevated radial per band on 11-meter fiber pole

Table 2.

finish this job. The 40-meter vertical was also ready to use. The next day we would finish the other antennas, a 10/12/15-meter multiband vertical, an 80-meter vertical and a double half delta loop (DHDL) antenna for receive. We were waiting for a local guy who would climb into a 17-meter high palm

tree to place a rope on top of it for the 160-meter vertical. After two days, we decided not to wait any longer and started to throw a rope over a palm tree and do the job ourselves. We chose a palm tree approximately 12 meters high for 160 and another palm tree for 60 meters. A few hours later, both antennas were ready for use. The antenna farm was completed (*Photo E*). Luckily there were not many other guests, so we could use all the space we needed for our antennas.

### Equipment

We had three complete stations operational (*Photo F*), plus one spare radio. Some hours of the day, we operated all three stations simultaneously (see *Tables 1* and *2* for the makeup of each station).

We used bandpass filters between each radio and its associated amplifier. Logging was done with WINtest and WSJT-X. The computers were wirelessly networked. We used the Microkeyer MK2 as the interface between the radio and computer. There was a good internet connection, so we uploaded our log to Clublog every day.

### Operating and Propagation

While all of our operators are mixed mode operators, everyone had his preferred mode. We focused on the main modes of CW, SSB, and RTTY (*Photos G, H and I*). Due to bad propagation, though, most of our QSOs ended up being on CW or FT8. There was a high demand for this mode. Searching the bands, sometimes the only activity we could find was on the FT8 frequencies (we hope this will change quickly). During the morning hours, there was not much propagation at all, so we did some sightseeing and other necessary things like shopping (*Photo J*). When we did get on the air in the



## ANNOUNCEMENTS (from page 2)

**ORANGE, TEXAS** — The Orange Amateur Radio Club, Jefferson County Amateur Radio Club, and Beaumont Amateur Radio Club will hold the **Orange Hamfest 2019** from 7:30 a.m. to 2 p.m., Saturday, February 23 at the Orange County Convention & Expo Center, 11475 FM 1442. Contact: Rocky Wilson, (409) 988-8906. Email: <n5mtx@gmail.com>. Alternate Contact: Chuck Vincent, (409) 540-0477. Email: <batmo@aol.com>. Website: <www.qsl.net/w5nd>. VE exams.

**SOUTH BURLINGTON, VERMONT** — The Radio Amateurs of Northern Vermont will hold **HAM-CON** from 8 a.m. to 2 p.m., Saturday, February 23 at the Holiday Inn Convention Center, 1068 Williston Road. Phone (802) 879-6589 (afternoon and evenings only). Email: <w1sj@arrl.net>. Website: <www.ranv.org>. Talk-in 145.15-. VE exams, commercial FCC exams, DXCC / WAS / VUCC card checking, special event station W1V.

**SOUTH PARK TOWNSHIP, PENNSYLVANIA** — The Wireless Association of South Hills Amateur Radio Club will hold **WASHfest 2019** from 8 a.m. to 3 p.m., Sunday, February 24 at the Home Economics Building, South Park, 3735 Buffalo Drive. Contact: Carol Danko, KB3GMN, (412) 884-1466. Email: <n3sbf@comcast.net> or <washarc@yahoo.com>. Website: <www.n3sh.org>. Talk-in 146.955- or 443.650+ (PL 131.8).

## MARCH

**CAVE CITY, KENTUCKY** — The Mammoth Cave Amateur Radio Club will hold the **43rd Annual Cave City Hamfest** beginning 7:30 a.m., Saturday, March 2 at the Cave City Convention Center, 502 Mammoth Cave Street. Contact: Larry Brumett, KN4IV, 108 Withers Street, Glasgow, KY 42141. Phone: (270) 651-2363. Email: <lbrumett@glasgow-ky.com>. Talk-in 146.34+. VE exams.

**ELRYIA, OHIO** — The Northern Ohio Amateur Radio Society will hold the **NOARS Winter Hamfest** from 8 a.m. to noon, Sunday, March 3 at the 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: <winterhamfest@noars.et>. Website: <www.noars.net>. Talk-in 146.70 (PL 110.9).

**IRVING, TEXAS** — The Irving Amateur Radio Club will hold its **Hamfest** from 8 a.m. to 1 p.m., Saturday, March 2 at the Betcha Bingo Hall, 2420 W. Irving Boulevard. Contact: Ken Hanson, N2VIP, (609) 510-3068. Email: <ken@n2vip.org>. Website: <http://irvingarc.org>. Talk-in 146.720 (PL 110.9). VE exams.

**RUSSELLVILLE, ARKANSAS** — The Arkansas River Valley Amateur Radio Foundation will hold the **Russellville Hamfest** beginning 9 a.m., Saturday, March 2 at the L.V. Williamson Boys & Girls Club of the Arkansas River Valley, 600 East 16th Street. Email: <russellvillehamfest@gmail.com>. Website: <http://sites.google.com/view/arvarf>. VE exams.

**CONCORD, NORTH CAROLINA** — The Mecklenburg Amateur Radio Society will hold the **Charlotte Hamfest and 2019 ARRL North Carolina Section Convention** from 3-7 p.m., Friday, March 8 and from 8:30 a.m. to 4 p.m., Saturday, March 9 at the Cabarrus Arena & Events Center, 4551 Airport Road. Phone: (704) 948-7373. Website: <www.charlottehamfest.org>. Talk-in 146.655 or 146.940 (PL 118.8). VE exams, card checking.

**BRAZIL, INDIANA** — The Wabash Valley Amateur Radio Association will hold its **2019 Hamfest & Computer Expo** from 8 a.m. to noon, Saturday, March 9 at the Clay County 4-H Fairgrounds, 6550 North State Road 59. Email: <hamfest@w9uuu.org>. Website: <http://w9uuu.org>. Talk-in 146.685 (PL 151.4).

**EAU CLAIRE, WISCONSIN** — The Eau Claire Amateur Radio Club will hold its **32nd Annual Amateur Equipment Auction** from 8 a.m. to 2 p.m., Saturday, March 9 at the Saving Grace Lutheran Church, 2124 East Ridge Center. Website: <www.ecarc.org>.

**LINCOLN, NEBRASKA** — The Lincoln Amateur Radio Club will hold the **Lincoln Hamfest and 2019 ARRL Nebraska State Convention** from 8 a.m. to 3 p.m., Saturday, March 9 at the Lancaster Event Center, 4100 North 84th Street. Website: <www.lincolnhamfest.org>. Talk-in 146.76-. VE exams.

**PUYALLUP, WASHINGTON** — The Mike & Key Amateur Radio Club will hold the **38th Annual Mike and Key ARC Electronics Show & Swap Meet** beginning 9 a.m., Saturday, March 9 at the Puyallup Fair & Events Center-Pavilion Exhibition Hall, 110 9th Avenue SW. Contact: Diane Dinkelman, N7WA, (253) 631-3756. Email: <ddmdink@gmail.com> or <n7wa@arrl.net>. Talk-in 146.82- (PL 103.5). VE exams.

(Continued on page 36)

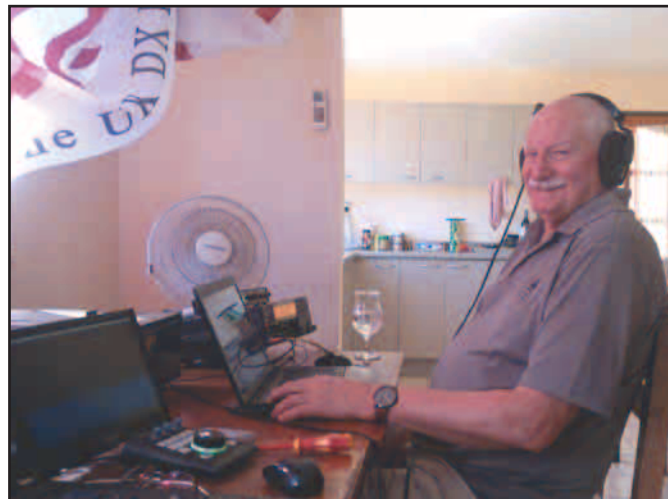


Photo G. Tom, GM4FDM, operating CW.

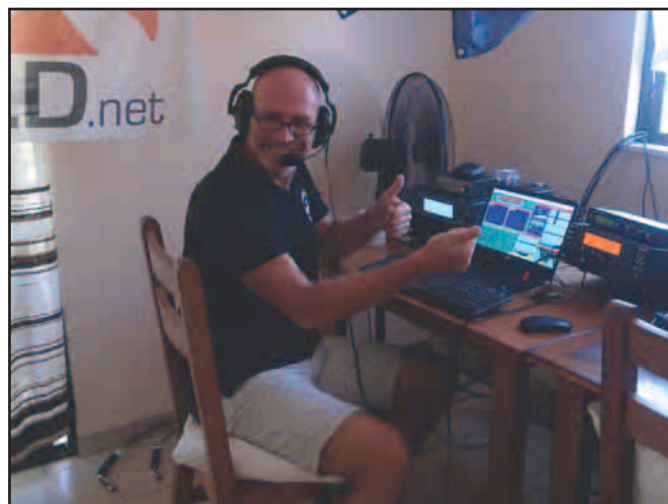


Photo H. Martin, PA4WM, enjoying working a pileup on single sideband.

morning, we used mainly 17 and 20 meters. Around noon, 15 meters was sometimes open for a few hours, mainly to Japan and some parts of North America. The 12-meter band was open only to Japan. For Europe, 17 and 20 were the best bands. Overall, 20 was the best band for all continents; 30, 40, and 80 meters were also good, but quite difficult for reaching Western Europe. On the third day, we moved the 40-meter vertical closer to the beach. The noise on 40 was high. After we moved the antenna, the noise level was reduced by at least 6 dB. We had no coax cable left, so we had to combine the 17- and 40-meter feeds. It seems that everything between 350° and 10° (our path to Western Europe) was extremely difficult. That is why there are only a few F, DL, ON, PA, G, and GM calls in the log. The propagation stopped around Poland and didn't move further to the west. On 60 meters, we had a tremendous S9+ QRM, something generated in our resort. We changed the antenna polarization from vertical to horizontal, but that didn't help. The next day, we moved the dipole 50 meters farther away from the buildings, but the QRM was still the same. We would have had many more QSOs in the log without this noise. FT8 was doing a good job getting the weak signals out of the QRM. The last morning, the QRM was at a minimum and we logged

many Western Europeans on 60 meters. Our DHDL receiving antenna was not performing well. We tried it the first day, but without success on all the low bands. Propagation on 160 was terrible. We were forced to use an inverted-V instead of an inverted-L. The noise on this band was S9, very difficult to copy anything. On the DHDL antenna the signals were not readable at all. I also tried listening on the 80-meter vertical, but still had a very high noise level.

So we were forced to use FT8 on this band as well. We didn't make many QSOs on 160 meters. In total, we made a little bit more than 17,098 QSOs, of which 7,240 were unique calls. We expected a little bit more, but the circumstances did not allow much more.

During our last weekend on Tonga, we participated in the CQ World Wide DX CW Contest. Participating in a contest from the Pacific is completely different than contesting from Europe. It was a



Photo I. Ronald, PA3EWP, operating RTTY.



Photo J. When the bands were dead, group members did some sightseeing (by bike) and shopping, such as at this local market.

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nice experience and we learned a lot from it. We made a total of 1,700 QSOs in the contest. Without the contest, we would have made more QSOs in the same amount of time. It was difficult to find a clear frequency and, after that, to keep your frequency. A lot of times we were covered by the NA and EU mesh.

## Last Day

We had to pay a lot of overweight baggage fees coming to Tonga. We didn't want to pay it again on the way back. The price of the overweight was more than the new value of the mast and coaxial cable. We decided to find another way to send the fiber mast and coax back home; the alternative was to leave it on Tonga and buy new ones at home. But why not send it to Tarawa for my next DXpedition to Kanton, T31EU? After a few telephone calls, we made the decision to send it to Tarawa, which was much cheaper than sending it back home and taking it with us to Kanton in February.

The last morning, we packed the ski bag (35 kilograms – *Photo K*) and brought it to Fiji airways for transport via Fiji to Tarawa. Chuck, our contact person on Tarawa, would take care of the final handling of the ski bag. We had another quick visit to town before we went back by bus to the resort. The last stuff was packed and, at the end of the afternoon, we were ready to leave for the airport. After arriving in Auckland, we went to a hotel for a few hours of sleep. At 9 a.m., we went by taxi to the city center for breakfast. Afterward, we walked around a little bit and went back to the airport. The flight from Auckland to Doha was 17-1/2 hours, and very

bumpy. Arriving at Doha airport, we had an 8-hour layover until our departure back home. We went to a lounge to relax, had a nice shower and breakfast. After a few hours, the team separated as Pat went back to London, Tom returned to Edinburgh, and Martin and I flew to Amsterdam. Six hours later, we were back in the Netherlands after traveling for two days.

## QSL

Tom, GM4FDM, is our QSL manager. All QSLs will be answered by the bureau, OQRS, and direct. In addition, a short time after our DXpedition the logs were uploaded to LoTW.

Many thanks for the support from the following DX clubs: OHDXF Finland, SDXF Swiss DX Foundation, EU DXF European DX Foundation, LYNX DX Group, Clipperton DX Club, BARTG, LADYG - LA DX Group Norway, FEDXP Far East DXploiters, EIDX group, GPDY Portuguese DX group, CDXC - The UK DX Foundation, The East Tennessee DX Association, Lone Star DX Association, Mediterraneo DX Club, German DX Foundation, GMDX Group, and the Radio Society of Great Britain. Thanks also to the many individual sponsors, especially Alex, PA1AW, for his support and maintaining the website. For more information and photos, see our website at <<http://tonga.ildxt.eu>> and Clublog for more statistics.



*Photo K. Rather than pay excess baggage fees two more times, the group packed up the fiberglass antenna masts, and coaxial cable in a ski bag and shipped it to Tarawa for PA3EWP's next Pacific adventure — to Kanton (T31EU) — scheduled for this month.*

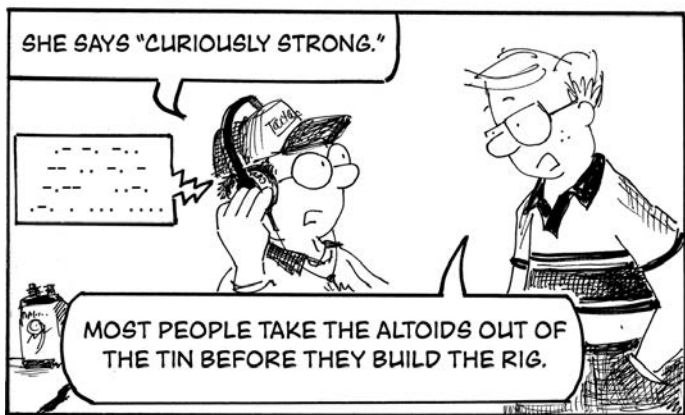
## SPURIOUS SIGNALS

By Jason Togyer W3MCK

[spuriouscomic.blogspot.com](http://spuriouscomic.blogspot.com)



© 2019 Jason Togyer W3MCK [jtogyer@gmail.com](mailto:jtogyer@gmail.com) CQ Magazine



*Portable operating seems to go hand-in-hand with QRP, since many low-power rigs are lightweight and battery-powered. One challenge can be finding a way to support a temporary antenna, especially if you're in an area without trees or other natural supports. QRP Editor KA8SMA checks out one solution to this problem — a lightweight but sturdy collapsible mast from SOTABEAMS.*

## **CQ Reviews:**

# SOTABEAMS Tactical 7000hds Portable Antenna Mast

**BY R. SCOTT ROUGHT,\* KA8SMA**

**R**ecently, I had the opportunity to try the SOTABEAMS Tactical 7000hds, a fully collapsible, portable antenna mast designed for the ham on the go. As a ham who enjoys portable operation, a mast or other support structure is necessary for the successful deployment of a wire antenna when in the field, especially if operating in an area void of trees and other supports. I put the Tactical 7000hds through the rigors of portable operation and used it as my primary support during several portable operations last fall. I deployed the mast under windy conditions, during periods of light rain, and at times when there was a flake or two of snow in the air. Each adventure was different, and for good reason, as I wanted to see how the mast performed under a variety of conditions.

### **About SOTABEAMS**

If you are not familiar with SOTABEAMS, it is a company based in the United Kingdom that offers a variety of products designed specifically for amateur radio. After reading the SOTABEAMS website, I learned that the company's CEO, Richard Newstead, G3CWI, has a genuine passion for portable operation and understands that the right accessories and equipment are imperative for successful field operations, especially when



*Photo A. The SOTABEAMS Tactical 7000hds portable antenna mast.*

venturing into the wilderness. G3CWI is also the co-founder of the well-known Summits on the Air (SOTA) program, which has been incorporated into his company's name.

SOTABEAMS offers a line of telescopic masts, multi-band dipole and end-fed antennas, radio accessories (audio filters, DC power and RF cables), and more. The most unique item offered by SOTABEAMS may be the SOTAKite, a kite designed to lift wire antennas in wind speeds between 5 and 18 miles per hour.

The entire line of products offered by SOTABEAMS can be purchased via their website and shipped directly to you from their facility in the United Kingdom, or purchased in the U.S. from DX

Engineering, SOTABEAMS' stateside partner / overseas agent that stocks most of their product line, including the Tactical 7000hds.

### **The Tactical 7000hds**

The Tactical 7000hds is a heavy-duty telescopic mast that extends to 23 feet and collapses to 23 inches for easy transport into the field. The letters hds in the product's name stand for "heavy duty short," as this mast was designed to be more rugged than other masts available in the marketplace, yet short enough for ease of portability. Its compact size makes slipping this mast into a backpack, go-bag or similar carry bag a cinch. It can also be placed diagonally in a travel-sized carry-on suitcase for

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\* CQ QRP Editor  
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ka8sma@cq-amateur-radio.com





*Photo B. Extending and locking pole sections.*

air travel. The mast is constructed of 14 fiberglass pole sections that collapse inside each other for easy deployment and takedown. Each pole friction-locks firmly in place by twisting it during deployment. Twisting each pole in the opposite direction allows each section to collapse inside one another during takedown. The mast is nonconductive and is made from heavy glass-fiber composite (fiberglass) that provides strength and balance. For those who desire a low profile when operating portable, the mast is military olive in

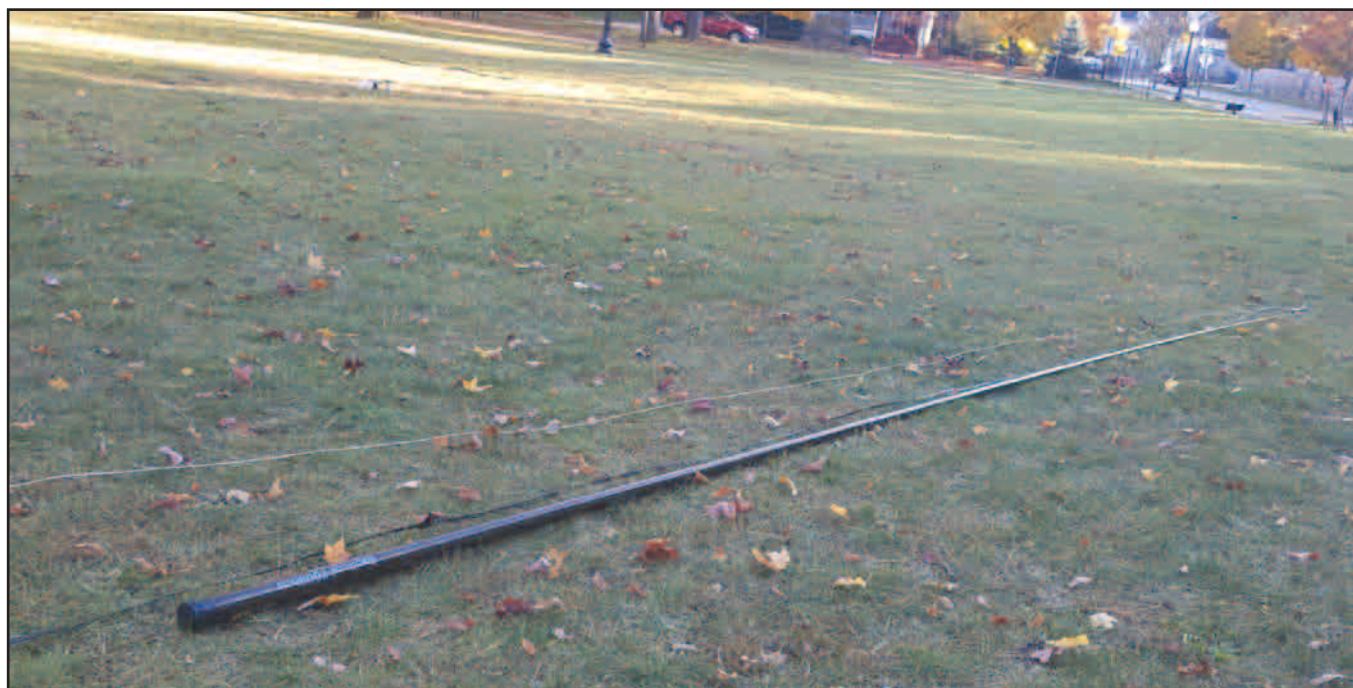
color and comes with a camouflage carry bag.

The mast weighs 3.64 pounds and its 14 pole sections range in diameter from 2.05 inches (base) to 0.16 inches (top). The bottom base has a screw cap that measures 2.4 inches in diameter and supports a rubber shock absorber that helps prevent the poles from cracking or breaking when collapsing the mast. In the event a pole needs to be repaired or replaced, the bottom cap can be unscrewed allowing the sections to be removed. In the unlikely event replace-

ment parts may be necessary, SOTABEAMS offers these for purchase on its website.

## **Performance in the Field**

The Tactical 7000hds arrived at my doorstep from the United Kingdom packed firmly in a heavy cardboard cylinder. An instruction sheet was packed with the mast. Although the mast comes ready for deployment, I perused the instructions and went online to YouTube to watch a short video made by SOTABEAMS about the Tactical 7000hds and a second SOTABEAMS video showing their method for erecting a collapsible mast in the field. Since the Tactical 7000hds does not come with a guy kit, I was concerned about how the mast would stay upright since it is not designed to be driven into the subsurface, but instead the base of the mast stands freely on the ground. After watching the video, I learned that only three supports (guy lines) are necessary to keep the mast upright. If I used a dipole antenna in an inverted-V configuration only one additional support line (comprised of masonry cord or light rope) would be necessary since the dipole's legs would serve as two of the three support (guy) lines. I was happy when I learned this information since the inverted-V is my favorite antenna for portable operation. There are several tips in the SOTABEAMS videos that beginners and more experienced users of collapsible



*Photo C. Ready to be put into position.*



*Photo D. Up and supporting an inverted-V dipole.*

masts may find helpful. These videos can be seen online by searching for “Tactical 7000hds Heavy Duty Antenna Mast” and “Erecting a SOTABEAMS HF Dipole” on YouTube.

It is important to note the if the mast will be used to support an end fed antenna, three guy lines will be necessary. I used masonry cord as guys to support the mast when using it with this type of antenna. SOTABEAMS offers a variety of mast guying kits and other products to support the mast, including drive-on car stands and suction cup mounts for securing it to the side of a motorhome or RV.

### **A Walk in the Park**

My first outing with the Tactical 7000hds was at a local park. I followed the guidance provided in the SOTABEAMS YouTube videos for deploying the mast and, within minutes, it was freestanding and supporting a 20-meter inverted-V dipole. The only items needed in addition to the mast were my dipole, masonry cord, and three ground stakes for securing support lines. The dipole I used was constructed of 22-gauge stranded wire with 300-ohm twin lead for the feedline (same antenna setup I use for portable operations). I then tried to support an end-fed wire with the mast. I used masonry cord to support the mast (three guy lines). After the mast was standing, I tugged and pulled on the end-fed wire that I had attached near the top of the mast to check stability.

Surprisingly the mast stayed erect with no swaying. Even Mother Nature with her gusty winds could not topple it. I found the top of the mast flexed nicely with no indication it would fall over as I tugged and pulled on the end-fed wire. Closer inspection after collapsing the mast confirmed that there was no damage or stress to the smaller diameter poles near the top after I had tugged hard on the antenna.

After deploying and collapsing the mast a few times, I was able to set up the mast and antenna (whether using the Inverted V or end-fed antenna) in about three minutes. Takedown (collapsing the mast and rolling up the antenna) took about the same amount of time.

### **Likes and Dislikes**

The small size of this mast when collapsed is truly amazing. After multiple uses, I still find it difficult to believe that SOTABEAMS packed the strength and durability of this mast in such a small package. In the past, I have homebrewed by own masts for use in the field and the finished products are several feet in length, heavy, and not nearly as robust as the Tactical 7000hds. Since discovering the Tactical 7000hds, I have retired my other homebrew masts and made a permanent home in my backpack for this little gem.

One item that I believe should be included with the mast is a ring or insulator that slips over the top pole to attach the antenna. I attached the antenna to the mast by wrapping several turns of masonry cord approximately one foot below the top of the mast and securing the cord to the pole with electrical tape. I then tied the masonry cord to my antenna wire. It was not until later that I discovered SOTABEAMS offers a laser-cut insulator (Versatile Top Antenna Insulator) that is designed to slide over the top pole for securing a wire antenna. The insulators are sold in packs of five and are relatively inexpensive. I would like it if SOTABEAMS included one of their Versatile Top Antenna Insulators with each mast sold as this is an item that many hams may overlook until they are in the field and have no way to attach their antenna to the pole. Although my masonry line idea works for attaching the antenna to the mast, I believe the insulators will do a much better job in securing this connection.

Lastly, I found the pole sections to be slippery which made it difficult (for me) to twist each section when locking them into place. I need to point out that this is not a dislike, but rather an observation. The second time I took the mast into the field I packed a pair of latex gloves (the same type of gloves you can purchase at home improvement and hardware stores for pennies on the dollar) in my backpack. The latex gloves provided me with all the grip necessary to twist the poles together.

### **Final Comments**

The Tactical 7000hds hits the mark for a portable, telescoping mast and has the strength necessary to support a variety of wire antennas. I can report the poles easily collapsed and pulled out during cold, wet, and hot conditions (temperatures ranging from 30° to 85° Fahrenheit) and I never had any issue in erecting or collapsing the mast. Whether you are a serious portable operator or get into the field only once or twice a year, you owe it to yourself to add the Tactical 7000hds to your portable setup. The Tactical 7000hds retails for \$74 U.S. (plus international shipping) direct from SOTABEAMS or \$105.99 via DX Engineering. Additional information and product ordering is available via the SOTABEAMS website <[www.SOTABEAMS.co.uk](http://www.SOTABEAMS.co.uk)> or via DX Engineering at <[www.dxengineering.com](http://www.dxengineering.com)> or you can call (800) 777-0703.



*If you think DXing with low power is a challenge, try adding in operating mobile-only and CW-only! Here's NJ3K's story of how he worked 100 countries doing just that.*

## How I Worked 100 DX Entities QRP, CW Mobile

**BY BRUCE A. MANNING,\* NJ3K**

**S**everal years ago, I had a mobile CW station in one of my pickup trucks, consisting of my Kenwood TS-440AT and Hustler antenna. With that, I was able to work mobile CW. But the 440 was the only HF radio I had, so it did double duty as my home station as well. That proved to be inconvenient, to say the least. So ... move ahead to the present and I now have two Elecraft K3s, one as my home station rig and the other for operating away from home.

The KX3 is a great little radio. I have used it for portable operations from the Grand Canyon in Arizona to the Black Forest in Germany. My job required me to travel around the state of Pennsylvania and the KX3 made many trips with me to motels and fields and parks. I have always wanted to set up the radio in the car and see how it worked as a mobile rig (*Photos A and B*). I thought with 5 watts and a mobile antenna, it probably wouldn't work too well, especially since any mobile antennas is a poor compromise at best.

At the Dayton Hamvention® in 2017, I purchased some parts. I picked up a Wolf River Silver Bullet coil, a 53-inch stinger for the top of the coil, and a Lido cup-holder mount. I had a 2-inch receiver on my 2013 Ford Escape, so I got a piece of flat steel and bent it 90° to attach the antenna (*Photo C*). Using a mirror mount, I put the antenna together. But I did not put the coil at the bottom; rather, I put it above a Hustler 54-inch mast. There are two reasons for this design.

1) A coil in the middle of a vertical antenna improves the radiation resistance and, with 5 watts, I needed all the help I could get. I did the math on the improvement of radiation resistance and it makes a 65.13% improvement on 20 meters. With the coil at the bottom on 20 meters radiation resistance is at 7.6 Ohms, while a coil in the middle radiation resistance is at 12.55 Ohms. Still very poor but better.

2) The second reason for the design change came from the ease of adjusting the Wolf River coil if I could stand up instead of having to bend over. My 67-year-old back likes that part. I know that the car's body and other metal parts were acting as the other half of the antenna and I thought I should bond all the metal parts together, but first I wanted to see just how it worked without all this extra work.

To set the tap on the coil to the correct position I have a piece of wood, about the size of a ruler. I put marks on it for



*Photo A. The author in his car, operating CQ QRP. (Photos courtesy of the author)*

the proper position for the different bands (*Photo D*). Using it, I can quickly set the tap and then use the internal tuner in the KX3 for final adjustment. I also installed a Hustler Quick Connect mount to facilitate removal of the antenna when needed, like when taking the car to the service shop, etc. I did have to tie a small piece of rope around the bottom of the coil and attach it to the roof rack on the car to keep it from swinging too much.

### On The Air

I set out to see just how well this would work. I was not expecting too much. But to my surprise, it worked pretty well. I was able to work several stations in the U.S and Canada and even some DX. After a while, I had worked enough DX in Europe and the Caribbean that I thought maybe I could work DXCC with this setup. A quick check of the map showed me there were plenty of DX entities in those two parts of the world

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\* 784 Pine Grove Road  
Port Allegany, PA 16743  
email: <bmanning@zitomedia.net>



Photo B. Interior of NJ3K's mobile station, built around his Elecraft KX-3 transceiver.

to accomplish this goal. I finished the installation in early June 2017 and by late October, I had 17 countries worked. After the CQ World Wide CW DX Contest, I had 48 countries worked. Almost halfway there. I will admit it was tough going to pick up new ones during a big DX CW contest. I spent a lot of time hoping conditions would improve and the pileups would decrease. By the end of the ARRL DX CW contest, I was at 56 countries worked. The CQ WPX contest put me at 93 and now the goal was in sight.

One of the contacts in the CQ WPX contest was with Xenia, ZL4YL, 8,630 miles from my driveway to her QTH (shown in the January 2019 page of the 2019-2020 CQ calendar – ed.). I'll admit she did the heavy lifting on this one with her towers and stacked Yagis. By vacation time, I was sitting at 95 countries. We took a long vacation to Europe to visit our son and his family. The KX3 went with me and saw duty in Normandy and near Colmar, France; also at my son's house in Ghent, Belgium and the Black Forest in Germany. Upon my return home, I continued the quest. By September 28, I was at 99. Finally, on October 16, I worked MWØEDX for number 100. This accomplishment was recognized by the North American QRP CW Club (NAQCC) with its Simple Wire Antenna DXCC certificate #1 for mobile QRP! (Photo E)

### Lessons Learned

I spent many cold and hot hours setting in the car listening to a new country call CQ and working the pile up, only to have the station go QRT when they heard no one calling



Photo C. NJ3K's mobile vertical antenna, mounted on his Ford Escape.



Photo D. Taps on the coil are easily changed with this handy guide, marked off at the proper tap point for each band.



**TULLAHOMA, TENNESSEE** — The Middle Tennessee Amateur Radio Society will hold the **MTARS Tullahoma Hamfest** from 8 a.m. to 2 p.m., Saturday, March 9 at the First United Methodist Church, 208 West Lauderdale Street. Contact: Larry Cagle, K4WLO, 100 Urban Farms Road, Manchester, TN 37355. Phone: (251) 680-3520. Email: <k4wlo@arrl.net>. Website: <www.qsl.net/mtars>. VE exams.

**KALAMAZOO TOWNSHIP, MICHIGAN** — The Southern Michigan Amateur Radio Society will hold the **Michigan Crossroads Hamfest & Radio Swap** from 8 a.m. to noon, Saturday, March 16 at Wings Event Center, 3600 Vanrick Drive. Contact: SMARS, P.O. Box 934, Battle Creek, MI 49016. Phone: (269) 815-8007. Email: <crossroadshamfest@w8df.com>. Website: <www.w8df.com>. Talk-in 147.00+ (PL 94.8). VE exams.

**MIDLAND, TEXAS** — The Midland Amateur Radio Club will hold the **64th Annual St. Patrick's Day Hamfest and 2019 ARRL West Texas Section Convention** from 8 a.m. to 2 p.m., Saturday, March 16 at the Martin Luther King Community Center, 2300 Butternut Lane. Website: <https://hamfest.w5ggg.org>. VE exams.

**STUART, FLORIDA** — The Martin County Amateur Radio Association will hold the **44th Annual Stuart Hamfest** beginning 8 a.m., Saturday, March 16 at the Martin County Fairgrounds, 2616 SE Dixie Highway (A1A). Contact: MCARA Hamfest Chairman, P.O. Box 1901, Stuart, FL 34995. Phone: (561) 309-8138. Email: <hamfest@mcaraweb.com>. Website: <www.stuarthamfest.com>. Talk-in 147.060+. VE exams.

**JEFFERSON, WISCONSIN** — The Tri County Amateur Radio Club will hold **Hamfest2019** beginning 8 a.m., Sunday, March 17 at the Jefferson County Fairgrounds Activity Center, 503 North Jackson Avenue. Contact: Johnny, KD9JQC, (920) 723-7439. Email: <hamfest@w9mqb.org>. Talk-in 145.49 (PL 123). VE exams.

**PERRYSBURG, OHIO** — The Toledo Mobile Radio Association will hold the **TMRA Hamfest** from 8 a.m. to 2 p.m., Sunday, March 17 at the Owens Community College-Student Health and Activity Center, 30335 Oregon Road. Website: <www.tmrhamradio.org>.

**BUFFALO, MINNESOTA** — The Maple Grove Radio Club will hold its **Midwinter Madness Hamfest** from 8 a.m. to 1 p.m., Saturday, March 23 at the Buffalo Civic Center, 1306 County Road 134. Email: <swap@k0ltc.org>. Website: <http://k0ltc.org>. Talk-in 147.000+ (PL 114.8). VE exams.

**CHARLESTON, WEST VIRGINIA** — The 35th Annual Charleston Area Hamfest and 2019 ARRL West Virginia Section Convention will be held from 9 a.m. to 2 p.m., Saturday, March 23 at the Charleston Coliseum & Convention Center, 200 Civic Center Drive. Contact: Rick Cummings, WV8RC, (304) 610-6404. Email: <rickwv8rc@gmail.com>. Talk-in 145.35 (PL 91.5). VE exams, DXCC / WAS / VUCC and CQDX card checking.

**GODFREY, ILLINOIS** — The Lewis & Clark Radio Club will hold its **2019 Hamfest** from 7 a.m. to noon, Saturday, March 23 at the Lewis & Clark Community College-The Commons, 5800 Godfrey Road. Email: <hamfest@k9ham.org>. Website: <https://k9ham.org>. Talk-in 145.230- (PL 79.7). VE exams.

**MT. VERNON, MISSOURI** — The Ozarks Amateur Radio Society will hold its **2019 Hamfest** from 8 a.m. to 1 p.m., Saturday, March 23 at the Mt. Vernon Arts and Recreation Center, 822 W. Mt. Vernon Boulevard. Contact: Bob Myer, KA0RM, 704 Windsor Avenue, Aurora, MO 65605. Website: <http://w0oar.com>. Talk-in 146.970- (PL 162.2).

**ANNANDALE, VIRGINIA** — The Vienna Wireless Society will hold its **Winterfest** from 6 a.m. to 1 p.m., Sunday, March 24 at the Northern Virginia Community College Annandale Campus-Richard J. Ernst Cultural Center, 8333 Little River Turnpike. Contact: Doug, AK4AO, (703) 698-6158. Website: <www.viennawireless.net>. Talk-in 146.910. VE exams, WAS / DXCC / VUCC card checking.

**SEVIERVILLE, TENNESSEE** — The Sevier County Amateur Radio Society will hold the **2019 Sevier County Hamfest and 2019 ARRL Delta Section Convention** from 8 a.m. to 3 p.m., Saturday, March 30 at the Sevier County Fairgrounds, 754 Old Knoxville Highway. Email: <hamfest@seviercountyars.org>. Website: <http://seviercountyars.org>. VE exams, card checking.

## APRIL

**FORT SMITH, ARKANSAS** — The Fort Smith Area Amateur Radio Club will hold the **Hanging Judge Hamfest** from 8 a.m. to 2 p.m., Saturday, April 6 at the Sebastian County Emergency Communications and Training Facility, 8400 South Zero Street. Contact: Mike Cole, W5TMC, (918) 427-1431 or (479) 522-3683. Email: <mikew5tmc@gmail.com>. Website: <www.hangingjudgehamfest.com>. VE exams.



Photo E. The North American QRP CW Club recognized NJ3K for working 100 countries on CW while operating QRP mobile with its Simple Wire Antenna DXCC Award #1 for the category.

them. I was there, but they could not hear me. I learned a lot about patience and propagation. Several times I could just barely hear the DX station calling, but after an hour or so things improved enough that I could work them. I had a rule of thumb that worked most of the time: If their signal level was an S-5, they stood a pretty good chance of hearing my 5 watts; after all, one S-unit is 6 dB. The difference between a 100-watt signal and a 5-watt signal is -13 dB, a little over 2 S-units. So if they were running 100 watts and had an S-5 signal, I should be about an S-3 on their end. But if they were transmitting 1,500 watts, that is almost -25dB, which works out to a 4 S-unit change. So if they were at S-5, I would only be at S-1. Big difference. I will admit some of the DX definitely could hear me better than others. Several times, they were barely moving the S-meter and I would have to call multiple times at a slow WPM rate and they could pull my signal out of the noise.

As for propagation, it seems that a 4,000-mile distance was quite the norm. I have done this many times with my portable operations and just a 25-foot wire tossed up in a tree and another 25 feet lying on the ground. I have worked to and from Europe several times with this setup and 5 watts of CW.

Some of the notable contacts were: 2-18-18, Z60A on 20 meters; 3-22-18, 3CØW on 17 meters; 11-25-17, TO2SP on 20 meters; 4-9-18, PJ5/Al5P on 30 meters; 2-18-18, VP2MSS on 15 meters, and 5-26-18, ZL4YL on 20 for the greatest distance. Band breakdown: 20, of course, is the workhorse with 72 QSOs; next was 15 meters with 12, then 40 meters with 9, 17 meters had 4, and 30 meters had 3 QSOs.

What does all this mean? Well, a couple of things. First, you can work DX with less, way less, power than an optimum station. Next, there is hope for those in areas where even a simple dipole antenna is frowned upon. QRP *does*, in fact work. We have all heard this and there is a lot of proof it does. Finally, it was fun — frustrating at times — but a lot of fun overall. Throwing on a jacket and slipping on my shoes to run out to the car in the winter, freezing while trying to work a new contact, might seem a bit extreme, but it's the price we pay.



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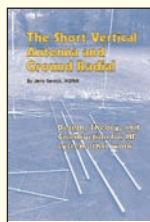
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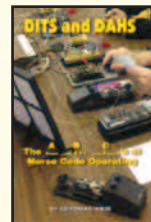
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*It was the cruise of a lifetime ... but not to some exotic destination. Eleven days at sea with his son's scout troop, and QRP ham radio came along for the trip.*

## QRP on the Cruise of a Lifetime

**BY FRANK KROZEL,\* K9GH**

**B**ack in 2004, I had the opportunity to take a sailing trip of a lifetime with my son, Brandon, KC9DNH, on a Boy Scout event off the Florida Keys. The captain basically loaned his boat — named the “Soggy Paws” (*Photo A*), to the Boy Scouts of America and the scouts were taught many things from basic boating to chart reading and everything they needed to “stay alive” for a while on the water (*Photo B*). We did 11 days I believe on the water, moored every night where the boys wanted to be.

In preparation for the trip I packed everything I thought I would need — including my FT-817. When we arrived for the sail, the captain told us each we could fill only one bag, which he supplied. The bags were only 8 x 15 inches, so there wasn't too much space in it for clothing but YES, I could operate. As any good ham would do, I left much of my needed clothing back at port ... but not my ham gear. That went in the bag.

I was one of the parents so we had



*Photo A. The “Soggy Paws” in port during our 2004 scout cruise. Note the boys’ sleeping bags on the deck. The parents who came along got to sleep inside. (Photos courtesy of the author)*

sleeping accommodations inside the boat (the boys slept on the deck), and when shown my sleeping arrangements, I found I was sleeping next to a Kenwood TS-50. This was used by the ship's owner for communications as well as Winlink. But we did not use it for any communications. I was able to

make several contacts with my 817 (*Photo C*), including some folks nearby in the Caribbean as well as a few hams (with beams) back in 9-land.

It's been 15 years since that trip, and Brandon is all grown up, but I will never forget our QRP boating adventure in the Caribbean.



*Photo B. The author's son, Brandon, KC9DNH, at the helm, Brandon is now grown up but not far from his scouting experiences ... he's a camp director for the YMCA in Chicago.*



*Photo C. The author at the microphone of his FT-817, working QRP from the Caribbean.*

\* <kg9hfrank@gmail.com>

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Working with low-power gear often requires the measurement of very low current levels. K2AOP's meter circuit allows you to accurately measure currents in the picoamp range! If you don't have a calculator handy, that's one-millionth of a microamp, which itself is one-millionth of an ampere. Bonus: John's meter also lets you measure extremely high resistance levels.

## An Ideal Low Current and Ultra High Resistance Meter

BY JOHN CLARK,\* K2AOP

This circuit was first built around 1971 to measure leakage current of the newly available CMOS integrated circuits. Over the years, it has been improved as better operational amplifiers (op-amps) and higher value resistors have become available. This version incorporates Analog Devices' zero-drift 130-dB gain ADA4638 op-amp and Ohmite's ultra high value precision resistors.

This amazing but simple current measuring circuit provides the following features:

1. It measures current with less than 10  $\mu\text{V}$  across its input terminals.
2. It delivers 10 volts output for full-scale ranges of 10 pA to 10 mA.
3. It is undamaged by a continuous overload of 1-amp or short 10-amp peak.
4. It provides high precision, limited only by range resistor tolerance and the display DVM accuracy.
5. It makes possible the accurate measurement of ultra-high resistance.

### Circuit Description

This current measuring circuit (Figure 1) has its current-sense resistors inside a feedback loop but the measured current level does not change as it flows through the loop. When the loop is balanced, there is less than 10 microvolts across the meter input terminals and op-amp inputs while voltage across the feedback/current sense resistor is exactly  $I$  times  $R$ .

The ADA4638 uses high gain and negative feedback to accomplish this by providing the power to make the voltage across the resistor  $I$  times  $R$  while adjusting the voltage at the end of the resistor so that the inverting input voltage is within 10  $\mu\text{V}$  of circuit ground. During an on-scale current measurement, the usual voltage drop across a current-sense resistor is effectively canceled by this circuit.

The complete current path is: +input, resistor, ADA4638, power supply, PS return, input return.

\* 6226 E. Carolina Dr.  
Scottsdale, AZ 85254-1930  
email: <K2AOP.7@gmail.com>



Photo A. Front view of K2AOP's finished picoammeter. Note the different ranges for measuring current levels from 10 milliamps to 10 picoamps.

All input current flows through the current sense/feedback resistor because the protection diodes don't conduct with 10  $\mu\text{V}$  and ADA4638 bias current is canceled by current from the zero adjust circuitry.

Inserting some values to establish the potential accuracy: If input current is exactly 10 mA and the resistor is exactly 1K, the voltage across the 1K will be exactly -10 volts. To use this result, voltage must be measured across the resistor to circuit ground. Unfortunately, when that measurement is made, the 10- $\mu\text{V}$  maximum terminal voltage adds error. When the error is added to the exact -10 volts, we have -10 volts  $\pm 10 \mu\text{V}$  or -10V  $\pm 1\text{PPM}$  or -10 volts  $\pm 0.0001\%$ , which applies from 10 pA to 10 mA when using the ADA4638.

### Construction Notes

The PC board mask and parts layout diagrams are in Figures 2, 3, and 4. Component information is in Table 1. A packaged, complete working pA meter, Photos A and B, is shown





Table 1. Parts List

P/N	QNT	VALUE	TOL %	WATTS	VEND	P/N#	mfg	PKG
C1	1	0.1MFD	200V	PP	DIGI	338-3417-ND	cd	RADIAL
C2	1	10PF	200V	NPO	DIGI	478-5200-1-ND	avx	AXIAL
C3	1	1500PF	50	NPO	DIGI	478-7672-ND	avx	RADIAL
C4, 5	2	1200PF	50	NPO	DIGI	490-8641-ND	murata	"
C6	1	680PF	50	NPO	DIGI	490-9041-1-ND	"	"
C7	1	560PF	50	NPO	DIGI	490-8703-ND	"	"
C8	1	470PF		NPO	DIGI	478-4841-1-ND	avx	AXIAL
C9	1	330PF		NPO	DIGI	399-4468-1-ND	kem	AXIAL
C10	1	150PF		NPO	DIGI	399-4456-1-ND	kem	AXIAL
C11	1	0.01MFD	50V	X7R	DIGI	478-1542-1-ND	avx	1206
C12-14	3	0.1MFD	50V	X7R	DIGI	478-1556-1-ND	avx	1206
C15, 16	2	0.22MFD	50V	X7R	DIGI	478-1560-1-ND	avx	1206
C17, 18	2	330MFD	50V	ALUM	DIGI	P5184-ND	pan	RADIAL
C19	1	0.1MFD	50V	X7R	DIGI	487-3187-ND	avx	RADIAL
D1, 2	2	200V 1A			DIGI	ES1DFSC-T-ND	SMA	
D3, 4	2	100V 0.2A			DIGI	BAS16HT1GOSCT-ND	SOD-323	
D5, 6	2	5.6V@20	0.5		DIGI	1N5232BFSC-T-ND	DO-35	
D7, 8, 11, 12	4	6.2V@20	0.5		DIGI	1N5234BFSC-T-ND	DO-35	
D9, 10	2	100V 0.2A			DIGI	1N916B-ND	DO-35	
D13-16	4	600V 1A			DIGI	1N4005GOS-ND	on	DO-41
D17	1	REF	0.1		DIGI	LM4040AIM3-10.0/		
D18	1	5V			DIGI	LM4040AIZ-5.0-ND	ti	TO-92
F1	1	0.25A SB	.1		DIGI	LM4040AIZ-5.0-ND		
M1	1	0-20V			DIGI	811-1017-ND	murata	TO-92
Q1	1	B>75	0.1	DPM	DIGI	PN2222ATFCT-ND	on	TO-92
Q2	1	B>100	40V	.625	DIGI	PN2907ABUFS-ND	on	0805
R1 21 22	3	3.3K	1	.25	DIGI	RMCF0805FT3K30CT-ND		AXIAL
R2	1	100M	5	.25	MOSR	588-MOX-200001006JE		1206
R3	1	1	1	.25	DIGI	RNCP1206FTD1R00CT-ND	sei	AXIAL
R4	1	150K	1	.125	DIGI	S150KCACT-ND	TopAdj	
R5	1	100K 25T	TRIM		DIGI	490-2876-ND		
R6	4	*1K	0.1	*.5	MOSR	71-PTF561K0000BYEB	vishay	AXIAL
R7	1	10K	0.1	.125	DIGI	PTF10KDCT-ND	"	
R8	1	100K	0.1	.125	DIGI	PTF100KDCT-ND	"	
R9	1	1M	0.1	.125	MOSR	71-PTF651M0000BYEK	"	
R10	1	10M	0.1	.3	MOSR	71-P1206H1005BNT		1206
R11	1	100M	0.5	.75	MOSR	588-MOX4002310006D ohm		AXIAL
R12	2	1KM	0.5	1.5	MOSR	588-MOX1125231007D	"	
R13	1	10KM	1	1	MOSR	588-MOX-750231008FE	"	
R14	1	100KM	1	1.5	MOSR	588-MOX1125231009FE	"	
R15	1	1MM	10	1.5	MOSR	588-MOX112523100AK	"	
R16, 17	2	1M	0.1	.25	DIGI	RNCF1206BKE1M00CT-ND		1206
R18	1	330	1	.125	DIGI	RMCF0805FT330RCT-ND		0805
R19	1	3.3M	1	.125	MOSR	71-CRCW0805M30FKEA		0805
R20	1	10K 15T	5	TRIM	DIGI	3006P-1-103ZLF-ND boums	PnlM	
R23, 26	2	390	1	FUSE	DIGI	RMCF0805FT390RCT-ND	0805	AXIAL
R24, 25	2	15K	1	.25	DIGI	S15KCACT-ND	sei	AXIAL
R27	1	8.2K	1	.25	DIGI	S8.2KCACT-ND	sei	AXIAL
R28	1	10M	1	.25	DIGI	RNF14FTD10M0CT-ND sei	honeyw	AXIAL
R29	1	50K	5	THERM	DIGI	480-3140-ND		DO-35
R30	1	47K	1	.25	DIGI	RMCF0805FT47K0CT-ND		0805
R31	1	4.7K	1	.25	DIGI	S4.7KCACT-ND	sei	AXIAL
T1	1	24V .085A	1		DIGI	237-1902-ND	triad	
U1, 2	2	OP AMP	2		DIGI	ADA4638-1ARZ-ND	8SOIC	

\* 4 X 1K 1/8W in series-parallel = 1K 1/2W.

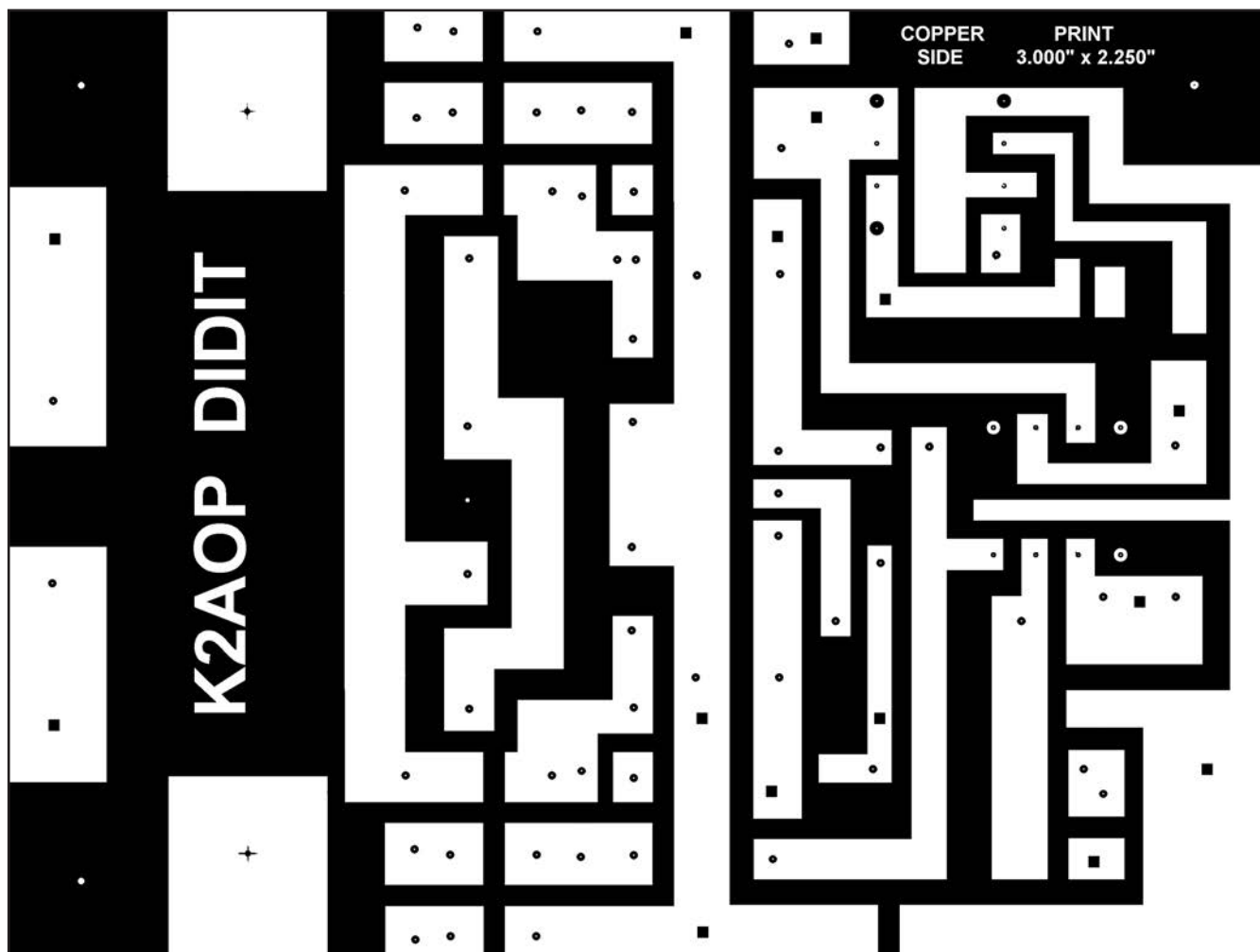


Figure 2. PC board mask for the meter circuit. Recommended dimensions are exactly 3 inches long and 2.25 inches wide.

as an example, but the point of this article is to explain how to measure current with the basic current-to-voltage converter. The rest of the circuit can be replaced by what is easiest for the builder to duplicate.

Build just the converter to satisfy yourself that this works as claimed. Work with the output polarity reversed (without the inverter) and one resistor and capacitor at a time to verify the amazing performance. To accurately measure currents of 10 pA and 100 pA full scale, an old Centralab ceramic wafer switch is required. The best presently-available switches (cost reduced) have resistance just above one million megohms and will cause error by lowering the highest-range resistor values. If an old Centralab switch can't be obtained, make your most sensitive range 1 nA and settle for 1 pA resolution on a 3-1/2 digit DVM.

The inverter/buffer isn't needed if the output polarity isn't important and the current converter load is a 1M minimum input resistance DVM. The range switch resistors provided in the parts list are for the builder interested in precision. Less accurate and less expensive ones will still work. ALL soldering, including the attachment of fine wire leads to the ADA4638, *must* be done with the soldering iron tip, the circuit, and yourself connected to the same ground to prevent damage to the op-amp and circuit components from electrostatic discharge (ESD).

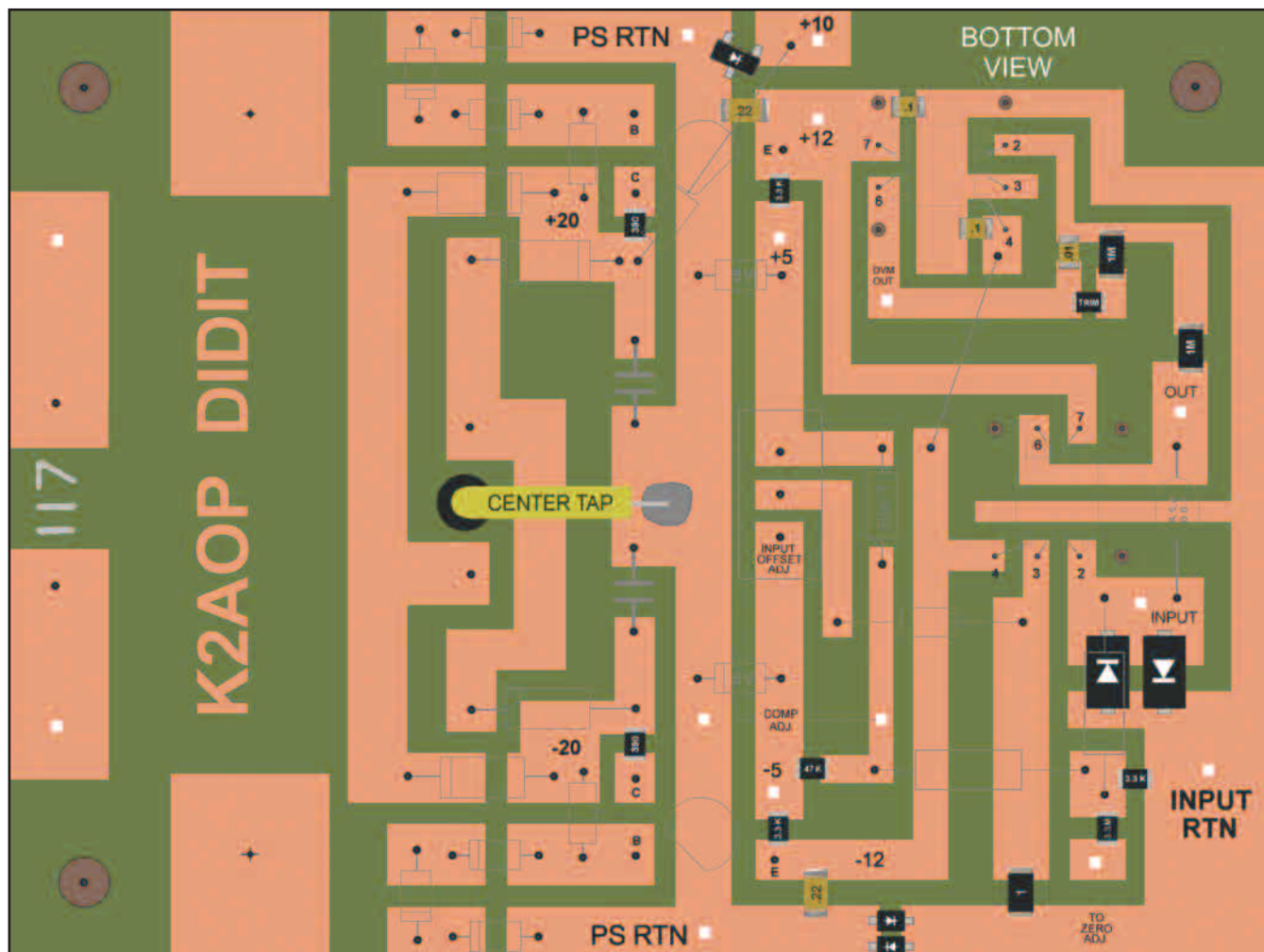
***Build just the converter to satisfy yourself that this works as claimed. Work with the output polarity reversed (without the inverter) and one resistor and capacitor at a time to verify the amazing performance.***

If you build with ranges below 1 nA, include the temperature compensation. The  $\pm 1$  pA stability over 72° to 82° Fahrenheit improves to better than  $\pm 0.2$  pA. The capacitors used on the switch must be very low leakage. Use NP0. Connect the critical input and return wiring as the schematic shows or the 10- $\mu$ V insertion loss can increase by many times. The 10- $\mu$ V max across the input terminals at 10 mA is mostly from the input terminal brass, 0.001 ohm. If a safe HV probe can be built using Ohmite's 1000 M, 0.5%, 7.5-KV resistor, the probe and circuit can accurately measure 100-mV full scale to 5,000 volts.

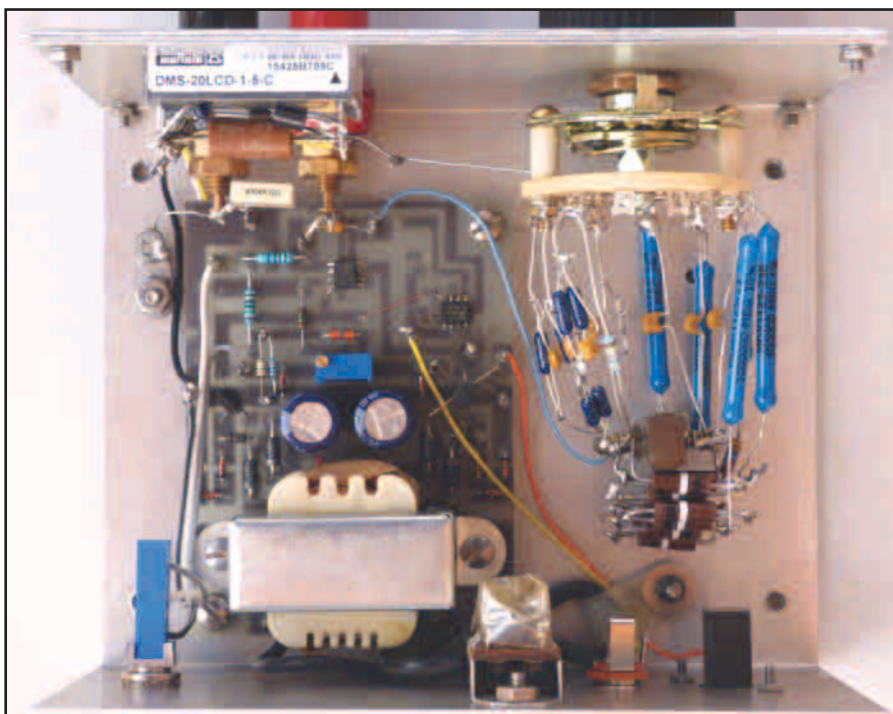
### Adjustment

Shield the input from electrostatic effects with aluminum foil connected to the input return. Do not allow the foil to be in contact the red plastic or to short out the input. Apply power and allow at least one-half hour of warm up on the lowest





range. Adjust the zero for 00.00 V as measured on the 10-volt range of a correctly zeroed DVM connected to DVM OUT. Remove the aluminum foil. On the 10-mA range, connect a metal film 1K resistor across the input terminals. Thermoelectric cautions must be observed at  $\mu\text{V}$  level. Use a DVM with microvolt resolution, properly zeroed while BOTH test probes are in contact with the input return terminal. Adjust the input offset trimpot for zero  $\mu\text{V}$  between the input terminals. To ensure that there has been no interaction, repeat the adjustments to this point. Then, with the 1K removed, on the 10-mA range, apply +10-mA then -10-mA ( $\pm 5\%$ ) from a com-



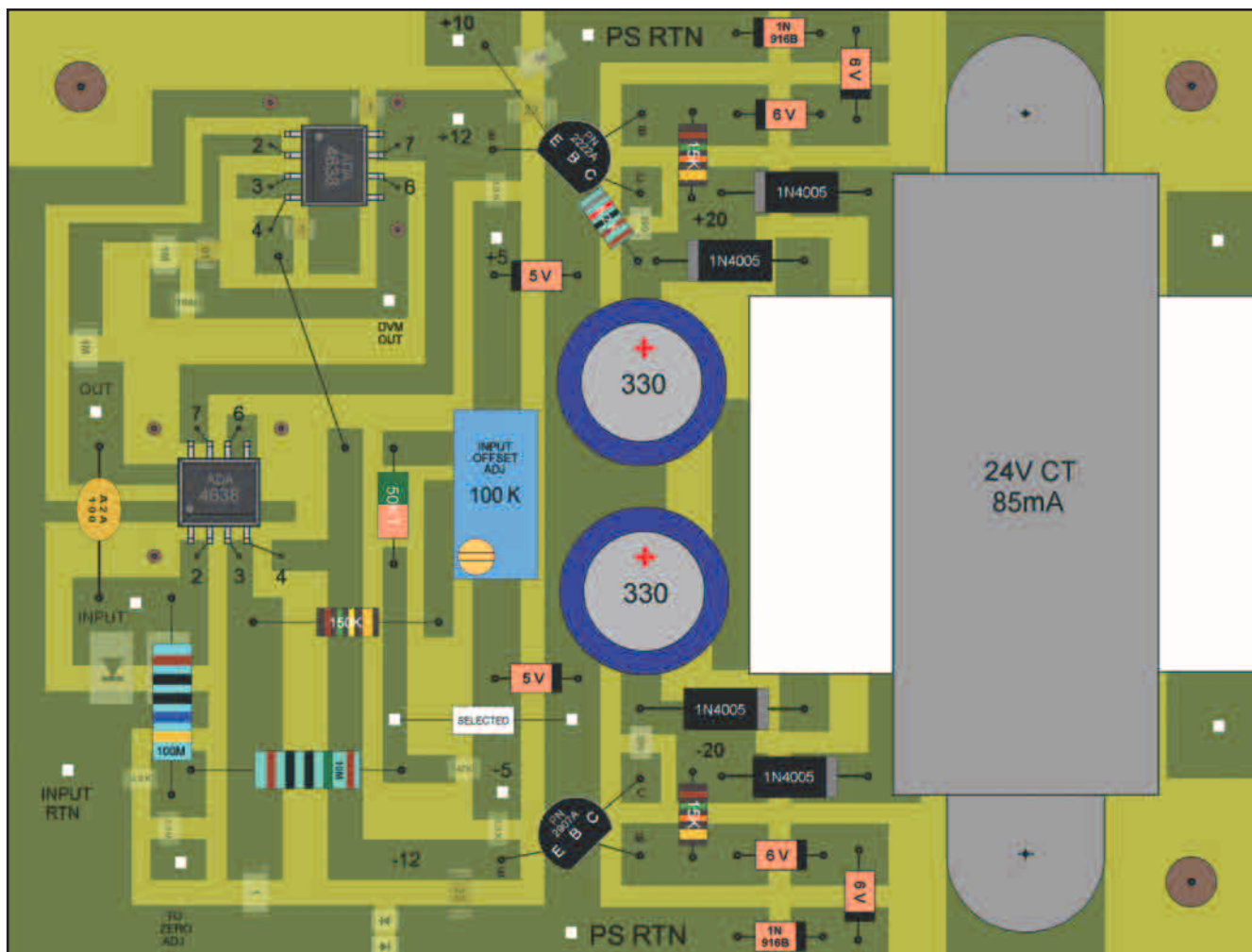


Figure 4. Parts placement for the top side of the circuit board. Note correct orientation for the ICs.

pletely isolated source such as a 1.5-volt battery in series with a 150-ohm resistor. The voltages between input terminals will both be less than 10  $\mu$ V with correct adjustment of offset and test DVM zero.

## Operation

You will be pleased to find that the zero stability will be better than  $\pm 1$  pA and should not need adjustment on ranges of 1 nA and up after the initial zeroing. Excellent repeatability and accuracy will be your reward for building with high precision range resistors. The 10- $\mu$ V insertion loss makes measurement of low or leakage current in low-voltage electronics easier and more accurate than by any other method.

Ultra-high resistance is measured by reading the current through it with 10 volts applied across it, then calculating  $R = E$  divided by  $I$ . Example: 10 volts divided by 0.177 nA = 56.5 thousand megohms. The precision and repeatability that is possible when measuring

*Excellent repeatability and accuracy will be your reward for building with high precision range resistors.*

ultra-high resistance should more than compensate for the minor inconvenience of having to calculate  $R = 10$  volts divided by resistor current. To measure the average current in a circuit that has rapidly varying wide changes in level, a filter cap should be connected across that circuit and the current measured. The circuit should then be disconnected, the cap leakage current measured and then subtracted from the total current.

## Conclusion

When you complete this project and begin making the extreme and accurate measurements that are possible, I expect that you will complain that I took too long to publish this.



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# Build an Amplified Absorption Wavemeter

## Improve Sensitivity to Really Low RF Signals

BY DR. SAM GREEN,\* WØPCE

In 1970, I was playing with tunnel diode oscillators as very low power RF sources for short-range transmitters and signal generators. The RF power was so low that my trusty Heathkit grid dip oscillator could not sense it in diode mode, where it becomes a simple absorption wavemeter with a vacuum tube diode RF detector to drive the meter.

I built an amplified absorption wavemeter with one transistorized gain stage to be able to see the signal and estimate the frequency of those tunnel diode oscillators and have used it ever since. The parts all came from my junkbox.

The neatest feature is that it reverts to an unamplified instrument when turned off and becomes much more sensitive when turned on. I was proud of this innovation. Now I update the circuit with modern components for much better performance and less variability.

### Background

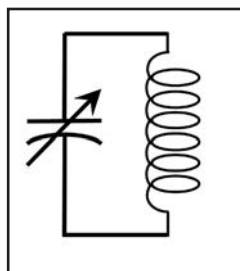
An absorption wavemeter, as shown in *Figure 1* and *Photo A*, is simply a tuned circuit with no indicator. As the wavemeter tunes through resonance, it causes observable changes in a nearby coupled circuit as it absorbs energy from it. For example, you would notice a change in transmitter plate current when coupling energy away from the tank circuit.

*Figure 2* adds a small incandescent lamp to the tuned circuit as an indicator. The lamp can connect across the resonant circuit or via a coupling link. An RF source coupled to the tuned circuit lights the lamp most brightly when the circuit resonates at the frequency of the coupled RF energy. The tuning dial is calibrated to read frequency. Pretty simple, isn't it?

The absorption wavemeter shown in *Figure 3* uses a crystal diode detector and a meter for an indicator. Again, the meter indicates maximum when RF energy couples in at the resonant frequency of the tuned circuit.

A milliamp-class meter is superior to the lamp and provides an indication for moderate signal levels, but a sensitive 50- $\mu$ A meter is preferable to sense small signals.

The 1N34A point-contact crystal diode is a throwback to an earlier age of crystal sets with cat's whiskers. A fine conical point contacts a block of germanium crystal under spring pressure. Its characteristics are better for low-level RF detection than common rectifying junction silicon diodes.



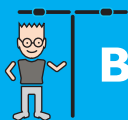
*Photo A and Figure 1. The circuit for a basic absorption wavemeter couldn't be simpler — a resonant circuit formed by a variable capacitor and a coil.*

The impedance of the diode is much higher than that of a lamp, but it can still lower the Q of a high impedance tuned circuit. A resistor of perhaps 1k $\Omega$  in series with the diode diminishes this degradation and provides a narrower indication of tuning at the expense of a fraction of the sensitivity. The resistor is omitted in *Figures 3, 4, and 5*, but is a worthwhile addition.

### Add Gain

*Figure 4* shows a transistor amplifier to increase the sensitivity of the absorption wavemeter. The circuit is similar to an amplified field strength meter I found in the 1969 RSGB *Radio Communication Handbook*. Parts values shown reflect the

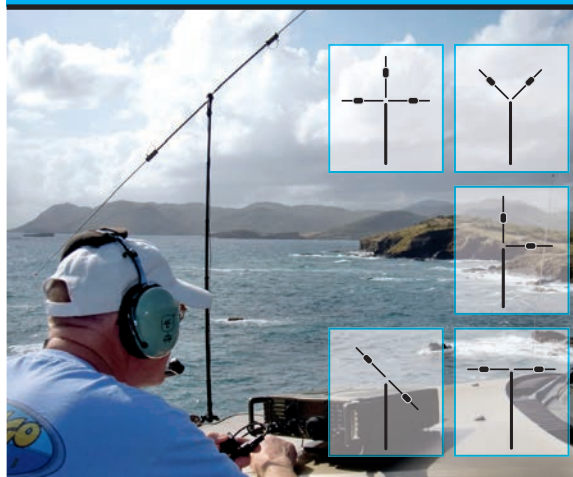
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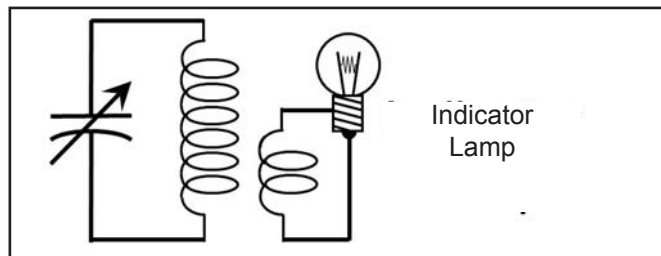


Figure 2. Absorption wavemeter with indicator lamp added to the circuit. The light shines most brightly when tuned to resonance with the signal under test.

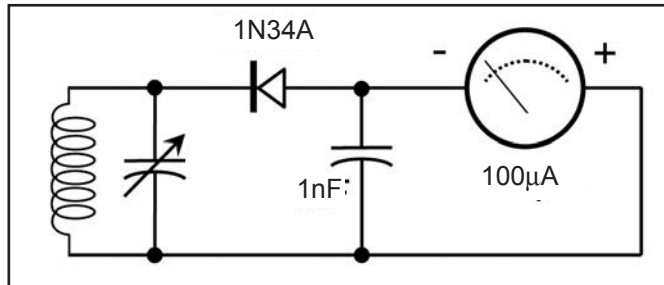


Figure 3. Unamplified absorption wavemeter with meter indicator. The meter is more sensitive than the lamp.

original circuit except for the 1N34A. It's simple and effective and provides an order of magnitude gain over an unamplified absorption wavemeter. Connecting an antenna to an absorption wavemeter adds the functionality of a tunable field strength meter.

Calibration is simple and consists of adjusting the meter to zero with no input signal present. Operation is simple. Couple to an RF signal. At resonance, a small input will peg the meter.

So what's the problem? Well, this circuit only works with germanium transistors, which were a lot more common 60 years ago. Most old germanium transistors work, some better than others. Some few don't work at all. Try more than one germanium transistor if you can. Don't bother to try a silicon transistor. It won't work.

You can replace the 1N34A crystal diode with a low-offset HP 5082-2835 silicon hot carrier (Schottky) diode, if you have one, but the transistor must be germanium. If I were smarter, I could tell you why. It is likely related to the higher voltage drop across the emitter-base junction in silicon transistors.

Germanium transistors are in production again, but if you want an old one that's not in a surface mount package, the nice folks at Gateway Electronics, a mile from my Saint Louis QTH, have a stock of 2N404 PNP germanium transistors at low cost.

Higher beta devices yield higher amplification. For an NPN transistor, just reverse the polarity of the diode, meter, and battery. My unit actually uses an NPN transistor, but I show the schematic for PNP because more such devices are available.

Decrease the value of resistor R1 for a milliamp-class meter or a transistor that requires higher collector current before the beta comes up. Increase R1's value to decrease battery current.

## WØPCE 1970 Wavemeter

The amplified wavemeter circuit in Figure 5 works at reduced sensitivity with power off by rearranging the circuit elements with a DPDT switch. This is the instrument I used for decades.



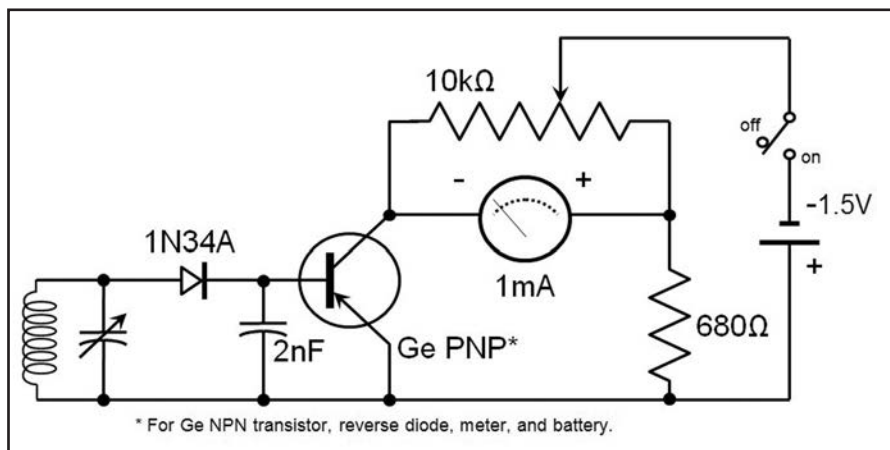


Figure 4. Germanium transistor amplified absorption wavemeter. The transistor improves sensitivity to measure low-level signals.

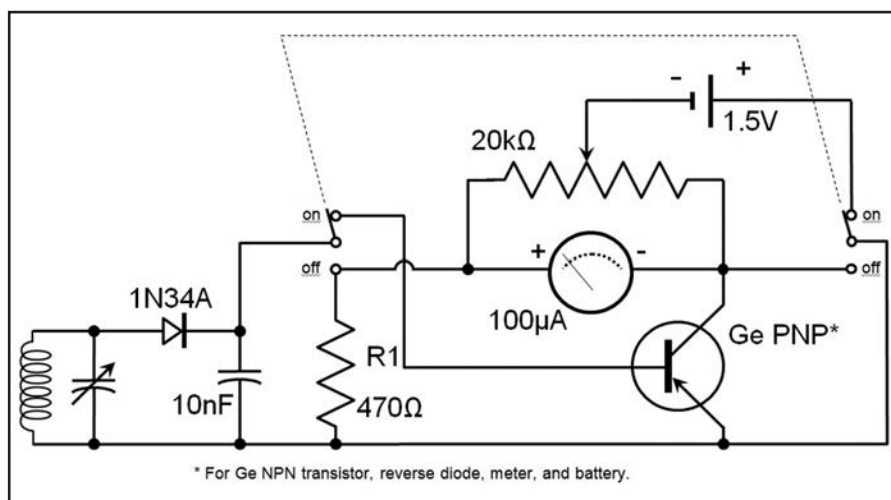


Figure 5. Schematic of WOPCE's 1970 amplified absorption wavemeter. It's still in use today.

With power on, the circuit is the same as in Figure 4. With power off, the circuit is nearly the same as in Figure 3. How cool is that? The difference is that the potentiometer and resistor are now in parallel with the meter, slightly reducing sensitivity.

The 1970 wavemeter is shown in Photo B for example only, though you should note the desirability of low-inductance connections between the variable capacitor and the socket for the plug-in coils. All inductance should be in the coils if you want to go to high frequencies.

Select a variable capacitor with a large ratio between maximum and minimum capacitance in order to get the widest tuning range with the fewest plug-in coils. Do not remove rotor plates from the variable capacitor to lower the capacitance, as that decreases the maximum-to-minimum ratio.

Mount the variable capacitor and the connector into the case and wire them together with short low inductance leads. If you can't avoid significant lead length, use a wide flat conductor such as copper tape.

Finally, after the variable capacitor and connector are wired, try winding some coils on low-loss material and see where they resonate. Coil requirements depend on your variable capacitor. I used plastic tubing of a convenient size that fit nicely onto once-abundant RCA phono plugs. You need a signal source of known frequency to calibrate the instrument. Wind the coils so that the tuning ranges overlap somewhat.

"Transistorized Grid Dip Oscillators" and "Tunnel Dippers" were marketed long ago, but were never as good as tube-type grid dip oscillators. If you come across a discarded solid-state dipper, you have the basis for a simple

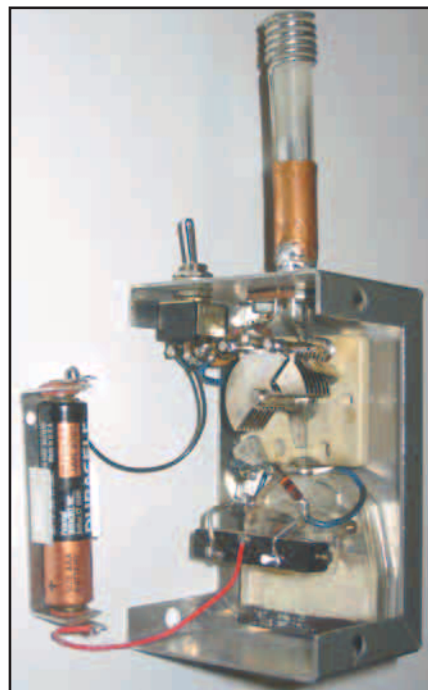
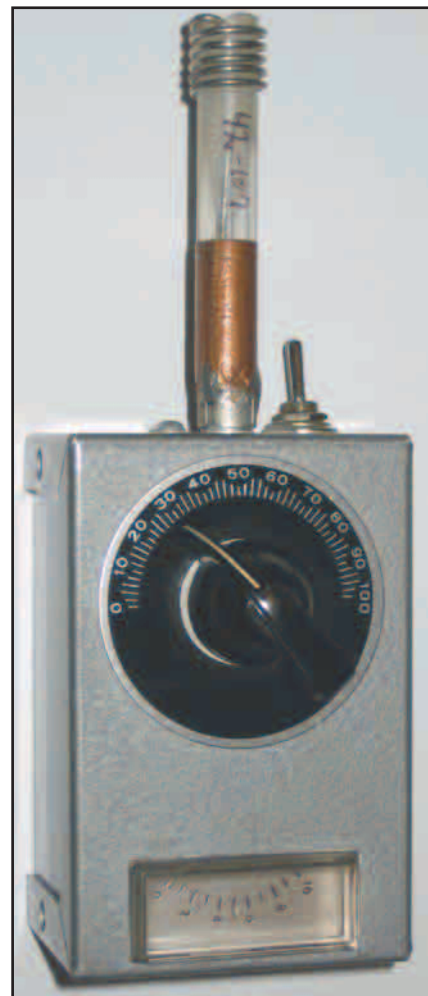


Photo B. WOPCE's 49-year-old wave-meter. It still works, but his newer version is much more sensitive and is more consistent in operation.

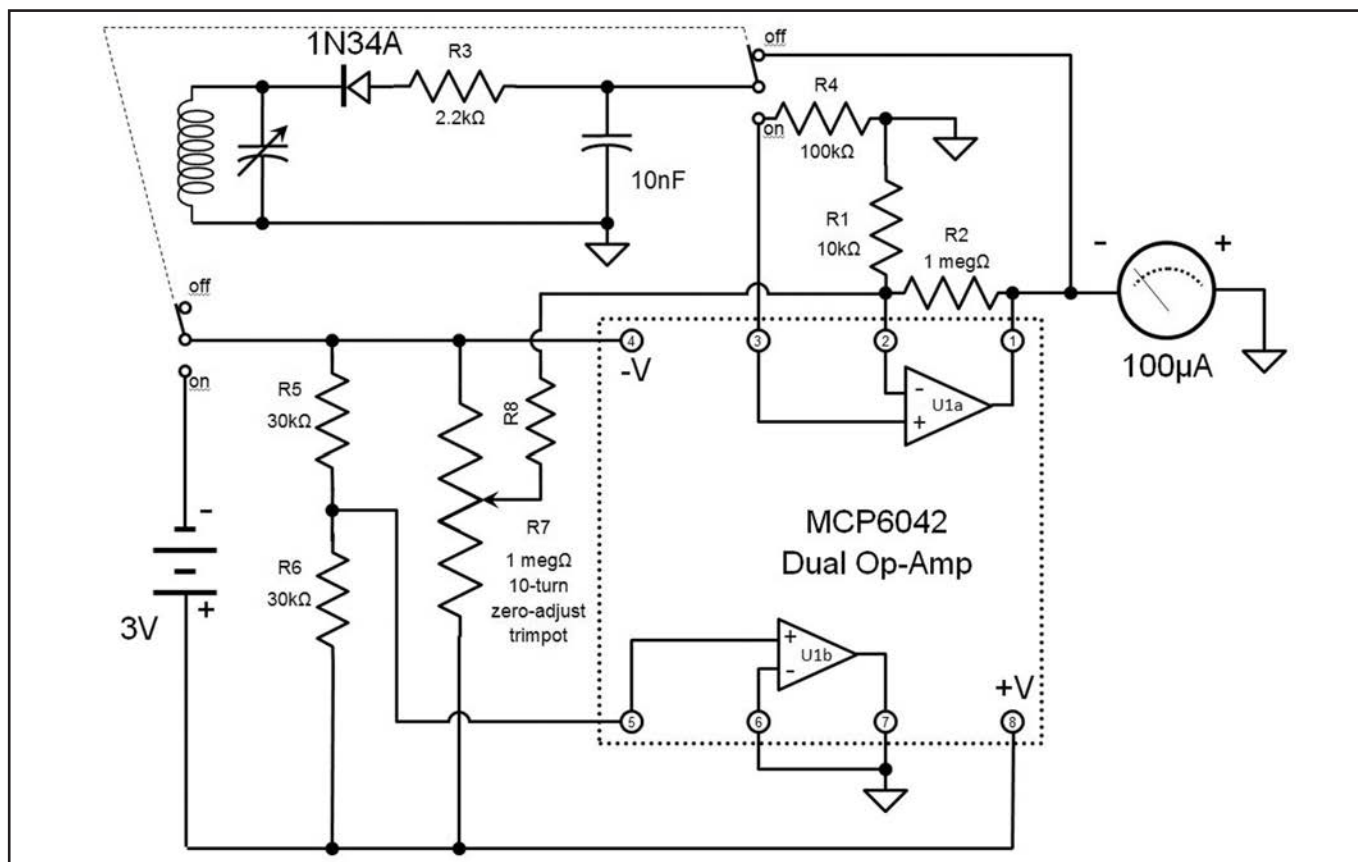


Figure 6. WØPCE dual op-amp wavemeter brings the circuit into the 21<sup>st</sup> century with high gain and sensitivity that weren't available 50 years ago.

conversion. Remove the oscillator circuitry and convert it to an amplified wavemeter.

### WØPCE Wavemeter Upgrade

The amplified wavemeter circuit in Figure 6 is an upgrade with much greater sensitivity and consistent performance at the cost of somewhat greater complexity. Half of an operational amplifier — U1a — provides the gain.

Again, the circuit reverts to an ordinary un-amplified instrument when turned off and becomes very sensitive when turned on, even with a milliamp-class meter. If sensitivity is too high or the zero adjustment is too finicky, increase R1 to 30-100kΩ or more. Decrease R1 for greater sensitivity and/or use a more sensitive meter. I used 10kΩ for R1 to achieve extremely high sensitivity, but I suggest starting with 30kΩ.

The op-amp-based circuit operates consistently and eliminates device variability experienced with the germanium transistor-based circuit.

Select a newer operational amplifier that operates with less than 3 volts so a pair of AAA cells can power it. Don't expect general-purpose op-amps to work with less than 9 volts of supply voltage. Any low bandwidth (low slew rate),

low voltage, rail-to-rail op-amp that requires less than a 3-volt supply and low supply current should work fine. My current favorite is the MCP6042 from Microchip Technology. It works down to 1.4 volts and draws less than 1 µA over and above the meter drive current. A sensitive meter keeps current drain low.

The other half of the dual operational amplifier U1b serves to split the supply voltage to generate an in-between ground potential.

Standard ±50% ham tolerance (HI!) is fine for all components, but keep R5 equal to R6.

### Conclusion

I was so young in 1970. The circuit I built with a germanium transistor is still useful, but the new circuit has very much higher gain and avoids selection of touchy components.

In editing this article, among other errors, I learned that the circuits in Figure 4 and 5 turn the leaky germanium transistors *off* rather than *on*. On retesting, I find the circuits seem more sensitive this way. Sensitivity also improves with a higher voltage supply of 3 volts. I still can't make the circuit work with silicon transistors.

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There are quite a few QRP kits out there that are tempting to build and operate. But many seem to lack one thing: an enclosure to house their components once they have been assembled and “perfected.” N4KYW offers simple solution.

## A Little Help From the Kitchen

BY HOWARD A. GOODMAN, \*N4KYW



Photo A. Top side of packaged Elenco power supply.

I seem to have a natural inclination to come up with alternative uses for common objects. So a while back, it occurred to me that with the dwindling availability of certain construction components for electronic projects, in particular enclosures and chassis, I should look elsewhere ... outside of the electronics websites. That's when it hit me to consider using inexpensive baking pans.

Baking pans and their deeper cousins, loaf pans, especially the non-stick coated variety, have several advantages.

1. They are typically manufactured from thin steel, making them easy to cut, drill, punch, nibble, etc.

2. The side walls generally slope upward when the pan is inverted. So when a pan sits on a desk, the controls mounted on its side walls will angle upward, to the advantage of the operator.

*Baking pans and their deeper cousins, loaf pans, especially the non-stick coated variety, have several advantages.*

3. The non-stick coating serves as an attractive and durable finish. Yes, you can still find a mill-finish loaf pan at Walmart for 88 cents, but then you'd probably end up having to paint it yourself. Spend the extra couple of bucks and get one with a non-stick finish. (And do NOT just borrow a pan from your kitchen ... you know it'll be the next pan that's needed for cooking/baking. —ed)

### Project Examples...

For years I have used a regulated variable power supply on the bench that I built from a kit (Elenco K-11). Eventually, though, I grew tired of having to treat it with kid gloves because of its fragile condition, i.e., hanging together by noth-

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\* email: <howagood@yahoo.com>

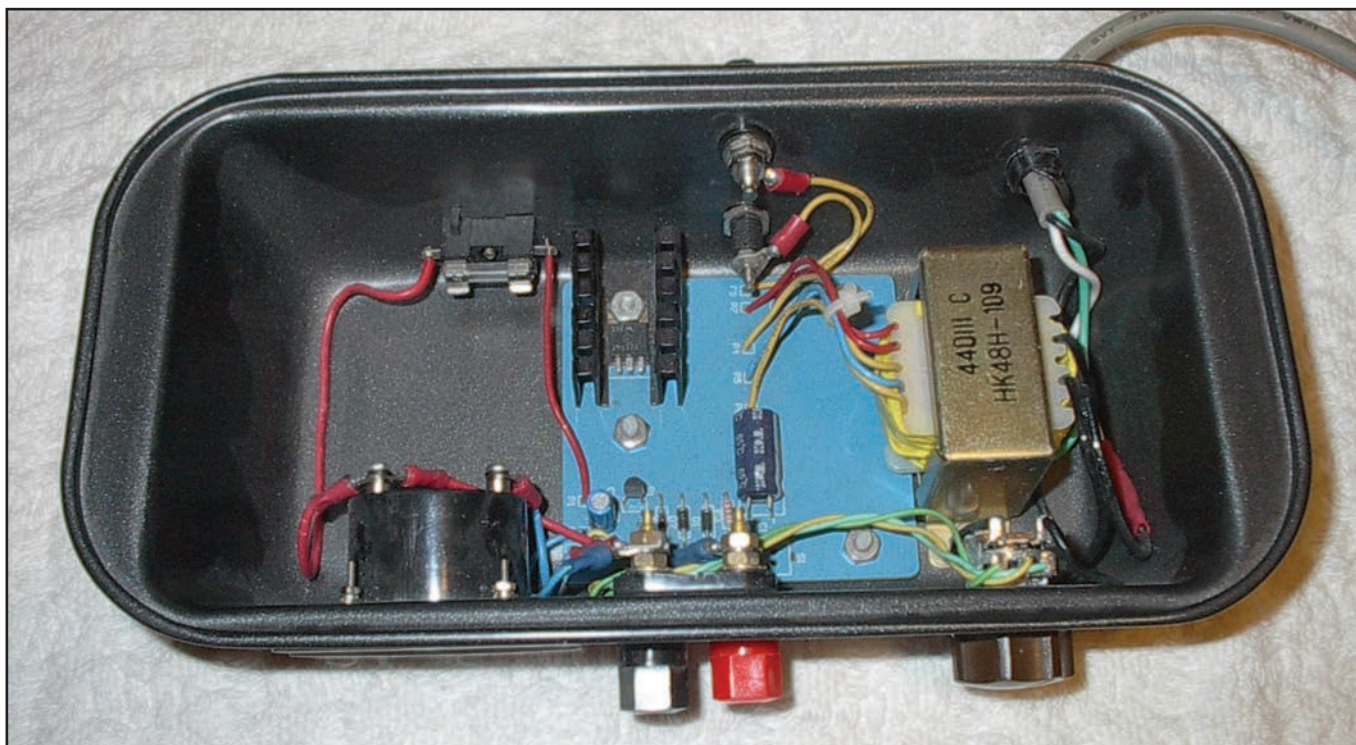


Photo B. Underside of the power supply.



Photo C. Top side of packaged "Poor Ham's Variac" variable voltage power supply.

ing more than the wires used to connect the components.

With ovenware in mind, I went out and bought a loaf pan with a nice brown non-stick finish. After figuring out how many holes to drill and where to drill them, I reassembled the power supply components inside the loaf pan. The result is shown in *Photos A and B*. I even added a voltmeter to the front side-wall so that the voltage setting could be monitored at all times.

I believe the marriage between electronics and kitchen utensils speaks positively here. Notice the olive drab col-

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Photo D. Underside of power supply enclosure.



Photo E. Top side of packaged regenerative receiver.



Photo F. Underside of regenerative receiver enclosure.

ored knob toward the left side of *Photo A*. That knob is all that remains of a Knight Kit T-50 CW transmitter I purchased from Allied Radio after earning my Novice ticket nearly 60 years ago.

I was so pleased with the results of my power-supply packaging project that I began to search for others that would benefit from being housed in a permanent dwelling. I didn't have to look far.

## Variable Power Supply

*Photos C and D* illustrate my adaptation of a "Poor Ham's Variac," a rather simple and inexpensive substitute for a weighty, pricey Variac®, a brand name for a variable voltage power supply. These supplies are often used to restore (reform) vintage electronics containing electrolytic capacitors that haven't had high voltage applied for decades. They accomplish this by gradually ramping up the supply voltage, allowing the electrolytics time to "reacclimate," until the voltage reaches 110.

My version accomplishes the same thing, except that it uses a set of incandescent light bulbs placed in series with the load. To increase the voltage supplying the load, the incandescent bulb is simply swapped out for one having a higher wattage rating (i.e., lower resistance).

Finally, my current project (still in process) is a regenerative receiver being assembled from a kit that did not include an enclosure. Instead of using a wall transformer, I may end up building a 12-volt DC power supply or battery pack into the leftover space to the right of the circuit board. (*Photos E and F*)

So, when it comes to finding suitable enclosures for your electronics projects, whether kit or homebrew, you may not need to look any further than your kitchen.

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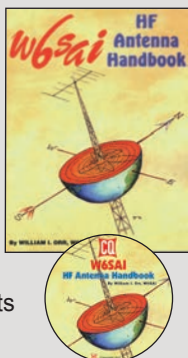


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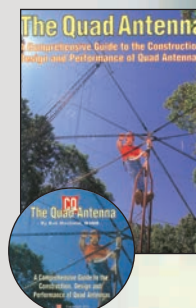
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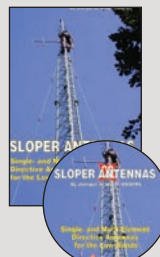


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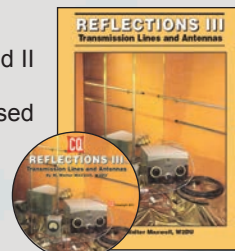


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Radioteletype came of age in the 1950s, championed by local groups of RTTY enthusiasts as well as CQ magazine, the first ham magazine with a RTTY column. The mode remains popular today, and advances in technology even make it portable.

# Southern California RTTY History

## ... and its Continued Popularity Today

BY PAUL SIGNORELLI,\* WØRW

**W**HEN I OPERATED RTTY IN THE 1950S, ALL THE RECEIVED RTTY TEXT LOOKED LIKE THIS. THIS IS CONSIDERED "SHOUTING" IN TODAY'S NETIQUETTE RULES BUT BACK THEN ALL YOU HAD WAS BAUDOT UPPER CASE TEXT<sup>1</sup>.

Radioteletype, better known as RTTY, was very popular back in the 1950s and, at the July 1958 meeting of the Southern California Radio Teletype Society (SCARTS), some 78 members and their wives spent the afternoon and evening at a swimming pool party held at the Arcadia home of Merrill Swan, W6AEE, better known in the area as Mr. Teletype. One teletype expert, Art Addaway, tore down a Model 15 machine and showed us how to adjust it, oil the clutch felts with a hypodermic needle and put it back together. All of the details were published in the popular RTTY, Inc., *News of Amateur RTTY Bulletin* for August 1958. These old RTTY bulletins were copied onto a CD ROM and put on the web at one point, but I don't know where they are now. (Several volumes are posted on [archive.com](http://archive.com) – ed)

Due to the efforts of W6AEE of The RTTY Society of Southern California and publisher of RTTY, and Wayne Green, W2NSD, then RTTY editor of CQ magazine, amateur radio operators successfully petitioned the FCC to amend Part 12 of the regulations, which was effective on February 20, 1953, permitting FSK (frequency-shift keying) in the non-voice parts of the 80-, 40-, and 20-meter bands. ASCII format at 300 baud was approved in 1980 and the requirement for CW identification of RTTY transmissions was dropped in 1983<sup>2</sup>.

Merrill, W6AEE, and Bruce, ZL1WB, are on the cover of RTTY Bulletin for October 1958. The RTTY Bulletin started in 1953 and the history was published in November 1958 edition. Merrill even gave Bruce a Model 26 to take back to New Zealand. WØBP and ZL1WB made the first USA-to-New Zealand RTTY contact in 1956.

There was a similar RTTY group up north in San Francisco, The NCARTS, which had similarly large groups attend its annual meetings.

In addition, ARRL conventions always drew a lot of RTTY ops. I was at the RTTY meeting at the Chicago ARRL Convention in 1957 and got to meet all the RTTY pioneers: "Beep" Phelps, WØBP; Phil, W2JAV; and Bob Weitbrecht, W6NRM/6 ex-W9TCJ. A picture of me at the convention was published in the RTTY column of CQ magazine in November

1957, p. 198. (Photo A). W6UJX and I also met many other RTTY ops at the 1958 ARRL convention in Washington D.C.

I had a Model 26 Teletype machine and then upgraded to a Model 15. Back then the machines were sold to hams for about \$100 with a restriction that they were for amateur use

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**RTTY** [from page 141]

presented with a working Model 14 Typing Reperforator, a tape head, a dual-faceplate distributor, and an AC-governed motor for his Model 26.

Special thanks go to Bob Weitbrecht, W9TCJ, for his fine photos that appear here. The hard-working RTTY Committee that made this year's RTTY Meeting such a success consisted of W9SPT, W9GRW, WØBP, W9JBT, W9OCV, W9TCJ and WN9CNY.  
73, Byron, W2JTP

K6CHR having an "eye to eye" QSO on the W9TCJ 2-station conference hookup.

Bruce Rowlings, ZL1WB, gives the low-down on the down under.

**Nebraska Hamfest**

The Pioneer Radio Club of Fremont, Nebraska, is sponsoring a Hamfest to be held at the Hotel Pathfinder on Sunday, November 3, 1957. It will be an all day affair and will wind up with a banquet in the evening. XYLs are invited too. More Info? Write Tom Morris, WØVUO, 134 East 4th Street, Fremont, Nebraska.

Photo A. A 1957 picture of me in CQ magazine (top photo), back when I was K6CHR.

\* email: <w0rw1@msn.com>





*Photo B. Still operating RTTY today, pedestrian-mobile using an NUE-PSK Modem (no, I don't have to carry a Model 15 teleprinter with me!).*

only. My Terminal Unit (TU) was a W2PAT/W2JAV design. It had cross-coupled neon bulb triggers for end-of-mark and end-of-space pulses. It was a system used to regenerate a missing pulse in case of QSB. I used a Heathkit DX-100 keyed by a VF-1 that had a 6AL5 shifter diode for 850 Hz shift. I used to copy news items from the Associated Press shortwave broadcasts in the morning and take the news to high school.

At Christmastime, you could find RTTY artwork on VHF where you could get perfect copy. K7TTY has them online at <https://tinyurl.com/yajl6q72>. They were predecessors to ASCII art that is shown at <https://tinyurl.com/ybnpmog2>.

Cecil, W6ZBV, published a PSK RTTY system in the July 1958 *RTTY Bulletin*. He was way ahead of his time. Bob Weitbrecht was deaf and invented the TTY (telephone teletype) for the hearing-impaired, together with the acoustical coupler for landline modems. He worked at Yerkes Observatory and passed away in 1983. Bob's picture appears on the cover of the book, *A Phone of Our Own — The Deaf Insurrection Against Ma Bell*, by Harry Lang.

### Fast-Forward...

Today, I was out operating RTTY pedestrian mobile (without a 100-pound Model 15 Teletype machine ... I don't have a Teletype machine anymore), by using the battery-operated NUE-PSK Modem<sup>3</sup> without a computer or keyboard (*Photo B*). It has a 4-line LCD display and a graphic spectrum display plus transmit and received text in upper and lower case. I mounted a single lever key on the side to input



*Photo C. Close up of NUE-PSK modem. Note the single-lever paddle at lower right used to input messages.*



*Photo D. Another modem with a QWERTY keyboard in use with my PRC319.*

data into it (*Photo C*). When I am transmitting on RTTY, I am really sending 20 wpm CW into the modem and it converts the CW to ASCII, then to Baudot for RTTY. The NUE modem allows me to "VFO" around the band even though I am using a fixed-frequency radio (PRC319). I also have a modem with a portable keyboard (*Photo D*).

Operating RTTY afoot isn't very difficult ... I just have to watch out for gopher holes and snakes.

### Notes

1. The Baudot code doesn't provide for lower case letters. A comprehensive history of the Baudot code can be found at <https://tinyurl.com/92c68cx>
2. More detailed global RTTY history is at <https://tinyurl.com/azhbfaa>
3. See [www.nue-psk.com](http://www.nue-psk.com)



## A Simple High-Power Optical Communication System

**L**ast month, and on several occasions in the past, I have written about optical communications as it is of particular interest to me and I believe it is fertile ground for amateur experimentation. I work in fiber-optic transmission systems of all sorts but I am not talking about “wire-type communications” here; I am talking about free space applications — akin to radio. As you might realize, this is usually a line-of-sight mode since almost anything between a transmitter and receiver can block an optical signal, similar to UHF and microwave transmissions. This month, I would like to present some ideas on this subject as “food for thought” to the experimenters in our midst.

### Producing a High-Power Optical “Signal”

First, let me give you an idea of how to produce a high-power optical transmitter without an expensive and elaborate laser modulation system. *Figure 1* is a diagram of the system. The source is a 1,000-watt projection lamp of the type used in older movie and slide projectors. These are still available and, if you are lucky, you may be able to get an entire old projector that will provide lenses, etc. The output of the projection lamp is then applied to a lens assembly (like the one in the projector) to produce a powerful continuous beam of light. This beam is focused on a mirror cemented to the voice coil of a speaker. The speaker in turn is connected to an audio amplifier. Now, when one talks into the microphone, the speaker vibrates. This causes the mirror to also vibrate and the reflected beam of light moves in step with the audio-produced vibration. The moving beam of light is now passed through a mechanical slit, arranged so that as the beam vibrates (moves), the slit cuts off more or less of the light. This results in an amplitude-modulated light beam that is then applied to another lens assembly which “straightens” everything out and produces a parallel beam. The arrangement of the lenses, choice of speaker, and position of the slot determine just

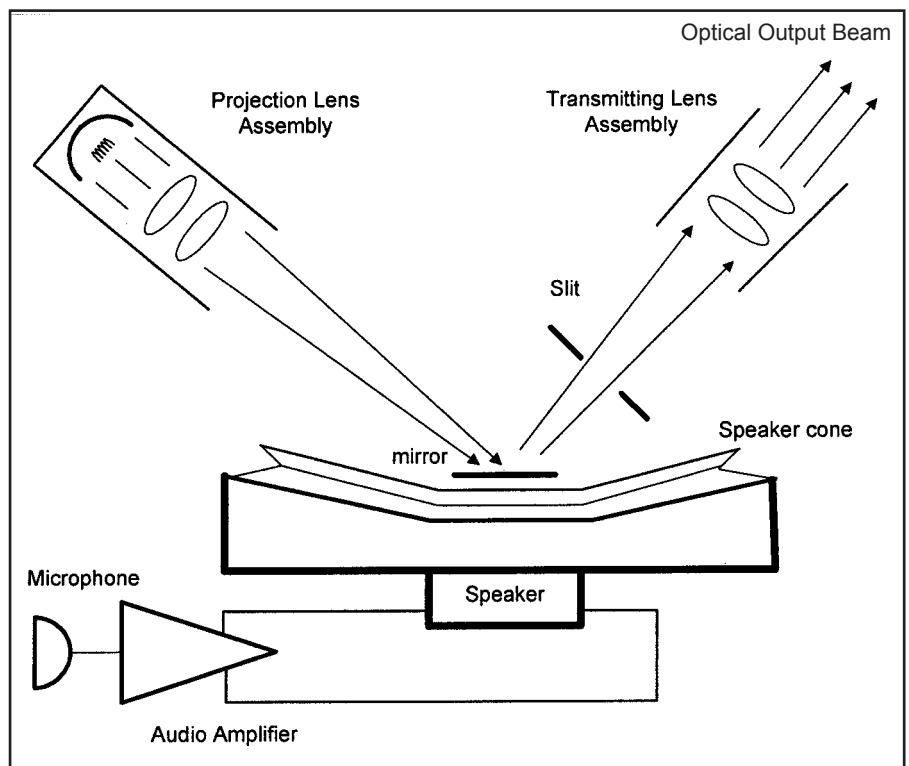


Figure 1. High power optical transmitter.

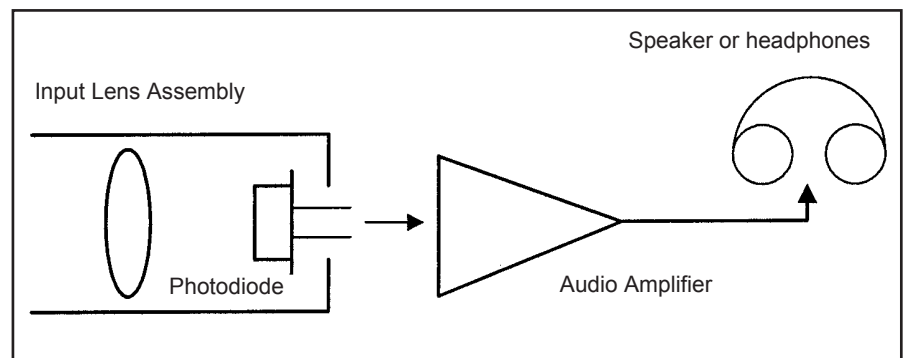


Figure 2. Simple optical receiver.

how much of the light is controlled and thus the degree of modulation of the output beam. Color filters can be inserted anywhere in the path of the beam to produce “tuned” outputs. Students of history will note that this scheme is very similar in operation to Alexander Bell’s photo-phone.

A receiver can be quite simple, as shown in *Figure 2*. Here, a very simple

lens is used to focus the incoming beam of light onto a photocell. This can be anything from a simple solar cell to a more elaborate photodiode, etc. The output from the photodiode is then applied to an audio amplifier and then to a pair of earphones or speaker as desired. The details given for this sort of system are really just a simple starting point. One can make this as elabo-

\*c/o CQ magazine

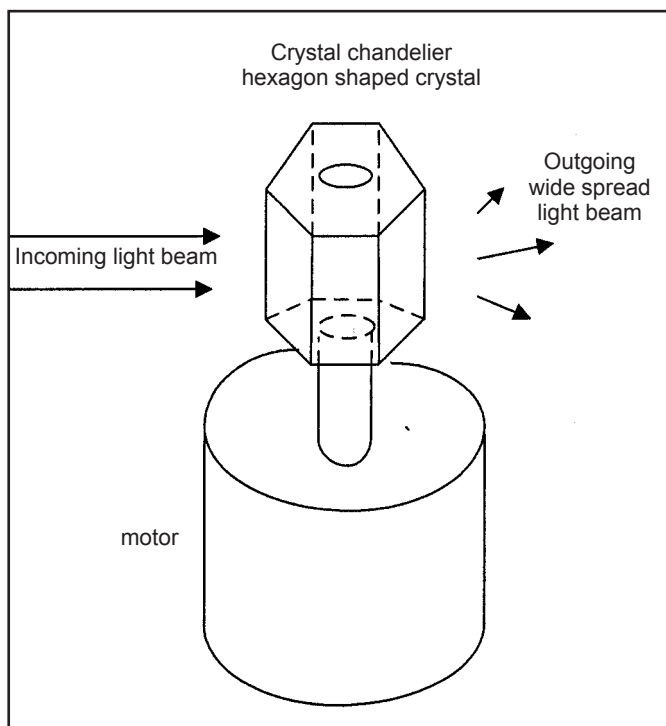


Figure 3. A way to produce an omni-directional light beam.

rate as one wishes, but for simple experimentation, it is hard to beat. More elaborate approaches have been given in previous columns for those interested.

### An Omnidirectional Light Beam

Once you have a simple operating system, you might realize that this is really a directional system, but there is a simple way to make it omnidirectional. *Figure 3* shows a very simple device with a hexagonal (six sided) glass crystal turned by a motor. The crystal is from a chandelier and you can probably find something suitable from a large lighting store that does lamp repairs. The motor is one that can turn the crystal quickly enough to allow speech to be transmitted without too much background interruption. You will obviously have to experiment with the motor speed, the frequency response of the audio and the entire mechanical arrangement but again, this is just a suggestion and the final result is up to your imagination.

### What Color is Your Signal?

By using various color filters, as I mentioned, you can choose the color of the transmitted light and a similar filter can be used over the photodiode receiver to provide some degree of "tuning." A store that deals in stained glass supplies can help here.

In conclusion, I wrote this column to not necessarily give you a project but to show how, with some unique out-of-the-box thinking, you can come up with all sorts of ideas. Some will be crazy and some, with a bit of effort, can become useful. These are related to amateur radio in that it is a way of communicating in a medium that is not too common but, in one form or another, can easily become a method used in the future. It is, after all, used in "wired" fiber optic transmission systems. The final result is, of course, up to you.

— 73, Irwin, WA2NDM

## BEHIND THE BYLINES...

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

**Don Minkoff, NK6A** ("QRP, Marconi and Me," p. 12), loves to travel and loves to bring a QRP ham station along for the ride. He wrote about a trip to Portugal and Ireland in our February 2016 issue ("Sardines, Wine, Whiskey, Cows and a Radio," p. 14) and was pictured on the cover of that issue.

**Richard Lawn, W2JAZ** ("Traveling Light," p. 20), is a jazz musician (thus the call) and music educator who has played with Lionel Hampton and Chuck Mangione, among others. He has taught music at the college level, becoming dean of the College of Performing Arts at the University of the Arts in Philadelphia in 2002. He retired as professor emeritus in 2012. On the ham bands, Rick has a variety of interests, most notably QRP and satellites.

**Ronald Stuy, PA3EWP** ("DXpedition to the Kingdom of Tonga," p. 24), is president of the Contestgroup Oude Maas (PI4COM) in the Netherlands and a board member of the European DX Foundation. An accomplished DXpeditioner, he has operated from more than a dozen countries and is planning to be on the air this month from Kanton Island as T31EU. Ronald wrote about operating from Rotuma as 3D2EU in the October 2018 issue of CQ.

**Frank Krozel, KG9H** ("QRP on the Cruise of a Lifetime," p. 38), is an electromagnetic compatibility (EMC) expert and president of a company that builds EMC chambers and systems as well as wireless antenna pattern measurement systems. He's been on the board of the Chicago IEEE EMC chapter for many years and has organized multiple mini-symposia for the Chicago chapter of the EMC Society. Frank is also treasurer of the Motorola Amateur Radio Club and is the middle member of a ham family – his father was N9MFQ and his son is KC9DNH.

**Dr. Sam Green, W0PCE** ("An Amplified Absorption Wavemeter," p. 46), has been a ham since he was a high school freshman in 1957. He held a Technician license for 36 years before upgrading to Extra in 1993. Sam is a retired aerospace engineer with specializations in photonics and optical data communications. He has written extensively for professional journals and holds 18 patents. He lives in St. Louis, Missouri.

**Howard Goodman, N4KYW** ("A Little Help from the Kitchen," p. 50), calls himself a refugee from the corporate world who has become a novelist and self-help writer. He writes from first-hand experience in his non-fiction book, *Rx for Finding Work Again*, which – according to his website – offers advice on "how to thrive and gain income from the corporate world when permanent employment fails." See: <<http://www.lulu.com/spotlight/howagood>>.



# THE LISTENING POST

BY RICH MOSESON,\* W2VU

## A Visit to the Medium Waves

A combination of a news item, Gerry's inability to do this month's column due to some personal issues, and part of my January editorial prompted me to focus this month's "Listening Post" on a range of frequencies that is frequently overlooked today, despite the fact that it's where so many of us (myself included) got hooked on radio and DXing ... the AM broadcast band.

News item first: As of the end of 2018, two medium wave broadcasters in Belgium went off the air: Groot Nieuws Radio on 1008 kHz and French-speaking station RTBF, which previously broadcast on both 621 and 1125 kHz. This, according to Ydun Ritz on his excellent "Ydun's Medium Wave Info" site <<https://mediumwave.info>>. Ydun also reports that RTBF is continuing its broadcasts on FM, DAB+, and the internet. If you're interested in MW listening, I recommend that you check out Ydun's site. While it's focused mostly on Europe, he does have some North American news and I'm not aware of a similar resource on this side of the Atlantic.

You might have noticed that the frequencies of these stations seem unusual for those of us in the U.S. and Canada, where AM broadcast stations have — for nearly a century — been spaced 10 kHz apart on the radio dial. The rest of the world, though, uses 9-kHz separation. This accomplishes a few things: 1) You can squeeze about a dozen more station allocations into the AM band with 9-kHz spacing than with 10; 2) Shifting off of the North American 10-kHz pattern reduces interference from high-powered U.S. and Canadian broadcasters when the AM band is open, and 3) the flip side of that, listeners in North America have a somewhat better chance of hearing real DX on the broadcast band if the distant stations have no immediate competition from "local" stations.

This is an ideal time to give a try (or return) to AM BCB DXing — winter at the bottom of the sunspot cycle. Get yourself a radio that can actually be tuned (as opposed to pushing buttons for pre-programmed memories), hook up a nice long wire antenna and tune in between the domestic frequencies. Of course, there's plenty to listen for domestically as well. So keep that AM radio handy!

### Leading Logs

We thank Mark Taylor of Madison, Wisconsin for compiling this month's Leading Logs in Gerry's absence. We hope Gerry will be back in this space next month. All frequencies are listed in kilohertz and all times are UTC. Meanwhile, here's what you've been hearing...

**ANGOLA**—Rádio Nacional de Angola, Mulenvos, 4949.75, 0210-0316, a nice program of local vocals and instrumentals hosted by a woman announcer with Portuguese language announcements. The woman announcer spoke briefly at 0256 followed by instrumental music. Time pips and the station ID by the woman were followed by male and female announcers with the news. Poor signal. (D'Angelo-PA/FCDX)

**ASCENSION ISLANDS**—Akhbar Mufriha, 9530, 2202-2215\*, woman and man alternating talk in listed Pukar language. A man gave station ID at 2206 before instrumental music. Closing pro-



One of Editor W2VU's first broadcast band DXing QSLs in 1970 came from Midwest powerhouse WOWO in Fort Wayne, Indiana.

gram announcements at 2214 followed by instrumental music prior to carrier being terminated. Fair to good. (D'Angelo-PA/FCDX)

**AUSTRALIA**—Reach Beyond Australia, possibly from Kununurra, 9740, 1413, going from Bhopuri to Meitei. Man with distinctive chant, woman announcer with ID and two street addresses in India, theme like music, second woman announcer (presumed Meitei) with ID, program schedule (several mentions of "meter band") into South Asian music. Poor-fair. (Taylor-WI)

**BANGLADESH**—Bangladesh Betar, 4750, 1218. Happy to hear this one today from 1218 tune in, mainly woman talking with instrumental bursts of music. Fair signal but nasty swishing QRM, Hanging in there past 1230 now and may switch to English soon, according to the Fergie lists. (Perry-IL)

**BOLIVIA**—Emisora Pio XII, Siglo Veinte, 5952.4, 0204-0232\*, lively program of local vocal selections. A male announcer with occasional Spanish talk. Series of announcements just prior to closedown routine by male announcer accompanied by familiar Colonel Bogey March. Fair signal. (D'Angelo-PA/FCDX)

Emisora Pio XII, 5952.50, 0035, was coming in nicely just now, only a slight het from WRMI 5950 but notchable and nice and mellow clear in USB ECSS. LA pop music at tune in 0035 then female announced ID at 0040 and into sports program. Male announcer with excited presentation style, bursts of music in between items of sport news. 0044 carrier was suddenly cut, not sure if tech glitch or if they closed down the transmitter early, well ahead of the MW which usually runs to a 0230 shutdown after Col. Bogey March. (Perry-IL)

Emisora Pio XII, possibly from Siglo Viente, 5952.5, 0039, in Spanish. Woman talking at length. Fair. (Taylor-WI)

**BRAZIL**—Radio Educação Rural, possibly from Tefé, 4925, 0225-0230, mellow ballad, two male announcers, announcement or ad, brief mellow ballad, female than male announcers, brief song, 0230 off. I did not hear an ID before sign off. (Taylor-WI)

Voz Missionaria, possibly from Cambriou, 5939.8, 0036, in Portuguese. Mellow ballad. Fair. (Taylor-WI)

Rádio Aparecida, Aparecida, 6135.2, 0105-0133, soft vocal selection followed by a man and woman talking to another man at a remote location in Portuguese. Several station IDs at 0125

\*c/o CQ magazine



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along with other announcements. Good signal. (D'Angelo-PA/FCDX)

Radio Aparecida, Aparecida, 9630.4, 2258, in Portuguese. Man and woman announcers, street noise, music, 2300 4 time pips, ID, woman announcement into apparent news. Fair. (Taylor-WI)

Rádio Voz Missionaria, Camboriú, 9664.8, 0126-0200, nice vocal selection by a male singer followed by a series of vocal selections. Male announcer with station ID at 0158 followed by several announcements. Good signal. (D'Angelo-PA/FCDX)

**BULGARIA**—Overcomer Ministry, Kostinbrod, 11600, 1443, in English. "Brother" Stair with call in information; starting to preach about the "man of sin" from Revelation in the Bible. Fair signal. //WRMI, 9395. (Taylor-WI)



Another easy catch for an east coast BCB DXer at the time was WBT in Charlotte, North Carolina.

**CANADA**—Bible Voice possibly via Nauen, Germany, 11900, 1450, in English. Man preaching. Fair. (Taylor-WI)

**CHINA**—China National Radio 1, Hailar (Nei Menggu), 4750, 1111-1152, male announcer with talk in presumed Mandarin language although much too weak to be sure. Later, a woman began speaking. Group vocals at 1145. (D'Angelo-PA/FCDX)

Voice of the Strait, Fuzhou, 4900, 1135-1153, male announcer talking in Chinese. Seemed 4940 was much poorer. This was poor overall. Next day signal was much improved (34443) with slight CODAR QRM but definitely 4940 which was also improved (35443) with Chinese talks by male and female announcers. (D'Angelo-PA/FCDX)

CNR 1, Shijiazhuang, 7215, 2325, in Mandarin. Male and female announcers alternating. Fair. 7220 (with RRI also audible,), 7230, 7270 (jammer), 7275, 7290, 7470 (jammer), 7540 (jammer). (Taylor-WI)


PBS Nei Menggu, possible from Hot Hot, 7270, 2325, in Mongolian. Male announcer with strong reverb, woman with correspondent report or call in, then announcer continues. Poor. (Taylor-WI)

PBS Nei Menggu, possibly from Hot Hot, 9520, 2322, in Mandarin. Male announcer talking at some length. Poor. (Taylor-WI)

**CLANDESTINE**—Ndrason International, Ascension Islands, 5960, \*0500-0532, female announcer with Kanuri language opening station ID and announcements. Mix of music and talks with plenty of station IDs. Very good signal. (D'Angelo-PA/FCDX)

**COLOMBIA**—La Voz de tu Conciencia, Puerto Lleras, 6010, 0042, in Spanish. Man and woman alternating with items for a while then talking. Listened quite a while and didn't hear any identifying information for station ID since I haven't heard Conciencia in some time. Poor-fair. (Taylor-WI)





Date Sept 28, 1970

Thank you for your DX reception report on Feb 11, 1970

57 WFAA RADIO operates full time on 570, a 5,000 watt regional channel, (directional night) and is affiliated with the American Entertainment Radio Network.

**Charlie Van**  
 Program Manager

*Snagging 5,000-watt WFAA in Dallas/Fort Worth was a bigger challenge for a beginning DXer in New York State.*

**EGYPT**—Radio Cairo on 9,940 heard at 1844 with talks in listed Turkish. Poor with poor modulation. (Brossell-WI).

**ENGLAND**—KBS World, Woofferton, 3955, 2146-2201\*, French language program with talks and some musical interludes. Closedown announcements and instrumental music to close. Fair to good reception. (D'Angelo-PA/FCDX)

BBC World Service, Al Seela, OMAN, 7445, 2351-0000\*, *Heart and Soul* program until 2359 when station ID and several promotional announcements were heard prior to closedown. Fair signal. (D'Angelo-PA/FCDX)

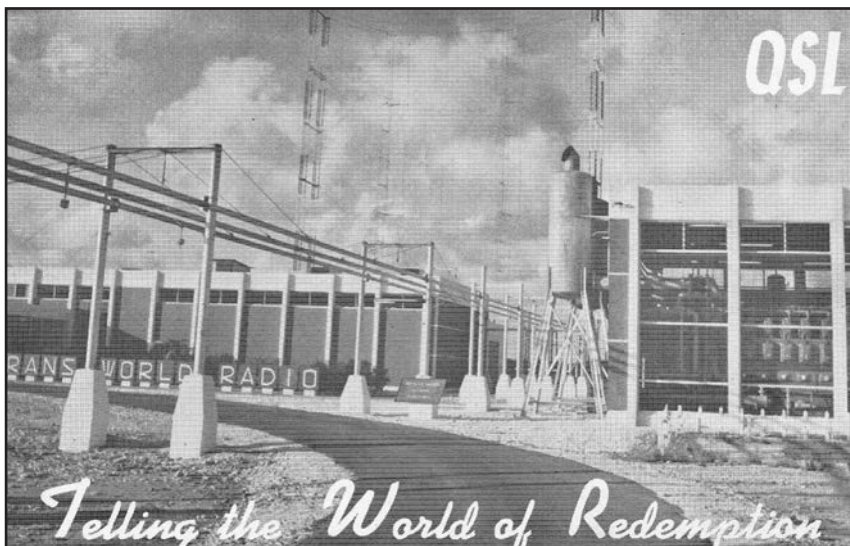
Radio SAMA (IBRA Radio), Woofferton, 9635, 1745, in Arabic. Man speaking with musical bridges of Middle Eastern music. Poor-fair. (Taylor-WI)

BBC-Ascension Relay, 15,400 heard at 1650 with a report on continuing corruption in the government of Zimbabwe. Mostly poor. (Brossell-WI)

BBC-Madagascar Relay, 15,420 heard at 1656 with a man and woman speaking (and laughing) in listed Kinya Rwanda-Kirundi. Fair. (Brossell-WI)

BBC-Ascension Relay, 15,490 heard at 1820 with talks in French. Poor. (Brossell-WI)

**ERITREA**—Voice of the Broad Masses, Asmara, 7140, 0337-0406, finally enough audio with a male announcer speaking in the listed Tigrinya language. Brief musical selection but programming was mainly conversations between several people. Weak but in the clear. (D'Angelo-PA/FCDX)



*Trans World Radio in Bonaire, at the time part of the Netherlands Antilles, was the first real DX for many broadcast band DXers "back in the day." Its signal on 800 kHz was tough to pull out with competition from powerhouse CKLW in Windsor, Ontario.*

Voice of the Broad Masses 2 (Dimtsi Hafash), Asmara, 7180, 0330-0407, finally clear of amateur QRM noted with male announcer speaking in listed Amharic language. At 0335 some flute music before another man began speaking. Whistling and HoA vocals commenced at 0337. Poor amid amateur QRM. (D'Angelo-PA/FCDX)

**ETHIOPIA**—Amhara State Radio, Addis Ababa, 6090, 2025-2101\*, male announcer hosting *Horn of Africa* vocals program. Closedown announcements and station ID at 2058 followed by choral national anthem. Fair. (D'Angelo-PA/FCDX)

Radio Fana, Addis Ababa, 6110, 0436-0451, another terrific program of *Horn of Africa* vocals hosted by male announcer speaking Amharic. Fair to good. (D'Angelo-PA/FCDX)

**FRANCE**—KBS World, Issoudun, 5980, 2023-2100\*, French language program with a male / female announcing team hosting a program of popular music many of which were sung in English. At 2058 program closed followed by station ID and closedown announcements. Fair. (D'Angelo-PA/FCDX)

Radio Nigeria Kaduna, Issoudun, 7235, 2236-2300, Hausa language program with male announcer alternating with vocal music program. Closed with station ID and orchestra National Anthem. Fair with some amateur radio QRM. (D'Angelo-PA/FCDX)

Radio Nigeria Kaduna, Issoudun, 17690, 1307-1322, tuned in to hear a male announcer speaking in Hausa. Weak signal but in the clear. (D'Angelo-PA/FCDX)

**GERMANY**—Deutsche Welle-French Relay, 15,350 heard at 1546 with a man speaking in listed Hausa. Poor. (Brossell-WI)

**INDIA**—AIR Bhopal, 4810, 1239, looks like we've got a decent subcontinental opening. Starting to move up the band and there's Bhopal on 4810 with a fair signal at 1239 check with subcontinental music and het. (Perry-IL)

**IRAN**—Voice of Islamic Republic of Iran, Sirjan, 6040, 2012-2020. English program with discussion about woman's rights in Iran and then a talk about John Bolton. Fair. (D'Angelo-PA/FCDX)

**JAPAN**—Radio Japan, Yamata, 11665, 2200, in Japanese. Three short and one long time pip, station ID then into apparent news. Poor-fair. (Taylor-WI)

Radio Nikkei 2, possibly from Chiba / Nagara, 3945, 1236, program of mellow instrumental music. Poor. (Taylor-WI)

**KUWAIT**—Radio Kuwait, Sulaibiyah, 11630, 1520-1601\*, Arabic language program with talks, music and recitation prior to closedown. Good signal. (D'Angelo-PA/FCDX)

Radio Kuwait, possibly from Sulaibiyah, 11629.8, 1458, in Arabic. Man speaking slowly through top of the hour, 1501 signal drops considerably from fair to poor with Middle Eastern music and the same man continues. No ID audible. Occasional ute giving "machine gun" interference near or on signal. (Taylor-WI)

**MADAGASCAR**—MWV African Pathways Radio, 13,670 heard at 1836 with a Bible study on Daniel. Fair. (Brossell-WI)

**NIGERIA**—Voice of Nigeria, Ikorodu, 9690, \*1800-1832, opening of English service with news and program called *60 Minutes*. A lot of discussion about upcoming democratic elections. Fair to good signal. Re-tuned at 1900 but Spain opened

on the channel blocking Nigeria. (D'Angelo-PA/FCDX)

**OPPOSITION**—Shiokaze, possibly from Yamata, Japan, 7245, 1358, in Korean. Man talking over mellow music, ID, 1400 off. Poor-fair. (Taylor-WI)

Dengê Welat, Issoudun, 9525, 2131-2200\*, non-stop Kurdish language talks by a male announcer until group singing at 2156 prior to carrier being terminated at top of the hour. Fair but steadily improving signal. Again at 0348 with male announcer speaking Kurdish. Good signal. (D'Angelo-PA/FCDX)

Dmtse Radio Erena, possibly from Kostnibrod, Bulgaria, 9720, 1751, in Tigrigna. Male announcer with call in by a man then announcer talks until feed is cut mid sentence at 1800 sign off. Poor-fair. (Taylor-WI)

Denge Welat, possibly from Grigoriopol, Moldova, 11530, 1427, in Kurdish. Very distinctive folk group singing by women. I had to leave the room and when I returned at 1440 there was a male announcer, bumper into a woman talking at some length (maybe a speech). Fair. (Taylor-WI)

Radio Tamazuj, possibly from Talata Vololondry, Madagascar, 11705, 1504, in Sudanese Arabic. Male announcer with distinctive stinger, same announcer, same stinger, second male announcer, another male announcer interviews a woman, stinger, ID into first man. Fair. (Taylor-WI)

Radio Sana'a, possibly from Jeddah, Saudi Arabia, 11860, 1449, in Arabic. Man giving apparent speech. Poor. (Taylor-WI)

Radio Dabanga-South Africa Relay, 15,350 heard at 1541 with talks in listed Sudanese. Poor. (Brossell-WI)

Eye Radio, Santa Maria do Galeria, 15410, \*1500-1546, male announcer with English language opening station ID and announcements quickly followed by Arabic. Arabic news followed by English news with many items focused on South Sudan. Poor to fair. (D'Angelo-PA/FCDX)

**PALAU**—T8WH, Medorn (World Harvest Radio), 9965, 1243-1306, thanks to a tip from Rich Cuff caught some religious vocals until 1259 when a male announcer gave station ID: "This is T8WH, Palau. This is World Harvest Radio ... send reception reports to P. O. Box 1, South Bend..." Poor to fair. (D'Angelo-PA/FCDX)

**PERU**—Radio Huanta 2000, Huanta, 4747.4, 0002-0023, nice program of OA vocals but poor to fair signal suffered from a lot of CODAR ARM. (D'Angelo-PA/FCDX)

Radio Tarma, Tarma, 4775, 0207-0406, male announcer speaking Spanish and station IDs with plenty of OA music. Series of announcements at 0226. Kept waiting for them to closedown periodically circling back to them but they kept on playing OA music, which was fine by me. Poor to fair with some CODAR QRM. (D'Angelo-PA/FCDX)

**PIRATE**—Radio Boo Boo, 6925 USB, 2150-2221. "30 days in the hole," "Don't call us, we'll call you," long guitar solo, "Papa was a rolling stone," 2206 SSTV (Polar bears around a fire "Radio Boo Boo. Whammer jammer"), blues harmonica, 2211 off. Poor-fair. (Taylor-WI)

Yeah Man Radio, 6925 AM, 0043-0106\*, male announcer hosting program of jazz instrumental music with English language talk between musical selections talking also mentioning listeners to have a "Happy Thanksgiving." Closed with a final station ID before pulling the long. Fair to good signal. (D'Angelo-PA/FCDX)

QWK, 6930 USB, 2206-2212, Mellow instrumentals with pauses between songs, gravelly-voiced man gave station ID and shout out to Redhat, (Taylor-WI)

Radio Free Whatever, 6965 USB, 2203, instrumental rock, station ID, song abruptly stopped, "Oh oh" and Dick Weed explained his internet crashed. Went off the air to reboot. Second man came on with some funny comments, then Dick Weed back on and restarted music by Wunderbar into a program of rock music, station IDs and talk. Fair. Apparently the second man was a pirate spammer, not planned. (Taylor-WI)

X-FM, 4070, 0151, station ID, invitation to log on HFU, HF Café, FRN, Redhat talking about having a "normal show" with

a list of songs to play, call in, or Gmail for requests, bunch of station IDs including a canned ID into start of music. Program of mellow rock, talk, and many station IDs. Mentioned why he was off for a time and how he got back on tonight. Good. (Taylor-WI)

**SOMALIA**—Radio Hargeisa, 7120, 0404-0436, Rich Cuff spotted this with a male announcer reading the news in Somali. Mix of Horn of Africa music and talks. Poor to fair. Next night noted just after opening at 0332 with a male announcer reading the news in Somali with a decent signal. (D'Angelo-PA/FCDX)

**SOUTH AFRICA**—Radio Sonder Grense, Meyerton, 3320, 0312-0355, Afrikaans language program with popular music selections hosted by a female announcer. Good signal. (D'Angelo-PA/FCDX)

Channel Africa, Meyerton, 3345, 0308-0347, English service with various features including a conversation between a man and woman about local events in South Africa. Almost gone by tune out. Poor to fair. (D'Angelo-PA/FCDX)

**SOUTH KOREA**—KBS World Radio, possibly from Kimjae, 7215, 2320, in Mandarin. Two male announcers, correspondent report, and back to announcers. Fair. (CNR 1 also listed on this frequency, however this was not any of the many CNR 1 frequencies or jammers). (Taylor-WI)

KBS World Radio, Kimjae, 9805, 2204-2234, male announcer with news bulletin in the Indonesian language. Feature segments after the news at 2208 after a station ID. An English language station ID at 2218 as "KBS World Radio." Fair. (D'Angelo-PA/FCDX)

KBS World Radio, possibly from Kimjae, 9805, 2022, in Indonesian. End of song, woman starts talking over music then man joins her. Fair. (Taylor-WI)

**SRI LANKA**—Sri Lanka Broadcasting Corporation, Trincomalee, 7120, 1139-1200\*, flute music until time pips at 1145 when switched into Hindi service program with apparent

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news until prayer just before close. Poor to fair. Next afternoon, 1906-2000\* with program of Somali language talks and some rustic music. Poor. (D'Angelo-PA/FCDX)

**SWAZILAND (Eswatini)**—Trans World Radio, Mpangelo Ranch, 3240, 0309-0346\*, a long talk by a male announcer in the listed Nda language. Station ID and closedown announcement at 0345 followed by IS and carrier cut. Fair at tune in but deteriorating rapidly. (D'Angelo-PA/FCDX)

**THAILAND**—Radio Thailand, Udorn, 5875, 1109-1122, vocal by a female singer followed by a man with closedown in the Vietnamese language. After brief interlude of bells, a man mentions: "That completes our program in Vietnamese." There was another round of bells prior to an English language announcement: "This is HSK9, Radio Thailand World Service broadcasting from the Public Relations Department in Bangkok." A male announcer began the Malay language program. Fair signal. (D'Angelo-PA/FCDX)

Radio Thailand, Udorn, 9940, \*1228-1300\*, open carrier until bells opening English news with national news followed by Bangkok Airways commercial and then global news. Fair to good signal but deteriorating by closedown. (D'Angelo-PA/FCDX)

Radio Thailand, Udorn, 13745, \*0000-0043, opening of the English news program hosted by a male and female

announcers with numerous public service announcements and usual array of commercial ads. Although briefly lost signal around 0029 as antenna pattern changed, reception continued afterwards. Poor to fair. (D'Angelo-PA/FCDX)

**TURKEY**—Voice of Turkey, possibly from Emirler, 11815, 1448, in Turkish. Sports (probably soccer / football). Fair. (Taylor-WI)

Voice of Turkey, Emirler, 12035, 1330-1424, English program with news, *Review of the Turkish Press*, Turkish music and various features (*Turkey My Home*, *Turkey in a Nutshell*, *Question of the Month*, etc.). Closed with multi-lingo station IDs. Good signal. D'Angelo-PA/FCDX)

**UNITED STATES**—Overcomer Ministry (Brother Stair), Kostinbrod, Sofia, Bulgaria, 5900, 2317-2335. Brother Stair inviting phone calls from listeners, talking about shortwave alternating with a male announcer discussing atomic blasts and destruction being planned, etc. Poor to fair but steadily improving. (D'Angelo-PA/FCDX)

TransWorld Radio, Dhabayya, UAE, 7235, 0344-0345\*, light instrumental music just prior to carrier being terminated. Fair. (D'Angelo-PA/FCDX)

TWR India, via Gavar, Armenia, 9305, 1403, in Hindi. Program of South Asian music. Poor-fair. 9910, fair. (Taylor-WI)

Adventist World Radio, Trincomalee, Sri Lanka, 9540, 2131-2200\*, Mandarin language religious program with very long

talks by a male announcer with only one vocal selection noted. Fair. (D'Angelo-PA/FCDX)

Adventist World Radio, Trincomalee, Sri Lanka, 9540, 2144, in Mandarin. Man and woman alternating, 2158 ID and program ends, carrier cut at 2200. Fair. (Taylor-WI)

VOA-UK Relay. Wooferton, 11,610 heard at 1700 with "This is the Voice of America," followed by two announcers speaking alternately in listed Somali. Fair. (Brossell-WI)

Radio Farda, via Lampertheim, Germany, 11695, 1445, in Farsi. Persian music. Poor-fair. (Taylor-WI)

Adventist World Radio, via Nauen, Germany, 11730, 1446, in Mandarin. Man preaching. Fair. (Taylor-WI)

Adventist World Radio, Kostinbrod, Bulgaria, 11945, 1512, in Tamil. "How great thou art" in Tamil with South Asian accompaniment. Recording stutters occasionally, into a male announcer talking at some length. Fair. (Taylor-WI)

Radio Liberty, Biblis, Germany, 11965, 1454, in Turkman. Man reading apparent news. Poor. (Taylor-WI)

VOA-Botswana Relay, 15,580 heard at 1831 with a report on the wildfires in California. Fair-to-poor. (Brossell-WI)

**VATICAN**—Vatican Radio, 11,620 heard at 1553 with a conversation between two men in listed Amharic. Poor. (Brossell-WI)

**ZAMBIA**—Zambia National Broadcasting Corporation (Radio One), Lusaka, 5915, \*0246-0314, familiar fish-eagle IS until commencement of choral national anthem, a male announcer opened program in a local language. Tribal singing until news at 0258. After news returned to music programming. Poor. (D'Angelo-PA/FCDX)

## Thanks

Bob Brossell, Pewaukee, WI. Equipment: JRC NRD-545 (Godar DXR-1000 antenna); KENWOOD R-2000 (Grove Flex antenna); DRAKE DSR-2 (Long-wire); SONY ICF 6700W; ETON E1; SONY ICF SW77.

Rich D'Angelo, French Creek State Park DXpedition No. 56 (November 18, 19, and 20, 2018). Equipment: Ten-Tec RX-340, Drake R-8B and an Eton E1, 500-foot wire essentially north for the RX-340 and 250-foot wire essentially northeast for the R-8B and a whip antenna for the E1.

Ralph Perry, Wheaton, IL. Equipment: Drake R8B, Dentron Super-Tuner, Ameco & Palomar Preamps, Wellbrook Loop, 350-foot LA BOG, Delta Skyloop.

Mark Taylor, Madison, Wisconsin. Equipment: Perseus, Elad FDM-S2, Airsty HF+, ICOM R75, Tecsun PL 880, and various other portables; 42-meter dipole, 100-foot long wire, and W6LVP loop.

**Looking Ahead...** Here are some of the articles we're working on for upcoming issues of **CQ**.

- Saturating Ground Systems Under Limited-Space Verticals
- A Simple 14-Watt Amplifier for Digital Modes on 630 Meters
- Results: 2018 CQ World Wide RTTY DX Contest
- How I Became a Lunatic (My Intro to EME)
- Building and Using a Lightbulb Antenna

## Upcoming Special Issues

**June:** Take it to the Field

**October:** Emergency Communications

**December:** Technology

Do you have a hobby radio story to tell? Something for one of our specials? **CQ** now covers the entire radio hobby. See our writers' guidelines on the CQ website at <http://bit.ly/2qBF0dU>.

## *Amateur and SWL News From the Southern Hemisphere and Beyond...*

*Popular shortwave broadcaster may reappear, the business of issuing licenses, new allocations for Turkey and 1X2 callsigns reappearing in the UK.*

### **Campaign in Australia to Bring Back Shortwave Radio**

When the Australian Broadcasting Corporation ended its shortwave services in January 2017, many residents became upset because, in several remote communities and in the Northern Territory, the broadcasts were a lifeline to civilization. Now, politicians are getting involved.

A Labor Government under Opposition Leader, Bill Shorten, in a bid to win the 2019 election, has vowed to provide the required \$2 million in funds to bring services back.

Senator Nigel Scullion, minister for indigenous affairs, acknowledged the vital necessity of shortwave radio, particularly during cyclones, floods, and other emergencies. He was quoted on radioinfo.com as saying: "This is a really poor decision by the ABC Board which is supposed to ensure the broadcaster provides services, such as the shortwave radio service, not provided by other organizations."

In a recent report from Amateur Radio Newline, Chris Nott, president of the NT Cattlemen's Association, was reported to mention that HF shortwave radio transmitters are a necessity in the bush where mobile and data coverage doesn't exist for FM and AM radio.

[Amateur Radio Newline]

### **WIA Seeking to Take Over Some ACMA Duties**

The Australian Communications and Media Authority (ACMA) released a consultation paper in June seeking an approved body to take over some of its duties by providing training, conducting examinations, and issuing certificates of proficiency as delegated under the Radiocommunications Act of 1992. The current arrangement expires early this year.

The Wireless Institute of Australia (WIA) recently formed the WIA Education Group to work to provide a response that is in the best interests of the amateur radio community, allowing the most up-to-date and flexible delivery options for future exams and callsign management.

So far, the group has come up with ideas to reduce barriers to entry with cost reduction, immediate delivery and quicker processing times, as well as automating the process to ensure a smooth and quicker entry into the hobby. As the selection process grows closer, the WIA Education Group hopes to be chosen for this task.

In addition, the ACMA will be seeking additional Registered Training Organizations (RTOs) to provide training, conduct examinations, and issue statements of completion consistent with an established syllabus. The requirement to be an RTO is intended to ensure that certain standards of organizational governance are met.

[WIA and ACMA]

### **SARL Meets With Radio Regulator ICASA**

South Africa's ICASA/SARL Liaison Committee met at the end

of November to discuss various regulatory issues affecting amateur radio in South Africa.

One topic covered was the process of type approval affecting all equipment that utilizes the radio frequency spectrum or has an effect on it. SARL stressed that this does not apply to homebrew amateur radio equipment for personal use, and encourages hams to develop their hobby through homebrewing.

The issue of recently type-approved commercial VHF equipment that results in unauthorized use of amateur frequencies was tabled. ICASA is aware that SARL has filed a complaint. ICASA has agreed to supply SARL with details of the Regional Managers who are dealing with radio interference and, over the next few weeks, SARL will develop guidelines on how interference should be reported.

The ICASA ruled that hams wishing to receive satellite signals and weather photos in the 137-MHz band must apply for a separate satellite receiving license as it is not covered under their amateur radio license.

ICASA also confirmed that *Communications Regulators Association of Southern Africa* (CRASA) had accepted the proposal to join the CEPT TR61-01 scheme which allows licensed radio amateurs to operate in member countries for a period of up to three months without the need to apply for a license. The final process to ensure that all administrations have communicated this through their structures may take some time.

[Southgate Amateur Radio News]

### **Turkey Gets Two New Allocations**

Turkey's telecom regulator, BTK, introduced two new amateur radio frequency allocations in a government gazette notice dated November 29, 2018 — the new WRC-15 60-meter secondary allocation of 5351.5-5366.5 kHz with a power limit of 15 watts EIRP, and a 6-meter allocation of 50-52 MHz, with a power limit of 75 watts. All modes are allowed on both bands.

[ICQPodcast.com]

### **Ofcom Still Issuing 1X2 Callsigns**

Following a Freedom of Information request to UK telecoms regulator Ofcom to find out how many amateur radio 1x2 callsigns have been issued recently, Ofcom responded that from August 2017 to October 18, 2018, there were 48 of the 1x2 format callsigns (for example, G2TV, M5AB) either issued or re-issued.

[Southgate Amateur Radio News]

### **In Closing**

As I'm putting this column together this month, we are in a season between major holidays. You'll be reading this in February, but I'm submitting it in December. Not much is happening that I can see, which, of course, is good news if we're referring to natural disasters. A few fires and floods still occurring with hams helping as always, but no new news was sent my way. Ham radios and accessories will be given as gifts this holiday season, so maybe there will be some success stories to publish in the "new year." I'd appreciate if you tell us all about it — contact <aa6ts@cq-amateur-radio.com>, and don't forget to send photos.

— 73 de AA6TS

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Email: <aa6ts@cq-amateur-radio.com>



# EMERGENCY COMMUNICATIONS

BY WALT PALMER,\* W4ALT

## Emergency Communications and Accessibility

One of the best parts of my job as EmComm editor for CQ magazine is receiving cards, letters, and emails from readers. Every month, I receive comments about an article I have authored, sometimes complimentary, sometimes to point out where I was wrong. Hey, I'm human and can take the licks. So, before we begin this month's offering, my direct email is <walt@w4alt.com>, or feel free to pen a card or letter to me at P.O. Box 67, Lewes, DE 19958.

I received a lovely handwritten letter from my new friend Michael, KC5DBD, in Huntsville, Texas. Michael has been a ham since 1992 and enjoys working mobile emergency communications. However, in 2009 he became dependent on crutches and since 2014 has been using a wheelchair, with no hope of walking again. Michael asked if he would be of any use as a "wheelchair mobile" for emergency communications. It took me about two seconds to begin my response.

*Michael:*

Regarding your idea of "wheelchair mobile," WHY NOT?

What about being a Net Control Operator? If you have the ability to work a radio that can hit a repeater, a reliable net controller is the perfect job for anyone who is not physically able to "beat the streets." I would suggest you get in touch with your local amateur radio group.

As for training material, I'm including several pages from the ARRL website regarding emergency communication training. I'd also recommend you have your librarian help you find FEMA Independent Study Courses for ICS 100 and 200, plus NIMS 700 and 800. These courses can be viewed and studied online.

You've already taken the first step by maintaining your ham license. Using it to further your training in the world of emergency communications is a noble cause. The great thing about our hobby is even with physical disabilities, we can offer our talents and services during times when communications is paramount.

— 73, W4ALT

Michael's letter got me wondering about others who may be interested in ham radio and emergency communications but who also have physical disabilities. So, I posted a request to the Facebook group RACES - Radio Amateur Civil Emergency Service. The emails began to pour in.

*First was from Gene King, KI4LEH:*

I am legally disabled, heart issues, mobility issues in which I use a walking cane to get around and physically limited. Of course, I can operate a radio and do so. And I can get set up with my Go-Kit when needed, it just takes me longer to do so.

Now, I volunteer as the RACES Officer for the Sumter County, Florida-Division of Emergency Management. I am

able to take care of the administrative tasks of our local RACES, do the planning and implement what we need to. Of course, I have some good folks to whom I can delegate a task and they get it done.

I am the only legally disabled volunteer (here right now). However, the door is open for others who may be interested...

— 73, Gene

*Sumter County Emergency Management  
Radio Amateur Civil Emergency Service (RACES)*

Another notable message was received from Ron Mesic. My questions are in italic.

*What is your disability?*

Fibromyalgia. Constant pain and fatigue, occasional pain attacks equivalent to a broken femur, serious challenges getting sleep. Headaches and eye aches and pretty much anything aches. A lot of amplification of everyday aches and pains.

Imagine if someone threaded thin wire through your muscles and joints — it would hurt a little just staying still, but when you start to move it would hurt a lot — and once you got moving it would be pretty manageable — until you stop. Then imagine you could be stabbed randomly with an icepick in the head, but it just lasts a minute. Kind of like Voodoo.

*What are your physical or mental limitations?*

"Fibro Fog" is an occasional reduction in memory and mental acuity associated with pain and fatigue. It cycles.

I can't rely on stamina and may or may not be able to exert force. I may need to wait until I feel up to it in order to do some work on the house or the car, and I can't do my own antenna work any longer, but if I wait for the opportunity, I can still do many things.

It's distressing because it isn't predictable. You wind up queuing up tasks so that you can jump on it if you feel well enough. I'm pretty fortunate that I have a "desk job."

Not to be indelicate, but there are times where proximity to plumbing is a priority.

*How long have you been a ham?*

Since April 2003

*How long have you been disabled?*

Approximately 20 years — it was a gradual transition, but it was diagnosed around 1998 or so.

*How long have you been active in EmComm?*

Since approximately 2005

*What tasks do you perform with the group?*

Former Deputy EC/RO (Emergency Coordinator / Radio Officer).

\* email: <w4alt@cq-amateur-radio.com>

*I'm interested in jobs handicapped individuals can excel at during an activation. While I imagine it would be difficult to deploy, what tasks are available to handicapped individuals?*

Biggest issue with deployment is sleeping arrangements. I can still do many things, but I pay for it later. If there's a flare-up, I may not be able to walk or even drive much. I've spent the night in a Red Cross shelter as part of an exercise — and I survived, but it wasn't pretty. When I go to annual training ... I stay in billable quarters or else get a hotel. I've done the barracks, but I can't count on performing well if I don't get some kind of sleep — it's really just trying to stack the deck so I'm more likely to be able.

I haven't supported the marathon or other "runner safety" call-outs for the last few years because mornings are just too rough. Maybe if the pain cycle swings to a happier place I can do those again. I love doing runner radio support, and have contributed — I think greatly — through providing accurate and detailed after-action reports.

Another critical problem with activation is the fact that disasters are typically accompanied with low pressure weather systems — and I'm sensitive to weather changes.

*Is administrative work your specialty?*

I'm an engineer, so some of that comes naturally, I suppose. I've had many, classes including the ICS-300 and ICS-400 FEMA training on managing complex and expanding incidents. If I had to claim a specialty, I'd say training — developing and delivering. Also net control operation, but not so much lately.

*Would this include logistics and planning?*

I'm a Major and Brigade S3 in the State Defense Force <[www.mivdf.org](http://www.mivdf.org)>. I was Hospital AEC, I do Skywarn spotting, tornado siren test reporting, (and) CERT.

I was Deputy EC/RO for Wayne County and was asked to be EC/RO for Macomb County — but that's still in limbo. I'm also engaged with the amazing TeamRubicon organization.

Come to think of it, I was the Planning Officer for SATRA for a little while.

*Would your disability permit you to act as Net Control?*

Sure. Not a problem at all, as long as there's not a flare-up going on.

In general, I like to sign up for things with a backup person already on deck, just in case. My personality doesn't allow me to "drop the ball." if I commit to something, I'm going to do it — even if I pay for it a lot later.

Here's the deal: Fibromyalgia sucks, but you need to move in spite of pain. If you don't move, you atrophy.

If I went to a gym and pushed a bar back and forth, but hurt for three days afterwards — I don't see the value proposition. So I volunteer. I mentor high school robotics & grade school STEM, I work SAR (search-and-rescue) with the MIVDF (granted, I tend to stay at the command post unless absolutely necessary) and teach SAR to Boy Scouts. I do a lot with CERT, work with the MI-TESA Transportable Emergency Surge Assistance medical facility — in that case I'm the Infrastructure Strike Team Lead, bringing electrical tech and safety expertise to bear for mobile hospital setup. There's more — basically these things hurt to do — but I see value in doing them. They also come with a start time and a commitment — I can't hit "snooze," so I get out of bed, get dressed, and soldier on.

In 2018 I supported the PACE program at work — students from 60 universities in something like 14 countries converged on my work campus to compete in a personal mobility challenge. That was a week of 18-hour days — it was hard, but so worthwhile. After a week or two, the pain settled back down.

I worked the docks at the FIRST Robotics World Championships — trying to get 400 teams in and out of Cobo Hall in Detroit as quickly as possible — needed medication afterwards, but it had value, it supported purpose, it fed a life of significance.

Not that it will get me a cup of coffee anywhere, but all this volunteering has gotten me a lifetime achievement award from the White House (you may remember President Bush's "Thousand Points of Light" speech.)

I actively try to recruit folks I know in beds or wheelchairs to be more "radio-active" — I've tried to use stationary hams as an information nexus — when folks are in the field, they would be the ones with the phone lists and the maps and the "plan of the day" so they can handle most question traffic. It's very common for a random person to walk up to anybody with a HiViz vest and/or a radio expecting them to know what's going on ... commonly "where are the bathrooms," but still — I try to get handicapped folks engaged as the "answer man." Haven't been as successful as I'd hoped, though — frequently get interested conversation but when it comes time to actually do something — crickets. This reminds me — I developed and delivered training specific to "disaster preparedness for persons with disabilities."

My thanks to all who replied to my Facebook request and especially to Gene and Ron for their straightforward, no-holds-barred accounts and realizations there are meaningful opportunities for EmComm for hams with disabilities.

Circling back, Michael asks if he'd just be "in the way" with his "wheelchair mobile." Gene and Ron have provided their own personal accounts of how a disability cannot and should not deter anyone from volunteering their time and improving their radio skills to include emergency communications.

There are several articles written over the years regarding handicapped ham operators. Here are just a couple of them:

<[www.hamradioandvision.com](http://www.hamradioandvision.com)> - discusses ham radio for the blind operator.

<<https://tinyurl.com/ybe3cxb>> - Michael J. Runholt, KCØYFV, offers his story about HandiHams <<http://handi-ham.org/wordpress1>>.

As you will learn from these articles and testimonials, there are opportunities in emergency communications related to planning, logistics, fixed transmission points, net controllers, administration, and organization well suited for hams with disabilities or other physical challenges.

I urge radio groups and clubs to consider seeking out individuals with disabilities to help bolster their ranks and provide a resource for this untapped talent.

I also urge those with a physical limitation to seek out your local radio club as well as continuing education, such as the free FEMA self-study courses available online <<https://tinyurl.com/o64eada>> for a comprehensive list of topics and courses. Don't let a disability deter you from helping others!

Keep those cards, letters and emails coming! De W4ALT.



# HOMING IN

BY JOE MOELL,\* KØOV

## Tales of the 2018 CQ World Wide Foxhunting Weekend

“Over the river and through the woods, a sly little fox he was. So sly that this little fox sought the help of his twin.” That is how Nathan Hardman, N8THN, of Clarksville, Michigan announced that he had deployed a pair of hidden 2-meter transmitters for his friends to find in the next 12 days.

“I hope you all have your fox-hunting skills tuned up for the season,” he continued. “The two foxes are hiding within walking distance of designated parking areas. As this is an extended hunt, you must activate the fox. Key your radio, identify your transmission and press the 1 key. If you are close enough for the fox to hear you, it will begin transmitting a sequence of tones for 30 seconds followed by a Morse ID. When you find one of the foxes, email a picture of it to me and post a note to the Michiganfoxhunter Yahoo group of your success.”

To Nathan and his friends, looking for hidden radio transmitters is a favorite ham radio activity. For 21 years, CQ magazine has sponsored the annual Foxhunting Weekend to encourage hams and prospective hams everywhere to join the fun of using radio direction-finding (RDF) techniques to track down transmitters that their fellow hams have put in

unusual places. “Foxhunting” is just one name for this activity when it’s done in vehicles. You also may hear it called T-hunting or bunny hunting.

As always, my 2018 Foxhunting Weekend announcement in CQ brought a batch of hunt announcements and reports about hams having fun. Rules were determined locally so few hunts were alike, except for the on-foot radio-orienteeing events that followed standard rules of the International Amateur Radio Union (IARU). As you prepare for Foxhunting Weekend 2019, read on to find out how your fellow hams had a blast doing transmitter hunting all last year.

### Rolling to the Hidden T

The most popular form of RDF contesting in the U.S. is the mobile T-hunt on 2 meters. Hunt-when-you-can opportunities like Nathan’s in Michigan and those of the Connecticut Foxhunters, provide a no-stress way to carefully test out RDF equipment and learn how to use it effectively. They are also suitable for those who have work commitments on weekends and other prime foxhunting times. But more popular are mobile hunts in which everyone starts at the same time and a winner is determined, either by time-to-find or by driven mileage.

### Foxhunting on the Hudson

A good example is the annual Foxhunting Weekend event of the Peekskill/Cortlandt Amateur Radio Association (PCARA),

\*PO Box 2508, Fullerton, CA 92837

email: <homingin@aol.com>

Web: <www.homingin.com>



A beautiful day in the Rockies brought out this foxhunting group to the annual picnic of the Ski Country Amateur Radio Club. Their 2-meter equipment ranged from the usual measuring tape Yagis to log-periodic beams and Arrow satellite Yagis. (Photo by Bob Cutter, K1ØG)





*There is always a good turnout for the annual spring foxhunt of the Radio Amateurs of Tacoma. Here, several hunters are getting very close to one of the transmitters. (Courtesy of Rich Patrick, KR7W)*



*Orienteering enthusiast Addison Bosley, KJ4VCV, wore his competition clothes during the on-foot foxhunt at the Dayton Hamvention. (Photo by Bob Frey, WA6EZV)*

based along the Hudson River in New York, about 40 miles north of the Big Apple. This year's fox team was Jay Albano, N1NRP, and Marlon Henriquez, KC1EHW. They were visitors from Connecticut who had won the 2017 hunt.

At the Beach Shopping Center starting point were three PCARA teams and three visiting teams from Connecticut. Malcolm Pritchard, NM9J, reported, "Jay and Marlon took turns at the microphone, keying up for short periods as they talked, rather than leaving the carrier on continuously. The signal was reasonably strong at the start as alert hunters began swinging their antennas around for the best direction. Maximum signal appeared to be coming from due east."

Everyone took off and in just 39 minutes, Mike Ardovino, N2EAB, was first to find Jay and Marlon. Others arrived later, with the last team coming in at 90 minutes. Then everyone went to a nearby diner. "Notes were compared, routes were recalled and antennas were evaluated," NM9J wrote. "Here's to next time when N2EAB will be invited to play the fox."

### California Cruisin'

The PCARA foxhunters began their hunt together, but in some first-to-find hunts, teams can start from wherever they are at the time the fox comes on the air. An example is the monthly hunt of Orange County RACES in southern California. Hunt organizer Ken Bourne, W6HK, seeks out RACES members to take the group's foxbox, place it in an unusual location and turn it on just after the weekly net on a county-wide repeater. By monitoring the repeater output with a separate receiver, hunters can tell when the fox is on the air, even if they can't hear it on the input. Some of the hunters compare their signal strengths and bearings on a separate UHF repeater and beacon their travels via APRS, while others prefer to maintain radio silence as they hunt.

Before the OC-RACES hunt, the hider announces the city or area where the fox will be located. Some hunters use this information to try to guess the spot and start close to that location. Others prefer a clear, high location within the boundary for the strongest starting bearing.

### Moving Around in Chicago

The Chicago area has first-finder-wins mobile hunts almost every Saturday evening at 8 p.m. Unlike OC-RACES hunts, the Chicago hunters start together from the same location, which is dif-



ferent each weekend of the month. Mike Brost, WA9FTS, keeps careful records of the results of each hunt so that at the end of the year, the overall best foxhunting team can be honored. You can read stories of these hunts in the monthly Chicagoland Foxhunters Report<sup>1</sup>.

## Starting the Year Right

In addition to hunt-when-you-can opportunities, the Connecticut foxhunting group gathers at Wapping Elementary School in South Windsor in the afternoon of New Year's Day for a mobile foxhunt on the input of a local repeater, organized by Paul Gibson, N1TUP. His alternative to college football viewing features a tailgate party at the ending point.

## No-Wheels Foxhunting

Another kind of radio foxhunting is done without vehicles and takes place in open spaces of all sizes, from big backyards to wilderness forests. Known as foxtailoring, radio-orienteering, and Amateur Radio Direction Finding (ARDF), it rewards those who can get their bearings on the run, or at least at a fast walk.

A wide variety of on-foot foxhunts took place in 2018. Simplest were the informal hunts at hamfests and picnics, such as the annual Foxhunting Weekend get-together of the Ski Country ARC. This time it was hosted by Pat Fitzgerald, KVØK, at his home in Glenwood Springs, Colorado. The huntmaster was Brent Williams, KDØWAK.

My experience has been that it's difficult to get folks to run around seeking transmitters after they have completed a big potluck lunch, but that didn't seem to affect the intrepid Ski Country transmitter trackers. First, they tested their gear on a practice transmitter in plain sight nearby, then they headed out for the main fox.

Once again in 2018, Rich Patrick, KR7W, was huntmaster for the Radio Club of Tacoma's spring foxhunt at Fort Nisqually in Point Defiance Park. He wrote that he arrived early for a 2-hour walk in the woods to hide four "bunnies" at locations that were progressively more difficult to find. The farthest was almost a half-mile from the start location, sending its Bugs Bunny cartoon message, "What's up, Doc? Heh, heh, heh, heh."

KR7W reported, "Sixteen hunters autographed the sign-in sheet. It's hard to say who the fastest hunter was, because one third of them did not write their name and call on the self-score sheet and at least three hunters didn't turn in a score sheet. Twelve of them



*Ten-year-old J.R. Lindauer of Thousand Oaks, California is finding his first hidden transmitter at Hillcrest Park under the watchful eyes of his mother Allison, KG6AAT, and his grandfather, Dean Dods, KD6I. (Photo by Joe Moell, KØOV)*

did fill out and submit the no-name-required comment sheet, indicating that they had a good time, that they didn't think it was overly difficult, but at the same time they were challenged."

## Hunting at Hamvention®

The annual record for most transmitters in an on-foot foxhunt is almost always achieved by the OH-KY-IN ARC. Their Hamvention® on-foot hunts seem to get bigger every year. With the move to Xenia, the hunt organizers found a new location at James Ranch Gardens, directly across from the Greene County Fairgrounds.

Dick Arnett, WB4SUV, announced, "We will have over 30 low-power transmitters that can be found in any order within a one-hour time limit. Each transmitter has a code number attached that must be recorded to get credit for finding the transmitter. Some of them are disguised to match the surroundings and some are easy finds. All participants will get a sheet with the transmitter frequencies before starting."

Unfortunately, weather nearly spoiled this event as Bob Frey, WA6EZV reported: "On and off rain the entire day caused not just an early exodus from the convention for many on Saturday, but it also kept away several of the fox hunters as threatening storms and lightning were projected to hit near the time of the hunt. This forced us to limit the hunt to 30 minutes, not nearly enough

time to find all 33 hidden transmitters. The seven teams that decided to hunt had a good time and we finished just before the rain. Matt Sanderson, KC9SEM, was declared the winner with 14 finds."

## Antennas in the Park

There was no rain to spoil the Fullerton Radio Club's annual Antennas in the Park session. However, the temperature topped out at 94° as everyone gathered in Hillcrest Park for foxhunting, food, and radio fun. It was pleasant inside the Izaak Walton cabin, where several newcomers built tape-measure Yagis. In the 40-acre surroundings were three easy 2-meter transmitters for training and antenna testing, plus a five-transmitter ARDF short course.

Five of the Hillcrest participants had so much fun that they traveled to San Diego the next weekend to be among the 28 who took part in the annual on-foot foxhunt of the San Diego Transmitter Hunters. This year's location was Vacation Isle Park, a hill-free grassy site in the middle of Mission Bay. Joe Coronas, N6SZO, and Joe Loughlin, KE6PHB, set out a five-transmitter, 2-meter ARDF course. While the hunters were tracking the foxes, they got the grill going for a post-hunt barbecue.

## Champions-in-Training

ARDF sessions like those in Fullerton and San Diego are great training for



USA's annual ARDF Championships. The 2018 championships took place near Truckee, California in June<sup>2</sup>. Plans are now under way for the 2019 USA ARDF Championships, which will be combined with the championships of IARU Region 2 (North and South

America). Backwoods Orienteering Klub is organizing these competitions, which will take place near Raleigh, North Carolina from July 28 through August 4. Anyone who can safely navigate the woods with a map and RDF equipment is welcome to go for the gold. My next

"Homing In" column will have much more information about this full week of fox-hunting fun in the Tar Heel State.

## Getting Scouts Involved

This year's reports show that young persons participated at almost every one of the on-foot foxhunts. Foxhunting teaches useful radio skills and is great exercise. No ham radio or driver's license is needed to receive and follow the fox signals. That's why Scouting's Radio Merit Badge syllabus now includes an option for ARDF activities<sup>3</sup>. The annual Scout Jamboree-on-the-Air (JOTA) on the third weekend of October is an ideal opportunity to introduce foxhunting to Scouts in your town.

For the fifth year, campers at the Cabrillo Youth Center in San Pedro, California, were offered a JOTA foxhunting experience. I put out eight 2-meter mini-transmitters around the 12-acre site for the Scouts to find with help from Tom Gaccione, WB2LRH, and Bob Houghton, AD6QF. There were also some transmitters on the 80-meter band, set by Marvin Johnston, KE6HTS.

The San Diego transmitter hunters provided foxhunting for JOTA at Camp Balboa, which is the northwest corner of San Diego's famous 1,200-acre urban park. Five mini-transmitters were hidden in the campgrounds and VK3YNG "blue boxes"<sup>4</sup> were provided to the Scouts for RDF. According to Joe Coronas, N6SZO, "We elected to use the audio S-meter mode without headphones so that all of the Scouts in a hunting group could hear the tone pitch change to indicate the bearing."

N6SZO continued, "Each fox transmitter had a piece of colored tape on it so that when the Scouts returned, they could tell us what color of tape was on the fox they found so we could verify that they found the correct one. This was in response to last year when several Scouts saw others finding a fox and when their turn came, they just went to where they saw the others and assumed that what they saw was the one that they were looking for."

JOTA isn't the only time when Scouts can experience foxhunting. In Ventura County, California, Doug Dubrall, WA6RJR, provided hidden transmitter hunting at the Thousand Oaks Boy Scout Camporee in April. The emphasis at this event was competition of all types, so Doug put together a "secret transmitter hunt" to get the Scouts excited.

An October "Scout-O" orienteering event in Cincinnati gave over 70 Scouts the opportunity to try ARDF. Members



Scot Barth, KA6UDZ, gets his first bearings at the ARDF session in Vacation Island Park in San Diego. A month later, he was a competitor at the USA ARDF Championships. (Photo by Joe Moell, KØOV)



Glen Christensen, AI6RR, helps a pair of Scouts find a hidden transmitter during JOTA 2018 at Camp Balboa in San Diego. (Photo by Joe Coronas, N6SZO)



of the OH-KY-IN ARC built over a dozen measuring-tape Yagis to use with VK3YNG "blue boxes" so that all participants would be using the same type of equipment. "Each receiver was programmed for two of 15 low-power transmitters that were set out," wrote Bob Frey, WA6EZV. "Scouts worked in teams of two with the first Scout using the antenna to find a transmitter. Then they switched off to locate the second one."

### Next Foxhunting Weekend — May 11-12, 2019

Mobile or on-foot, one transmitter or

many, a radio foxhunt is sure to stir up activity in your ham club. Now is the time to plan for this year's CQ Worldwide Foxhunting Weekend, which will be May 11-12. CQ doesn't impose any rules or offer any awards for Foxhunting Weekend. That's up to you and the hams in your hometown. Your hunt can be for mobiles or all on foot. Use the international rules or make up your own.

If foxhunting is new to your area or you want to get more of the locals to join your foxhunting group, consider a "Tune-up In The Park" like the one in Byron Center, Michigan last April. Sponsoring groups were the Lowell, Allegan, Grand

Rapids and Holland radio clubs. According to Tom Bosscher, K8TB, the day started with five micro-transmitters in the park for leisurely learning and equipment checking. Seasoned foxhunters were on hand to help with equipment and RDF techniques. Then at noon, a fox transmitter went on the air less than eight miles from the park for the mobile hunters.

For many clubs, Foxhunting Weekend kicks off a season of regular transmitter hunts. For others, it's a special once-a-year event, like Field Day. Since the primary objective is lots of hunt participation, we don't insist that your event be on that weekend. Any time in the spring is fine with us!

Some hams prefer the formalities of carefully crafted boundaries, specifications for signal parameters, time limits, and so forth. Others are content just to have one or more signals to hunt. No need for any regulations, they say. Talk it up on the local repeater and social media to find out what your friends have in mind.

Foxhunting teaches an important skill — the ability to find the source of signals from afar. RDF is useful for public service and volunteer enforcement. It can even save lives. Most of all, it's fun. Give it a try, but make sure your group has safe fun. See to it that no one can be injured by your hidden transmitter or by trying to get to them.

Don't let the excitement of the hunt make you an unsafe runner or driver. Please ensure that all transmitting and receiving antennas are eye-safe. Always be mindful of your own physical limitations and never take chances behind the wheel or in the forest.

Afterward, write up the results and send them to me. The list of information in a complete CQ Foxhunting Weekend report is posted on my website<sup>5</sup>. In addition to the details of date, location, hiders and winners, CQ's readers also want to know what was unique about your hunt and what lessons (positive and negative) you learned from it. Don't forget to include some sharp action photos. The higher the resolution, the better.

Let's make Foxhunting Weekend 2019 the biggest ever. I look forward to receiving your reports. Happy hunting!

#### NOTES

1. <<https://tinyurl.com/y8xzdg82>>
2. <[www.homingin.com/truckee18](http://www.homingin.com/truckee18)>
3. <[www.homingin.com/ARDFinRMB](http://www.homingin.com/ARDFinRMB)>
4. <[www.homingin.com/equipment.html#snif4](http://www.homingin.com/equipment.html#snif4)>
5. <[www.homingin.com/joek0ov/report](http://www.homingin.com/joek0ov/report)>

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# QRP: Low-Power Communications

BY R. SCOTT ROUGHT,\* KA8SMA

## KA8SMA's Top 10 Reasons for Operating QRP

**U**nless this column is your first stop, you probably know by now that February is CQ's annual QRP Special and many of this month's features are slanted toward low-power communication. I started thinking about what to prepare for this column while traveling home from a project worksite last fall. While tuning across the car's FM radio dial, I came across a radio station that was playing snips from a "Top 10 List" that had aired on an old episode of Late Night with David Letterman. As I drove along listening to the clip, I thought, "why not do a Top 10 countdown focusing on reasons for operating QRP?" I could poke a little fun at QRO operators (hi), provide some information that both new and seasoned QRP operators may find useful, and most importantly, count down to the Number 1 reason for operating QRP. So, with no further ado, I present the Top 10 reasons for operating QRP.

### Number 10 – QRP will Amaze Your Friends, Family, and Fellow Hams

You may be considered immortal when your family and friends learn you have contacted ham operators on the other side of the world transmitting only a few watts of power.

Even fellow hams, including the QRO fellows running the legal limit, are sometimes a bit bewildered when they see firsthand the accomplishment of a QRP operator. I recall one QSO several years ago when I was in an SSB pileup trying to work a DX station. After I broke the pileup and told the DX station I was running QRP with only a few watts of power into a horizontal loop, he announced that KA8SMA was some type of "Houdini" for beating out all the high-power stations. A few minutes later I received an email from a QRO station who had looked up my callsign in one of the online call directories, snagged my email address, and sent me an email that simply read "500 watts into a Mosley TA-33 at 60 feet and you worked him before me with QRP and



Photo A. The transformation ... the shirt says it all!

some wire, oh my." I was not sure if this was a congratulatory email or whether he was upset ... maybe a little of both. I think there were a few QRO operators in the pileup who were grinding their teeth after the DX station made the Houdini comment. I do admit that in some instances, credit must be given to the ham on the other end of the QSO for pulling my weak signal out of the weeds; however, at the end of the day, a contact is a contact.

### Number 9 – Operating QRP Equals Less RF Exposure

Simply put, as power output increases, so does the potential for RF energy to cause damage to the human body; hence, QRP operators generally stand a much lower risk of contracting an RF related illness due to lower power output levels. (*Ed. Note – To be clear, no study has ever established a causal link between RF exposure at the power levels used by hams and any negative health impact. The FCC standards discussed below were established out of an abundance of caution.*)

For those who may not recall, the FCC requires that amateur radio operators

evaluate the effect of their station's emissions on the human environment, which also includes the impact on themselves. The FCC has mandated that an RF evaluation must be performed if the station's transmitter power exceeds the levels shown in *Table 1*. If the results of the RF evaluation indicate that exposure to RF fields is exceeds the limits established by the FCC, then steps must be taken to correct the problem and ensure compliance. QRP stations are categorically exempt from completing this evaluation since transmitter power levels are well below the power outputs listed in *Table 1*.

Additional information on conducting an RF evaluation is detailed in the FCC's August 1997 Office of Engineering & Technology (OET) Bulletin 65, Edition 97-01. Information can also be found in recent editions of the *ARRL Handbook for Radio Amateurs*.

### Number 8 – QRP Means Portability

Today's QRP transceivers can slip into a backpack for a hike down the trail and a quick setup for making contacts from your favorite locations. Add a battery

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





## SOTABEAMS ContestConsole Switching Unit for ICOM Radios

Contesters looking for a quick way to instantly access the voice, CW, and PSK memories on ICOM radios should check out SOTABEAMS' new ContestConsole. It was designed with the IC-7300 in mind but works with a wide range of other ICOM radios, including the IC-2300H, IC-2730, IC-275, IC-575, IC-7000, IC-703, IC-706, IC-707, IC-7100, IC-718, IC-7300, IC-7400, IC-746, IC-746PRO, IC-756, IC-756PRO, IC-756PROII, IC-756PROIII, IC-7600, IC-7610, IC-7700, IC-78, IC-7800, IC-7850, IC-7851, IC-9100, IC-910H, ID-4100A, ID-4100E. Functionality varies for each radio.

SOTABEAMS new ContestConsole connects between your radio and microphone and provides instant access to your memories without the need to have them displayed on the radio screen. Other features include a Transmit push-to-talk button; a transmit low power tune function, which sends a 10-watt carrier for antenna tuning (optional lead required); push-button frequency control (frequency up/down - or memory channel up/down); external push-to-talk socket for a footswitch; and an auxiliary 3.5-millimeter microphone socket.

The SOTABEAMS ContestConsole is available now and has a suggested retail price of \$89.89 in Europe, and \$74.90 everywhere else. For more information, contact SOTABEAMS, Unit 1 The Green, Fountain Street, Macclesfield, SK10 1JN, UK. Phone: +44 (0) 1625 501643. Website: <<https://tinyurl.com/ya63r8du>>.



**Table 1**

Band	Transmitter Power
160, 80 and 40 meters	500 watts
30 meters	425 watts
20 meters	225 watts
17 meters	125 watts
15 meters	100 watts
12 meters	75 watts
10 meters	50 watts

*Table 1. FCC's power thresholds for evaluation of amateur radio stations. (Source: Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, OET Bulletin 65, Edition 97-01, August 1997)*

and antenna and you have the makings for an afternoon of fun.

Portable operation also means less noise on the HF bands. I have discovered most hams cannot appreciate how quiet the bands really are until their station is removed from all the noisy RF emitting gadgetry at their QTH and surrounding community. My family loves technology, as do my immediate neighbors and everyone in the subdivision behind me. Today's "toys" are fun to play with and provide a purpose, but also create another layer of noise to contend with on the HF bands. I recall the first time I had set up a portable QRP operation on Isle Royale in Lake Superior off the tip of Michigan's Upper Peninsula. No utilities, no cellular phones, or anything else that could generate noise, except Mother Nature's Aurora Borealis. Thankfully, space weather was good while I was on the island with no solar storms. I had set up camp for the night and strung a wire through some tall cedars spread along the island's shoreline. When I turned on my Yaesu FT-817, I was not mentally prepared for the light hiss of the airwaves. The receiver was so quiet I thought there was a problem, but as I tuned across 20 meters, CW and SSB signals began bellowing through the radio's speaker as if these stations were transmitting next door to me. HF magic is the only way to describe the experience. Since my chances of returning to Isle Royale grow slimmer each year (I am getting older and the trails are a bit rough — during our last trip to the island my XYL slipped on the rocky terrain and fractured her foot the day before we departed), I find HF magic by setting up

portable operations at a township or county park away from my noisy QTH and neighborhood. Unless you live off the grid or in a location free of RF noise emitting gadgets, you owe it to yourself to experience a little HF magic.

## Number 7 – Digital Modes are Great for QRP

JT65, FT8, PSK, and JT9 are designed for low-power communication. Weak Signal Propagation Reporter (WSPR) is another low-power digital mode and is used as a propagation tool. WSPR transmits pertinent information for two minutes then listens for several minutes, gathering signal reports from distant stations. When finished, you go online to the WSPR website and view a map that shows the locations of all the stations that heard your signal. Aside from being a great propagation tool, it is also a great way to test different antenna systems.

## Number 6 – Signing “/QRP” in a Pileup is Fun

Sometimes QRP operators may need a little extra help in securing a contact, especially when trying to break a pileup. If I am in a pileup and feel the need for a little extra boost, I do not turn up the power, but rather announce that I am a QRP station. Generally, if the calling station hears “/QRP” he will call me right back. However, tagging QRP to the end of my callsign sometimes comes with a degree of embarrassment if the calling station asks everyone to stand by so he can work the QRP station. I have had many discussions with QRO operators who associate the calling station asking everyone to stand by with “hold on everyone, I hear a pip-squeak QRP station crying poor little me, please stand by while I work him and then we can get back to real radio.” Personally, I do not buy this train of thought and rather like to believe the calling station is simply asking everyone to stand by just so he can hear my signal better ... albeit, it is a great deal of fun and I do get a personal joy from working the station before all the hams with power and a tower do. I should mention that I seldom sign “/QRP” when making regular contacts, calling CQ, or contesting. Instead I hold out until after I have established the contact then mention I am a QRP station.

## Number 5 – Cool Clubs to Join!

There are lots of active QRP clubs one

can join such as the Michigan QRP Club, QRP Amateur Radio Club International (QRP ARCI), and the North American QRP CW Club (NAQCC), among others. The QRP ARCI organizes the annual Four Days in May gathering at the Dayton Hamvention® and sponsors several QRP contests throughout the year. NAQCC promotes “doing more with less” while encouraging the use of CW and simple wire antennas. All of these clubs share the same common theme: Promote low-power operation.

Contest/DX clubs aside (membership in my contest club is generally comprised of QRO operators), I have only heard of one “QRO Club” in my nearly 40 years of being a ham. I am not sure, but perhaps there are not many QRO clubs because no one really wants to admit they need to run high power to make contacts (hi ... just kidding folks — no need to send an email)

#### Number 4 – Instant Gratification

Whether DX or stateside, knowing you made a contact with five watts or less while others are plugging away with much more power is gratifying. Try it, but beware, you may be bitten by the QRP bug. Many hams have shared with me that after making their first QRP contact, they could not believe what they had accomplished. After making their second QRP contact, they realized operating QRP-style is not difficult, and after making their third contact, they said QRP had become an obsession. One can argue you are obsessed with QRP when you gather all your non-QRP gear, place it in a cabinet or on a shelf, and refer to it as the “stuff I used back in the day.” I’ll spare you the photo of the cabinet I have in my shack. I removed the cabinet’s front panels and placed all my “back in the day” radio gear inside. Even my XYL comments that the stuff I used to use looks nice inside the cabinet.

#### Number 3 – No Violations Under Part 97.313(a)

Even Big Brother wants you to minimize transmitting power as much as possible. Part 97 is found in Title 47 of the Code of Federal Regulations and identifies the rules and regulations that apply to the Amateur Radio Service and the conduct of amateur radio operators. The FCC is tasked with enforcing these rules. Section 313(a) of the Part 97 Rules states “An amateur station must use the minimum transmitter power necessary to carry out the desired com-

munications”. The intent is not to force hams to be QRP operators, but rather to use only the amount of transmitting power necessary to establish and sustain a contact. In other words, if you can make the contact with 50 watts, use 50 watts and not 1,000 watts.

#### Number 2 – You Can Do It!

If I can do it, you can do it. No special equipment needed; just turn the power output knob counter-clockwise. It is plain and simple. Give it a try.

#### And the Number 1 Reason to Operate QRP...

You can proudly wear a shirt like the one in *Photo A* that shows the evolution of a QRO operator into a more sophisticated QRP operator (hi). I learned about the design on this shirt from a friend who saw it on a YouTube® video by Cliff Batson, N4CCB, of Franklin, Tennessee. I contacted Cliff to find out where he purchased the shirt and discovered he had it made at an online T-shirt store. Kudos to N4CCB for incorporating the human evolution graphic — it sums up nicely the transformation of a ham from QRO to QRP. I have seen this idea applied to other

pursuits, but it is well-suited for the QRP arena. I recently had one of these shirts made at an online store so I could have my very own. In case you are wondering, yes, I will be wearing this shirt to all future ham gatherings.

#### Odds and Ends

If you have any additions to the Top 10 list or want to share your number-one reason for operating QRP, let me know and I will try to include it in an upcoming column. There are five more QRP/Low Power Communications columns in 2019 (April, June, August, October, and December). If you have an idea for an upcoming column or something you would like to share with others, pass it along. Several readers commented on last October’s column “A Portable QRP Antenna Showdown” with several asking for another showdown, but with more antennas to compare. I am planning another camping trip to Michigan’s Upper Peninsula later this year and will be taking the radio gear, so stay tuned. If you have a wire antenna design that you want tossed into the ring for the showdown, send it along and I will do my best to include it.

— Until April, 73



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## ANALOG ADVENTURES

BY ERIC P. NICHOLS,\* KL7AJ

## Small Signals

We'd like to welcome Eric Nichols, KL7AJ, to our contributing staff, along with his new "Analog Adventures" column. As more and more of our technology becomes digital, it's sometimes easy to forget that radio itself is analog, and always will be. The goal of this column is to help make sure that we all keep up on the knowledge and techniques needed for sending and receiving analog radio signals, even if the modulation on those signals is digital. — W2VU

I think it's most fitting and timely to launch this new column on analog methods in the CQ's annual QRP Special. In this column, we will explore classical as well as cutting-edge analog techniques, and hopefully take you on some very interesting detours.

It's probably best to start out by defining what analog means. For many of us, *analog* means *not digital*. While this is a workable definition in the narrow sense, I believe it's a much more inclusive term. For me, at least, analog means focusing more on the basic *science* of radio, while recognizing that digital methods are a manifestation of the *technology* of radio. Radio waves are analog by nature; this fact can often be obscured by the sheer ubiquity (and surprisingly low cost) of sophisticated digital signal processing hardware and software.

In this hopefully never-ending series, we will explore devices as diverse as logarithmic amplifiers, A-to-D (analog-to-digital) converters, D-to-A converters, temperature sensors, light intensity sensors, RF voltage, current, and power sensors, and zero-drift DC amplifiers. We will explore measurement methods "from DC to daylight," some very old, and some very exotic.

### You're Amazing!

Since it is QRP month, let's begin by examining just what is necessary to receive a radio signal of the sort that QRP artisans (like you) work with on a daily basis. You'll be astonished that radio works at all.

Let's take a look at the receiving end. A typical HF communications receiver is calibrated so that an S9 signal (strong but not bone-crushing), represents 50 microvolts at the antenna terminals. This is a good reference point, and while what constitutes S9 isn't chiseled in granite, 50 microvolts is fairly standard. But how much *power* is that? After all, it's power that really does the work. Well, if we assume that the input of an HF receiver is a nominal 50 ohms, we can calculate the power input using the formula  $E^2/R$ . Plugging in 50 microvolts, or 0.000050 volts, for E, we come up with a staggeringly minuscule 50 *picowatts*. That's not a lotta watts. And remember, this is for a typical S9 signal. Now, let's scoot the power down to an S1 or so, a region that QRP denizens are more than likely to inhabit. Traditionally, each S-unit represents 6 dB. Between S9 and S1, we therefore have *about* 48 dB of change. For simplicity's sake, let's round that up to 50 dB, or a power ratio of 100,000. This means that an S1 signal is about 100,000 times weaker than our already measly 50



If this is what comes to mind when you think of analog versus digital, then CQ and KL7AJ have a column for you. "Analog Adventures" will go beyond traditional perceptions of analog as being "not digital" or continuously variable to examine various devices and measurement techniques that help us better understand the analog science of radio. (For the insatiably curious, which we hope you are, this is KL7AJ's favorite analog meter, an RCA VoltOhmmyst!)

picowatts. This comes out to about 0.5 *femtowatts* (or  $5^{-16}$  watts). This is almost an indescribably feeble signal ... and yet we work with those kinds of signals on a routine basis. Are you impressed yet? You should be.

### The Great Equalizer

One of the great equalizers between a "big gun" station and a peanut whistle station is *distance*. Radio signals attenuate as the inverse *square* of the distance. On the surface, this might seem to be sort of depressing; radio signal strengths would seem to drop off a lot quicker than we'd like them to. However, one of the elegant mysteries and beauties of the logarithm — and its ilk — is that after a while, everything sort of levels out. The fact that we're still receiving signals from deep-space probe Voyager 1, which is on the order of 30 billion miles out in space and transmitting a few tenths of a watt (on a really good day), testifies to this fact. The same principle that allows Voyager 1 to "compete" with much closer and newer spacecraft is what allows the QRPer, the QRPPER, and the QRPPper to compete with the world-class contest station. Well, maybe not in a head-to-head shootout, but at

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least on the same playing field. The ether is immensely even-handed, and we should rejoice in this fact.

## Lock Me In

When it comes to detecting weak signals, far and beyond the call of duty, my favorite analog device is the *lock-in amplifier*. The lock-in amplifier has been used for everything from medicine to metallurgy, and yet is largely unknown in amateur radio. It is an old method, but one that has not been surpassed by any digital method, when it comes to extracting nearly non-existent signals out of the noise. The tried-and-true lock-in method will certainly play a major role in weak-signal work on our two new ham bands on 630 and 2200 meters, as the venerable technique is discovered (or re-discovered) by enterprising, experimentally minded, radio amateurs. We will devote a significant amount of space to lock-in methods and machinery in this column over the months to come.

## Ah, Yes – Transmitters, Too

Every ham should build a QRP transmitter ... or two ... or three. It's really hard to grasp many electronics concepts, especially when it comes to RF techniques, without building some actual hardware. A QRP transmitter is a good way to use up all those 2N2222 transistors lying around in your parts drawer (You do have a parts drawer, don't you? [See *Sidebar*]). Some enterprising ham once lashed together 100 2N2222s to build a 100-watt linear amplifier. While this was not the most practical application of RF technology, it did prove that, with enough patience (and spare parts), you can make almost anything work.

## Coming Up Next: The Amazing Operational Amplifier

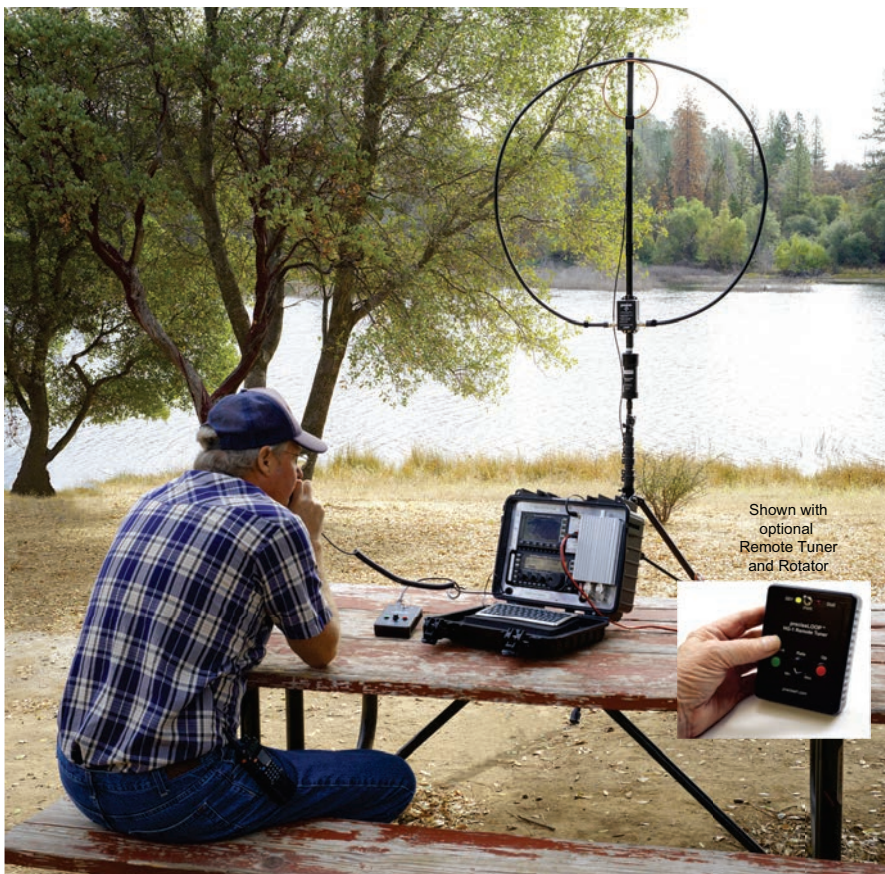
I will close this month's column with a teaser for the next one. We will explore the versatile operational amplifier (op-amp) in all of its glorious configurations — well, at least a few of them. The nice thing about the op-amp is that it can make anyone a circuit designer. You don't have to know all the persnickety details like biasing and temperature compensation that plagued all of us old-time "discrete component" designers. The op-amp lets you get right down to the business of actually *doing stuff*, and you'll be surprised to learn just what kind of stuff that can be.

Until next time, keep the soldering iron hot!  
— 73 de KL7AJ

## A Great Book for 2N2222 Projects

If you're a fan of the 2N2222 transistor, here is a must-read: *Build Your Own Low-Power Transmitters: Projects for the Electronics Experimenter*, by Rudolf F. Graf (ex-KA2CWL), and William Sheets (K2MQJ). It's available in print from Amazon at <<https://tinyurl.com/y9fu3exq>> and online via Google Books.

This innocuous-sounding title is deceptive. It is loaded with intriguing transmitter projects with an emphasis on the venerable 2N2222. I ended up being compelled to read the entire tome online as a side-effect of researching this column (an occupational hazard of any tech writer). Doubtless a few of these projects will materialize on my workbench before long. A search online of the authors leads even farther to a large number of other intriguing works; I am somewhat ashamed that I knew nothing of either of these authors before a few days ago. Be forewarned, this book is addictive; I'm certain I will find the other works by these fine authors equally so.



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## KIT-BUILDING

BY JOE EISENBERG,\* KØNEB

*30 Meters, Anyone? and Just Mousing Around*

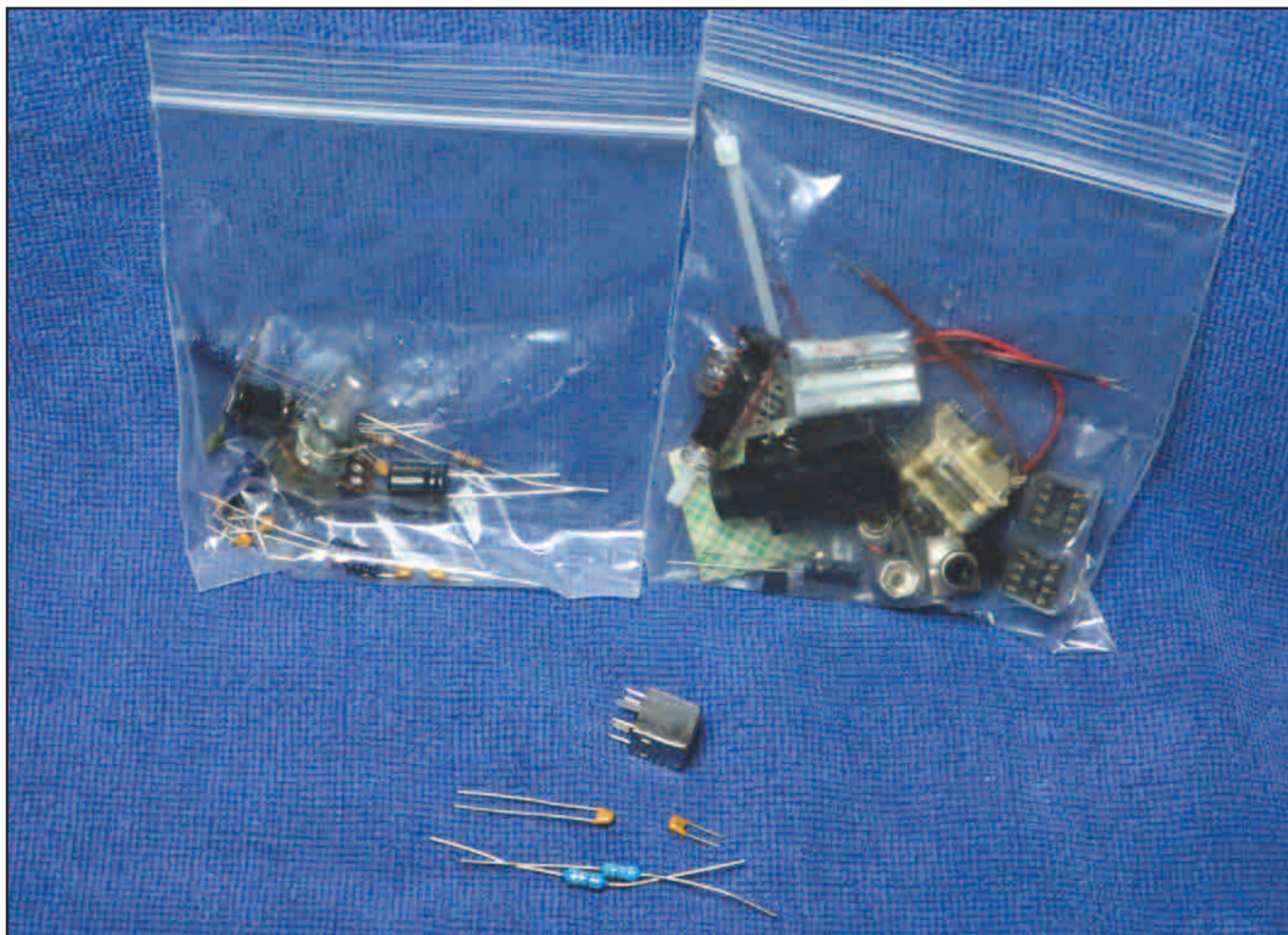
**T**his month, I thought I'd work on a kit that has great instructions and follows a step-by-step approach to its assembly. The Vectronics 30M receiver kit has been around for quite a few years, yet it's still available and works.

The Vectronics lineup of receivers covers the 80- through 20-meter bands and has a matching set of QRP CW transmitters to go with each of them. For a beginning builder, I found this kit to be straightforward and relatively easy to solder. The supplied PC board is single-sided with large pads, making desoldering a lot easier, should it be necessary. The only drawback I found is that the PC board ground pads are not thermally isolated, making it necessary to turn up the heat a little bit on my soldering iron to prevent cold solder joints on the ground pads. Owning a variable heat thermostatically-controlled soldering station is always best, and this kit surely pointed that out.

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

The parts count is relatively low as receiver kits go, and there is a separate bag of band-specific parts that are the first parts called for in the manual. The rest of the parts are the same regardless of the band. The same goes for the cases, as the only difference between them is which of the supplied stickers you use to mark the front and rear panels of the optional case. I highly recommend the matching case kit as it saves a lot of time when assembling your kit.

When I sorted my parts, I kept the band-specific parts in their bag, as those were the first to be mounted. I sorted the rest of the parts as I usually do, with resistors in one compartment, disc capacitors in another, and so forth. A few interesting things I noticed included the fact that there were only two resistors to be mounted on the board. Usually, most kits have quite a few more resistors. There are sockets provided for both 8-pin ICs and I recommend following the directions carefully to ensure the notch on the sockets as well as the ICs point in their correct direction and that the proper IC is mounted in the proper socket. I have found by using my needle-nose pliers I can quickly

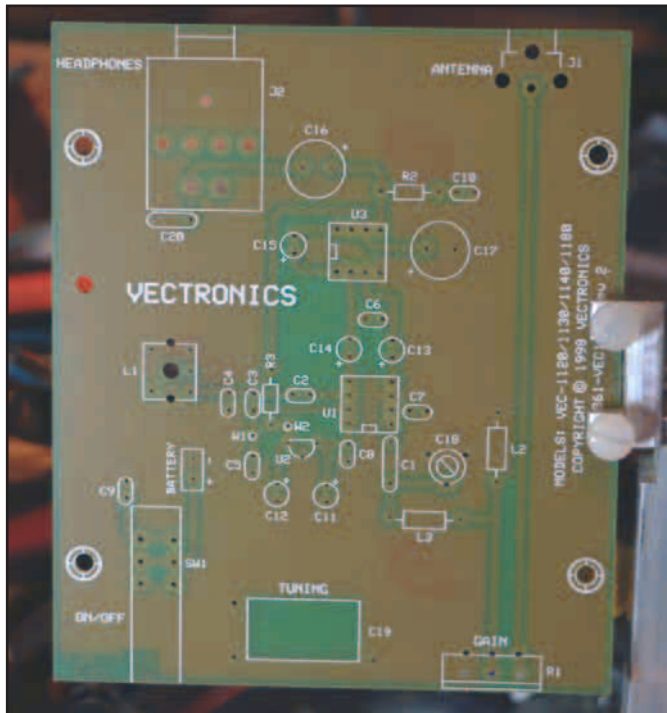


Parts bags for the Vectronics 30-meter receiver kit. The band-specific parts are in front of the two bags.

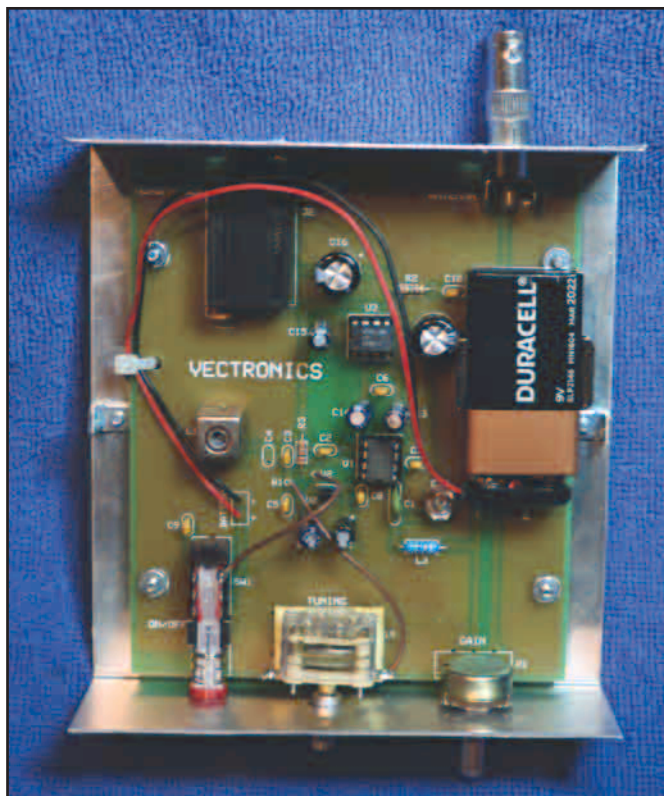


straighten the pins on an 8-pin IC in preparation for inserting it in its socket.

The headphone jack is a quarter-inch mono jack, so be sure to find an adapter if your headset uses an eighth-inch stereo jack. The antenna input is an RCA type phono jack. I used



The Vecronics PC board is ready for assembly. It is a single-sided board, making for easier desoldering if needed.



The finished 30-meter receiver board mounted in the matching case.

an RCA to BNC adapter to connect it to my Four States 4S Tuner that was hooked up to my outdoor vertical antenna I use for testing kits.

The alignment procedure I followed was very simple. There are only two components you use besides the main tuning capacitor to perform alignment. One is a slug-tuned transformer, and the other is a simple trimmer capacitor, also mounted on the board. I used a signal generator that was set for the low end of the 30-meter band and turned the tuning control to the left. I tuned the slug with a ceramic tuning tool until the signal was heard, then peaked the trimmer capacitor, and that was it. It didn't take very long at all. Unfortunately, as when I have built previous kits, the band was dead, and so I waited until the next day to try again. Conditions were a lot better, and I heard lots of signals including CW, RTTY, and FT8. You can use a signal generator and a frequency counter to calibrate your tuning dial and mark the front panel accordingly. It is a fun kit to get a new builder into the idea that they can build a simple receiver and hear people talking. The four different kits are the VEC-1120K, the VEC-1130K, the VEC-1140K, and the VEC-1180K for 20/30/40/80 meters, respectively. The VEC-1100KC is the matching case that is designed for use with all four receiver kits.

The matching transmitter kits (1200 series) use a VXO, so they don't cover quite as much of the band. The receiver kits sell for \$29.95 and the matching cases are \$14.95. Go to <[www.vecronics.com](http://www.vecronics.com)> to order any of these Vecronics receiver or transmitter kits.

### MS101 USB Mouse Kit

Another great beginner's kit is the MS101 USB Mouse Kit from Make It Yourself. This kit is designed to help introduce people to the idea of kit building, even if they are not hams or have an interest in radio. The end result is a USB mouse that you can use with your computer. The assembly time is less than an hour, and it was quite an enjoyable experience.

The PC board is a well-marked single-sided board, ideal for first-time builders. The instructions are available online and are extremely well-detailed. The relatively low parts count makes for easy parts sorting. In my kit, there were a couple of extra parts that had spaces for them on the PC board, but were not called for in the assembly instructions. Just keep them in your spare parts bin for future use on other projects. I got a pleasant surprise when I plugged my completed mouse into the USB port in the front of my new ICOM IC-7610. The mouse cursor moves over the part of the screen containing the spec-



A completed Vecronics 30-meter receiver kit in the case with the knobs mounted.





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*The Make-it-Yourself USB mouse kit comes with parts presorted in the pullout plastic holder. Three different color tops for the mouse are provided.*



*The completed USB mouse plugged into my ICOM IC-7610, being used with the spectrum display.*

trum scope and waterfall display. Using the left mouse button in the display field moves the VFO to that frequency point and re-centers the display. Right-clicking on a point lets you momentarily hear the signal present at the point where the mouse is pointing and releasing the right mouse button returns the VFO to where it was previously.

The Miykits USB Mouse kit is available for \$15.99 at [www.miykit.com](http://www.miykit.com). Since it is sold through Amazon, any

benefits of Amazon Prime membership should apply.

### **My Future Travels**

Finally, I plan on being at the Orlando Hamcation in February, the Lincoln Hamfest in March, and Ozarkcon in Branson in April along with the Green Country Hamfest in Claremore, Oklahoma in April. See you there!

*— Until next time, 73 de KØNEB*

Here is the first of a series of articles going behind the scenes of our advertisers. This month we are taking a look at *HamTestOnline* which offers online courses for the U.S. ham radio license exams.

*HamTestOnline* integrates study materials with question drill, using the actual exam questions and answers. The software tracks your progress and focuses on weak areas, drilling questions you get wrong more often than ones you get right. While viewing their website we came across the informative and entertaining user story below. We think you will enjoy it too.

## Christina's Story

BY CHRISTINA CUNNINGHAM, KT1NA

Until I met my husband, John, W1AI, my only exposure to ham radio was a brief visit to a ham radio store back in 1974, where the owner said, "Little girl, there's too much math, and you would have to learn Morse code. Just buy a CB radio."

Jump to 2012, and I find myself engaged to the owner of the *HamTestOnline*™ website, which helps people pass the FCC ham radio license exams. I wanted to help him with the website, but he says I would have to have a ham radio license first. I'm thinking, "Uh-oh, math and Morse code! Run away!" But we're engaged, so running is not an option. So I have to tell my then-fiancé that I am completely *Lousy* (with a capital L) at math and not sure I could learn Morse code. I'm in some real hot water here.

But wait, I'm saved! He explains that the Morse code provision was *dropped* in 2007 \*phew!\*, and you can basically skip all of the math-related questions on the exams and still pass the exams \*double phew!\*. With those obstacles cleared, I decide to go for all three — Tech, General and Extra — at once. He's telling me his courses are *that* good, so I figure, what the heck, I might as well start at the top rung. For me, I'm also testing his course. Let's see if this website is as good as he says it is!

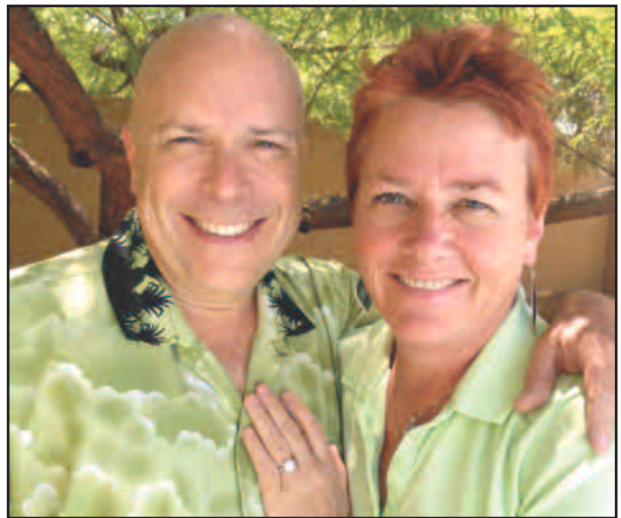
We picked an exam date 6 weeks out. My first thoughts were "OK, now I've stuck my neck out. I hope I can do this!" John wanted to help, but I said, "No, I want to be a regular user, no assisting allowed." I used an iPad to study for portability.

I started with just the Tech topics turned on. Hey, this is fun! I remember some of the Ohm's Law, current and voltage stuff from 37 years ago, then I realize I've forgotten most of it. But wait! This website is giving me the basics, and when I get it wrong, it's bringing back those questions a lot sooner than the ones I got right! I'll be dogged, it does know me. Just like the slogan. I'm thinking, "Holy mackerel, where was this software when I was in high school trying to learn math?!"

I got to about 70% on the Tech course, left those topics on and then turned on the General topics. I studied approximately one hour a day Monday thru Friday (I had a full time 40 hour out-side job). I studied on weekends too, as much as I could, sometimes 6-8 hours. Busy or not, I had a deadline.

All this time, my exam date was looming. I got to 70% on the General and turned the Extra topics on. When I got to 90% on all three, four days before my exam, I was really confident. My exam was set for a Saturday night, 7:00 pm. I had stayed in Study mode up until this point, but now I took 4 practice exams to be sure I was ready, and then went right back to Study mode!

John drove me to the exam session, and I studied on the iPhone the whole way there. There were a lot of volunteer examiners in the exam room, I'd say as many as there were people testing. I had read about noisy sessions, so I brought my earplugs. I was so glad I did!



John, W1AI and Christina, KT1NA

John is also a VE, so he signed in as well. Of course, he would not be scoring my tests. I got the Tech exam and was not used to seeing the questions on paper. It was quickly not a big deal, because I could see the answers sticking out on the page in my mind. This might be easy! I finished the Tech with confidence and waited for my score. John was sitting next to the volunteer examiner who scored my exam, and eventually he gave me a big thumbs up!

The examiner congratulated me and asked if I wanted to take the General exam. "Of course!" So same thing, filling in the circles, this one was a bit more challenging, a little more math. I guessed those rather than leaving them blank. Turned it in, waited... waited... agony... and another thumbs up and congratulations!

"Do you want to go for the Extra?" the examiner asked. You know I said yes, I'd just spent 62 hours over six weeks studying! Someone asked me if I'd studied, and I said, "Oh yeah." So. Deep breath, last time, filling in the answers, a little bit tougher than the General.

It seemed to take forever to get the score on this last one. It was all in slow motion from here. John's thumb went up, the whole room was congratulating me, and John was hugging me all at once. *I'd done it!!!! Woo Hoo!*

The room was buzzing, and the examiner who scored my exams said that in twenty years as a volunteer examiner, this was only the second time he'd seen someone pass all three in one session! Then he asked me, "What book did you use," and I said, "There's a book? All I used was *HamTestOnline*!"

Every VE in that room was gob-smacked at my accomplishment. I remember there were some General-class VEs there who seemed to think if I could do it, they could too. John let them know that *HamTestOnline* gives free Extra courses to active VEs who hold General or Advanced class licenses.

What a great night. I passed all three! Now I could use my new Extra license to talk around the world, join my CERT group ham radio team, and work on the website with my fiancé. Also, I was lucky enough to get the vanity call sign I applied for — John said I could get a shorter 1x2 (like his, W1AI), but *I really really* like mine because it spells my name, so I'm keeping it.

So there you have it, folks. I am *living proof* that *HamTestOnline* works! This is a *serious* case of, "If I can do it, anybody can do it." It's so exciting because it opens up a whole new world to a lot of people who might not otherwise be able to pass the exams (raising hand)! I know you can do this. Come on in, the water's fine!

Christina, KT1NA, General Manager, *HamTestOnline*  
Extra Class Accredited Volunteer Examiner



# LEARNING CURVE

BY RON OCHU, KOØZ

## Learning Through Involvement

**F**or those of us old enough to remember, one song from the Beatles' Abbey Road album contains the lyrics, "And in the end, the love you take is equal to the love you make."

To me, these lyrics are a poetic, musical way to express the notion that what you put into something is what you get in return. In other words, not taking a little risk and not putting in a little work translates into diminished non-rewarding results; however, putting your all into an endeavor is far more rewarding with greater results. However, putting out your all is much easier said than done. Perhaps, like me, you've found, with the passing of time, that it's all too easy to become complacent and maybe even lackadaisical when it comes to ham radio involvement. I find myself settling in a comfort zone, which, in and of itself, isn't necessarily bad, but when I'm no longer learning from others or sharing what I know, then it's time to "step up my game and to get involved!"

### Stepping It Up!

I've found that a surefire way to step up my game is to simply get involved at some level. The more involved I become, the more I learn. Getting involved, even at a minimal level, is beneficial. For instance, as a beginner, one may not be particularly interested in some ham radio mode or activity. Perhaps it appears too daunting or time consuming. The thing is, by getting involved, even at an introductory level, one can't help but learn something new. After all, learning is all about taking prior knowledge and applying it to something new. In other words, we learn from experience.

### Getting Started

Experience is the best teacher. Hams are an enthusiastic, inclusive, group of hobbyists. Hams welcome anyone with a genuine interest and a willingness to learn, whether it be DX (long distance), radiosport (contesting), or public service, to name only just a few ham radio activities. These groups are always looking to expand their ranks. Getting involved is a sure-fire way to gain experience and to build upon existing communication skill sets. Listen to local FM repeater nets for upcoming classes or events. Club meetings and newsletters are another good source announcing ham activities. The next step is to contact activity leaders and ask them how you can help. Don't be shy if you don't have any experience; you're still welcome. Depending on the activity, well-oiled, dynamic groups will pair you up with a more "seasoned" hams.

### A Few Cases in Point

Scouting in America can always use dedicated, enthusiastic mentors to assist scouting leaders with youth activities such as JOTA (Jamboree On The Air). Local scout leaders can always use ideas and technology managing an event. Lori Owens of the Lincoln Trails Boy Scout Council is one of the scout leaders involved with Spookoree (*Figure 1*), a family fun Cub Scout event involving the whole family partici-



Figure 1. Lincoln Trails Council Spookoree logo.



Photo A. Jim Pitchford, N9LQF, assisting cub scouts with VHF contacts at Spookoree 2018. (Photos by KOØZ, except as noted)

pating in crafts, a haunted trail, fun, and ham radio. This event took place over the weekend of October 19-21, 2018 at Rhodes-France Scout Reservation near Pana, Illinois. I became aware of it through my friend and county EMA manager Jim Pitchford, N9LQF (*Photo A*).

Spookoree is a popular event for the Lincoln Trails Council. The idea of the camp is to have Cub Scouts and their families experience various activities such as archery, crafts, yard games, obstacle course, and JOTA along the Halloween trail (*Photo B*). All these event activities are staffed with adult volunteers and they all need to have communications. Jim, N9LQF, provides the scout leaders with commercial-grade radios and he monitors the frequency for any needs that may

\*Email: <ko0z@cq-amateur-radio.com>



Photo B. Spookoree punch card given to scouts as they complete activities along the Halloween Trail. One of the activities is JOTA — Jamboree On The Air.

arise (Photo C). Jim also spearheads the JOTA event and recruits area hams to introduce these young scouts to the fun of amateur radio. That's how I became involved with this event. All I needed to do was to wake up early on Saturday morning, drive myself over to the scout camp, and to watch the boys

and their families have fun making contacts via ham radio. My wife, Debbie, KC9ULA, came along to lend a hand (Photo D).

When I arrived on site, Jim; Mark Osborn, WA9SXX (Photo E); and Jeff Naville, KC9WZO (Photo F), had already erected a few HF dipoles, VHF verticals, rigs and power supplies. Jim provided all the equipment. He needed experienced hams to assist scouts with three operating positions. I took position three (Photo G). Between our three stations, Cub Scouts made contacts with hams in Canada, Illinois, Maryland, Pennsylvania, and Ohio. A huge "shout-out" to Matt Miller, KD8OHN (Photo H), from Ohio, who spent a lot of time chatting with the scouts visiting my station at the camp and making them feel very welcome on ham radio. If only he and the other ops who chatted with the scouts could have seen the smiles on the faces of the scouts and their proud parents. Seeing those smiles, alone, made our efforts so worthwhile. Lori Owens and Jason Dion, KC9JCB (Photo I), were so appreciative of our collective efforts to add another offering to Spookoree's already exciting activity lineup.

### There's More!

Spookoree was a resounding success and it was good to have that experience, but now it was time to get ready for the



Photo C. One of the adults with a commercial handheld, stationed along the Halloween Trail providing communications back to Spookoree leaders.

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Photo D. Debbie Ochu, KC9ULA, walking Kip outside the JOTA shed along the Halloween trail.



Photo E. Volunteer Mark Osborn, WA9SXX, assisting cub scouts with HF contacts.

next public service Boy Scout event a few weeks later, called "Last Scout Standing." It took place at Otter Lake in Macoupin County, Illinois, over the weekend of November 3-4. Each year, Lincoln Trails Council leaders offer their senior Boy Scouts a challenging weekend. Every year, the venue changes and leaders plan for months a series of competitive challenges for their teenaged scouts. Jim, N9LQF, knows I love CW (Continuous Wave) using Morse code

communications. Earlier in the year, he asked me if I'd like to put on one of the challenges in "Last Scout Standing." My challenge would involve the scouts using Morse to send, receive and translate a message in a challenging way.

### Last Scout Standing Challenge

This was my first year involved with the program and this 63-year-old doesn't have the endurance that these young Scouts possess. My task was to have

the Scouts decode their instructions for their next challenge, but not to make it "too easy." Outside of knowing my challenge involved communications decoding, my scouts had no idea of what to expect, but they were instructed to be prepared. Scouts were divided into teams of four. We had eight teams beginning with staggered start times. Their day began around 5:30 a.m. and my station was number five for the day. My first team arrived by 9:15 a.m. These scouts were hot on the trail and they meant business.

My first half of the challenge awaiting the scouts was to learn about DFing (direction finding). I had four handheld transceivers (HTs) tuned to 147.480 MHz. Near the lakeside, on a peninsula, sandwiched between two trees and buried under some leaves, I had hidden a low-power transmitter with a password attached to it. Their task was to find the hidden transmitter, retrieve the password, and bring it back to me before they could do the second half of the challenge which involved Morse code. First, some basics.

### DF Basics

To make the challenge a bit easier, I attached the 15-milliwatt transmitter to a dummy load (non-radiating antenna). Don't be fooled, dummy loads will radiate, just not very well, which was fine for my purpose. I instructed the scouts to start walking until they heard the sig-





Photo F. Volunteer Jeff Naville, KC9WZO, assisting scouts at the JOTA station.

nal. The next step was to get closer to the signal's origin and use body fading (holding the HT close to the chest and using your body as an attenuator) to help produce a direction-finding null. When the signal gets stronger, that means you're getting closer. Moving the frequency a step at a time and finally removing the antenna will help zero-in on the hidden transmitter.

The scouts loved the activity. My first team took the HTs, paired up and one pair took one side of the peninsula and the other pair took the other side and proceeded on their way. Twenty minutes later they came back with the password. Some teams were more organized and better-prepared, and it showed, but all teams were enjoying the challenge.

### Morse Code Challenge

The second-half involved Morse Code. Since I may have more than one team at a time, I decided to use flashlights instead of code practice oscillators to send the code (*Photo K*). That way, if there were two teams transmitting there would be less confusion as to who was sending, and each team could remain competitive without interference. Each team had an alphabet sheet with Morse code and was split into two groups and given a scrambled message to be sent and received using Morse. Using flashlights proved to be a good idea, because I did have overlapping teams and they didn't interfere with each other. After sending their coded messages, the team regrouped and unscrambled the words, which told them that their next task was to proceed down the trail to the dock where they'd be met by adults who'd assign them a canoe and directions.

I found this activity to be very rewarding and I believe the scouts did as well. It takes time to send Morse using a flashlight. I was worried that the scouts would rush the dah into a dit or they would not leave enough space between letters,



Photo G. Your author working with scouts on the HF side of the JOTA station.





*Photo H. One of our HF contacts, Matt Miller, KD8OHN, made time to welcome scouts to HF and to tirelessly answer many questions. (Courtesy of KD8OHN)*



*Photo I. Scout leader Jason Dion, KC9JCB, observing the fun and radio magic at Spookoree 2018.*



*Photo J. Otter Lake, Macoupin County, Illinois, where “Last Scout Standing” took place in November.*

but they seemed to catch on quickly. Each of the eight teams made it through my challenge and into the canoes. Typically, scouts spent 45 minutes to an hour at my challenge.

### **Problem-Solving**

My reward came when I saw these young men take a challenge, own it, come up with a strategy, and then implement their plan. It's all too easy for older folks to criticize younger generations, but I'm here to tell you that these young scouts would make you take pause and nod your head in approval. These scouts have bright futures and their dedicated leaders and parents can be proud of them. I was only one challenge; these teams had plenty of more ahead of them that afternoon, evening and the next morning. I am honored to have been invited to be a part of these young scouts' lives and to be a small part of a bigger team that is continuing the fine tradition of helping to shape America.

### **Being Available**

There's no doubt about it. Getting involved with a project involving others



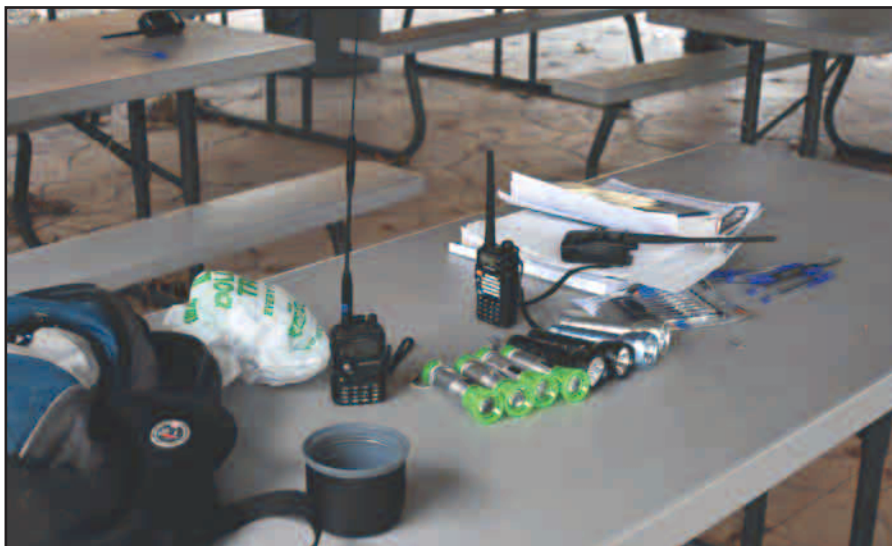


Photo K. HTs and flashlights used for the communications challenge in "Last Scout Standing."



Photo L. Scout team sending Morse code messages using flashlights in "Last Scout Standing."



Photo M. After successfully completing the Morse Code challenge, scouts were off to the next challenge involving canoeing on Otter Lake.

is rewarding. Everyone contributing towards a common goal, lending talents, resources and problem-solving skills along the way makes for a more successful outcome. The key thing is to make yourself known to others. Flamboyance, grand entrances, or a fistful of credentials are not prerequisites for volunteering. A willingness to learn and to contribute, on the other hand, is necessary. The next step is to be consistent. Make good on any promises. Be available to assist with a project. Each time it becomes easier because you'll see what like-minded hams bring to the project and soon, you'll be learning from them in the classroom of experience. In my case, Jim Pitchford, N9LQF, is my BSA contact. His daughter, Lori Owens, and his son-in-law, JR, know they can rely on Jim for resources.

## Contacts and Networking

I am fortunate to have Jim, Lori, and JR as my "in" to area scouting. Jim knows that he can count on me to contribute. As a matter of fact, I already have Spookoree 2019 in my activity calendar. Readers may want to get involved with something similar with their local scouting organizations, but they may not have the same contacts as I do, so who could they contact? Lori and JR Owens are great resources. They can put you in touch with their counterparts in your area. Lori's email is <loriaowens@hotmail.com>. The Lincoln Trails Council is <www.lincolntailscouncil.org>.

## Reach Out

Lori and JR and their associates are dedicated, thoughtful, caring adult leaders. They are happy and more than willing to promote scouting. I am sure they can give you many helpful tips on how to introduce your group to area scout leaders. I'm glad that I am associated with others who are willing to share their talents, time, and resources for the betterment of us all. With that in mind, I'd better get about the business of getting online and renewing my BSA Youth Protection Training for 2019's JOTA, Radio Merit Badge workshops, and any other activity that may be around the corner. I like involvement for I find it rewarding and it helps keep me active. The Beatles lyrics are spot-on, "And in the end, the love you take is equal to the love you make." Thank you for reading CQ and I hope to hear you on the air.

— 73! KOØZ



# ANTENNAS

BY KENT BRITAIN, WA5VJB

## E- and H-Field Antennas

**T**here are some interesting claims about E- and H-field antennas that keep trying to revise physics. In *Photo A*, I have my *E-field generator*. A balloon and a silk scarf are great at generating an *E* or *electrostatic field*. But it is a static field, and why we call it static electricity. *E* fields do not propagate, they stay put. (*OK, I will admit the charged plasma from solar storms does hit the earth, but the E-field that accompanies all those particles traveled with the plasma and did not propagate at the speed of light!*)

In *Photo B*, I have my *H-field*. The magnetic lines of flux exist only between a north pole and a south pole. And while they can extend some distance from these poles, they do not propagate on their own. (And yes, I am familiar with the work of Nathan Stubblefield and his technique of communicating with lines of magnetic flux using large induction coils in the early 1900s. But his best DX was in tens of feet, and his quarter-mile demonstration was made using a quarter-mile-long induction coil.) Bottom line, a transmit antenna that isolates the *E* and the *H* fields cannot radiate.

### AMSAT GOLF Antennas

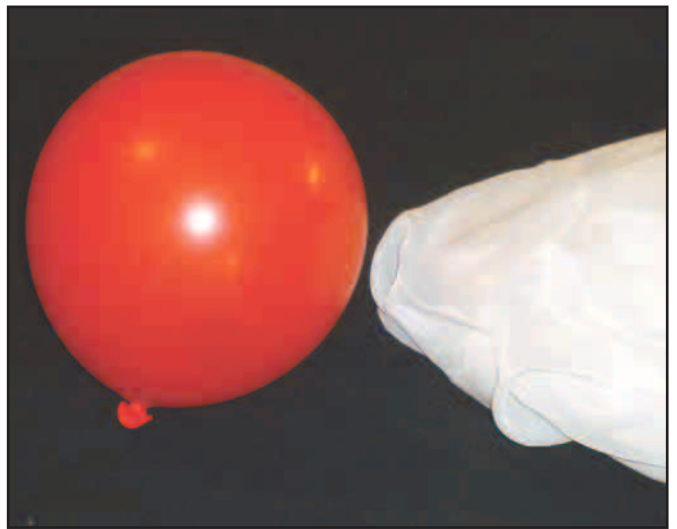
In several previous columns, I have mentioned the extremely broadband nature of *planar disk* antennas, and I've been working with AMSAT to design some of these for future satellites. For one of the GOLF series of satellites, I started out with a 1.269-10.5 GHz planar disk antenna, on the far left in *Photo C*. Then I was asked if we could extend the frequency range a bit so the same antenna could be used on GPS L1 and L2 at 1225 MHz in addition to L-band, S-band, and C-band reception. Antenna range testing at 1269 MHz wasn't as good as I had hoped, so the antenna needed to be a bit longer anyway. Adding GPS L2 was just another reason to make it a bit longer, and we have the antenna on the far right in *Photo C*.

"Gee, you know the SDR radios used on the other bands could also be used as a 435-MHz backup receiver." Now I got to add the top loaded T-element for 435 MHz into what became the middle antenna. Note that the base loading inductor for the 435-MHz element is doing double duty as an RF choke to isolate the L-band+ elements from the 435-MHz element. Prototype testing will continue when the antenna range dries out a bit and a prettier version will fly in a few months.

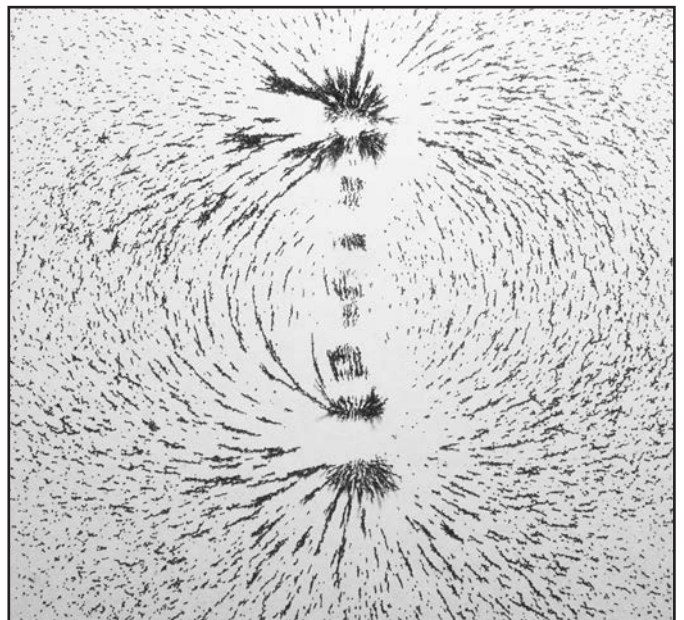
### Five & Dime

Many of the new AMSAT cubesats will be using a 5-GHz up /10-GHz down RF system, thus the designation "5 & Dime." Yes, many hams have already panicked over the perceived high cost of putting together a station to work these birds. Hey, we're cheap too, OK? In *Photo D*, you see the basis of

a 5 & Dime station. Many of the satellite TV services are now using LNBs with built-in frequency synthesizers. The Octagon LNB in the photo is one of these crystal-controlled LNBs and sells for about \$15. The 10-GHz amateur satellite band comes out of the LNB at about 700 MHz and is stable enough to listen to 10.3-GHz SSB signals. Plus, 700 MHz is in the old UHF TV band, so one of the low-cost, software-defined radios that could pick up analog TV channels



*Photo A. E-field generator: A balloon and a silk scarf.*



*Photo B H-field from a magnet.*

\* 110 Starlite Drive  
Murphy, TX 75094  
email: k5qy1@verizon.net



Photo C. Several planar disk antennas being developed for use on an AMSAT GOLF-T cubesat. From left, versions for L-band, S-band, and C-band; L/S/C, GPS and 435 MHz; and L/S/C plus GPS only (before adding 435 MHz). See text for details.



Photo D. AMSAT "5 & Dime" downconverter and SDR plus SDR uplink transmitter.

becomes your receive system. AM, FM, or any number of digital formats just become software in the SDR.

At the moment, we are not sure that more than just the LNB feed looking at the sky will be needed for the receive antenna. While an old Direct TV or Dish Network dish would work fine with these LNBs (after all, they were designed to work with those dishes), you would have a lot of gain and a very narrow beam. Probably too narrow to easily

use unless you have an automatic satellite tracking system with less than 3° of error. Again, it isn't clear that you are going to need that much gain. We are not trying to receive a wideband TV signal from 23,000 miles away, but a much narrower band signal in low earth orbit. A small dish or just a simple horn antenna slipped over the LNB would be an easy project. Total cost should be less than \$50 for the 10 GHz/Dime receive system.

For the transmit side, I show a HackRF One software-defined radio that goes up to 6 GHz. Now throw in one of those WiFi extenders for 6 GHz and you have your uplink transmitter.

The 5.6-GHz ham band was chosen as the uplink band because of the availability of low cost SDRs that cover 6 GHz. Well, international frequency assignments also had a little bit to do with it. Making the 5.6-GHz uplink part of its own dish, or perhaps a simple patch array, are also antenna possibilities. See, we're keeping it simple and inexpensive.

## Ideas Wanted

As always, we welcome your questions and topic suggestions. You guys do come up with some good ones. This month's discussion of E-H antennas came from a reader's inquiry. Just drop a snail mail to my QRZ.COM address or an email to <wa5vjb@cq-amateur-radio.com>. Spring is not far away, so it's time to start planning those big antenna improvements. For other antenna articles and projects, you are welcome to visit <www.wa5vjb.com>.

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## Classic Cars – Classic Radios

**T**hough the calendar may tell us we're mired in the winter months, this is a great time of the year to be a "car nut." But then again, most car nuts — myself included — enjoy their pursuit throughout the year anyway.

What makes this time of year fun is indoor car shows. Some feature the latest models from Detroit, Europe and Asia; others focus on antiques, classics, and custom creations. And from the proliferation of car enthusiast TV shows available on cable, satellite, and internet channels, interest runs high among those who define love as a "many fendered thing." (Sorry, but I felt I had to do that.)

So if you enjoyed being part of the performance car era, classics, customs - or perhaps you still participate - there is no end of entertainment to be found at car auctions, trade shows, swap meets, or at the many "cars & coffee" events that take place across the country. If

you live in a moderate climate area, there's an event almost every weekend. Doesn't matter if you love GM, Fords, MOPARs, or any of the many foreign performance models, there's fun to be had acquiring, maintaining, restoring, and showing off your treasure.

A show I attended in Los Angeles inspired this installment of *Mobiling*. More on that later.

Warning: if you were born after 1990, much of what appears below will appear to be written in a foreign language.

### You Never Forget Your First...

Date. Kiss. Car. Ham Radio.

I'll skip the first two but submit that my first car was most of a 1955 Plymouth (a good portion of it had rusted away) purchased in 1968 for the princely sum of \$50. It featured a "three on the tree" manual shift, a wheezing flathead six with an oil-bath air cleaner, pop-up cowl ventilation, 6-volt electrical system, and a tube-driven AM radio that didn't work on purchase, but a new vibrator set that right. It just took some time to warm up. I got six months out of that car, sold it for \$35 and bought a '63 VW (after all, it was the '60s). In retrospect, I think that old Plymouth was one of the better

automotive values I ever enjoyed in terms of investment ratios. Later on came more "real" cars with big V8s (and big appetites for fuel, performance, and replacement parts).

For me, ham radio came a bit later, but as a person who turned wrenches, installed sound systems, and later CB radios to pay my way through college, in later years those skills set the stage for building some pretty awesome mobile amateur radio platforms. I still have most of those tools, so if you need distributor points set to their proper dwell angle, I'm still your guy.

### Best of Both Worlds

So why not combine classic cars with a classic radio? Well, I didn't invent that idea. Some of it was organic, as in, the classic car and classic radio may have aged gracefully together, but there are a few folks out there who have taken the time to meld two great hobbies into a work of art that features both.

See the accompanying photos (Photos B, C, and D) from last year's classic auto show held at the L.A. Convention Center. Many TV show luminaries were there, including Wayne Carini of *Chasing Classic Cars* (Photo



Photo A. CQ cover from May 1950 shows the growing romance between ham radio and the postwar auto boom.

\*5904 Lake Lindero Drive, Agoura Hills, CA 91301  
e-mail: <aa6jr@cq-amateur-radio.com>



Photo B. Wayne Carini of *Chasing Classic Cars* (right) shares some tips with your author. (Photo by KD6ARA)



Photo D. This custom Ford was featured in last year's L.A. Classic auto show. The owner was not present when the photo was taken, so little is known about the ham radio element that is evident from the license plate.

B), Mike Brewer of *Wheeler Dealers*, and more. There was a seemingly endless display of antique and custom creations but an aging custom Ford caught my eye because of its California-issued ham license plate. (see *Photos C and D*).

Going back through my photo archives, I also found the accompanying pictures of a nicely restored Ford van that

was displayed several years ago at the Dayton Hamvention® (*Photos E, F, and G*), then held at the old Hara Arena complex. You have to love the work that went into creating a mobile platform that pays proper homage to a classic Collins radio.

Hopefully, these examples may help inspire those of you

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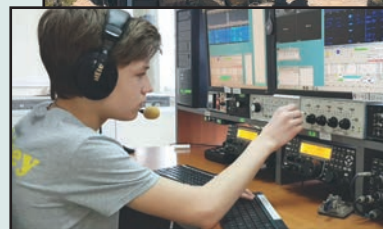
### 2019-20 calendar

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*Photos E, F, G. What happens when you put a classic in a classic? You get a very cool retro package. These photos from a previous Dayton Hamvention® feature a Ford van and a classic Collins. In those tube radio days, keeping your feet warm while driving with the radio operating may not have been difficult.*



who have considered blending a classic radio into your classic car. Think about it — the radio can help better define the life and times in which the restored car was designed to thrive.

### Modern Classics?

So with the renewed interest in customs, classics, or resto-mods (old cars fitted with more reliable, higher performance, contemporary running gear) why not integrate ham radio as part of the effort? Unless maybe you're running with open pipes, in which case your signal reports could be less than optimal.

Seriously, integrating a modern ham rig into a classic car couldn't be easier than it is now. Most older cars had gobs of space available beneath the dash, in the trunk and in most cases, under the hood. Today's solid-state rigs require a fraction of the space mobile gear needed in the days of tube-powered radios that required some rather exotic and space-devouring power supplies. You might even consider fitting a modern radio into the shell of an old classic radio box whose innards may have passed beyond the salvageable stage. Kind of a resto-mod approach to putting a classic radio in a classic car. That might be sacrilege to some purists but in today's world, hey, just about anything goes.

And if you have a classic, email some photos to me and I'll be glad to share them with our readers in a future column. Combining two great pastimes may sound like an interesting challenge. And why not?

The Disney/Pixar movie *Cars* (a must-see for any car nut or fan of the old Route 66) had a great line delivered by the character Sally, as she spoke of cruising Route 66 in the days prior to interstates, "Cars didn't drive on it to make great time. They drove on it to have a great time."

As we look ahead to spring and summer, may many miles of great times be in front of your windshield.

— Happy mobiling & 73, Jeff, AA6JR



## BY TONY EMANUELE,\* K8ZR

## VHF Plus Calendar

DUBUS EME Contest 144 MHz & 432 MHz:  
February 16<sup>th</sup> & 17<sup>th</sup>  
DUBUS EME Contest 2.3 GHz: March 16<sup>th</sup> & 17<sup>th</sup>  
144 MHz Spring Sprint: April 8<sup>th</sup>  
DUBUS EME Contest 1.2 GHz: April 13<sup>th</sup> & 14<sup>th</sup>  
222 MHz Spring Sprint: April 16<sup>th</sup>  
Lyrid meteor shower predicted peak: April 21<sup>st</sup> & 22<sup>nd</sup>  
432 MHz Spring Sprint: April 24<sup>th</sup>  
VHF Super Conference - Sterling VA: April 26<sup>th</sup> – 28<sup>th</sup>  
DUBUS EME Contest 10 GHz & up: May 11<sup>th</sup> & 12<sup>th</sup>

The winter sporadic-E ( $E_s$ ) season got off to a good start at the beginning of December with 6 meters open on the second on the east coast and again on the fifth, with the much of the Midwest and south participating in the opening. Most of the activity was FT8 on 50.313 MHz, but there was notice-

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

Assuming that Cycle 25 will follow the pattern of previous solar cycles, solar activity will increase rather quickly, reaching 80% to 90% of the maximum value approximately three years after the Cycle 24 minimum<sup>3</sup>. Kennedy notes that some solar observers are predicting a peak  $R^Z$  value of 135. Though not great, a value of 135 would result in modest F<sup>2</sup> openings. Add FT8 to the mix and it will be interesting to see the results in a few years.

In 2015, members of the Southeastern VHF Society, the North East Weak Signal Group and the Mt. Airy VHF Radio

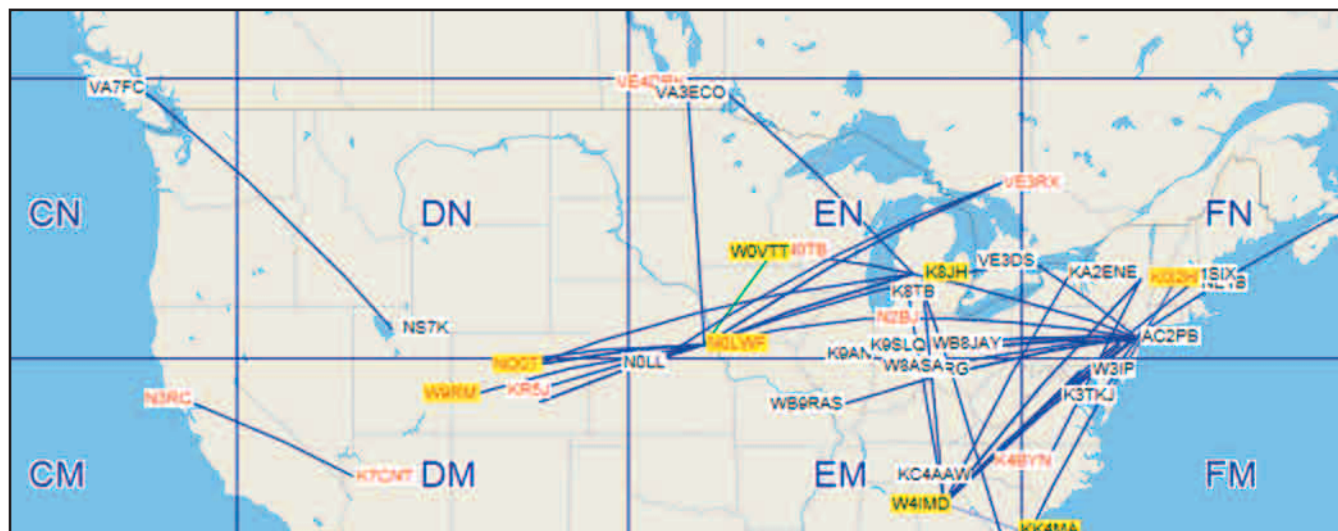
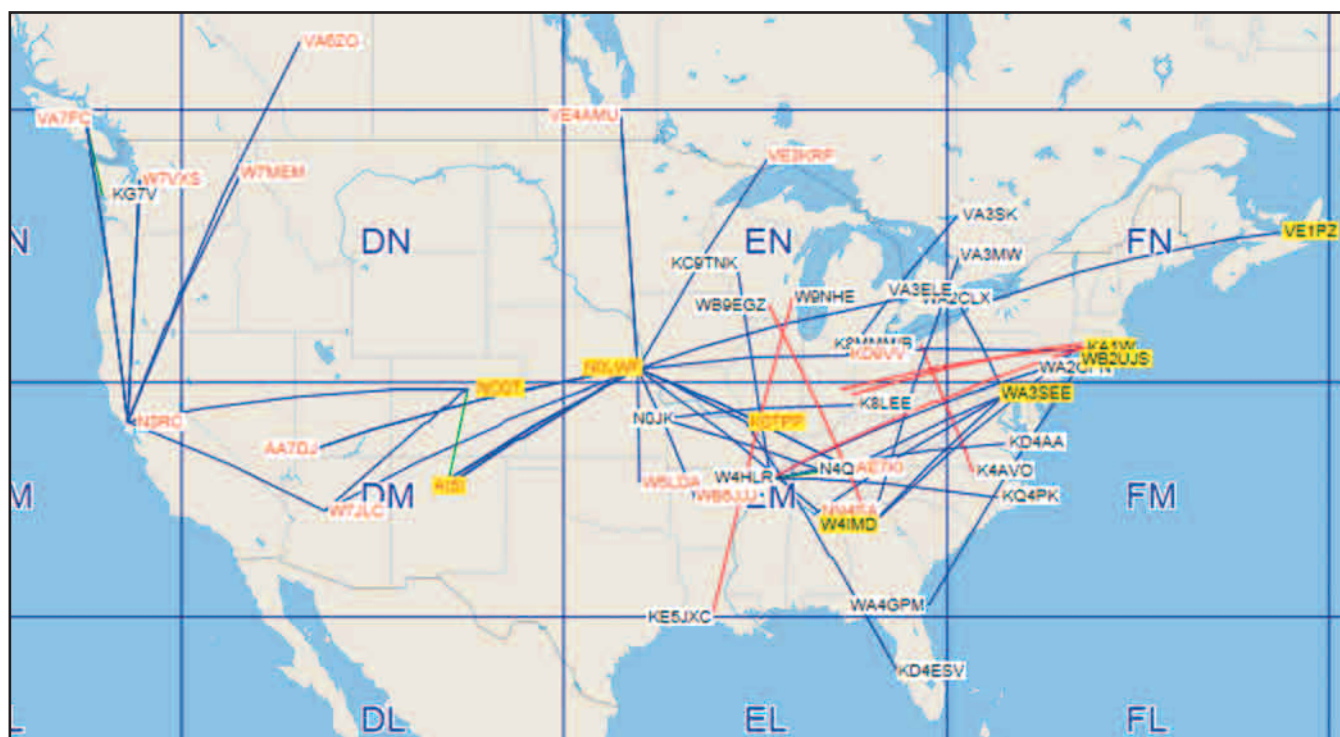


Figure 1. DX Maps file showing some of the 6-meter meteor scatter contacts made during the Geminids meteor shower in mid-December. This map is as of 0219 UTC on December 14, the evening of December 13 in the U.S.





Club floated the idea of joint VHF conference to be held at a mutually convenient location within a few hours' drive of their respective members. The idea was realized in April 2016 when the first VHF Super Conference was held in Sterling, Virginia, outside Washington, DC. Well over 200 VHF / UHF / microwave enthusiasts were in attendance and it was resounding success by any measure.

guaranteeing some number of room nights, and most have an additional requirement to spend some dollar amount on food and beverage onsite during the event. There are other considerations that are important to the conference hosts, including adequate space for the antenna range, spacious meeting rooms for conference presentations and vendor displays, and the ever-popular hospitality suite.

This year's VHF Super Conference will again be sponsored by Southeastern VHF Society, North East Weak Signal Group, and the Mt. Airy VHF Radio Club and will be held April 26<sup>th</sup> – 28<sup>th</sup> 2019 at the Holiday Inn Washington-Dulles International Airport, 45425 Holiday Drive, Sterling, Virginia. See <<https://vhfsuperconference.com>> for conference details including hotel booking information and the schedule of events.

Like the first VHF Super Conference, the hotel is expected to sell out, so if you're planning to attend, make your room reservations sooner rather than later. You might also consider arriving a day early in order to visit the Steven F. Udvar-Hazy Center, the Smithsonian National Air & Space Museum's annex at Washington Dulles International Airport, minutes away from the conference hotel. Its numerous exhibits include the Space Shuttle Discovery, the Enola Gay (the Boeing B-29 Superfortress that dropped the first atomic bomb) and a Lockheed SR-71 Blackbird reconnaissance aircraft, to name a few of the more popular ones.

As of this writing, the date and time for the VHF / UHF / microwave forum at the Hamvention® in Xenia, Ohio have yet to be determined. If you are interesting in presenting, please contact me with the topic you would like to present. A petition to increase the amount of time allocated for the forum, signed by many who attended last year, has been submitted to the Hamvention forum committee. Hopefully, the committee will see fit to increase the allocated time slot from one and a half hours to at least 2 hours.

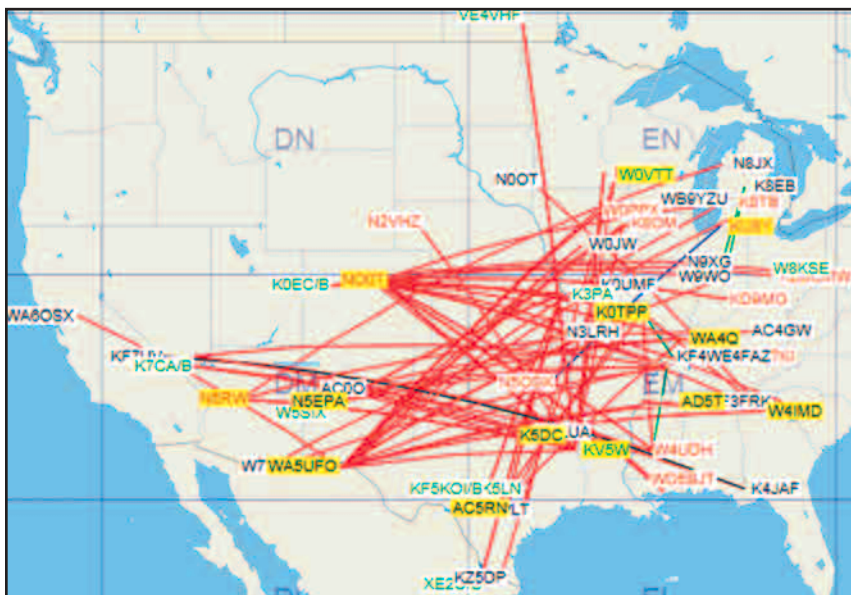


Figure 4. Hams in the Midwest and southwestern U.S. were the beneficiaries of this 6-meter  $E_s$  opening on December 5 (evening of December 4 local time). (Map courtesy DX Maps)

Recently, Bill Mitchell, AEØEE, announced on the HamSci reflector that an APRS propagation project that he developed, called *aprsdb*, has been released. *aprsdb* is a tool for storing and analyzing APRS data without reliance on internet infrastructure. All the data collection and analysis is entirely local. See: <<http://github.com/wsmitchell3/aprsdb>>. Bill noted on his website that the project was inspired by Jon Harder, NGØE, of the Mountain Lake APRS website — more commonly referred to as the VHF Propagation Map and home of the “big red blob” when conditions are up.

Regular users of the Mountain Lake APRS website noticed that the site was offline for a while in 2018 as policy changes made by Google regarding the cost of using Google Maps was increased beyond the scope of most hobbyists or non-commercial users. Fortunately, an alternative was identified, modifications were made and the site is back online. The Mountain Lake APRS, DX Maps, ON4KST, Ping Jockey, and other sites enhance our enjoyment of amateur radio. Those behind the scenes donate their time and resources in a labor of love, hoping to contribute in some small way to the advancement of amateur radio. You can help offset the cost of maintaining your favorite site by making a small donation — it will be appreciated and will help ensure the long-term viability of your favorite site(s).

— 73 and CU on the bands, Tony, K8ZR

#### Notes:

1. DUBUS magazine. Joachim Kraft, Publisher. Hamburg, Germany. Pages 34 -41
2. Ibid. page 105.
3. Ibid. page 105.
4. Relative sunspot numbers are designated Ri (International.)

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## Oops...

The composing room gremlins were at it again in November (even though there's no longer a composing room, the gremlins are still around, kind of free-floating...). The “Reader Feedback” item in the November issue was written by Howard Reynolds, WA3EOQ, not Harold as we put in the byline. Our apologies.



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## Focus on CQ Awards: The CQ DX Awards

While we continue our search for a successor to K1BV as Awards Editor, we'll use the opportunity to shine a spotlight on CQ's own operating awards, some of which are very well-known, such as USA-CA (the USA Counties Award) and WAZ (Worked All Zones), and others of which don't always grab as much attention. We'll start this month with one of those — several, actually — the CQ DX Awards.

—W2VU

**A**t first glance, the CQ DX Award might seem like a clone of the ARRL's DXCC award, since the basic level entails making confirmed contacts with 100 different DX entities. But there are differences and, in some ways, the CQ DX Award is more difficult to earn than basic DXCC.

To start, there is no mixed-mode version of the CQ DX Award. You need to confirm contacts with stations in at least 100 DX entities in *either* SSB, CW, or RTTY, and there are separate awards for each mode.

There are many endorsements available for the CQ DX Award, for various bands, power levels, less-common operating modes (e.g., SSTV and satellite), and mobile or remote station operation. In addition, stations with credit for at least 275 active countries qualify for the CQ DX Honor Roll, a singular distinction.

Confirmations for the CQ DX Award are accepted in the form of traditional QSL cards or eQSL.cc electronic confirmations. As of now, we are not permitted to accept ARRL Logbook of the World credits for the CQ DX Award.

Complete details are in the rules, which are reproduced here and available on the CQ website at <<https://tinyurl.com/y9rkdrdk>>.

Next time, we'll check in on the CQ DX Field Award, which provides you with "wallpaper" for contacting at least 50 of the world's 324 10° x 20° "grid fields" ... a task which isn't as easy as it sounds, since many fields are all or nearly-all water!

### Complete Rules: CQ DX Award and the CQ DX Honor Roll

#### CQ DX Award

1. The CQ DX Award is issued in three categories. The CQ DX CW Award is issued to an amateur radio station submitting proof of contact with 100 or more countries. The CQ DX SSB Award is issued to an amateur radio station submitting proof of contact with 100 or more countries. The CQ DX RTTY Award is issued to an amateur radio station submitting proof of contact with 100 countries using two-way RTTY. Applications should be submitted on the official CQ DX Award application (form 1067B). Reasonable facsimiles or computer printouts are also acceptable.

\*12 Wells Woods Rd.  
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2. All contacts must be two-way in the mode for which the application is made. Cross-mode or one-way contacts are not valid. QSLs must be listed in alphanumeric order (A to Z and 1 to Ø) by prefix. All contacts must have been made after November 15, 1945. Deleted countries do not count. Only currently active countries are acceptable.

3. QSL cards must be verified by one of the authorized checkpoints for the CQ DX Awards, or must be included with the application. Return postage must be included. Electronic verifications from sources approved by CQ are acceptable. See the CQ website for acceptable online sources.

4. Country endorsement stickers are issued for 150, 200, 250, 275, 300, 310, and 320 active countries. A fee of \$1.00 per sticker (where stickers are issued) is charged. An SASE must be enclosed with all endorsement applications.

5. Special endorsements, as follows, are available for a fee of \$1.00 each:

- 28 MHz endorsement - for 100 or more countries confirmed in the 10-meter band.
- 3.5/7 MHz endorsement - for 100 or more countries confirmed using any combination of the 40- and 80-meter bands.
- 1.8 MHz endorsement - for 50 or more countries confirmed using the 160-meter band.
- QRPp endorsement - for 50 or more countries confirmed using 5 watts output or less.
- Mobile endorsement - for 50 or more countries confirmed with the applicant operating mobile.
- Slow Scan TV endorsement - for 50 or more countries confirmed using two-way SSTV.
- OSCAR endorsement - for 50 or more countries confirmed via amateur satellite.
- Remote operation endorsement - for 100 or more confirmed countries of which one or more qualifying contact was made using remote station technology (operator is not physically present at the station location). All applications including contacts made using remote station technology must

include this endorsement. Qualifying contacts may be made on or after January 1, 2015.

i. All-Remote operation endorsement - for 100 or more confirmed countries of which all qualifying contacts were made using remote station technology (operator is not physically present at the station location). Qualifying contacts may be made on or after January 1, 2015.

6. Any altered or forged confirmations will result in permanent disqualification of the applicant.

7. Fair play and good sportsmanship in operating are required for all amateurs working toward CQ DX Awards. Continued use of poor ethics will result in disqualification of the applicant.

8. A fee of \$6.00 is required for CQ subscribers applying for a CQ DX Award certificate. The latest CQ mailing label must be attached for the subscriber discount. For non-subscribers the certificate fee is \$12.00. IRCs are acceptable in lieu of check or cash.

9. Normally the ARRL DXCC country list constitutes the basis for CQ DX Award country status. Deleted countries are not valid for the CQ DX Award. As a country is deleted, country totals of applicants are automatically adjusted accordingly.

10. All contacts must be with land-based amateur stations working within authorized amateur bands. Contacts with ships and aircraft are not acceptable.

11. Decisions of the CQ DX Awards Manager shall be final.

## THE CQ DX Honor Roll

12. The CQ DX Honor Roll lists all stations with a total of 275 or more active countries.

13. Separate Honor Rolls are maintained for SSB and CW. To remain on the Honor Roll, a station must update his or her totals at least once per year. Updates indicating "no change" are acceptable to meet this requirement. An SASE must be included with all updates in order to receive confirmation of total.

14. An audit sheet showing countries needed by an Honor Roll member is available for \$3.00 plus an SASE for each mode. These are available from the CQ DX Award Manager.

15. All checks must be made payable to Keith Gilbertson. Applications should be sent to Keith Gilbertson, KØKG, CQ DX Awards Manager, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA.



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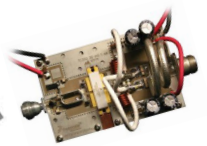
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AN779H (20W)	AR305 (300W)
AN762 (140W)	AR313 (300W)
EB63A (140W)	EB104 (600W)
EB27A (300W)	AR347 (1000W)

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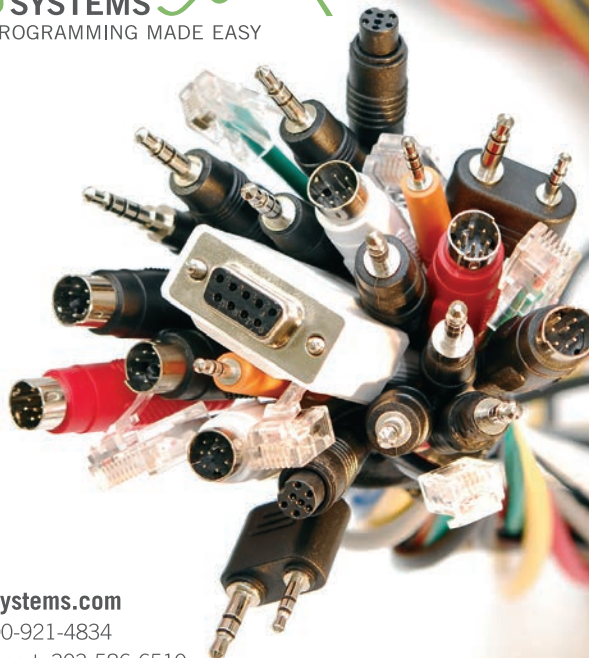
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## The Most-Wanted Countries ... and Why

The top 25 most-wanted DX entities from Club Log, as of November 15, 2018, are listed in *Table 1*. For me, it seems quite strange to see some of these here, for a number of reasons. I would have thought they would have been further down. Some, such as Midway, Desecheo, South Sandwich, and Palmyra had been activated fairly recently by large operations. Others just haven't been on the air lately, such as Peter I, Aves, St. Peter & Paul Rocks, and Turkmenistan. And some, such as Mount Athos, Macquarie, and Marion Island, are on the air but being activated by solo operators. Let's look at the top 10 a little more carefully.

**1. North Korea** being in the #1 slot is pretty obvious. There have only been three operations from DPRK and two were quite small. The largest was P5/4L4FN, who made 16,415 QSOs from November 9, 2001 through November 21, 2002. Two previous authorized amateur stations were reported as P5/OH2AM on May 14, 1995, with 20 QSOs, and one of the few, specifically North Korean callsigns of P51BH (OH2BH) on April 21, 1999. The latter did an amateur radio demonstration for North Korean officials with 263 QSOs. P5RS7, in 1992, ended up to not be in North Korea and was disallowed by the DXCC program. A few other pirate or unauthorized activities have occurred over the years. The bottom line is that P5 has not been on the air since 2002 and overall, only about 16,500 QSOs have ever been made. With the current situation over there, I would not hold my breath waiting for this one to come on the air.

**2. Bouvet Island.** I guess we don't have to dig very deep on this one, either. However, there have actually been quite a few QSOs made with Bouvet over the years. The first was LH4C by W4BPD in 1962 (no documented landing), followed by 3Y3CC and 3Y1VC in 1977 (50 QSOs), 3Y5DQ and 3Y1VC in 1979 (2,000 QSOs), 3Y5X in 1989-1990 (50,000 QSOs), 3Y2GV in 1997 (3 hours only), 3YØC by N4BQW in 2000-2001 (3,351 QSOs), and 3YØE by ZS6GCM in 2008 (1,500 QSOs). So, if you add them up, it comes to about 57,000 QSOs since 1977. The bulk were made by 3Y5X in 1989-1990. So, the biggest reason Bouvet is so rare is that it hasn't seen a major operation for nearly 30 years. Unfortunately, the recent attempt by the 3YØZ team had to be aborted. Had they been successful, Bouvet would not be in the top 25 right now. We shall see if the current plan to activate Bouvet (3YØI) is fruitful. We may even know before this column gets published.

**3. Crozet Island.** This one has never seen a dedicated DXpedition team. The only activity has been by ham scientists living on the island, although over the years, some have mounted a valiant effort to work many DXers. But many things have changed this since there have been fewer assigned military and scientific personnel going to Crozet and other similar islands as well. I have no real statistics on how many QSOs have been made from Crozet over the years. I happen to be the QSL Manager for FB8WJ from the early 1980s. I took over for the previous QSL Manager who became a SK. It is a large paper log maybe 3 inches thick. There have been

1.	P5	DPRK (North Korea)
2.	3Y/B	Bouvet Island
3.	FT5/W	Crozet Island
4.	BS7H	Scarborough Reef
5.	CEØX	San Felix Islands
6.	BV9P	Pratas Island
7.	KH7K	Kure Island
8.	KH3	Johnston Island
9.	VKØM	Macquarie Island
10.	FT5/X	Kerguelen Island
11.	3Y/P	Peter I Island
12.	FT/G	Glorioso Island
13.	YV0	Aves Island
14.	KH4	Midway Island
15.	ZS8	Prince Edward & Marion Islands
16.	VP8O	South Orkney Islands
17.	PYØT	Trinidad & Martin Vaz Islands
18.	PYØS	Saint Peter and Paul Rocks
19.	KP5	Desecheo Island
20.	SV/A	Mount Athos
21.	VP8S	South Sandwich Islands
22.	EZ	Turkmenistan
23.	KH1	Baker & Howland Islands
24.	JD/M	Minami Toriushima
25.	KH5	Palmyra & Jarvis Islands

*Table 1. Club Log's Top 25 Most-Wanted Countries, as of November 15, 2018.*

attempts to activate Crozet but permission has not been possible. The island of Crozet is the most protected of all the French islands in the perimeter of the Prefecture of the French Southern and Antarctic Lands (TAAF in French). It has always been the subject of special attention and has a relatively low rate of invasive alien animal or plant species. This makes it particularly sensitive to any new introduction. The scientific base is relatively small compared to the other Southern Islands and has a very high concentration of seabirds sensitive to disturbance nearby. On the positive side is that other relatively recent DXpeditions have been warmly received by TAAF so this might leave the door open a crack for a future DXpedition to Crozet. It just might not be as large as some from other TAAF territories. Patience is required to let those with the closest relationship with TAAF continue to work on this one. But who knows? Maybe another ham radio scientist will do a tour of duty on Crozet someday.

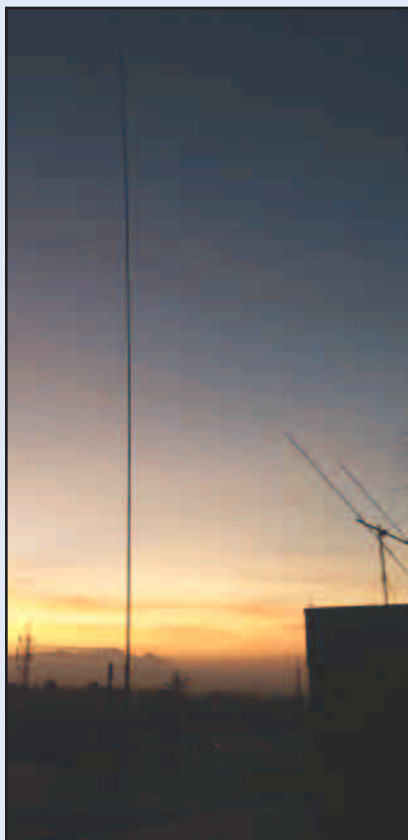
**4. Scarborough Reef.** My personal belief is that of all the entities on the list, this one just might end up being the most difficult to activate. The political situation in this area of the South China Sea is just too intense. Permission is required, for sure, but the two countries claiming the reef (China and the Philippines) haven't been happy about the issues around this place, which is mostly a submerged reef with only a handful of rocks emerging from the water. Setting up radios on the rocks is quite a challenge. Amateur radio activity has included: 1994 (did not qualify), 1995 (11,835 QSOs), 1997

\*Email: <n2oo@comcast.net>

**Y**oung hams throughout Region 1 of the International Amateur Radio Union (IARU), which covers Europe, Africa, and the Middle East, got on the air during December for YOTA (Youngsters On The Air) Month. American hams Ken Claerbout, K4ZW, and Bob Johnson, W9XY, visited Ethiopia in December and helped the young operators at club station ET3AA (operating as ET3YOTA) at the Addis Ababa Institute of Technology with some antenna work and pileup tips.



December 2018 was designated as YOTA (Youngsters On The Air) Month in Europe, the Middle East, and Africa by Region 1 of the International Amateur Radio Union (IARU).



The new low-band antenna installed at ET3AA (ET3YOTA) by recent visitors Ken Claerbout, K4ZW, and Bob Johnson, W9XY. (Photo by K4ZW)



Bob Johnson, W9XY, visiting Ethiopia, provides some pileup-handling pointers to students at Addis Ababa Institute of Technology club station ET3AA during their "Youngsters On The Air" (YOTA) activity in December as ET3YOTA. (Photo by K4ZW)

## The WPX Program

### CW

3879 .....	DL6JZ	3881 .....	AK7O
3880 .....	EI6GI	3882 .....	F8BJE

### SSB

4178 .....	N7ZUF	4181 .....	KM5VI
4179 .....	K8DTW	4182 .....	K4PWS
4180 .....	KM4IZZ		

### Mixed

3757 .....	KM5VI	3766 .....	KX4BW
3758 .....	DJ4LR	3767 .....	KM4IZZ
3759 .....	WD6DBM	3768 .....	JA6TNY
3760 .....	HB9VAB	3769 .....	WA1ZKN
3761 .....	N7ZUF	3770 .....	EA2DUS
3762 .....	KE4H	3771 .....	K9STH
3763 .....	JJ3DKQ	3772 .....	W9MB
3764 .....	K8DTW	3773 .....	N2AJO
3765 .....	WU1V		

### Digital

947 .....	N5HC	957 .....	K0KOC
948 .....	K4JWA	958 .....	WA1ZKN
949 .....	DJ4LR	959 .....	DL5KLX
950 .....	DL6JZ	960 .....	AK7O
951 .....	WD6DBM	961 .....	VE3VPT
952 .....	HB9VAB	962 .....	W9MB
953 .....	KC1BUF	963 .....	AC8TO
954 .....	DF2GH	964 .....	JA7BAL
955 .....	KX4BW	965 .....	N2AJO
956 .....	NZ9U		

**CW:** 400: K4JWA. 450: DL6JZ. 500: DF2GH. 550: W6AER, NK0S. 750: ES3VI. 1150: HB9JOE. 1600: DL3ANK, AK7O. 2100: AB1J. 3050: PY5EG. 3550: W9OO. 4850: W8IQ. 5500: N6JV. 7400: K2VV.

**SSB:** 350: ES3VI. 400: N7ZUF, K8DTW, K4PWS. 500: K1KQC. 550: EA3DE. 650: K4YEH. 700: K4JWA, HB9JOE. 750: W6AER, IU8FRE, DD9WL. 800: EA3IAA. 1050: DL3ANK, KM5VI. 1150: N5HC. 1300: N5KAE. 3350: W9OO. 6400: K2VV.

**Mixed:** 450: DJ4LR, JJ3DKQ, WU1V, WA1ZKN, N2AJO. 500: N7ZUF, N2WWD, PY3TX, K4WRX, KB0HL, K9STH, G8PMA. 550: EA3DE, KE8Y, W9MB. 600: WD6DBM, NO6E. 700: PY4AZ, HI8SMX. 800: HB9VAB, DF2GH, DD9WL. 850: W5BR. 900: IK8TPB, EA3UU. 1000: N0RQV, N7ELB, ES3VI, AC8TO. 1100: K4JWA, DL6JZ. 1300: KM5VI. 1350: YB1BML. 1400: IU8FRE. 1450: HB9JOE. 1500: EA3IAA. 1550: N5HC, N6PM. 1650: W6AER. 1700: N5KAE. 1950: NK0S. 2000: TF5B. 2300: K9RR. 2350: KM5VI. 2650: DL3ANK. 2700: AK7O. 3550: AB1J. 3850: PY5EG. 4600: W9OO. 8550: K2VV.

**Digital:** 350: K4JWA. 400: KE4H, DF2GH, KX4BW, EA2DUS, JA7BAL, N2AJO. 450: DJ4LR, PY3TX, WA1ZKN, G8PMA. 500: DL6JZ, ES3VI, K4WRX, W9MB. 550: NU8H. 600: WD6DBM, N7ELB, NO6E. 650: HI8SMX. 700: PY4AZ. 750: N5HC, AK7O, AC8TO. 800: HB9VAB, IK8TPB, W5BR, IU8FRE. 850: EA3IAA, EA3UU. 1000: N0RQV. 1100: K6GF, NK0S. 1200: W6AER. 1350: N6PM, YB1BML. 1400: DL3ANK. 1600: WA5VGI. 1900: TF5B.

**160 Meters:** K4JWA, N7ZUF, AC8TO, NK0S  
**80 Meters:** N5HC, N6PM, HB9VAB, HA9PP, IZ2ESV  
**40 Meters:** N5HC, WD6DBM, ES3VI, NO6E, WA1ZKN, AK7O, AC8TO, IZ2ESV, NK0S  
**30 Meters:** DL3ANK, AK7O, AC8TO, IZ2ESV, YB1BML  
**20 Meters:** N5HC, HI8SMX, HB9VAB, N7ZUF, K4WRX, N7ELB, WU1V, DD9WL, AK7O, KV5VI, N5KAE, AC8TO, IZ2ESV, NK0S, G8PMA  
**17 Meters:** N0RQV, N5HC, K4JWA, HI8SMX, W6AER, N7ELB, AK7O, AC8TO, YB1BML  
**15 Meters:** N5HC, N0RQV, AK7O, NK0S  
**10 Meters:** N5HC, N7ELB, AK7O

**Africa:** K4JWA, DL6JZ, IU8FRE, WA6KHK  
**Asia:** N5HC, W6AER, WD6DBM, HB9VAB, N7ZUF, N0RQV, N7ELB, ES3VI, PY3TX  
**Europe:** N5HC, HI8SMX, W6AER, HB9VAB, DF2GH, K8DTW, WU1V, DL5KLX, KM5VI, AC8TO, N2AJO  
**Oceania:** KE4KMG, LB2TG, HB9BIN, N3RC, AL4Y, N5HC, DL6JZ, WD6DBM, YB1BML  
**North America:** N5HC, K4JWA, WD6DBM, HB9VAB, N7ZUF, KC1BUF, KE4H, K8DTW, KX4BW, WA1ZKN, DD9WL, KE8Y, VE3VPT, KM5VI, W9MB, AC8TO, N2AJO, YB1BML  
**South America:** N5HC, K4JWA, DL6JZ, AC8TO, K6GF, NK0S  
**30M Bar:** DL3ANK

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.



(13,154 QSOs) and 2007 (45,830 QSOs). So, 70,819 QSOs were made by the three activations that counted.

**5. San Felix.** I can't easily give you many QSO totals for this one. The first activation was by CEØXA in 1965. Others occurred in 1972, 1984 (31,000 QSOs), 1990, 2000, and 2002 (68,910 QSOs). No other activations have occurred since. There was an attempted activation in 2016-2017 that failed due to an issue of some sort with the Chilean Navy. I do not know any other particulars. But situations like this never seem to help activate a rare entity. We must always work politely and with great care when seeking permission to operate anywhere. Since San Felix consists of four islands (Desventuradas Islands) with San Felix itself being the only one with a presence (military air strip), it may be hopeful for a team to get permission to activate one of the uninhabited islands. Actually the 1990 and 2000 operations were from San Ambrosio Island, which is actually the largest island in the group.

**6. Pratas Islands.** This Taiwanese outpost is also known as Dongsha Island. I was fortunate enough to have been on the last DXpedition team to activate the island in 2003 as BQ9P. At that time, it was administered by Taiwanese Marines. In 2007, the island was declared part of the Dongsha Atoll National Park managed by the Ministry of the Interior. Paul Pai, BV4FH, was instrumental in getting permission to operate from Pratas for many years due to his military contacts in Taiwan. However, Paul became a Silent Key in 2014. So, these two occurrences have made getting permission to go to Pratas a bit more difficult. I know that people in the right places are trying. Previous activities occurred in 1994, 1995, 1998, 2000, 2001, 2003. None since 2003.

**7. Kure.** I can only go by the more recent rumors on this one. The latest information surprised me a bit when I heard that a group was denied permission to activate Kure based on a statement by the U.S. Fish and Wildlife Service that "(v)ertical structures such as the radio antenna for ham radio operations, pose a direct bird strike hazard." My surprise was based on what I had considered a much friendlier relationship that I had thought we had with USFWS in the Pacific region after successful activations from such places as Midway and Baker, where it was proven that vertical antennas were NOT a hazard to the bird populations. Also, amateur radio expeditions have provided reliable (and free) transport for USFWS

## The WAZ Program

### SINGLE BAND WAZ

#### 6 Meter

141 .....DK1FQ, 25 Zones      143 .....HB9BIN, 26 Zones  
142 .....SP8AWL, 32 Zones

#### 20 Meter CW

644 .....J68GD

#### 20 Meter SSB

1248 .....HB9BIN

#### 30 Meter Digital

3 .....OE3SGU

#### 40 Meter CW

321 .....HB9BIN      322 .....JQ2GYU

#### 80 Meter CW

102 .....HB9BIN

#### 160 Meter

543 .....RU6B, 30 Zones      546 .....DF1KQ, 30 Zones  
544 .....IK8HJC, 39 Zones      547 .....R5DT, 35 Zones  
545 .....OH5VT, 40 Zones      548 .....US8UA, 32 Zones

#### 160 Meter Updates

449 .....EW8W ex-EW8DJ,      364 .....WB6RSE, 37 Zones  
40 Zones      474 .....WA2HZO, 35 Zones  
428 .....DK3DG, 40 Zones

### ALL BAND WAZ

#### CW

985 .....IKØPRG      991 .....SP2SWI  
986 .....ON6GRP      992 .....K9RX  
987 .....R3QX      993 .....HB9BIN  
988 .....IK8HJC      994 .....OE3SGU  
989 .....JE1TRV      995 .....UR7UD  
990 .....DL1YCF

#### Digital

60 .....HK3W      63 .....DJ4LR  
61 .....J14WAO      64 .....LY2PAD  
62 .....OE3SGU      65 .....JA3DBD

#### Mixed

9625 .....JR6GHN      9637 .....IK8HJC  
9626 .....IZ4IRO      9638 .....JA1TOU  
9627 .....K2QQ      9639 .....K9RX  
9628 .....W6RS      9640 .....JF4VZT  
9629 .....JL1ELQ      9641 .....WB6VYH  
9630 .....JE2DJC      9642 .....OE3SGU  
9631 .....K19A      9643 .....EA1CRK  
9632 .....PY2MC      9644 .....BH4SRC  
9633 .....N5HC      9645 .....DJ4LR  
9634 .....KB7AZ      9646 .....DL8DBW  
9635 .....AGØA      9647 .....IK1BKN  
9636 .....JL1GYZ      9648 .....SK7HW

#### RTTY

288 .....W7SYK      290 .....UA5D  
289 .....SP3FAR

#### SSB

5423 .....N5HC      5427 .....K9RX  
5424 .....SP3FAR      5428 .....HB9BIN  
5425 .....W6HYI      5429 .....W3RMS  
5426 .....IK8HJC

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>.

## 5 Band WAZ

As of December 15, 2018

2,094 stations have attained at least the 150 Zone level, and 997 stations have attained the 200 Zone level.

As of December 15, 2018

**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	W2LK	199	23
DM5EE	199	1	W3NO	199	26
<b>EA5RM</b>	<b>199</b>	<b>1</b>	W4LI	199	26
EA7GF	199	1	W6DN	199	17
H44MS	199	34	W9XY	199	22
HAØHW	199	1	WAØMHJ	199	23
HA5AGS	199	1	WA2BCK	199	23
I5REA	199	31	9A5I	198	1, 16
IKØFVC	199	1	EA5BCX	198	27, 39
IKØXBX	199	19 on 10M	F5NBU	198	19, 31
IK1AOD	199	1	G3KDG	198	1, 12
IK8BQE	199	31	G3MKQ	198	1, 27
IZ3ZNR	199	1	<b>HB9FMN</b>	<b>198</b>	<b>1 on 80 &amp; 10</b>
JA1CMD	199	2	JA1DM	198	2, 40
JA5IU	199	2	JA3GN	198	2 on 80 & 40
JA7XBG	199	2	JA7MSQ	198	2 on 80 & 10
JH7CFX	199	2	JH1EEB	198	2, 33
JK1BSM	199	2	K2EP	198	23, 24
K1LI	199	24	K2TK	198	23, 24
K4HB	199	26	K3JGJ	198	24, 26
K5TR	199	22	K3LR	198	22, 23
K7UR	199	34	K4JLD	198	18, 24
K9KU	199	22 on 15	K5FUV	198	18, 23
KBØEO	199	23	K5OT	198	18, 23
KZ4V	199	26	K6FG	198	17, 18
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	W4UM	198	18, 23
RX4HZ	199	13	W5CWQ	198	17, 18
RZ3EC	199	1 on 40M	W6OUL	198	37, 40
S58Q	199	31	W6TMD	198	34, 40
SM7BIP	199	31	W9RN	198	26, 19 on 40
VE2TZT	199	23	WC5N	198	22, 26
VO1FB	199	19	WL7E	198	34, 37
W1FJ	199	24	ZL2AL	198	36, 37
W1FZ	199	26			

The following have qualified for the basic 5 Band WAZ Award:

5BWAZ #	Callsign	Date	# Zones
2089	JL1ELQ	2018-11-19	156
2090	R3QX	2018-11-19	172
2091	PY2MC	2018-11-22	194
2092	SP3FAR	2018-11-26	200
2093	TF5B	2018-12-07	150
2094	DL8DBW	2018-12-07	154

Updates to the 5BWAZ list of stations:

5BWAZ #	Callsign	Date	# Zones
1870	EW8W	2018-11-18	200
1012	EA5RM	2018-11-26	199
1940	K4XP	2018-11-26	200
2015	JA7OUV	2018-11-28	200
2050	W1TSP	2018-11-30	184
1967	JA2GYU	2018-12-03	197
1480	WØ7R	2018-12-08	200
2032	DF2GH	2018-12-09	174

New recipients of 5 Band WAZ with all 200 Zones confirmed:

5BWAZ #	Callsign	Date	All 200 #
1870	EW8W	2018-11-18	993
2092	SP3FAR	2018-11-26	994
1940	K4XP	2018-11-26	995
2015	JA7OUV	2018-11-28	996
1480	WØ7R	2018-12-08	997

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).**

people who tagged along. My hope is that a friendlier atmosphere will exist in the future.

**8. Johnston Island.** I don't know of any current proposed activation of Johnston Island. Johnston Atoll is a national wildlife refuge and is closed to public entry. Limited access for management needs is only by letter of authorization from the U.S. Air Force and Special Use Permit from the U.S. Fish and Wildlife Service. For nearly 70 years, the atoll was under the control of the U.S. military. During that time, it was variously used as a naval refueling depot, an airbase, a nuclear and biological weapons testing site, a secret missile base, and a chemical weapon and Agent Orange storage and disposal site. These activities left the area environmentally contaminated and remediation and monitoring continue. Over the years when Johnston Island was fully operational, it was quite active. The last operation from Johnston was in 2003. The only reason this entity is now at #8 is due to its being closed since 2004 and access has not been allowed.

**9. Macquarie Island.** There is a very active ANARE base on Macquarie. There has been irregular activity by scientists or other base personnel who rotate in and out. This is only a rare entity because as far as I can tell, there has never been a full-blown DXpedition that was allowed to go there. Luckily, activity continues. There is a current operation there

now (Norbert, VKØAI) who has been active and is an avid FT8 user. I worked him and the QSO was confirmed on LoTW in a couple of days.

**10. Kerguelen (also known as Desolation Islands).** Another French island under TAAF that operates a scientific base there. I believe the only major DXpedition to ever go to Kerguelen was FT5XO in 2005. They ran a "Micro-Lite" operation running modest antennas and no amplifiers. It made their travel package extremely "lightweight." I remember that they were always a bit weak, but always easily worked, which made sense. Other than that operation, activity has been by infrequent scientist/hams who rotate in and out of the Alfred Faure scientific station or occasional short-term visitors to the base. It seems that TAAF may be more prone to allowing a moderate DXpedition here at some point in the future. But it is extremely difficult to access due to its remote location in the Southern Indian Ocean and its limited space and resources.

So, there you have it. A quick look at the top 10 entities as noted on the Club Log Most Wanted List using the "No Mode Filter," "All bands" and "Global Log settings." See <<https://clublog.org/mostwanted.php>> for the complete list.

Now, it's time to call another CQ on 30-meter FT8! See ya' in the Pileups!

— 73 de N2OO

## 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	K3UA .....339	N5ZM .....339	WØJLC .....339	JA7XBG .....335	K6LEB .....331	N7WØ .....324	RA1AØB .....313	YU1YØ .....295
HB9DDZ .....339	K4CN .....339	N7FU .....339	YU1AB .....339	F6HJM .....334	N7WØ .....331	YT1VM .....322	WA4DOU .....312	WA2VQV .....292
K4IQ .....339	K4JLD .....339	N7RO .....339	K8SIX .....338	K1FK .....334	K6YK .....329	4Z5SG .....321	YØ9HP .....312	4XIVF .....286
K9MM .....339	K4MQG .....339	NØFW .....339	KA7T .....338	K9OW .....334	W9IL .....329	N2LM .....321	W6WF .....309	K6YR .....284
N4MM .....339	K5RT .....339	ØK1MP .....339	WA5VGI .....338	PY2YP .....334	IKØADY .....328	ØN4CAS .....321	KT2C .....307	K7CU .....282
WB4UBD .....339	K7LAY .....339	W3GH .....339	W1DF .....338	WG5G/ .....334	ØZ5UR .....328	HB9DAX/ .....319	W4ABW .....306	PP7LL .....282
WS9V .....339	K7VY .....339	W4ØEL .....339	W9RPM .....338	QRPP .....334	AB4IQ .....327	QRPP .....319	K7ZM .....305	WR7Q .....282
EA2IA .....339	K8LJG .....339	W5BØS .....339	G3KMQ .....337	WD9DZV .....334	K6CU .....326	HA1ZH .....318	K8IHQ .....301	N2VW .....280
F3TH .....339	N4AH .....339	W7CNL .....339	KØKG .....337	K2OWE .....333	KE3A .....326	N6PEQ .....318	HA5LQ .....301	K4EQ .....280
K2FL .....339	N4CH .....339	W7ØM .....339	W7IT .....337	K5UØ .....333	EA5BY .....325	W6YQ .....318	RN3AKK .....300	WB5STV .....277
K2TQC .....339	N4JF .....339	W8XD .....339	K8ME .....336	N6AW .....333	KA3S .....325	CT1YH .....316	WA9PIE .....298	YØ6HSU .....275
K3JGJ .....339	N4NX .....339	WK3N .....339	W6ØUL .....336	W4MPY .....333	N3RC .....324	EA3ALV .....315	K4IE .....295	

### SSB

AB4IQ .....340	K5TVC .....340	VE2PJ .....340	JA7XBG .....339	K8ME .....336	N6AW .....333	WØULU .....329	T8II .....320	4Z5FL/M .....302
DJ9ZB .....340	K6YRA .....340	VE3MR .....340	KØKG .....339	EA3BMT .....335	ØE3WWB .....333	CT1AHU .....328	YØ9HP .....320	K7SAM .....301
DL3DXX .....340	K7VY .....340	VE3MRS .....340	W2FKF .....339	F6HJM .....335	WD9DZV .....333	N1ALR .....328	W1DF .....318	KA8YYZ .....301
DØ9RG .....340	K8LJG .....340	VE3XN .....340	W4UNP .....339	HB9DQD .....335	AA1VX .....332	N2LM .....328	XE1RBV .....317	4X6DK .....298
EA2IA .....340	K8SIX .....340	VK2HV .....340	K3UA .....338	IKØAZG .....335	KE3A .....332	AE9DX .....327	N7YB .....315	K2HJB .....295
EA4DØ .....340	K9MM .....340	W3AZD .....340	K7LAY .....338	IW3YGW .....335	N2VW .....332	K7HG .....327	IV3GØW .....312	F5MSB .....293
HB9DDZ .....340	KE5K .....340	W3GH .....340	K9HQM .....338	ØE2EGL .....335	N5YY .....332	K6GFJ .....326	N8SHZ .....312	W9ACE .....291
I8KCI .....340	KZ2P .....340	W4ABW .....340	N4NX .....338	VK2HV .....335	K5UØ .....331	KE4SCY .....326	KU4BP .....310	N3KV .....289
IK1PG .....340	N4CH .....340	W5BØS .....340	W9RPM .....338	W4WX .....335	KØ2Q .....331	KF4NEF .....325	W6NW .....310	W6MAC .....289
IN3DEI .....340	N4JF .....340	W6BCQ .....340	YU1AB .....338	WB3D .....335	SV3AQR .....331	W6WF .....325	I3ZSX .....309	K7CU .....287
K2FL .....340	N4MM .....340	W6DPD .....340	4Z4DX .....338	AA4S .....334	WØROB .....331	W9GD .....325	G3KMQ .....308	IZ1JLG .....282
K2TQC .....340	N5ZM .....340	W7BJN .....340	K1UØ .....338	EA5BY .....334	W6ØUL .....331	VE7EDZ .....324	KA1LMR .....308	WA9PIE .....282
K3JGJ .....340	N7BK .....340	W7ØM .....340	N7WR .....338	K9OW .....334	XE1MEX .....331	F6BF .....323	RA1AØB .....308	WØ8EØL .....281
K4CN .....340	N7RO .....340	W8ILC .....340	WA5VGI .....338	PY2YP .....334	KØ5ZD .....330	ØN4CAS .....323	XE1MEX .....308	IWØHØU .....277
K4IQ .....340	NØFW .....340	W9SS .....340	W2CC .....338	VK4LC .....334	W4WGTG .....330	VE6MRT .....323	IK5ZUK .....307	N5KAE .....276
K4JLD .....340	ØK1MP .....340	WB4UBD .....340	W7FP .....338	W8AXI .....334	WØYDB .....330	W5GT .....323	IØYKN .....306	WA5UA .....276
K4MQG .....340	ØZ5SK .....340	WK3N .....340	W9IL .....338	XE1J .....334	ZL1BØQ .....330	N6PEQ .....322	XE1MW .....305	NØAZZ .....275
K4MZV .....340	ØZ5EV .....340	WS9V .....340	N4FN .....337	CT3BM .....333	AD7J .....329	W4MPY .....322	K4IE .....304	SQ7B .....275
K5ØVC .....340	VE1YX .....340	XE1AE .....340	IØZV .....336	IK8CNT .....333	N3RC .....329	K8IHQ .....321	K4ZZR .....304	
K5RT .....340	VE2GHZ .....340	YU3AA .....340	K3LC .....336	K8LJG .....333	VE7SMP .....329	KW3W .....320	K7ZM .....303	

### RTTY

N14H ..... 338	WK3N ..... 338	ØK1MP ..... 337	K8SIX ..... 334	K3UA ..... 332	AB4IQ ..... 323	K4IQ ..... 300	K8ME ..... 278
WB4UBD ..... 338	N5ZM ..... 338	K4CN ..... 334	W3GH ..... 333	W9RPM ..... 330	K4WW ..... 323	N4MM ..... 290	IN3YGW ..... 275



# CONTESTING

BY DAVID SIDDALL,\* K3ZJ

## Realtime Contest Scoreboards on the Web

*Plus: CQ Contest Hall of Fame Nominations; CQ WPX RTTY Contest; CQWW 160-Meter Phone Contest; ARRL DX CW and Phone Contests*

**W**hether competing at full bore or in casual mode, contest operators increasingly are trying online contest scoreboards. Competitors configure their logging software to automatically report their score information to a server on the web, where it can be viewed in an organized fashion by fellow competitors. Many users report that using online scoreboards adds to their fun. This month we describe scoreboards and their functionalities.

But first, please note that nominations for the CQ Contest Hall of Fame must be received no later than March 1, as discussed in earlier columns. A maximum of two (2) people will be inducted at the annual Contest Dinner on May 19 during the Dayton Hamvention®. If you know of someone who deserves this honor, consult the nomination instructions that are at <<https://tinyurl.com/hzj4yv9>>.

February signals the beginning of a major contest run. Four major contests are held on four consecutive weekends: CQ WPX RTTY, ARRL DX CW, CQWW 160 SSB, and ARRL DX Phone. More follow these in March.

Newer digital modes, such as FT8, are very popular and drawing new hams onto the air and into contesting. But more contacts-per-hour can be made using “old-fashioned” RTTY, reborn using computers instead of Model 19s and 28s from old Western Union offices. So we expect a big turnout on the bands for this year’s annual CQ WPX RTTY contest on the weekend of February 9-10.

The ARRL DX CW Contest will follow the CQ WPX RTTY contest, taking place on the weekend of February 16-17. Of note is that this contest is the first qualifying event on the road to WRTC 2022 in Italy.

The SSB portion of the CQWW 160-meter contest will begin at 2200 UTC on Friday, February 22, and run through 2159 UTC on Sunday, February 24. With top band DXers report-

ing generally excellent conditions, this year hopes are high for favorable propagation during the contest.

The ARRL DX Phone Contest follows on the next weekend, March 2-3. This will be the second qualifying contest for WRTC 2022.

Below we discuss the ARRL DX contests, then explore real-time contest scoreboards.

### ARRL DX CW and SSB Contests

The annual ARRL CW DX contest will open at 0000 UTC on February 16 and close at 2359 UTC on February 17. Electronic log submissions must be made over the internet and completed no later than 2359 UTC on Sunday, February 24. The ARRL Phone DX Contest similarly will begin at 0000 UTC on March 2 and run through 2359 UTC on March 3, with electronic log submissions due no later than 2359 UTC on Sunday, March 10.

The ARRL DX contests offer U.S. and Canadian stations a welcome opportunity to be sought after, because the format is that stations worldwide work only stations located in the 48 contiguous U.S. states and Canada. Low-power and antenna-challenged stations in the U.S. and Canada therefore can work the DX stations with relatively greater ease than in contests in which “the world works the world.” Especially on 40, 80, and 160 meters, the two ARRL DX Contest weekends bring lots of DX into the logs of smaller stations.

This year, the ARRL log deadlines have been lengthened to seven (7) days after the end of the contest. The deadlines are noted above. The link at which to submit all ARRL contest logs is at <<https://contest-log-submission.arrl.org>>.

The rules governing the ARRL DX contest differ somewhat from those of the CQWW DX contests. Serious competitors therefore should be sure to read the rules of each different contest. The rules that govern the ARRL DX contests are in three different documents. Combined, they constitute the

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



Figure 1. The home page of the original scoreboard, [getscores.org](http://getscores.org), created by Gerry Hull, W1VE, in 2006. The CQWW contests in 2006 were the proving grounds for Gerry's first real-time scoreboard. Scores were periodically sent over the internet directly from competitors' logs and displayed on an open website. Both of today's scoreboards use the same concepts. (Courtesy of W1VE)

## Calendar of Events

### All year

Feb. 2  
Feb. 2  
Feb. 2  
Feb. 2-3  
Feb. 2-3  
Feb. 2-3  
Feb. 2-3  
Feb. 2-3  
Feb. 3  
Feb. 6  
**Feb. 9-10**  
Feb. 9  
Feb. 9  
Feb. 9  
Feb. 9-10  
Feb. 9-10  
Feb. 9-10  
Feb. 10  
Feb. 11-15  
Feb. 14  
Feb. 16-17  
Feb. 16-17  
Feb. 20  
**Feb. 22-24**  
Feb. 23-24  
Feb. 23-24  
Feb. 23-24  
Feb. 23-24  
Feb. 24  
Feb. 24-25  
Feb. 27

### CQ DX Marathon

FISTS Winter Slow Speed Sprint  
AGCW Straight Key Party  
Minnesota QSO Party  
10-10 Int'l Winter Contest  
Black Sea Cup Int'l  
British Columbia QSO Party  
Mexico RTTY Int'l Contest  
Vermont QSO Party  
North American CW Sprint  
UKEICC 80m Contests SSB  
**CQWW RTTY WPX Contest**  
RSGB 1<sup>st</sup> 1.8 MHz Contest CW  
Asia-Pacific Spring Sprint (CW)  
FISTS Winter unlimited Sprint  
Dutch PACC Contest  
OMISS QSO Party  
SARL Field Day Contest  
CQC Winter QSO Party  
ARRL School Club Roundup  
PODSX Valentine Sprint  
AWA Amplitude Modulation QSO Party  
ARRL CW DX Contest  
AGCW Semi-Automatic Key Evening  
**CQWW 160M SSB Contest**  
REF SSB Contest  
South Carolina QSO Party  
UBA CW DX Contest  
North American RTTY QSO Party  
High Speed Club CW Contest  
North Carolina QSO Party  
UKEICC 80m Contests CW

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

[www.fistsna.org/operating.html](http://www.fistsna.org/operating.html)  
<http://bit.ly/1jKUszA>  
[www.w0aa.org/index.php/rules](http://www.w0aa.org/index.php/rules)  
<http://bit.ly/1FrFeBc>  
<http://bit.ly/10qlpGu>  
[www.orcadxcc.org/bcqp\\_rules.html](http://www.orcadxcc.org/bcqp_rules.html)  
<http://bit.ly/1MI59qF>  
[www.ranv.org/ranv.html](http://www.ranv.org/ranv.html)  
<http://ncjweb.com/north-american-sprint/>  
<http://bit.ly/2cv97YF>  
**[www.cqwprrty.com](http://www.cqwprrty.com)**  
<http://bit.ly/2BKCiSx>  
<http://jsfc.org/apsprint>  
[www.fistsna.org/operating.html](http://www.fistsna.org/operating.html)  
<http://pacc.veron.nl>  
<https://tinyurl.com/y8nd2ebk>  
<http://bit.ly/H0lqQf>  
<http://bit.ly/2Qayte1>  
[www.arri.org/school-club-roundup](http://www.arri.org/school-club-roundup)  
<http://bit.ly/2Rr8LTk>  
<http://bit.ly/1DEIKTK>  
[www.arri.org/arri-dx](http://www.arri.org/arri-dx)  
<http://bit.ly/1OmoGv8>  
**[www.cq160.com/rules.htm](http://www.cq160.com/rules.htm)**  
<https://tinyurl.com/yc07ced9>  
<http://scqso.com/rules>  
<http://bit.ly/W0gZiE>  
<http://ncjweb.com/naqp>  
[www.highspeedclub.org](http://www.highspeedclub.org)  
<http://ncqsoparty.org>  
<http://bit.ly/2cv97YF>

Mar. 2-10  
Mar. 2-3  
Mar. 2-3  
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Mar. 10-11  
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Mar. 13-14  
Mar. 16-17  
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Mar. 16-18  
Mar. 17  
Mar. 23  
Mar. 23-24  
Mar. 24  
Mar. 27  
**Mar. 30-31**  
Mar. 30-31

Novice Rig Round-Up  
ARRL SSB DX Contest  
Veron SLP Contest  
SARL Hamnet 40M Simulated Emergency Contest  
UBA Spring Contest 80m CW  
AGCW YL-CW QSO Party  
UKEICC 80m Contests SSB  
AGCW QRP Contest  
QRP ARCI Spring Thaw SSB Sprint  
EA PSK63 Contest  
Idaho QSO Party  
Oklahoma QSO Party  
QCWA QSO Party  
RSGB Commonwealth CW Contest  
SARL VHF/UHF Analogue/Digital Contest  
Stew Perry Topband Challenge  
FIRAC HF Contest  
South America 10 Meter Contest  
Tesla memorial HF CW Contest  
Wisconsin QSO Party  
North American RTTY Sprint  
UBA Spring Contest -2m CW/Phone  
AWA John Rollins Memorial DX Contest  
AWA John Rollins Memorial DX Contest  
Louisiana QSO Party  
Virginia QSO Party  
Russian DX Contest  
BARTG HF RTTY Contest  
UBA Spring Contest- 80m SSB  
FOC QSO Party  
UK/EI DX Contest  
UBA Spring Contest 6m CW/Phone  
UKEICC 80m Contests CW  
**CQWW WPX SSB Contest**  
Veron SLP Contest

<http://novicerigroundup.com>  
[www.arri.org/arri-dx](http://www.arri.org/arri-dx)  
<https://tinyurl.com/y7emhpqz>  
<http://bit.ly/H0lqQf>  
<http://bit.ly/2KKA9b9>  
<http://bit.ly/1uNZkyi>  
<http://bit.ly/2cv97YF>  
<http://bit.ly/14XJyHs>  
[www.qrpaci.org/contests](http://www.qrpaci.org/contests)  
<http://concursos.ure.es/en/eapsk63/bases>  
[www.idahoarri.info/qsoparty/rules.htm](http://www.idahoarri.info/qsoparty/rules.htm)  
<http://k5cm.com/okqp.htm>  
[www.qcwa.org/qcwa.php](http://www.qcwa.org/qcwa.php)  
<http://bit.ly/2DQc9mC>  
<http://bit.ly/H0lqQf>  
[www.kkn.net/stew](http://www.kkn.net/stew)  
[www.firac.de/html/contest.html](http://www.firac.de/html/contest.html)  
[www.sa10m.com.ar/index.html](http://www.sa10m.com.ar/index.html)  
<https://tinyurl.com/yano4dj4>  
[www.warac.org/wqp/wqp.htm](http://www.warac.org/wqp/wqp.htm)  
<http://ncjweb.com/north-american-sprint>  
<http://bit.ly/2KKA9b9>  
<http://bit.ly/1DEIKTK>  
<http://bit.ly/1DEIKTK>  
<http://laqp.org>  
<http://bit.ly/2DVwpUe>  
[www.rdx.org/asp/pages/rulesg.asp](http://www.rdx.org/asp/pages/rulesg.asp)  
<http://bartg.org.uk/wp/contests/>  
<http://bit.ly/2KKA9b9>  
[www.g4foc.org/qsoparty/](http://www.g4foc.org/qsoparty/)  
<http://bit.ly/2RrKsVT>  
<http://bit.ly/2KKA9b9>  
<http://bit.ly/2cv97YF>  
**[www.cqwp.com/](http://www.cqwp.com/)**  
[http://swl.veron.nl/Rules\\_SLP.html](http://swl.veron.nl/Rules_SLP.html)

**May 25-26**

**CQWW WPX CW CONTEST**

**[www.cqwp.com/](http://www.cqwp.com/)**



"contest rules." The three documents are the General Rules for All ARRL Contests <<https://tinyurl.com/7emtjzh>>; General Rules for ARRL Contests Below 30 MHz <<https://tinyurl.com/yadgbay4>>; and Rules for the ARRL DX Contest <[www.arrl.org/arrl-dx](http://www.arrl.org/arrl-dx)>.

In addition to the different periods between the end of the contest and the log submission deadline, the ARRL contests allow single operators in all categories to review band breakdown information on the live scoreboards, as noted below. Another difference in the contest rules relates to provision of non-operating assistance. This includes such things as help swapping out an amplifier or fixing an antenna during the contest period. Such help is *not* permitted for single operators in ARRL HF contests. (See section 2.1 of General Rules for ARRL Contests Below 30 MHz.)

Permitted power is another area of difference. Up to **150** watts is permitted in low power categories in the ARRL DX contests (not 100 watts). Note also that there are no power sub-categories for single-band, two-transmitter, and multi-transmitter entries. All of those entries are judged as high power (up to 1,500 watts).

Finally, entrants in the single-transmitter and two-transmitter categories are limited to six (6) band changes (a) per clock hour and (b) per transmitter. Clock hours are explicitly defined as from 00-59 minutes of the hour, **not** as any 60 consecutive minutes. Band changes per transmitter are counted as any band change, *i.e.*, going from 20 to 40 meters to grab a multiplier and then returning to 20 meters counts as two band changes.

## Realtime Contest Scores on the Web

Whether competitive or casual, quite a few contest operators

report that using an online scoreboard adds to their fun of contesting. In particular, many say that they experience increased motivation to keep focused and at the radio when propagation is less than ideal and new stations are hard to find.

Contesters operating alone and unassisted, as well as those operating assisted and at multi-operator stations, can use online scoreboards. No additional effort is required during the contest if using one of the popular contest logging programs and internet access is available.

Below we briefly recount the history of online scoreboards in radiosport and review some of the functionality that they provide to today's modern competitors. Former CQWW Contest Director Randy Thompson, K5ZD, describes his experience with real-time scoreboards in a sidebar.

## The Origins of Online Scoreboards

At least one online scoreboard has been live and available to testers for all major competitions since the CQWW Phone contest in October 2006. But the idea of a live scoreboard for radiosport events traces back to the Finnish operators who organized the World Radiosport Team Championship (WRTC) in 2002. During that competition, the referee at each competing station used a cell phone provided by sponsor Nokia to text the station's score information hourly to a central database. The scores were updated and published on the web during the contest so that friends and family anywhere in the world could track the progress of each station.

Gerry Hull, W1VE (*Photo A*) had an idea better than texting. In the lead-up to the CQWW Phone and CW contests in 2006, Gerry released to contest logging software vendors a messaging protocol with an open programming interface.

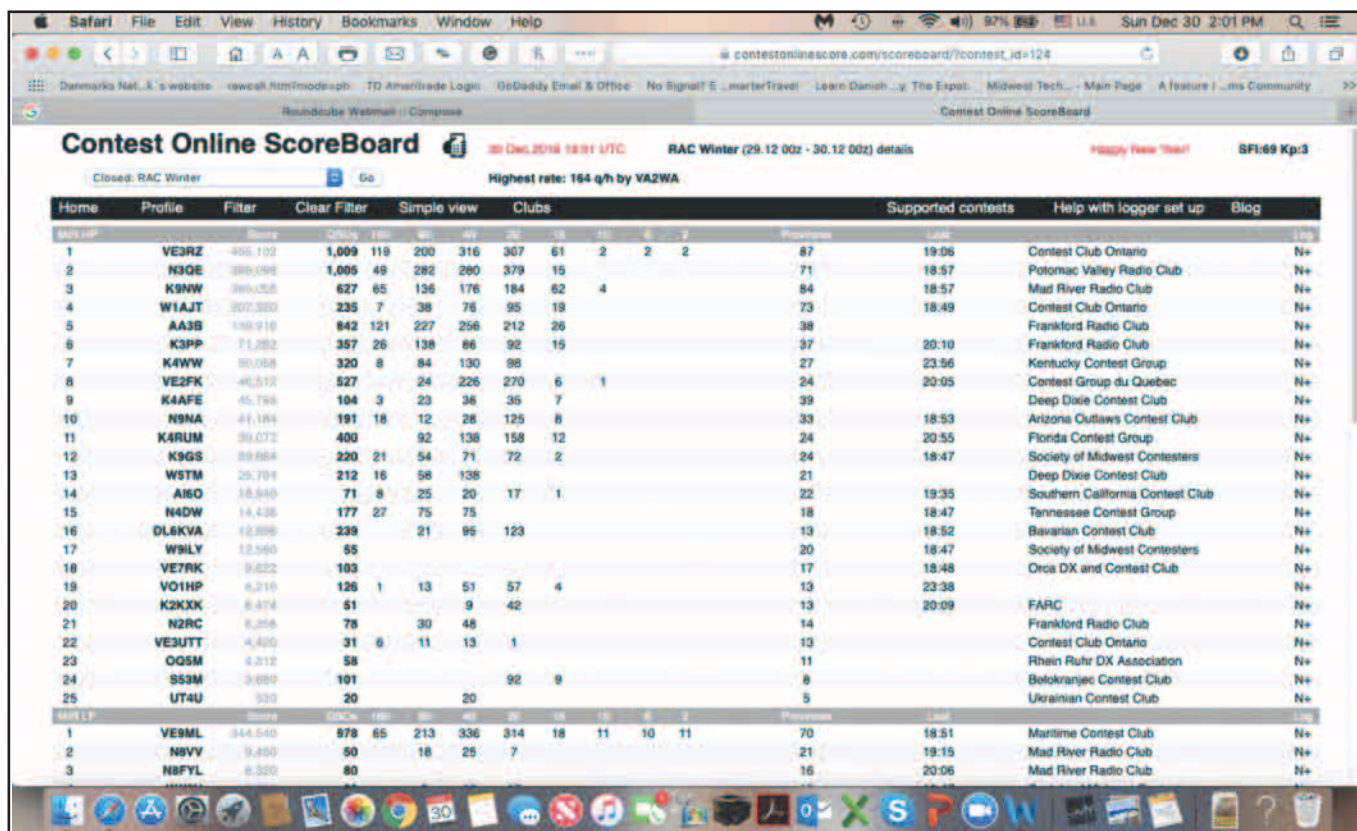


Figure 2. The main score page of the Contest Online Scoreboard showing the scores of participants in the RAC Winter Contest, with band breakdowns selected. Information is refreshed every minute. Participants choose how often their scores are reported with a setting in their logging software. ([contestonlinescore.com](http://contestonlinescore.com))

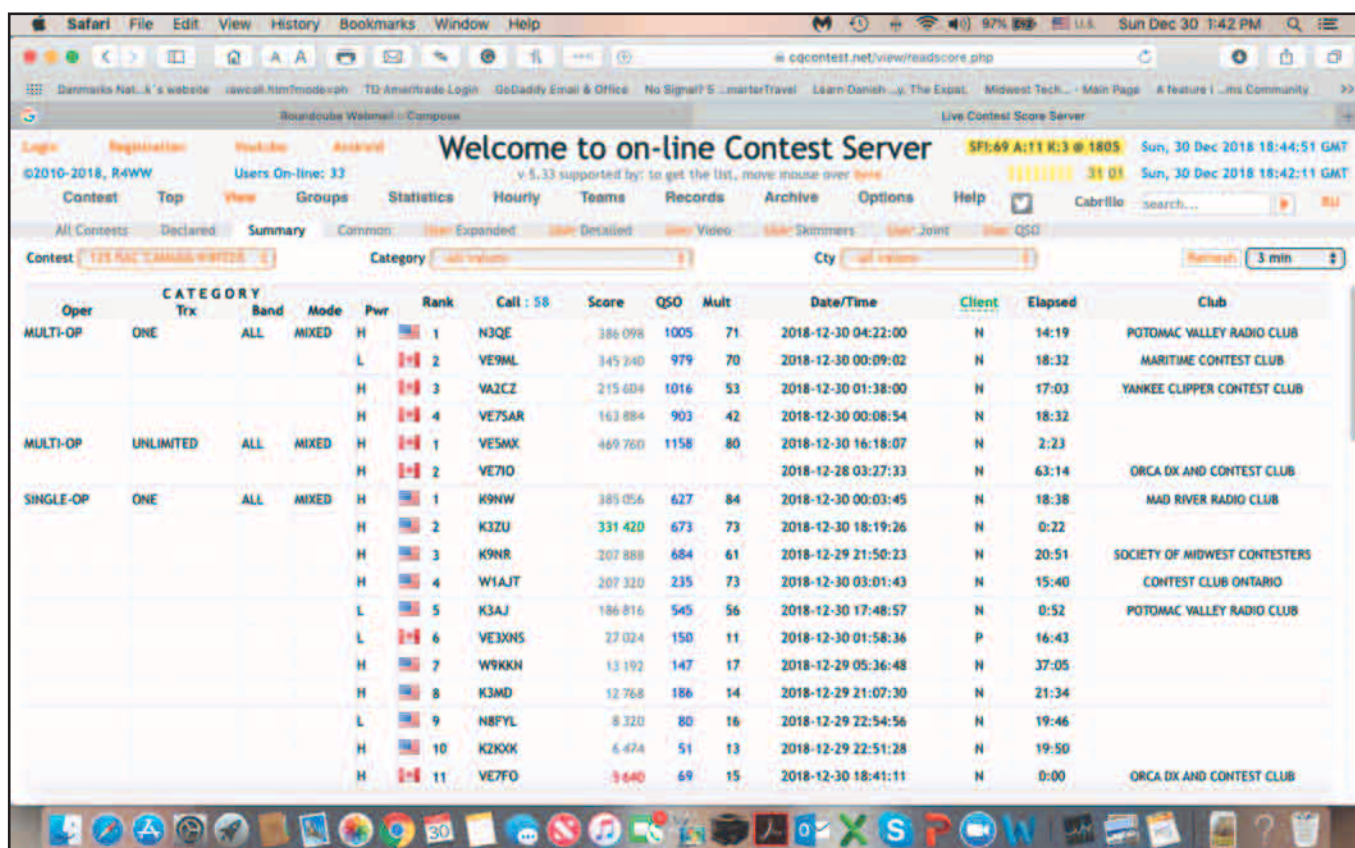


Figure 3. The main score page of the Online Contest Server, also showing the scores of participants in the RAC Winter Contest. The viewer can set the page refresh rate to 1, 3, 5, or 10 minutes. Participants choose how often their scores are reported with a setting in their logging software. (cqcontest.net)

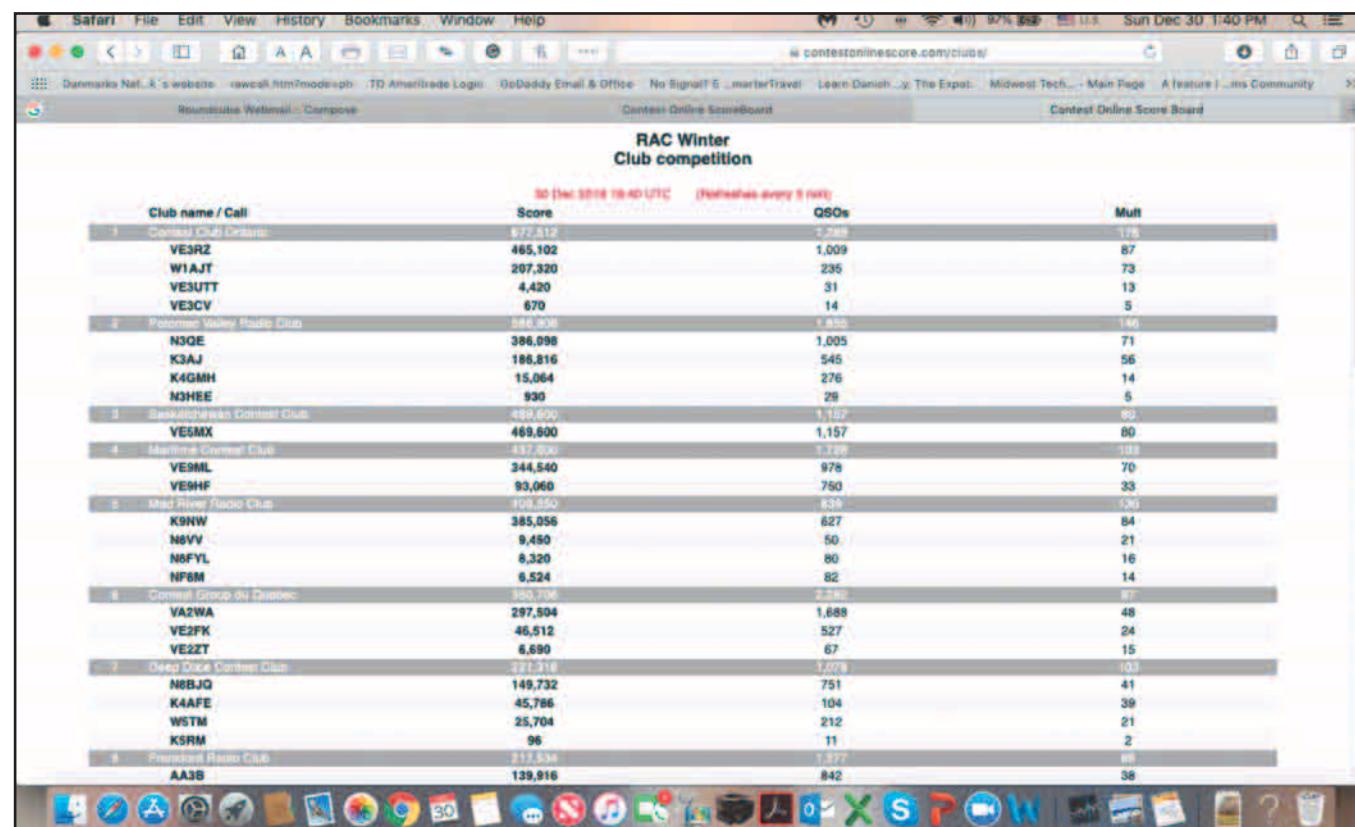


Figure 4. The club page on the Contest Online Scoreboard. The Online Contest Server provides similar information. (contestonlinescore.com)



The software enabled gathering scores automatically at pre-determined intervals directly from operators' electronic logs. The three most popular contest logging programs — N1MM Logger, Win-Test, and WriteLog — implemented the interface in time for the 2006 contests.

On the receiving end, Gerry's software collected participants' scores in a central database configured to display scores in real time on a website that he named "getscores.org" (Figure 1). In this manner, scores organized by category were made available during the contest for viewing by everyone, competitor or observer alike. Gerry's getscores.org website operated from 2006 through 2012 with help from Dave, K1TTT.

## Online Scoreboards Operate With Many Logging Programs

Competitors today have two successor online scoreboards from which to choose. Participants easily can configure their logging programs to report scores to both scoreboards at the same time, which is recommended. The first is the Contest Online Scoreboard ("COSB") that has been operated since 2017 by Victor, VA2WA (See Figure 2). It is accessed at: <<https://contestonlinescore.com>>. The other scoreboard, begun in 2010, is the Online Contest Server ("OCS") run by Dmitry Zakharov, R4WW (Figure 3). It is accessed at: <<https://tinyurl.com/y96o63sl>>. Do note, however, that the OCS keeps a public "blacklist" and will not display scores from certain stations.

Thus, since 2006, any station anywhere in the world using one of the major logging programs and having Internet connectivity has had the ability to report its score in real time. Today, the option to report to one or both of the online scoreboards is a feature of all major contest-logging programs. Both scoreboards list on their websites the logging programs



*Photo A. Gerry Hull, W1VE (center), in Wittenberg, Germany with the French team that he refereed at WRTC 2018. Shown are Sebastien, F8CMF, to the left and Stephane, F4DXW, on the right. Gerry first conceptualized and implemented automatic score reporting and a web-based, real-time scoreboard. (Photo by K3ZJ)*

## Online Scoreboards for Contesters

BY RANDY THOMPSON, K5ZD (FORMER CQWW CONTEST DIRECTOR)

Contesting traditionally has been a rather lonely sport. You sit in your shack, make QSOs, and then find out how you did at the end. That requires a lot of self-motivation to keep going when conditions are poor.

Over the past few years, I have been watching the online scoreboard while operating. It gives me an idea of how I am doing compared with others. There have been several times when I have operated many more hours than I intended to, just because I was chasing the next score above me on the scoreboard. That is especially true when I am operating part time. I sit down, see who is ahead of me, and then try to catch and pass them. It's a fun little shot of excitement when the pass finally happens ... especially if the other guy passes you back.

The ARRL and CQ have confirmed that watching a scoreboard during the contest does not put you in the Assisted category. It is also a great way to keep a multi-op team motivated and engaged.



*Randy Thompson, K5ZD*

Even the ops that go home to sleep can follow the progress of the team. All you need to add your score to the scoreboard is popular logging software and an internet connection. One scoreboard I like to

use is <<http://contestonlinescore.com>> (COSB), which is operated by Victor VA2WA. All the details about how to set up your logger are available at <<https://tinyurl.com/yby7gsnb>>.

If you set up your logging software to use the "score distributor server," then your score will be sent to other scoreboards in addition to COSB. Once you have the logger broadcasting your score every 5 minutes or so, you can focus on operating the contest. The logger and scoreboard will work silently in the background. I usually keep a small browser window open on the screen that is showing the scores for my operating category. (Hint: Click on the small mobile phone icon near the top of the COSB page and it will take you to a page optimized for mobile phones. That uses minimum screen space to show calls and scores.)

Give the scoreboard a try and see if you like it. Scoreboards are definitely more fun when more people are contributing.

with which they will work and provide detailed information for configuring the logging software.

### Scoreboards Offer Multiple Functions

Contest operators and anyone else with a web browser can view the scores being reported. On the receiving end, generally scores can be organized by category, club, defined team, or in other manners of interest (such as one's own category within a defined geographic area). Scores can be viewed by the contestants during the contest in a simple browser window left open on the screen, or on a smartphone or tablet.

A competitor can view more than their own category, if desired. The viewing window(s) can be configured to observe multiple categories to track how competition is shaping up or how propagation is playing out. The newest innovation is a capability being tested by COSB that enables viewing online scores from within the logging software itself, rather than only through a separate web browser.

In addition to reporting scores organized by category, both online scoreboards offer club (Figure 4) and geographic tracking capabilities. Additional analytical tools also available on each website are useful for comparing scores (Figure 5).

The COSB allows operators to register a custom team of competitors and track each other's progress during the contest. This might be an especially appealing option among low power or antenna-challenged friends, or for contesters operating in a specific geographic area. Using this capability might lessen the discouragement of seeing one's score from Wisconsin (for example) being compared to those being compiled by superstations in the Northeast. There even is a capability on the COSB website to create a "private room" in which testers' scores can be viewed only by other members of the private room.

An especially useful capability allows scores to be reported to both scoreboards simultaneously. This capability is thanks to the efforts of Bruce Horn, WA7BNM. With one click or the copying of a link, scores can be reported from one's logging software directly to a central distributor. The score will be forwarded to both online scoreboards from the distributor. Last year the scoreboards tried a method of exchanging scores directly among each other through the distributor, but this capability ended when the OCS withdrew from the

arrangement in April 2018. So now it falls to each individual scoreboard user to directly implement score distribution to both servers, if desired. Once set up, the entire process occurs in the background with no demands on the operator during the contest. In place of one of the scoreboard links, the distributor link to report scores to both scoreboards automatically is <https://tinyurl.com/y6u2e6qd>. Alternatively, this link works: <http://scoredistributor.net>. N1MM Logger Plus users simply select from options

under the configuration drop-down menu.

### Single Operators "Unassisted" Also Can Use Online Scoreboards

Insofar as we can determine, all operators, including single operators in all categories, can both report and view scores during competitions. However, there is a wrinkle when it comes to CQ contests such as the CQWW.



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The CQWW Rules FAQ conditions its permissive advice by stating that single operators “may view the scores on a live scoreboard site, **but should not view the band breakdown information.**” The CQWW FAQ is at <[www.cqww.com/rules\\_faq.htm](http://www.cqww.com/rules_faq.htm)>.

The CQWW advice contrasts with permissible scoreboard use during ARRL contests. For ARRL contests, including the DX contests in February and March, operators are free to view any information on the scoreboards, including band breakdown information. This is because the ARRL views “spotting assistance” to be third-party provision of a call sign with time and frequency information. Although the band information on a live scoreboard may indicate, for example, that someone nearby has found 10 meters open, this does not constitute “spotting assistance” as defined for ARRL contests because specific call sign, time, and frequency information is not shown on scoreboards.

## Closing Thoughts

Despite the existence of online scoreboards for over decade, many operators do not know about them, do not agree with their benefits, do not understand the ease of their use, or simply choose not to use them. Of course, there are some who do not have or do not use internet connectivity during contests.

Some suggest that select operators may view the scoreboard(s) during the contest but do not post their own scores. Other competitors consider viewing a scoreboard without posting to it to be bad sportsmanship.

Nevertheless, there are hundreds of scores being reported on both scoreboards during the major contests. There also appears to be a group of dedicated users who post their

scores for even the smallest contests. Both the COSB and OCS support hundreds of contests, including most of the small North American contests. The COSB list of supported contests is at <<https://tinyurl.com/y7gdfuyf>>. The OCS list of supported contests is at <<https://tinyurl.com/y7cjye84>>.

The COSB appears to maintain accessibility to past contest information for only a short time, but the OCS allows access to scores dating back to its beginning in 2010. The OCS offers some interesting utilities for analyzing individual scores in a number of interesting ways.

There also has been experimentation with live streaming during contests on the OCS. The streaming facility appears to still be available for anyone interested. Configuration directions are at <<https://tinyurl.com/yb77bxhc>>. I remember one past Scandinavian contest when webcams were used by multiple entrants. Some included the audio stream. The thought was that it might be interesting to non-contest participants, and even to non-hams, in much the same manner as many gamers tune into <[twitch.tv](http://twitch.tv)> to watch other gamers.

Another innovation being tried is making awards to users based on being the highest scorer who reported scores consistently during the entire contest. The COSB awarded CQ magazine subscriptions and trophies for several events, and is soliciting sponsors to continue the program for the 2019 CQ WPX contests. If interested, information is at <<https://tinyurl.com/y9ed8bkm>>.

Finally, both scoreboards have tutorials to guide new users on connecting with various supported contest logging programs and the functions available on each website. The COSB tutorial is at <<https://tinyurl.com/y6ug9vu7>>. The OCS tutorial is at <<https://tinyurl.com/y7f9ahpe>>. Information on sending scores to both sites is above. — 73, Dave, K3ZJ

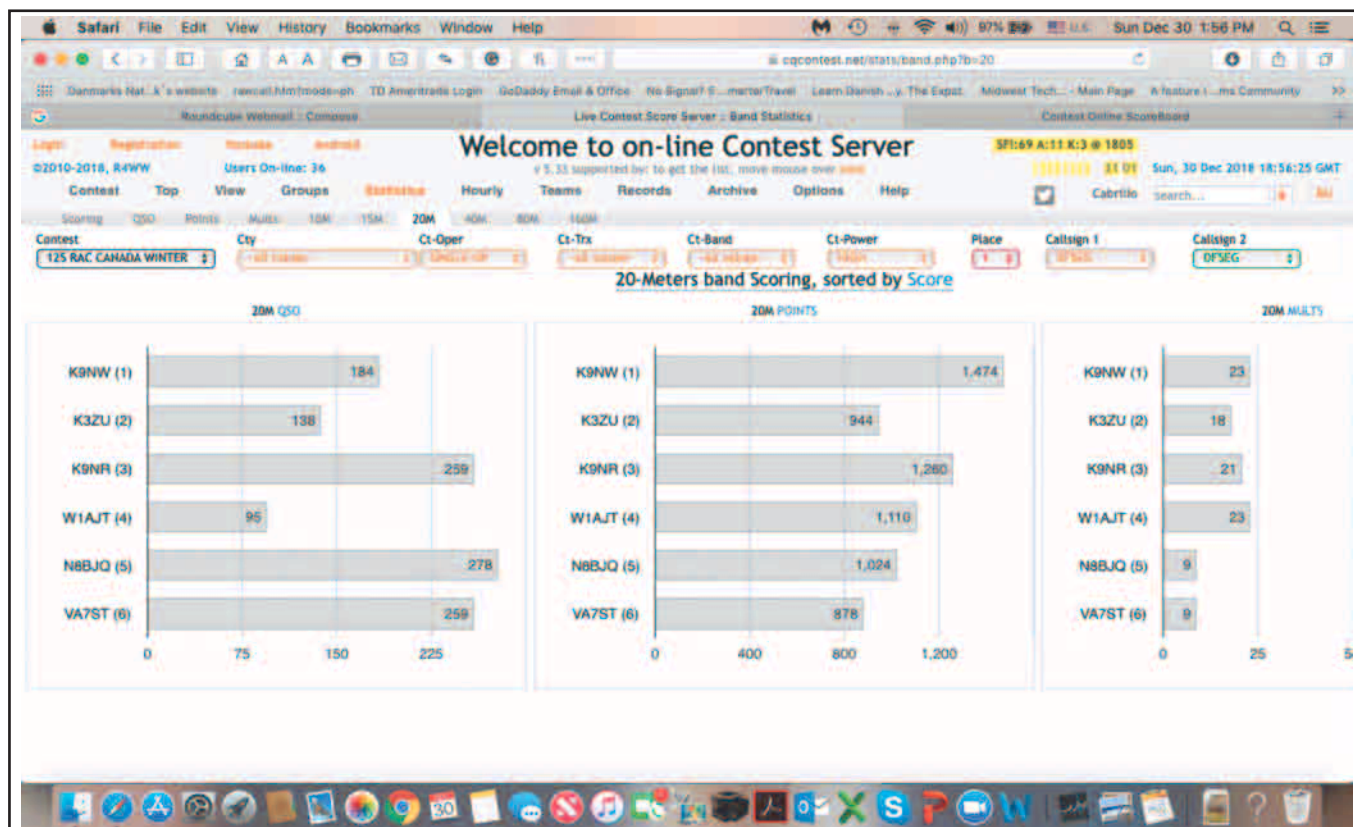


Figure 5. The Online Contest Server provides viewer-controlled graphing capabilities that can be used for post-contest analyses. Shown are the QSOs, points, and multipliers worked on 20 meters, graphed for the top six SOHP participants in the Winter RAC Contest. (cqcontest.net)

# PROPAGATION

BY TOMAS HOOD,\* NW7US

## The Solar Wind and Storm-Triggering Holes

### A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

#### Sunspots:

Observed Monthly, November 2018: 4  
12-month smoothed, May 2018: 5

#### 10.7 cm Flux:

Observed Monthly, November 2018: 69  
12-month smoothed, May 2018: 70

#### A<sub>p</sub> Index:

Observed Monthly, November 2018: 6  
12-month smoothed, May 2018: 8

### One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

#### Sunspots:

Observed Monthly, November 2017: 3  
12-month smoothed, May 2017: 14

#### 10.7 cm Flux:

Observed Monthly, November 2017: 72  
12-month smoothed, May 2017: 78

#### A<sub>p</sub> Index:

Observed Monthly, November 2017: 11  
12-month smoothed, May 2017: 11

### Good 2018 CQWW CW Contest Conditions

The 2018 CQ World Wide DX CW Contest weekend of November 24-25 started off with great geomagnetic activity conditions. Geomagnetic activity was very quiet; the Middle-Latitude (Fredricksburg) A Index was 2 on day one, and 3 on day two. The High-Latitude (College) A Index was 1 and 3, respectively, while the Estimated Planetary A Index (A<sub>p</sub>) was 4 and 3, making for a stable ionosphere. The sunspot count was 14 on day one and 15 on day two, so the 10.7-cm Radio Flux was 70 on both days. The background X-ray Flux was just above dead at level A1.0, so HF contest bands from 20 down to 80 were usable, and anything higher than that favored north-south and equatorial paths, but none were spectacular. How did you fare? What are your observations of conditions during this contest weekend? Please write.

**S**hortwave radio listeners and amateur radio operators look forward to new solar cycles because we know that the radio spectrum we love, from the top of the medium wave frequencies (MW or MF) to the bottom end of the Very High Frequencies (VHF), comes alive as a result of sunspot activity. The more active the Sun, the better conditions become on the high frequencies. Recently there have been hints of the next cycle, Solar Cycle 25. But with a rise in solar activity comes more activity of all kinds, including types that don't help propagation, but can degrade conditions on our beloved HF spectrum.

A major source of degradation to HF radio propagation is the occurrence of coronal holes with high-speed solar wind and escaping plasma, and the resulting ionospheric depressions caused by these winds and the passing of that plasma. Coronal holes may release huge clouds of solar plasma, which is spewed out into space on the solar winds.

When the Earth is under the influence of high-speed solar winds, we often experience periods of geomagnetic distur-

bances that can develop into significant storms. Of course, while this can degrade HF communications, these disturbances can also trigger aurora (Northern and Southern Lights), which in turn often creates conditions on VHF that radio hobbyists look forward to (aurora-mode propagation, for instance).

Fast solar winds originate in funnels within a coronal hole, with a speed of about 10 kilometers per second at a height of 20,000 kilometers above the sun's photosphere. Just below the surface of the Sun there are large convection cells. Each cell has magnetic fields associated with it, which are concentrated in the network lanes by magneto-convection, where the funnel necks are anchored. The plasma, while still

### LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for February 2019

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal:	A	A	B	C
5-10, 12, 14-20, 25-26				
High Normal:	A	B	C	C-D
1-2, 4, 11, 23-24, 27-28				
Low Normal:	B	C-B	C-D	D-E
3, 13, 22				
Below Normal:	C	C-D	D-E	E
21				
Disturbed:	C-D	D	E	E
n/a				

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

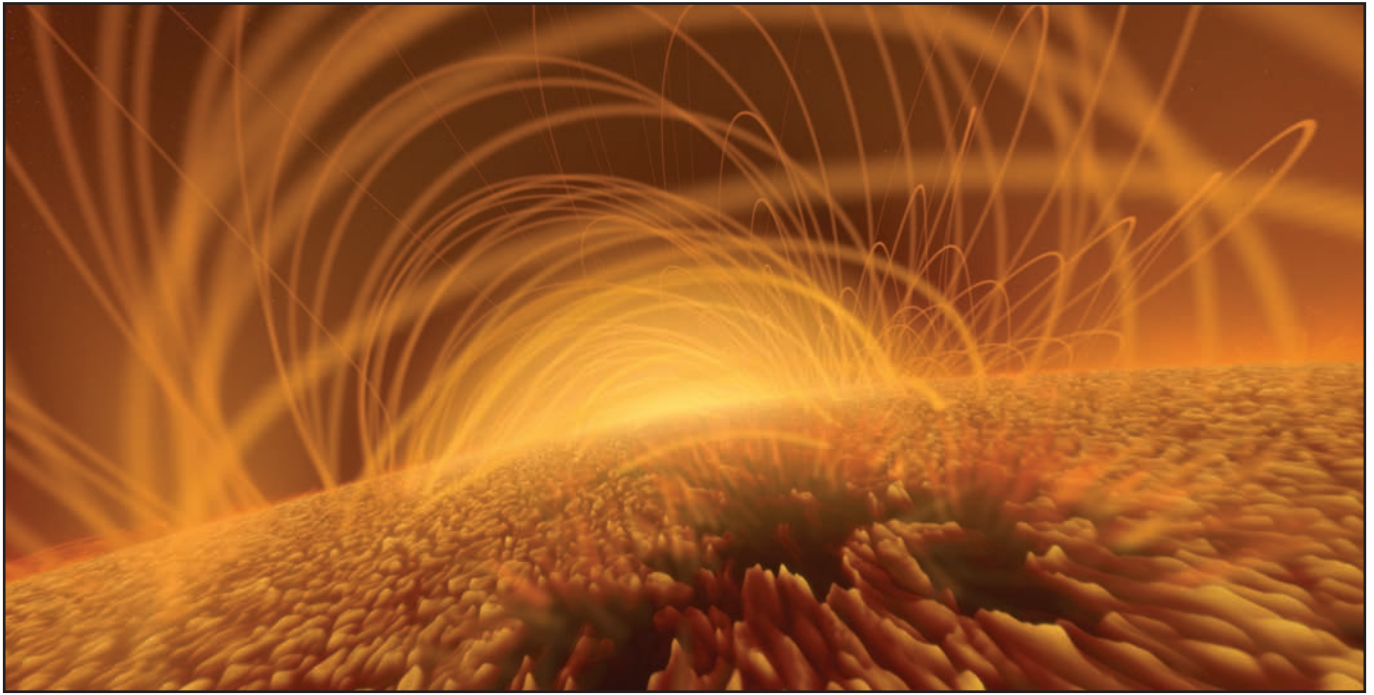
1. Find the propagation index associated with the particular path opening from the Propagation Charts appearing in "The New Shortwave Propagation Handbook" by George Jacobs, Theodore J. Cohen, and R. B. Rose.

2. 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 on a given signal path between two stations as shown in the Propagation Charts with a propagation index of 1 will be fair on February 1 and 2, poor to fair on February 3, fair again on February 3, and so forth.

3. Alternatively, you may use the Last-Minute Forecast as a general guide to space weather and geomagnetic conditions through 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 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.

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*A coronal mass ejection in the making: Magnetic loops pushing up from sunspots. (Photo by Yuhong Fan and Matthias Rempel, courtesy of National Science Foundation)*

being confined in small loops, is brought by convection to the funnels and then released there, like a bucket of water is emptied into an open water channel.

The solar wind plasma is supplied by plasma stemming from the many small magnetic loops, many only a few thousand kilometers in height, crowding the funnel. Through magnetic reconnection, plasma is fed from all sides to the funnel, where it may be accelerated and finally form the solar wind.

When the Sun unleashes this plasma, an event known as a coronal mass ejection, it projects a billion-ton blast of plasma into space at millions of miles per hour. The solar wind is gusty, much like winds on Earth, and ranges in speed from about 750,000 miles per hour (approximately 350 kilometers per second), to 1.5 million miles per hour (700 kilometers per second).

Since the solar wind is made up of electrically charged particles, it responds to magnetic fields that permeate the solar atmosphere. Solar wind particles flow along the invisible lines of magnetic force. When the magnetic field lines stretch straight out into space, as they do in coronal hole regions, the solar wind will move along these magnetic lines at a very high rate of speed. But when the magnetic field lines bend sharply back to the solar surface, like the pattern you see with iron filings around a bar magnet, the solar wind emerges relatively slowly.

When the interplanetary magnetic field lines are oriented opposite to the orientation of Earth's magnetosphere, the two fields connect and allow solar wind particles to collide with oxygen and nitrogen molecules in the upper atmosphere of these ovals. This causes light photons to be emitted. When the molecules and atoms are struck by these solar wind particles, the stripping of one or more of their electrons ionizes them to such an extent that the ionized area is capable of reflecting radio signals at very high frequencies. This ionization occurs at an altitude of about 70 miles, very near the E-layer of the ionosphere. The level of ionization depends on

the energy and amount of solar wind particles able to enter the atmosphere.

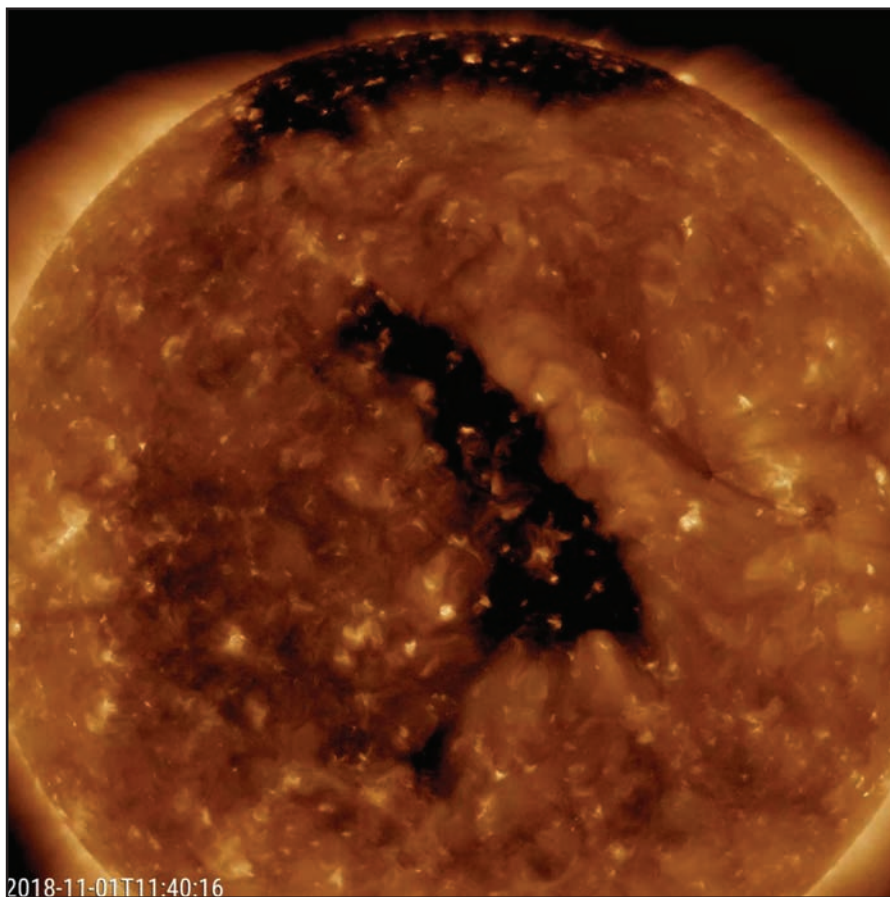
While there is a correlation between visible and radio aurora, radio aurora can exist without visual aurora. Statistically, a diurnal variation of the frequency of radio aurora QSOs has been identified that suggests two strong peaks, one near 6 p.m. and the second around midnight, local time.

VHF auroral echoes, or reflections, are most effective when the angle of incidence of the signal from the transmitter, with the geomagnetic field line, equals the angle of reflection from the field line to the receiver. Radio aurora is observed almost exclusively in a sector centered on magnetic north. The strength of signals reflected from the aurora is dependent on the wavelength when equivalent power levels are employed. Six-meter reflections can be expected to be much stronger than 2-meter reflections for the same transmitter output power. The polarization of the reflected signals is nearly the same as that of the transmitted signal.

The K index is a good indicator of the expansion of the auroral oval, and the possible intensity of the aurora. When the K index is higher than 5, most readers in the northern states and in Canada can expect favorable aurora conditions. If the K index reaches 8 or 9, it is highly possible for radio aurora to be worked by stations as far south as California and Florida.

### **Late Winter Propagation**

From the middle of February through early April, typical equinoctial propagation conditions can be expected on the HF frequencies. This usually means a noticeable improvement in conditions between the northern and southern hemispheres. Look for improvements between the United States and South America, Africa, Australasia, Antarctica, and parts of Asia. Equinoctial propagation occurs during the spring and fall months, when the sun is most directly overhead at the equator, producing similar ionospheric characteristics over large areas of the world. It tends to maximize during sunrise



*The most distinctive feature on the Sun during the period of October 31 through November 2, 2018, was a good-sized coronal hole at a slanted angle nearly centered on the face of the Sun. Coronal holes are magnetically open areas from which solar wind particles speed into space. They appear darker in this wavelength of extreme ultraviolet light. If these particles impact Earth's magnetosphere, they will likely generate aurora near the Earth's poles regions. (Courtesy of NASA/SDO)*

and sunset periods and over both short and long path openings.

### **But What About the (Lack of) Sunspots?**

As I write this, we are at the very end of Solar Cycle 24, right at the edge of the solar cycle minimum between Cycle 24 and Cycle 25. How alive can the higher frequencies be with long-distance propagation?

It is always a surprise to the casual amateur radio operator when getting on a band like 10 meters during the solar minimum, and discovering that there is still some life on the band, beyond short-skip distances. The openings are not as long — either in distance or time — as during more active portions of a solar cycle, but they are still there. Typically, the weak solar activity we are observing right now does not support worldwide DXing on the highest of the HF bands for any significant length of time, if at all.

The lower HF bands can become real players, though, as veteran HF operators know. At the same time, longwave and medium-wave bands begin to suffer now with the seasonal increase of electrical-storm noise.

During the daylight hours, optimal DX propagation conditions are expected on 20 meters. The band is forecast to open to all areas of the world sometime during this period, though often with moderate to strong fading. Conditions on 17 and 15 may be good, too, but usually for much shorter distances than during peak solar cycle years. Conditions are expected to become optimal for an hour or two after sunrise and again during the late afternoon. For short-range (regional) paths, 40 meters should be usable during most of the daylight hours. With increasing hours of daylight during February, expect the HF bands to remain open for an hour or so longer into the early evening than during the winter months.

Daytime conditions on 10 and 12 meters will be less exciting. Openings will be possible for stations in low-latitudes using north-south paths, with no openings expected into Europe or the Far East.

During the early evening hours and to as late as midnight, seven bands should be available for DX openings; 15, 17, 20, 30, 40, 60, 80, and 160 meters. Fifteen and 17 meters should hold up for openings towards Central and South America and the Caribbean, the Pacific area, Far East, and parts of Asia. Better openings into many areas of the world may be possible on 20 meters during this period, with the strongest signals from southerly and westerly directions. Good DX conditions are also forecast for 30, 40, and 80 meters for openings towards the east and the south. Openings in the same directions, but with higher noise levels and weaker signals, should also be possible on 160 meters.

Between midnight and sunrise, it should be a toss-up between 20, 30, and 40 meters for DX paths. These bands should open to many areas of the world with conditions favoring openings towards the south and the west. Expect similar conditions on 60, 75, and 80 meters, but with weaker signals and higher noise levels. Be sure to check 160 for some unusual DX openings towards the south and the west during this period. Conditions on the bands between 160 and 20 meters are expected to peak at local sunrise.

### **VHF Conditions**

Trans-equatorial (TE) scatter propagation tends to increase during the equinoctial period and some 6-meter openings may be possible between 7 and 10 p.m. local time. The best bet for such openings is between the southern tier states and South America for paths approximately at right angles to the equator. An occasional TE opening may also be possible on 2 meters. Unlike F2-layer or Sporadic-E openings on 6 meters, TE openings are characterized by very weak signals with considerable flutter fading.

If you use Twitter, 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



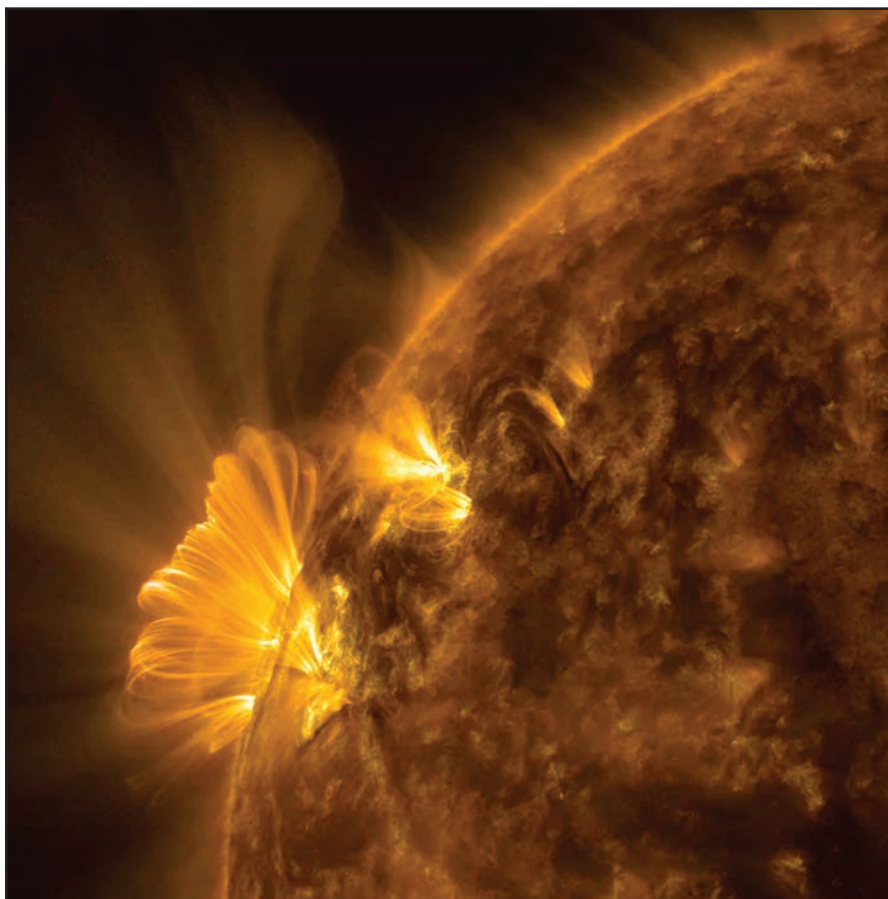


## On the Cover...

Foxhunting, or Amateur Radio Direction Finding (ARDF), is perhaps the ultimate in QRP, or low-power, amateur radio. Hidden transmitters send out flea-powered signals to be tracked down by hunters, making a foxhunting photo a perfect introduction to our annual QRP Special, which also includes the results of the 2018 CQ World Wide Foxhunting Weekend (page 66).

In this photo, members of Colorado's Ski Country Amateur Radio Club are waiting to begin their on-foot transmitter hunt in an area between Glenwood Springs and Aspen. Hunters are, from left, Jim Legg, ADØLI; Debbie Buckley, NØLDB; Robert Forster, ADØTA; Al Schulz, KØAMA; Clark Heckert, K3NI; Gerry Hittinger, N6HUQ; Sofia Harwood (no license yet); and Sue Ludtke, NØDBY. The club's annual Foxhunting Weekend activity is followed by a potluck lunch at a member's home.

The club — callsign KØRV — is a general interest group with monthly meetings, weekly nets, and informal weekly breakfasts at a local restaurant in Glenwood Springs. License exams are offered at every club meeting. The May foxhunt and Field Day are among the group's biggest events. The club covers a large part of western Colorado and operates five linked repeaters, as well as IRLP, Allstar and Echolink nodes. For more information, visit the Ski Country ARC's website at <[www.k0rv.org](http://www.k0rv.org)>. (Cover photo by Bob Cutter, K1ØG)



*Seen in the Extreme Ultraviolet Light by special instruments filtering the Sun's image at the 171-Angstrom wavelength, is this spectacular magnetic looping from where a coronal mass ejection was emitted. (Courtesy of NASA/SDO AIA)*

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 mean observed sunspot number for November 2018 was 3.5. The lowest daily sunspot value of 0 (zero) was recorded on November 1-7, 11, 20-23, and 27-30 — a total of 16 days with zero sunspots. The highest value of 15 was recorded on four days in the month, November 12, 16, 17, and 24. The 12-month running smoothed sunspot number centered on May 2018 is 4.5. A smoothed sunspot count of 6, give or take about 6 points, is expected for February 2019.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 68.9 for November 2018. The 12-month smoothed 10.7-cm flux centered on May 2018 is 70.2. The predicted smoothed 10.7-cm solar flux for February 2019 is 61, give or take a few points.

The observed monthly mean planetary A-Index ( $A_p$ ) for November 2018 is 6. The 12-month smoothed  $A_p$  index centered on May 2018 is 7.6.

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 on the main page at <<http://SunSpotWatch.com>>).

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](https://www.facebook.com/spacewx.hfradio)> and <[www.facebook.com/NW7US](https://www.facebook.com/NW7US)>. Speaking of Facebook — check out the CQ magazine fan page at <[www.facebook.com/CQMag](https://www.facebook.com/CQMag)>.

— 73, Tomas, NW7US

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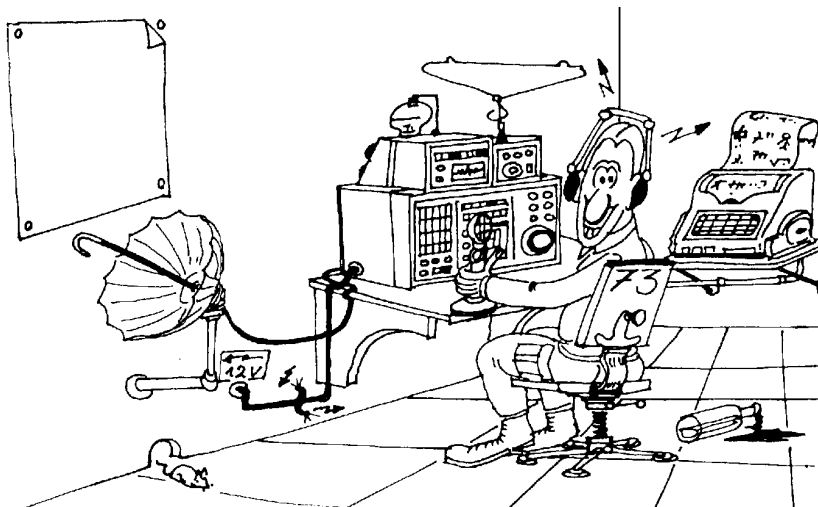
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**HF Mobile or Fixed Virtual X Antenna Patent:** For Sale or License. Request Free Power Point Presentation file. Shows design details, pictures, prototype tests. Design applies to a broad frequency range for many antenna arrays/beams/verticals. <[lgslay@sbcbglobal.net](mailto:lgslay@sbcbglobal.net)>. Larry Slay, K5WUL

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Go portable with LDG!

# IN THE FIELD!



One of the great things about ham radio is that you can take your hobby with you wherever you go. You're not limited to the shack, but can operate mobile from your car, handheld just walking around with an HT, and of course portable in the field. Whether picnicking, camping, putting parks, islands, lighthouses or mountain peaks on the air, or on Field Day, you can set up a portable station just about anywhere. And of course, when things go bad like a hurricane, earthquake or other natural or manmade disaster you can set up an emergency station near the action to help coordinate rescue and relief.

A lot of modern ham equipment is ideal for portable operation. You can get a 100 watt radio that's about the size of a hardback book, weighs only a few pounds, and will run off a battery for hours. The hard part about portable operation is always the antenna. There are generally two ways to go: you can put up a temporary wire antenna like a dipole or long wire, or you can use a portable antenna like a vertical or a hamstick dipole. In any case, for efficient operation you'll need a tuner to match the antenna to your radio.

LDG makes several tuners that are ideal for portable operation. They are light weight, compact, and can run on internal batteries so they require no external power source at all; they're literally just plug and play. The Z-100Plus and Z-11ProII handle up to 125 watts, and the Z-817 up to 20 watts. And, they all include a free internal battery holder. These tuners use latching relays to hold the tuning settings, so in standby mode once tuning is complete they use essentially no power at all. A set of AA batteries will typically last for months of normal operation.

As you plan for the fun and utility of portable operation, complete your portable kit with an LDG tuner. Visit us on the web at [www.ldgelectronics.com](http://www.ldgelectronics.com).

## ZERO POWER TUNERS

These tuners include a AA battery pack and are zero power once tuned!



### Z-100Plus

Low cost and Portable, the Z-100Plus operates from any 7 to 18 volt DC source. AA batteries will run it for a year of normal use. Internal frequency counter stores tuning parameters for fast recall. Handles 100 watts SSB or 30 watts digital.



### Z-11ProII

Designed for Battery Operation. Operates from 0.1 to 100 watts SSB or CW, 30 watts digital. Great for both QRP and standard 100 watts transceivers. Matches dipoles, verticals, inverted vees and most coax fed antennas.



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Receiver Frequency	0.03/0.1MHz										56MHz	118MHz-164MHz	420MHz-470MHz
	10										50	100	400
	Frequency [MHz]												

\* Specified performance: Amateur bands only



A Superb All-around Transceiver with a built-in real-time spectrum scope and superior basic operation

HF/50/144/430MHz 100W All Mode Transceiver

## FT-991 A

Operating Modes: CW/SSB/AM/FM/C4FM

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- 100 Watts (2 Meter & 70 Centimeter: 50 Watts) of Solid Performance
- IF DSP for Superb Interference Rejection
- 3.5-inch TFT Full-Color Touch Panel Display
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The Smallest HF/VHF/UHF Mobile Transceiver Provides base station performance from a compact package

HF/50/144/430MHz 100W All Mode Transceiver

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- Ultra-Compact Package (6.1" x 2.0" x 9.2")
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